



THE NATIONAL RABIES CONTROL STRATEGY





THE UNITED REPUBLIC OF TANZANIA

**THE NATIONAL RABIES CONTROL
STRATEGY**

July, 2019

TABLE OF CONTENTS

List of Figures	vi
List of Tables	vii
List of Abbreviation	viii
Foreword	x
Aknowlegment	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Background	1
1.2 Justification	2
1.2.1 Socio-Economic Importance	2
1.2.2 Cost Effectiveness of Rabies Control and Elimination	3
1.3 Rabies Epidemiology	3
1.3.1 The Virus	3
1.3.2 Reservoir	3
1.3.3 Transmission and pathogenesis	4
1.3.4 Incubation	5
1.4 Clinical Features	7
1.4.1 Clinical features in animals	7
1.4.2 Clinical features in humans	15
1.5 Diagnosis of Rabies	15
1.6 Situation Analysis	17
1.6.1 Rabies Situation in Tanzania	17
1.6.2 Rabies Surveillance System	19
1.6.3 Challenges of Rabies Control Activities	22
1.6.4 National Policies / Strategies and Legal framework	23
1.6.5 Agencies Responsible for Rabies Control	24
1.6.6 Stakeholders Analysis	26
CHAPTER TWO: ANALYSIS OF CRITICAL ISSUES WITH RESPECT TO THE RABIES CONTROL STRATEGY	20
2.1 Critical issues	20

2.2	Strengths, weaknesses, opportunities and challenges	20
CHAPTER THREE: STRATEGIC FRAMEWORK		25
3.1	Guiding Principles of the Rabies Control Strategy	25
3.1.1	Vision	25
3.1.2	Mission	25
3.1.3	Goal	25
3.1.4	General Objective	25
3.2	Key Strategic Objectives for Rabies Control and Elimination	26
CHAPTER FOUR: IMPLEMENTATION PLAN OF THE STRATEGY		41
4.1	Implementation Approach	41
4.1.1	Stage 1 (2010-2016): Planning for implementation of the strategy	42
4.1.2	Establishment of a National Rabies Control Committee (NRCC), or a similar body	42
4.1.3	Roles of The National Rabies Task Force (NRCC), or similar body	44
4.1.4	Mainstreaming of Rabies Agenda into One Health Committees at all levels (Regional and District OHC -ROHC & DOHC)	44
4.1.5	Additional Roles of regional, district and village OHC	44
4.1.6	Establishment of Rabies Action Groups (RAG)	44
4.1.7	Roles and responsibilities of RAGs	45
4.1.8	Rabies Control and buffer zones	45
4.2	Strengthen Surveillance for Rabies	48
4.4	Resource mobilisation	48
4.3	Review and Develop guidelines	48
4.4	Supply and distribute biologicals/vaccines (animal & human) and RIG	49
4.5	Conduct and Promote Operational Research	49
4.6	Develop of Communication Strategy	50
4.7	Key indicators in stage 1	50
4.8	Stage Two (2019 - 2021): Implementation of the elimination strategy in pilot areas	50
4.8.1	Key indicators in stage 2	51

4.9 Stage 3 (2021-2028): Implementation of the rabies elimination strategy outside the pilot areas	51
4.9.1 International Cross Border Engagements	51
4.10 Identification of Rabies Free Zones	51
4.10.1 Indicator to move from stage 3 to 4	52
4.11 Stage 4 (2028-2029) - Maintaining freedom from dog-mediated human rabies and elimination of canine rabies	52
4.11.1 Indicator for movement from stage 4 to 5	52
4.12 Stage 5 (2029-2030) –Maintain Freedom from rabies in humans and dogs	52
4.13 Vaccination Implementation Options	53
4.13.1 Overview of Tanzania : Area and population	53
4.13.2 Past and current rabies control projects	53
4.13.3 Vaccination coverage/implementation options	54
4.13.4 Timing of vaccination phases in line with the SARE framework	54
CHAPTER FIVE: INSTITUTIONAL AND FINANCIAL ARRANGEMENT	51
5.1 Institutional Arrangement	51
5.2 Financial Arrangement	53
5.3 Budget Summary	53
CHAPTER SIX: MONITORING AND EVALUATION	54
6.1 Monitoring	54
6.2 Evaluation	54
CHAPTER SEVEN: LOGICAL MATRIX FRAMEWORK FOR RABIES CONTROL STRATEGY (2017-2026)	55
REFERENCES	66

LIST OF FIGURES

Figure 1: Distribution of human rabies (Source: Hampson, 2015)	1
Figure 2: Rabies virus transmission and pathophysiology.	4
Figure 3: Global Rabies Risk Level Distribution (Source: WHO, 2013).....	8
Figure 4: Sample positivity from nine VICs in Tanzania between 2009 - 2013 (Source: MoLF, 2014)	9
Figure 5: Distribution of Zonal Veterinary Centers (ZVCs)	12
Figure 6: Stages of the stepwise approach for the control and elimination of rabies	35
Figure 7: Schematic diagram showing the coordination structure of the National Rabies Cont Control and Elimination Strategy	36
Figure 8: Map of Tanzania showing proposed zones for implementation of the Rabies Control and Elimination Strategy	40
Figure 9: Human population distribution of Tanzania by the 2012 census	47
Figure 10: Plan for vaccination where zones with the highest density of human population are vaccinated first and then maintained for a rabies-free state while vaccination proceeds to zones with the lowest human population density	49
Figure 11: Timing of vaccinations where zones with the highest density of human population are vaccinated first and then maintained for a rabies-free state while vaccination proceeds to zones with the lowest human population density	50

LIST OF TABLES

Table 1:	Doses of animal and human rabies vaccine imported between 2008-2014	10
Table 2:	Distribution of Zonal Veterinary Centers	11
Table 3:	Institutional Responsibilities and Roles	18
Table 4:	Strength, Weaknesses, Opportunities and Challenges	21
Table 5:	Surveillance data to be collected	41
Table 6:	Institutional responsibilities and roles	51
Table 7:	Logical Matrix Framework for Rabies Control Strategy	55
Table 8:	Projected budget for the rabies elimination strategy (2017 - 2026)	62

LIST OF ABBREVIATION

ANAW	Africa Network for Animal Welfare
ARIS	Animal Resource Information System
AU-IBAR	Africa Union – InterAfrica Bureau of Animal Resource
BMGF	Bill and Mellinda Gates Foundation
CDC	Centres for Disease Control and Prevention
CER	Chick Embryo Related
CIDB	Centre for Infectious Disease and Biotechnology
COSTECH	Tanzania Commission for Science and Technology
CVL	Central Veterinary Laboratory
DALY	Disability Adjusted Life Year
DMO	District Medical Officer
DPHC	District Public Health Care
DOHC	District One Health Committee
DVO	District Veterinary Officer
DVS	Director of Veterinary Services
ELISA	Enzyme-linked immunosorbent assay
FAO-ECTAD	Food and Agriculture Organization’s Emergency Centre for Transboundary Animal Disease
FAT	Fluorescent Antibody Test
FITC	Fluorescein IsoThioCyanate
GARC	Global Alliance for Rabies Control
HPA	Health Protection Agency
IDSR	Integrated Disease Surveillance Response
KZN	Kwazulu Natal
LGA	Local Government Authority
MAT	Medical Association of Tanganyika
MDA	Ministerial Department and Agencies
MNT	Mouse Neutralization Test
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MoLF	Ministry of Livestock and Fisheries
MUHAS	Muhimbili University of health and Allied Sciences
NGO	Non-Government Organization
NLP	National Livestock Policy
NRTF	National Rabies Task Force

OIE	Office International des Epizooties (World Organization of Animal Health)
PAHSP	Private Animal Health Service Providers
PARACON	Pan African Rabies Control Network
PEP	Post-Exposure Prophylaxis
PET	Post Exposure Treatment
PHC	Primary Health Care
PO-RALG	President's Office, Regional Administration and Local Government
PRP	Partner for Rabies Prevention
RDS	Rural Development Vision
RFFIT	Rapid Fluorescent Focus Inhibition Test
RNA	Ribonucleic Acid
RPHC	Regional Public Health Care
ROHC	Regional One Health Committee
RREID	Rabies Enzyme Immuno Diagnosis
RT-PCR	Real Time Polymerase Chain Reaction
SADC	Southern African Development Community
SARE	Stepwise Approach towards Rabies Elimination
SEARG	South and Eastern Africa Rabies Group
SUA	Sokoine University of Agriculture
TADs	Transboundary Animal Disease
TALIRI	Tanzania Livestock Research Institute
TDV	Tanzania Development Vision 2025
TFDA	Tanzania Food and Drug Authority
TPHA	Tanzania Public Health Association
TSPCA	Tanzania Society for Protection and Care of Animals
TVA	Tanzania Veterinary Association
TVLA	Tanzania Veterinary Laboratory Agency
TZSH	Tanzanian Shilling
USD	American Dollar
WAHIS	World Animal Health Information System
WHO	World Health Organization
ZDNWG	Zoonotic Diseases National Working Group
ZVC	Zonal Veterinary Centre
ZVIC	Zanzibar Veterinary Investigation Center

FOREWORD

Rabies is a viral zoonotic disease with serious socio economic impact. Worldwide, the annual human mortality from canine rabies is estimated to be 59,000, of which about 60% of the cases occur in Asia and 36% in Africa. Dog-mediated human rabies affects under-privileged, poor communities and 30% to 50% of all exposures are children less than 15 years of age. Beside human mortality, the economic burden of rabies is significant; the high cost of post exposure prophylaxis in human creates a heavy burden to both government and household budgets. At the household level, costs of post-exposure prophylaxis (PEP) arise directly from anti-rabies vaccines and indirectly from costs associated with travel, medical fees and income loss. The indirect household losses represent more than 50% of total costs. The total PEP costs have been estimated at US\$40 per patient in Africa and US\$ 49 in Asia, accounting for 6% and 4% of annual per capita gross national income, respectively.

The annual disability adjusted life years (DALYs) burden of rabies is estimated conservatively to be at least 1.74 million in Africa, exceeding those of dengue, Japanese encephalitis, leishmaniasis, trypanosomiasis, and onchocerciasis.

Rabies was first documented in Tanzania in 1932/33. Since then the disease has widely spread throughout the country with varying patterns of infection between regions. Rabies is endemic in the country causing an estimated 1,499 human deaths annually with at least 98% attributable to rabid domestic dogs.

The government have been taking measures to control rabies through provision of dog vaccines and human PEP as well as public awareness raising regarding responsible dog ownership, and disease signs and control measures.

In order to harmonize rabies prevention and control activities among public and private actors the government has formulated the Tanzania National Rabies Elimination Strategy. The strategy is in line with Tanzania Livestock Policy and the Tanzania Livestock Sector Development Strategy that ensures protection of the environment, society and the economy from the risks of zoonotic diseases. The overall goal of the strategy is to control rabies and finally eliminate it in the country by the year 2030 as set out by WHO/OIE.

Prime Minister's Office

ACKNOWLEDGMENT

Rabies Control and Elimination is an important undertaking of the United Republic of Tanzania. On behalf of the Government, We are pleased to recognize funding and technical assistance received from the Bill and Melinda Gates Foundation (BMGF) and the World Health Organisation (WHO) in the development and finalization of the National Rabies Control Strategy.

Several of our national institutions and partners have played a major role in the development and finalization of this Strategy. We would like to recognize and congratulate all institutions and organizations, public and private, national and international that supported development and finalization of this Strategy. Specifically, our acknowledgements go to the Ministry of Livestock and Fisheries (MoLF), Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC), the President's Office Regional Administration and Local Governments Authorities (PO-RALG), Ministry of Education and Higher Learning Institutions, Ministry of Finance and Planning, Ministry of Natural Resources and Tourism, Ministry of Health Zanzibar, Ministry of Livestock Zanzibar, PMO's Office – OHCD, academic and research Institutions including the Sokoine University of Agriculture, (SUA), University of Glasgow (UoG) and Ifakara Health Institute (IHI), Nelson Mandela African Institution of Science and Technology (NM-AIST) and Mbwa wa Africa for their crucial role.

Last but not least I wish to specifically recognize the technical support of the United Nations, especially from the WHO Country Office Tanzania's Dr. Alphoncina M. Nanai for the technical and management support, and Dr Niwael Mtui-Malamsha from the FAO for providing the important contributions that enabled this work to be done. FAO facilitated the publication of this document through USAID funding.

Once again on behalf of the United Republic of Tanzania, we thank you all.



Dr. Zainab A. S. Chaula
Permanent Secretary (Health)
MOHCDGEC



Prof. Elisante Ole Gabriel
Permanent Secretary (Livestock)
MLF

Members who contributed in developing the strategy

No	Name	Institution
1	Dr Abdul A. Hayghaimo	Ministry of Livestock and Fisheries
2	Dr. Martin Ruheta	Ministry of Livestock and Fisheries
3	Dr Eberhard M. Mbunda	Ministry of Livestock and Fisheries
4	Dr M. Loomu	Ministry of Livestock and Fisheries
5	Dr Makungu L Selemani	Ministry of Livestock and Fisheries
6	Dr C Bakuname	Ministry of Livestock and Fisheries
7	Dr Chanasa Mpelumbe Ngeleja	Ministry of Livestock and Fisheries -TVLA
8	Ms. Jubilate Benard	Ministry of Health, Community Development, Gender, Elderly and Children & One Health Coordination Desk, PMO
9	Mr. Geoffrey Mchau	Ministry of Health, Community Development, Gender, Elderly and Children
10	Dr Janneth Mghamba	Ministry of Health, Community Development, Gender, Elderly and Children
11	Dr. Niwael J. Mtui – Malamsha	FAO-ECTAD Tanzania office , Dar-es-Salaam
12	Dr Mzimbili	Serengeti Carnivore Project
13	Dr R Fyumagwa	Researcher, TAWIRI
14	Dr Morris Kilewo	TANAPA
15	Dr. Michael J Madege	MLF, ZVC Mwanza
16	Dr Starnford Ndibalema	MLF, ZVC Mtwara
17	Dr Solomon Nong'ona	MLF, ZVC Iringa
18	Dr Emmanuel Mutakyahwa	TFDA, Dar Es Salaam
19	Dr Julius Joseph	CIDB – TVLA, Dar Es Salaam
20	Kenedy Lushahasi	Ifakara Health institute
21	Joel Changalucha	Ifakara Health Institute
22	Emmanuel Mwamwaja	Wildlife department Sokoine University of Agriculture
23	Dr Emmanuel Mpolya	Nelson Mandela Institution of Science and Technology, Arusha
24	Dr Alphoncina Nanai	WHO, Tanzania Office
25	Jens Fissenebert	Mbwa Wa Africa Animal Rescue
26	Dr Justine Assenga	MLF & One Health Coordination Desk – PMO
27	Dr Katie Hampson	University of Glasgow, Scotland-UK
28	Dr. Mwajuma Chaurembo	ZVC – Temeke
29	Omar B Kassim	Ministry of Agriculture, Natural Resource, Livestock and Fisheris – Zanzibar
30	Dr. Yuda L Mgeni	DVO – Kilosa

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Rabies is an invariably fatal but preventable viral disease and has been one of the most feared diseases throughout human history. It has the highest human case-fatality proportion of any infectious disease (Anderson, Jackson et al. 1981; Rupprecht, Hanlon et al. 2002). Rabies is responsible for an estimated 55,000 to 70,000 deaths globally each year (Hampson, Coudeville et al. 2015; World Health Organization 2018), 60% of these deaths occur in Asia and 36.4% in Africa, mostly in rural areas due to bites from domestic dogs (Hampson, Coudeville et al. 2015). Dog-mediated human rabies is a neglected disease of poverty, affecting under-privileged communities and especially children less than 15 years of age (30% to 50% of all exposures) (Fèvre, Kaboyo et al. 2005; Cleaveland, Kaare et al. 2006). The annual disability adjusted life years (DALYs) burden of rabies is estimated conservatively to be at least 3.7 million globally (Hampson, Coudeville et al. 2015).

Rabies is present on all continents of the world except Antarctica (Fooks, Banyard et al. 2014). Only 7 African countries (Cape Verde, Libya, Mauritius, Réunion, São Tomé and Príncipe, and Seychelles) reported no indigenous cases of rabies (excluding bat rabies) during the year 2009 (CDC).

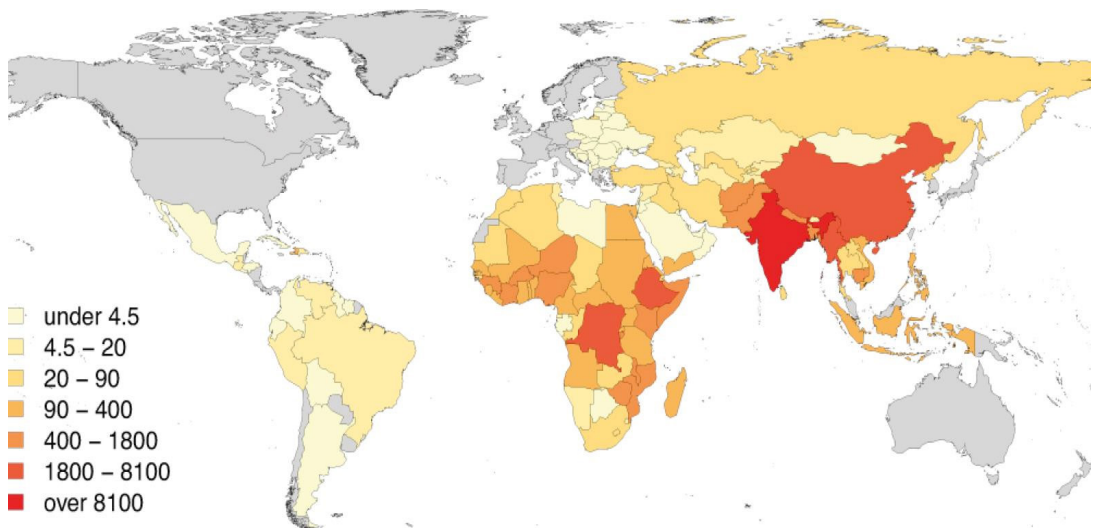


Figure 1: Distribution of human rabies (Source: Hampson, 2015)

Rabies deaths are believed to be significantly underestimated in most poor rabies endemic countries (Cleaveland, Fevre et al. 2002; Deressa, Ali et al. 2010). Apart from being underreported, misdiagnosis from other neurological conditions is common (Mallewa, Fooks et al. 2007), rabies victims are often too ill to travel to hospitals or die before arrival there. Families recognize the futility of medical treatment for rabies and laboratory confirmation of clinically suspected cases is difficult (Lembo, Hampson et al. 2010). As a result, even in countries where rabies is notifiable, many rabies deaths are not exhaustively recorded (Hampson, Coudeville et al. 2015).

1.2 JUSTIFICATION

1.2.1 Socio-economic Importance

Beside human mortality, the economic burden of rabies is significant, with a global estimated annual cost of \$ 8.6 billion USD (Hampson, Coudeville et al. 2015). The high cost of post-exposure prophylaxis in human creates a heavy burden to both government and household budgets. At the household level, costs of post-exposure prophylaxis (PEP) arise directly from anti-rabies vaccines and indirectly from costs associated with travel, medical fees and income loss (Hampson, Dobson et al. 2008). The indirect household losses represent more than 50% of total costs. The total PEP costs have been estimated at US\$ 40 per patient in Africa and US\$ 49 in Asia, accounting for 6% and 4% of annual per capita gross national income, respectively (Hampson, Coudeville et al. 2015).

In Tanzania rabies is endemic causing an estimated 1,499 annual deaths (Cleaveland, Fevre et al. 2002), and the direct medical cost associated with a complete regime of PEP is estimated at an average of USD 43.25 in urban and USD 44.78 in rural areas per person (Hampson, Coudeville et al. 2015). Poor households face difficulties paying for PEP, which results in considerable financial hardship and substantial delays or failure in PEP delivery (Hampson, Dobson et al. 2008). Shortages of PEP are also common in many rural areas, further increasing the costs as victims are forced to travel to far flung centres to obtain treatment. In addition, victims of rabid dog bites and their families suffer from psychological trauma resulting from the uncertainty and resignation to the inevitable outcome.

Rabies also impacts on livestock and other animals such as donkeys, camels and horses (Hampson, Coudeville et al. 2015). Weak surveillance and a lack of reliable data on the number of animal rabies cases is a major constraint to assessing the economic impact of rabies on the local communities (Townsend, Lembo et al. 2013).

Under the National Livestock Policy, control of trans-boundary animal diseases (TADs) and other economically important zoonotic diseases is the responsibility of the Ministry of Livestock and Fisheries (MoLF). Due to the nature of rabies lodging such responsibilities to one ministry leaves a lot to be desired in the One Health paradigm of disease control. Progress in preventing human rabies through control of the disease in the dogs faces barriers such as low prioritization (Awah, Tchoumboue et al. 2002; Lembo, Hampson et

al. 2010), epidemiological constraints, operational constraints and lack of resources. The Rabies Elimination Demonstration Project funded by BMGF, implemented in Tanzania, Kwazulu Natal (KZN) in South Africa and the Philippines has shown that elimination of human rabies is feasible through a One Health collaborative approach. It has further shown that prevention of animal rabies, effective surveillance in humans and animals, better public awareness and improved access to human rabies vaccines are essential elements for the elimination of human rabies.

1.2.2 Cost Effectiveness of Rabies Control and Elimination

Studies indicate that, dog vaccination in combination with human PEP is more cost-effective than PEP alone after 5 years (Bögel and Meslin 1990; Cleaveland, Kaare et al. 2006). Successful elimination of human rabies can be achieved by eliminating rabies in dogs through sustained mass vaccination programs, population control and responsible dog ownership. In Latin America, annual vaccination of over 45 million dogs led to a decrease of over 90% in dog rabies cases and a corresponding decrease in human deaths (Vigilato, Clavijo et al. 2013).

In the Philippines and Bali, Indonesia, the average cost per human life saved through PEP were between 1498\$-1620\$ while costs per dogs vaccinated ranged from 1.18\$-5.79\$ (Townsend, Sumantra et al. 2013). In KZN, South Africa, sustained mass dog vaccination reduced human rabies cases to zero, with estimated cost per life saved ranging from \$427-\$2565. In the Tanzanian demonstration project, cost per dog vaccinated ranged from \$2.5 - \$22.49 across districts and phases with the average phase ranging from \$7.3 –\$11.27. The cost per human PEP administered was approximately \$22.41, and the cost per life saved ranged on average from \$862 - \$7859 (World Health Organization website). Economic benefits of mass dog vaccination to eliminate rabies in the animal reservoir include saving human lives, reduction in expenditures for human PEP, and retaining of livestock whose death is prevented.

1.3 RABIES EPIDEMIOLOGY

1.3.1 The Virus

Rabies virus belongs to genus *Lyssavirus* and family *Rhabdoviridae* which causes encephalitis (inflammation of the brain) in all mammals.

1.3.2 Reservoir

In America, most of the rabies deaths are due to bats and there are rare deaths due to exposures to other sources including foxes, raccoons, skunks, jackals, mongooses and other wild carnivore host species. In Africa, evidence indicates that the primary rabies virus maintenance cycle is among domestic dogs, although other carnivores may be involved as non-maintenance populations (Johnson, Mansfield et al. 2010; Woodroffe, Prager et al. 2012). Due to this fact, mass vaccination targeting domestic dogs would have the greatest

impact in reducing the risk of infection in all other species including humans, livestock and wildlife (Cleaveland, Kaare et al. 2006; Lembo, Hampson et al. 2010). In Africa, the bats and other carnivores play a minimum role in human rabies transmission.

1.3.3 Transmission and pathogenesis

In most cases the disease is transmitted via the bite of rabid animals, which sheds infectious virus with their saliva. While the virus cannot penetrate intact skin it enters the body through transdermal inoculation (i.e. wounds) or direct contact of infectious material (i.e. saliva, cerebrospinal liquid, nerve tissues) to mucous membranes or skin lesions. Human-to-human transmission through bite is possible but rare. Transplantation of an infected organ can also rarely cause infection. Ingestion of raw meat or other tissues from animals infected with rabies is not a source of human infection (World Health Organization 2018).

After entry the virus binds to cell receptors and may replicate within striated muscle cells or directly infect nerve cells. The virus then travels via retrograde axoplasmic transport mechanisms to the central nervous system. Both motor and sensory fibres may be involved depending on the animal infected. Once it has reached the CNS, rapid virus replication takes place, causing pathologic effects on nerve cell physiology. The virus then moves from the CNS via anterograde axoplasmic flow within peripheral nerves, leading to infection of some of the adjacent non-nervous tissues, for example, secretory tissues of salivary glands. The virus is widely disseminated throughout the body at the time of clinical onset. With shedding of infectious virus in saliva the infection cycle of rabies is completed (Figure 2).

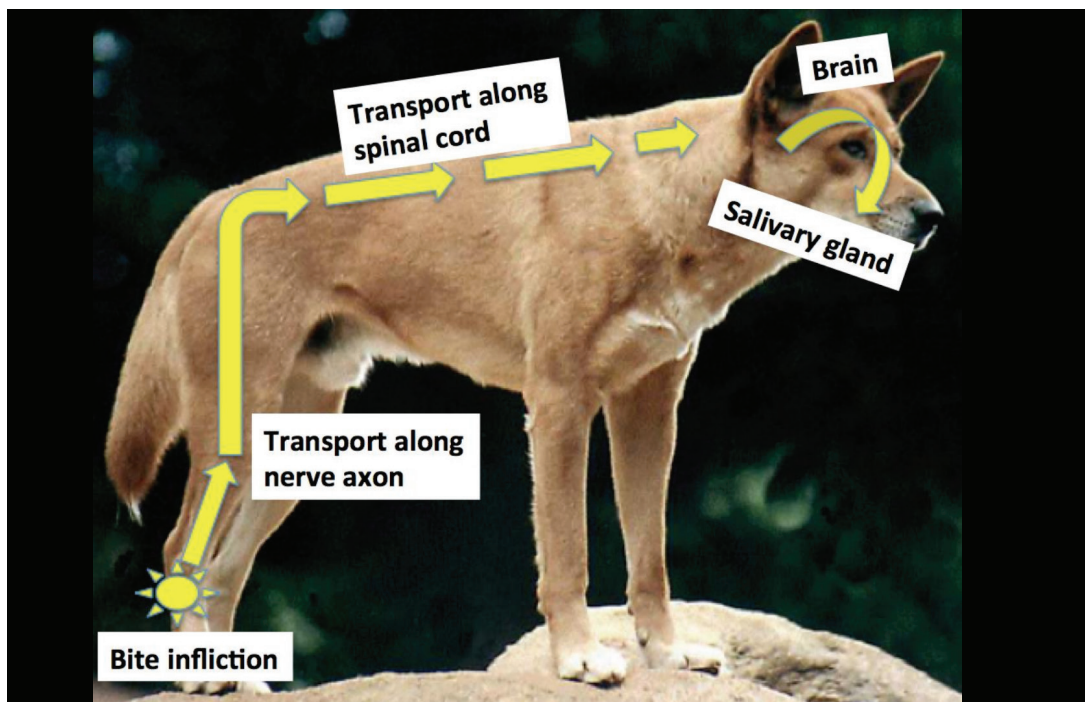


Figure 2: Rabies virus transmission and pathophysiology.

Humans are usually infected following a bite or scratch by an infected animal. Transmission can also occur when infectious materials usually saliva comes into direct contact with human mucosa or fresh skin wounds. Spread to humans via bites or scratches from infected animals, rabies is always fatal once symptoms develop. A definitive diagnosis can only be made by laboratory testing of brain tissue after the animal's death (Lembo, Niezgoda et al. 2006). Incubation of the infection after exposure is often prolonged and variable, causing problems both in predicting disease spread and in proving disease freedom.

1.3.4 Incubation

The incubation period varies from 2 weeks to 6 years (average 2–3 months) depending on the amount of virus in the saliva, the site of inoculation and the virus strain.

1.3.4.1 Incubation of the Disease in Animals:

The incubation period in dogs and cats is generally between two and twelve weeks post-infection, although longer incubation periods have been reported.

1.3.4.2 Incubation of the Disease in Humans:

In human cases, the incubation period is typically two to eight weeks, but may vary from less than a week to more than a year.

1.3.5 Clinical Features

1.3.5.1 Clinical features in animals

All animals exhibit certain neurological signs as a result of rabies. From species to species these symptoms may differ slightly. There are two distinct forms of rabies in animals, furious and dumb forms.

- **Furious rabies:** is the classic “mad-dog syndrome” and may be seen in all species. The animal becomes irritable and may viciously and aggressively use its teeth, claws, horns, or hooves to attack humans and other animals, without provocation. Such animals lose caution and fear of humans and other animals. They may demonstrate sudden behaviour changes and attack without provocation. Rabies cannot be definitively diagnosed on clinical signs alone and must be confirmed in the laboratory. In some cases, however, an animal may die rapidly without demonstrating significant clinical signs
- **Dumb/Paralytic rabies:** Paralytic (dumb) phase: This stage is characterized by the inability to swallow, leading to a typical sign of foaming saliva around the mouth. Some animals may develop paralysis beginning at the hind extremities. Eventually, complete paralysis is followed by death.

1.3.5.2 Clinical features in humans

It is very difficult to differentiate rabies in humans from other diseases by clinical examination. In rabies-endemic countries such as Tanzania rabies should always be suspected when neurological symptoms follow an animal bite. After the incubation period a 2–10 days prodromal period of nonspecific symptoms is followed. The first clinical symptom is

usually neuropathic pain at the wound site. Further symptoms, which may include tiredness, weakness, loss of appetite, head-ache, fever and other aches suggest involvement of the respiratory, gastrointestinal and/or central nervous systems.

During the acute stage of the disease two different forms may occur. Furious rabies is characterized by hydrophobia or aerophobia, hyperactivity and fluctuating consciousness. Paralytic rabies runs a less dramatic course, but the final outcome is the same. Rabies is inevitably fatal and death occurs during the first seven days of illness without intensive care due to respiratory failure.

1.3.6 Diagnosis of Rabies:

Even with symptoms quite characteristic for rabies, like changes in behaviour or difficulties in swallowing, the clinical examination cannot rule out rabies nor confirm the diagnosis. Brain tissue is the preferred specimen for post-mortem diagnosis in both humans and animals.

Intra-vitam (i.e., while subject is still alive) diagnosis in suspect human patients are based on detecting virus or viral RNA in saliva, neck skin biopsy or epithelial cells of the cornea. However, due to intermittent shedding of virus and variable diagnostic sensitivity of the methods applied, only positive results are valid.

Detection of rabies antigen:-Different immuno-chemical methods have been developed to detect the virus or its antigens. The most widely used methods for diagnosing rabies infection in animals and humans and recommended by both WHO and OIE are:

- I. **Fluorescent antibody test (FAT):** it is considered the gold standard for rabies diagnosis. Brain tissue samples, smears or cells are treated with antirabies serum or globulin labelled with fluorescein isothiocyanate (FITC). Preferentially polyclonal conjugates with fluorescence-labelled antibodies are used. Specific aggregates of rabies virus antigen are detected by their fluorescence using a reflected light (incident light) fluorescence microscope. The FAT is accurate, sensitive and rapid. Results can often be obtained within 1 to 2 hours of receipt of the specimen.
- II. Recently a **direct rapid immunodiagnostic test (dRIT)** was developed. This simple lateral flow test may be used under field conditions and in developing countries with limited diagnostic resources.

Other diagnostic techniques include;

- **Cell-culture isolation techniques:** Fixed rabies viruses can grow in a wide variety of cells. Successful in vitro cultivation of rabies virus was first reported in 1936. This property has been used extensively in research on rabies. However, it is only recently that techniques for the isolation of street rabies from suspect material in cell cultures have been developed. Tests for the isolation of street rabies in cell culture were first carried out in the mid-1970s using baby hamster kidney cells, line 21 (BHK-21), and chick embryo-related (CER) and neuroblastoma cells.

- **Enzyme-linked immunosorbent assay (ELISA):** In the rabies field the enzyme-linked immunosorbent assay (ELISA) was initially developed for the titration of rabies virus-neutralizing antibodies. The technique was applied to the quantification of rabies antigen by Atanasiu et al, 1974 using fluorescein-labelled IgG to the purified nucleocapsid. Subsequently, Pepin et al, 1985 developed an ELISA called rapid rabies enzyme immunodiagnosis (RREID), which was based upon the detection of rabies virus nucleocapsid antigen in brain tissue. In this test, microplates are coated with purified IgG and an IgG-peroxidase conjugate is used to react with immunocaptured antigen.
- **Intra vitam diagnosis:** In addition to the brain and spinal cord, rabies virus antigen can be detected by FA in the peripheral nerves, salivary glands, saliva, and also in the cornea and skin during the final stages of the disease. Intra vitam diagnosis of rabies by FA in corneal impressions was first described by Schneider in animals and by Cifuentes et al in humans. However, a study of the reliability of corneal impressions for rabies diagnosis showed that, especially when sampling is done under field conditions, a negative result could not rule out the diagnosis of rabies.
- **Tests for the determination of rabies antibodies-(Reference test):** Serum neutralization assays are used to determine the potency of rabies serum and immunoglobulins for post-exposure treatment, and to evaluate the immunogenicity of human and, to a lesser degree, animal rabies vaccines. The standard procedures recommended at the seventh meeting of the WHO Expert Committee on Rabies were the mouse neutralization test (MNT) and the plaque reduction assay. Since then, plaque reduction methods have been superseded by fluorescent focus inhibition tests, which are more convenient. Although the MNT is still widely used as a reference test, the rapid fluorescent focus inhibition test (RFFIT) has become the test of choice in most modern laboratories. The RFFIT has been shown to be at least as sensitive as the MNT in measuring virus-neutralizing antibodies.

In humans, the recommended test is dFAT on brain tissue. Other diagnostic tests that have been used are RT-PCR and dRIT (Jackson 2017; Rupprecht et al. 2002)

1.4 SITUATION ANALYSIS

1.4.1 Rabies Situation in Tanzania

1.4.1.1 History of Rabies and Current Situation

Rabies in Tanzania was first documented in the 1930s, and has never been eradicated. In north-western Tanzania, for example, dog rabies is endemic in the Mara Region but only sporadic in the adjacent Ngorongoro District (Cleaveland and Dye 1995; Fitzpatrick, Hampson et al. 2012). Cultural and religious factors may influence patterns of dog ownership and knowledge of rabies, which may in turn affect patterns of disease, recognition of rabies in local communities, and the probability of seeking post-exposure treatment in hospitals. Nonetheless, patterns of land use and human population densities throughout rural Tanzania

are relatively homogeneous as a result of the “*Ujamaa*” process of village development that followed independence, where more than 81% of the population live.

According to the Health Protection Agency (HPA), Tanzania is a high risk area for rabies (see Figure 3).

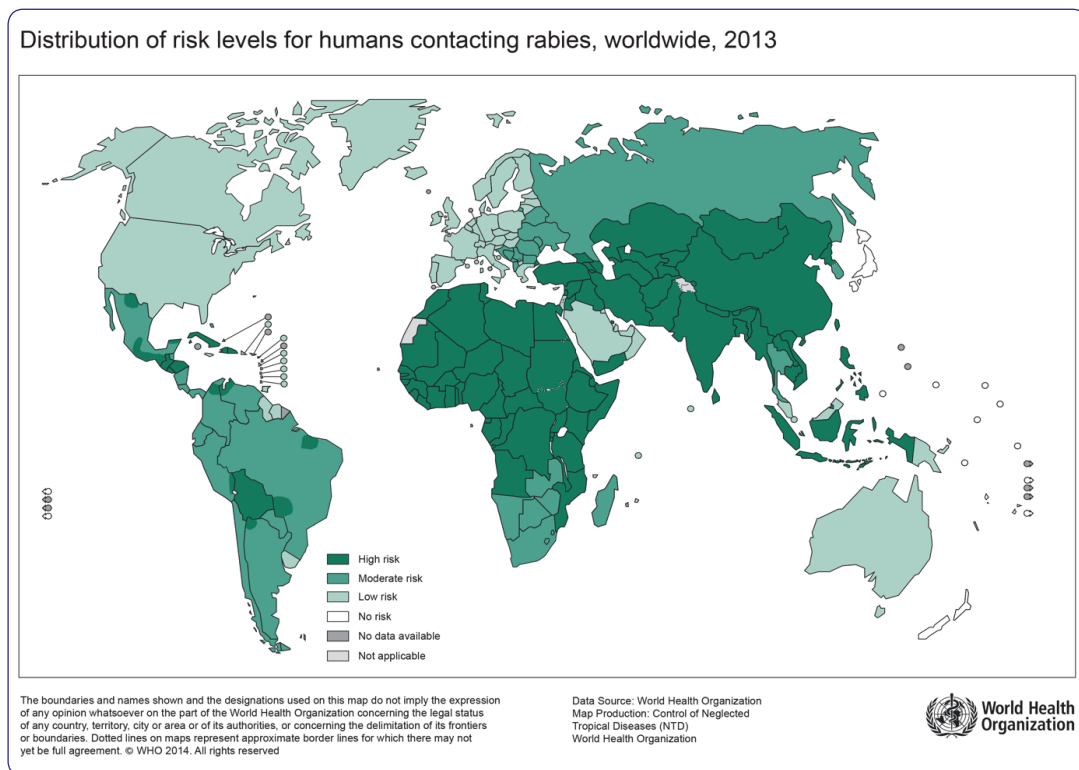


Figure 3: Global Rabies Risk Level Distribution (Source: WHO, 2013)

Rabies is a nearly 100% preventable disease through administration of safe, effective and extensively available vaccines for humans and animals. However, the majority of humans who have possibly been exposed to the virus are either unaware of the danger of rabies or are not able to access post exposure prophylaxis (PEP). PEP, which includes both vaccination and delivery of passive immunity through rabies immunoglobulin (RIG) in persons not previously vaccinated, is effective for preventing rabies in humans if given early enough after exposure (World Health Organization 2018). In people who have been infected with the rabies virus but do not receive PEP, the virus will eventually overtake a victim’s central nervous system (CNS). After onset of clinical symptoms, with no established treatment for rabies, the disease will typically progress to death.

Between 1990 and 1996 a total of 23,709 bite injuries were reported from suspect rabid animals in Tanzania, giving a mean of 3,387 (1,779-4,994) bite cases per year and a mean annual bite incidence of 12.5 (6.7-18.3) bite cases per 100 000. However in 2000 a total of 42,669 human dog-bite injuries were reported that suggested either an increase in the

number of bite cases or the extent of the problem was being underestimated (Cleaveland, Fevre et al. 2002). By extrapolating bite incidence data from Mara region to the whole of Tanzania, 1,499 (891—2238) human rabies deaths were predicted per year, equivalent to an annual incidence of 4.9 (2.88-7.24) deaths/100 000 (Cleaveland, Fevre et al. 2002). Laboratory surveillance reports also shows that between 2009 and 2013 a total 245 rabies samples were received at the CVL from all the nine (9) VIC's in the country. Figure 4 below shows the total number submitted and positive samples during that period. The data shows an average of 67.76% positivity rate over the period. The high proportion suggests that the laboratory surveillance system captures the cases which have a high clinical indicator of disease.

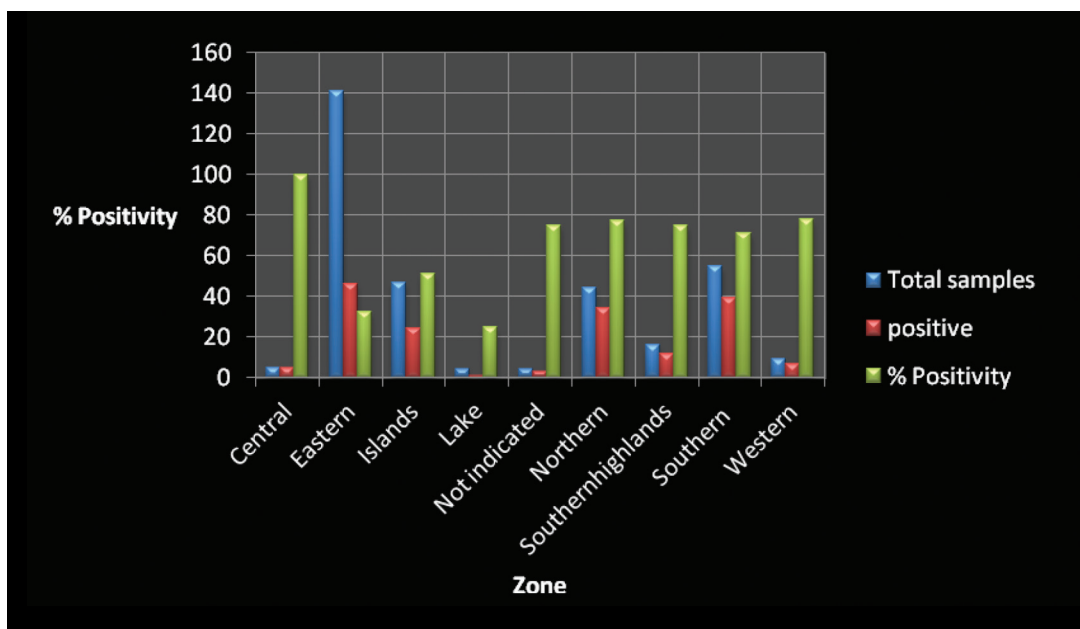


Figure 4: Sample positivity from nine VICs in Tanzania between 2009 - 2013 (Source: MoLF, 2014).

The lack of effective surveillance and diagnostic systems has resulted in underestimation of the burden of rabies in Tanzania. The current figures captured by the passive surveillance system underestimate the incidence and burden of the disease by 100 times in humans (Cleaveland, Fevre et al. 2002).

1.4.1.2 Availability of biological and anti-rabies vaccines in Tanzania between 2008 - 2014

Tanzania imports cell culture based animal and human anti rabies vaccines. The Table 1 below shows the number of both human and animal rabies vaccine doses imported in the country for the period between 2008 -2014.

Table 1: Doses of animal and human rabies vaccine imported between 2008- 2014

Year	Animal Rabies Vaccine	Human Rabies vials
2008	40,00,000	100
2009	10,901,000	68,003
2010	14,901,000	43,804
2011	25,802,000	40,420
2012	0	20,400
2013	51,510,000	25,068
2014	1000	62,327
Total	107,115,000	260,122

Source: TFDA, 2015.

1.4.1.3 Rabies Surveillance System

Currently, rabies surveillance is carried out by two separate systems; one within the MoLF called Animal Disease Surveillance which focuses on the diseases on animals and another within the MoHCDGEC, called Integrated Disease Surveillance Response (IDSR) which focuses on diseases on humans.

1.4.1.3.1 Ministry of Livestock and Fisheries (MoLF)

Although rabies in animals is a notifiable disease, surveillance is primarily passive. Suspected cases of rabies in the district are reported to the District Veterinary Officer (DVO) who immediately notifies the Director of Veterinary Services (DVS). A standard animal disease surveillance form is used by the DVO to collect epidemiological data on the suspected animal cases and submitted to the DVS. A standard laboratory sample submission form is also filled when samples are collected and submitted to Veterinary Laboratory (VL). Reporting system from lower levels is dominantly paper based and it is only at the Ministry headquarters level where this information is entered into Trans-boundary Animal Diseases Information (TADinfo) system. Later these reports are entered into Laboratory Information Management System (LIMS) to enable report sharing among countries within the SADC region. For AU/EAC and OIE they are entered into the Animal Resource Information System (ARIS)-2 and the World Animal Health Information System (WAHIS) respectively.

There are eight zonal veterinary investigation centres (ZVIC) in mainland Tanzania namely; (Mtwara, Temeke, Dodoma, Tabora, Iringa, Mwanza, Sumbawanga and Arusha) and another one in Zanzibar – the Zanzibar Veterinary Investigation Center (ZVIC). Rabies suspected

samples are collected across the country and submitted to the ZVC's or directly to CVL. Table 2 and Figure 5 below show the distribution of ZVC.

Table 2: Distribution of Zonal Veterinary Centers.

Number	Name of ZVC	Local Government Authorities
1.	Western (Tabora)	Zone Kibondo, Nzega, Igunga, Kasulu, Kigoma, Uyui, Urambo, Sikonge, Uvinza, Buhigwe, Tabora MC, Kakonko, Kaliua, Kasulu TC, Kigoma-Ujiji MC.
2.	Lake Zone (Mwanza)	Bariadi, Geita, Karagwe, Shinyanga MC, Tarime, Ukerewe, Bukoba, Itilima, Kishapu, Magu, Nyang'wale, Serengeti, Mbogwe, Meatu, Muleba, Musoma, Nyamagana, Shinyanga, Biharamulo, Bukombe, Bunda, Kahama, Kwimba, Maswa, Busega, Chato, Kahama TC, Musoma MC, Ngara, Sengerema, Bukoba MC, Ilemela, Rorya, Butiama, Missenyi, Misungwi, Kyerwa.
3.	Nothern Zone (Arusha)	Lushoto, Monduli, Rombo, Korogwe, Meru, Mwanga, Arusha CC, Muheza, Same, Karatu, Moshi, Tanga CC, Hai, Arusha DC, Handeni, Moshi MC, Kilindi, Longido, Siha, mkinga, Korogwe TC, handeni TC, Pangani, Babati, Hanang, Mbulu, Simanjiro, Kiteto, Babati TC.
4.	Southern Zone (Mtwara)	Kilwa, Mtwara, Tunduru, Lindi, Newala, masasi, Nachingwea, Liwale, Tandahimba, Mtwara/ Mikindani MC, Ruangwa, Lindi MC, Nanyumbu, Masasi TC.
5.	Southern Highland (Iringa)	Chunya, Iringa, Njombe TC, Mbeya DC, Mufindi, Songea, Wanging'ombe, Iringa MC, Kyela, Makete, Mbinga, Kilolo, Njombe, Rungwe, Songea Urban, Ileje, Ludewa, Mafinga TC, Namtumbo, Makambako TC, Mbozi, Nyasa, Mbarali, Mbeya CC, Momba, Tunduma.
6.	Central Zone (Dodoma)	Zone Iramba, Kondoa, Mpwapwa, Singida, Kongwa, Manyoni, Chamwimno, Singida Urban, Dodoma Urban, Ikungi, Bahi, Mkalama, Chemba, Gairo.

	Eastern Zone (Temeke)	Zone Bagamoyo, Kinondoni, Ilala, Kibaha DC, Kisarawe, Temeke, Mkuranga, Ulanga, Morogoro Urban, Rufiji, Mafia, Mvomero, Kibaha TC, Morogoro, Kilombero, Kilosa.
	South Western Zone (Sumbawanga)	Kalambo, Sumbawanga Rural, Nkasi, Sumbawanga MC, Mpanda DC, Mlele, Mpanda MC

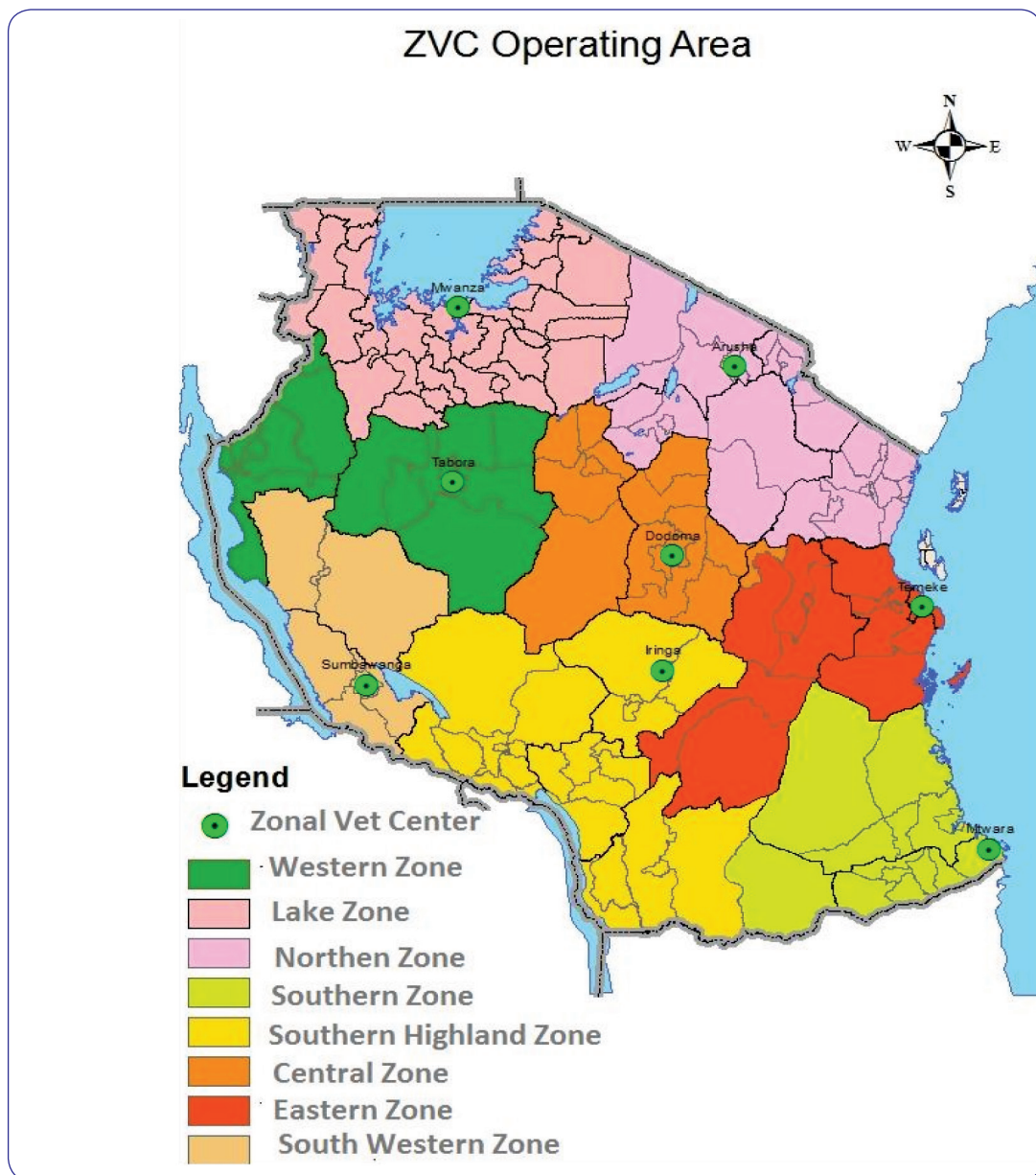


Figure 5: Distribution of Zonal Veterinary Centers (ZVCs)

1.4.1.3.2 Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC)

Rabies is a priority disease under the Integrated Disease Surveillance Response (IDSR) system. Dog bites are used as proxy for suspected rabies and reported through the weekly standard reporting form at the health facility level and a copy sent to the District Disease Surveillance Coordinator. The district summarizes both animal/dog bites and clinically suspected rabies cases and deaths from health facilities reports and sends a copy to the Ministry's Epidemiology and Disease Surveillance section. These reports are captured as part of routine monthly health facility reporting through the Health Management Information System (HMIS). These data are summarised at the district level and submitted to the national level.

1.4.1.4 Challenges of Rabies Control Activities.

There are a number of challenges in the prevention and control of rabies in Tanzania as listed below:

i. Limited access to anti-rabies vaccine

- There is limited availability of animal rabies vaccine in the animal sector, and limited availability of human vaccines and immunoglobulins in the human sector.
- Human rabies biologics may be available in private facilities, however at a prohibitive cost. Possibilities for locally produced rabies vaccines have not been explored.

ii. Inadequate laboratory capacity

- Human rabies diagnosis and management is dependent on diagnosis of rabid animals.
- Countrywide, there are seven animal laboratories that have the capacity to confirm rabies in animals. However, these laboratories often lack reagents for timely testing of specimens.
- At the LGAs level, there are inadequate resources for sample collection, packaging and shipping to diagnostic laboratories.
- There are no public health laboratories which carry out human rabies diagnosis

iii. Inadequate Surveillance system:

- In the IDSR system, dog bites are used as a proxy for suspect rabies cases in humans. However dog bites are under-reported in health facilities resulting in missed cases and misclassification of deaths due to rabies.
- There is underreporting of suspected rabies cases in dogs and other livestock due to the passive nature of the surveillance system.
- There is inadequate sharing of surveillance data between the human and animal health sectors at local and national levels, resulting in lost opportunities for prevention of human rabies, early detection and timely response to rabies outbreaks.

iv. Inadequate local research on rabies

- There is inadequate research that can enhance local rabies control. Comprehensive data on important topics such as the economic benefits of rabies control, dog demographics and ecology, and alternative dog population management methods is lacking.

v. Low public awareness on rabies prevention and control

- There is low awareness among the public, human and animal health workers on management of dog bite wounds, as well as pre- and post-exposure prophylaxis.
- Most patients who die from **rabies are either misdiagnosed or do not receive timely** and appropriate post-exposure treatment. In particular, many dog bites in children are not reported and may go completely unrecognized or be discovered late by parents and health care providers.
- Knowledge of the benefits of responsible dog ownership and dog population management among the public is low. In addition, there is little understanding among the public of the value of timely response following dog bites and timely PEP.
- There is low priority among policy makers on the importance and burden of rabies and the cost-effectiveness of rabies control through dog vaccination.

vi. Inadequate inter-sectoral collaboration and partnerships

- There is little coordination and collaboration between the human and animal health sectors and other agencies responsible for rabies control.
- Except for the BMGF Funded Rabies Elimination and Demonstration Project areas, most of the rabies control and prevention activities in the country have been ad hoc, uncoordinated (carried out by line ministries, NGOs, private practitioners), and without well-defined objectives or targets (e.g. vaccination coverage, goals and indicators to measure success and the costs of these control activities).

vii. Inadequate enforcement of laws and regulations

- Inadequate legislation requiring mandatory registration, licensing and vaccination of dogs and cats against rabies, and responsible dog ownership,
- There is inadequate implementation and enforcement of the existing animal disease control act
- Most of the LGAs have not enacted the laws to support rabies control activities in their areas.

viii. Funding constraints

- Rabies control activities, particularly dog vaccination, are underfunded by both the central and local governments.

- Most ad hoc rabies control activities are confined to small areas and dependent on unreliable donor support, resulting in little impact on rabies control.

1.4.1.5 National Policies / Strategies and Legal framework.

There are number of policies and laws that govern the control of rabies in the country. Effective application and enforcement of these policies accompanied by appropriate periodic reviews will significantly contribute to the control of both animal and human rabies.

1.4.1.5.1 National Policies and Strategies

Tanzania Development Vision 2025 (TDV) - provides guidance on national long-term strategic goals for social and economic development and highlights the change in approach and mindset needed to achieve the desired goal. For example, article 3.1 (Fourth bullet), access to quality primary health care for all.

The National Strategy for Income Growth and Poverty Reduction 2010 (NSGRP-MKUKUTA) - Emphasises inter-sectoral collaboration in disease control.

Rural Development Vision 2001 (RDS)- Focuses on stimulating economic growth and reducing poverty in rural areas and emphasises on achievement on rural dwellers of high quality livelihood with access to preventive and curative health care, among other things.

The National Livestock Policy 2006 (NLP) – The policy emphasises the importance of animal health services in the control, eradication and prevention and introduction of zoonotic diseases and animal diseases of economic importance.

Tanzania National Health Policy 2007 - The policy puts emphasis on the provision of equitable, quality and affordable basic health services, reduction of disease burden, maternal and infant mortality and increase life expectancy; availability of drugs and equipment; availability of health services to all people (urban and rural); as well as human resource capacity development.

Tanzania National eHealth Strategy 2013 - The strategy recognizes the potential of information and communication technology (ICT) that can offer in transforming healthcare delivery by enabling information access and supporting healthcare operations, management, and decision making

1.4.1.5.2 Legal Framework

Animal rabies is a notifiable disease and there are a number of laws regulating the prevention and control of Rabies in Tanzania These Acts of Parliament include:

- Presidential Circular No 1 2002
- Animal Diseases Act No 17 of 2003
- The Food, Drugs and Cosmetic Act No 1 of 2003
- The Animal Welfare Act No 19 of 2008

- Livestock Registration, Identification, and Traceability Act No 12 of 2010
- Public Health Act -2009
- The Local Government (District) Authorities Act No 7 of (1982)
- Local Government (Urban Authorities) Act (1982)
- Ministry of livestock and fisheries circular on vaccination 2017

1.4.1.6 Agencies Responsible for Rabies Control

1.4.1.6.1 Local Agencies

- a) **Dog Owners** - they are responsible for the overall animal welfare issues
- b) **Local Private Sector** - Private Animal Health Service Providers (PAHSP) and drug companies.
- c) **Local Government Authorities** - they are charged with the responsibility and powers to involve the community in planning and implementation of social and economic development plans in their respective areas.
- d) **Ministerial Departments and Agencies (MDA)-**
 - **Ministry of Livestock and Fisheries:** Rabies control in animals in the country is under the mandate of the Ministry of Agriculture Livestock and Fisheries through the Directorate of Veterinary Services (DVS).
 - **Tanzania Veterinary Laboratory Agency (TVLA):** Mandated to undertake animal disease surveillance, diagnostic services, animal disease research, vector control research, testing of veterinary pharmaceuticals, development and production of biologicals.
 - **Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC):** through the department of preventive services has the mandate to coordinate prevention and control diseases.
 - **Ministry of Natural Resources and Tourism** - To conserve natural and cultural resources sustainably and develop tourism for national prosperity and benefit of mankind through development of appropriate policies and guidelines; formulation and enforcement of laws and regulations; monitoring and evaluation of policies and laws.
 - **Tanzania Wildlife Research Institute (TAWIRI):** To carry out and coordinate wildlife research in the United Republic of Tanzania with an overall objective of providing scientific information and advice to the government and wildlife management authorities on the sustainable conservation for wildlife, consonant with the nation vision 2025 that is sustainable conservation of natural resources.
 - **President's Office, Regional Administration and Local Government (PO-RALG):** Leading institution in empowering regional, administration and local governments to improve the provision of quality life and services to the community.

- **Tanzania Food and Drugs Authority (TFDA):** regulation of drugs and vaccines. To protect and promote public health by ensuring quality, safety and effectiveness of food, medicines, cosmetics and medical devices.
 - **Ministry of Finance and Planning:** Manages the overall revenues, expenditures and financing of the government of the United Republic of Tanzania and provides the government with advice on the broad financial and economic affairs in support of the government's economic and social objectives.
 - **Ministry of Education, Science and Technology:** To promote quality of education and training, establish systems and procedures that will increase the number of literate Tanzanians who can contribute in achieving the national development objectives.
 - **Prime Minister's Office:** Through its One-Health Coordination Desk promotes collaboration among various stakeholders in addressing One-Health country priorities.
 - **NIMR** – Provides research guidance for human health including ethical clearance for human research.
- e) **Non Government Organisations (CBO, FBO,)**
- Ifakara Health Institute (IHI) - is an independent, non-profit organisation, registered in Tanzania. The institute conducts a wide range of health-related research, including biomedical and environmental studies, trials of drugs, vaccines and diagnostic, health-systems research, and monitoring and evaluation.
 - Mbwa wa Africa Animal Rescue: Is an independent non-profit organization registered in Tanzania. It is having a permanent dog shelter in USA-RIVER, Arusha and is conducting rabies vaccination and spay-neuter campaigns.
 - Tanzania Animal Welfare Society: Is a registered non-profit organization, which works to fight against all forms of criminal cruelty and advocates public awareness campaigns on animal welfare in Tanzania.
- f) **Higher Learning and Training Institutions** - Sokoine University of Agriculture (SUA), Muhimbili University of Health and Allied Sciences (MUHAS), Nelson Mandela African Institution of Science and Technology (NM-AIST) and so on, which strengthen the capacity of human resource for overall national development.
- g) **Professional Associations** - Tanzania Veterinary Association (TVA), Medical Association of Tanganyika (MAT), Tanzania Public Health Association (TPHA), Tanzania Society for Animal Production (TSAP) and so on which guide respective professions' ethical practices.

1.4.1.6.2 Regional and International Agencies

Tanzania works in close collaboration with several regional and international agencies, such as:

- United States' Centres for Disease Control and Prevention (CDC),
- Global Alliance for Rabies Control (GARC). Others include,
- Partners for Rabies Prevention (PRP),
- Pan African Rabies Control Network (PARACON),
- World Society for Prevention of Cruelty to Animals,
- World Animal Protection (WAP),
- Mission Rabies (MR) and so on.

1.4.1.7 Stakeholders Analysis

There are several stakeholders who play a role in rabies control in Tanzania (Table 3).

Table 3: Institutional Responsibilities and Roles

Name of Institution	Roles/Responsibility
Ministry of Finance and Planning	<ul style="list-style-type: none"> • Provision of funds and other resources • Oversees budget preparation and execution
Ministry of Livestock and Fisheries	<ul style="list-style-type: none"> • Formulation and harmonisation of policies and strategies • Information and data collection • Provision of technical support and implementation of activities
Ministry of Health, Community Development, Gender, Elderly and Children	<ul style="list-style-type: none"> • Formulation and harmonisation of policies and strategies • Information and data collection • Provision of technical support and implementation of activities.
Ministry of Natural Resources and Tourism	<ul style="list-style-type: none"> • Formulation and harmonisation of policies and strategies • Information and data collection • Provision of technical support and implementation of activities.
President's Office, Regional Administration and Local Government(PO-RALG)	<ul style="list-style-type: none"> • Implementation of antirabies activities • Creation of rabies awareness • Collection of data

Ministry of Home Affairs	<ul style="list-style-type: none"> • Enforcement of government laws
Prime Minister's Office One Health Coordination Desk	<ul style="list-style-type: none"> • Promotes collaboration among various stakeholders in addressing One-Health country priorities.
Ministry of Justice and Constitution Affairs	<ul style="list-style-type: none"> • Interpretation and custody of government laws
TFDA	<ul style="list-style-type: none"> • To ensure the availability of good, quality, safety and effectiveness of medicines by evaluation and registering of good quality vaccines, control the importation of vaccines and conducting post marketing surveillances for vaccines.
TVLA	<ul style="list-style-type: none"> • Timely diagnosis and research
TANAPA	<ul style="list-style-type: none"> • Coordination of wildlife related activities and control of rabies in wildlife buffer zones
ZVC	<ul style="list-style-type: none"> • Surveillance
Academic and Research Institutions (SUA, MUHAS, IHI, TAWIRI, TALIRI)	<ul style="list-style-type: none"> • Research, training, diagnosis and consultancy
PAHSP	<ul style="list-style-type: none"> • Data collection, provision of veterinary services and reporting
Dog Owners	<ul style="list-style-type: none"> • Ensures welfare of animals and responsible ownership
NGO both local and International	<ul style="list-style-type: none"> • Provides technical support and conducting vaccination campaigns, funding and linkages with communities
Media and Mobile Telephone Companies	<ul style="list-style-type: none"> • Collection of data and dissemination of information
Development Partners	<ul style="list-style-type: none"> • Support of antirabies activities

CHAPTER TWO

ANALYSIS OF CRITICAL ISSUES WITH RESPECT TO THE RABIES CONTROL STRATEGY

2.1 CRITICAL ISSUES

Critical issues identified in the rabies control and elimination strategy are;

- i. Availability and accessibility to anti-rabies biologicals and vaccines
- ii. Laboratory diagnostic capacity
- iii. Rabies Surveillance and outbreak reporting and response capacity.
- iv. Research on rabies in Tanzania
- v. Advocacy, Communication and social mobilisation on rabies prevention and control
- vi. Partnership and Inter-sectoral collaboration.
- vii. Resource mobilisation (funds and skills manpower).
- viii. Enforcement of laws and regulations
- ix. Monitoring and evaluation

2.2 STRENGTHS, WEAKNESSES, OPPORTUNITIES AND CHALLENGES

The table below gives the matrix of strength, weaknesses, opportunities and challenges of different critical issues on the control of dog-mediated human rabies in the country.

Table 4: Strength, Weaknesses, Opportunities and Challenges

Key issue	Strength	Weakness	Opportunities	Challenges
Availability and accessibility to anti-rabies biologicals and vaccines	<ul style="list-style-type: none"> • Presence of well structured human health delivery facilities • Existence of legal framework for regulation of biologicals and vaccines • Presence of Public-Private Partnership Policy (PPP policy). 	<ul style="list-style-type: none"> • Inefficient cold chain system in animal sector especially at grass root level • Limited access of biologicals in rural areas. • Poor knowledge on availability of PEP services • Inadequate supply of human and animal anti rabies vaccine 	<ul style="list-style-type: none"> • Availability of efficient biological and vaccine in the free market • Decentralised government structures • Availability of alter-native sources of electrical power • Presence of OIE vaccine bank • Possibility of local vaccine production 	<ul style="list-style-type: none"> • Inadequate power supply • High cost of PEP • Low priority of Rabies in councils and facility planning • Inadequate skilled manpower
Laboratory diagnostic capacity	<ul style="list-style-type: none"> • Presence of diagnostic laboratory infrastructures at district, regional, zone and national levels • Presence of trained and trainable laboratory technologists at various levels 	<ul style="list-style-type: none"> • Inavailability of WHO-approved vaccines • Poor infrastructure in the rural areas • Inadequate numbers of public and animal health/livestock extension staffs at various levels • Inadequate laboratory equipment and re-agents • Inadequate skills and knowledge • Inadequate funding of laboratories 	<ul style="list-style-type: none"> • Presence of laboratory technology training institutions • Availability of utility services (electricity & water) in all the districts and regions • Collaboration with international laboratories 	<ul style="list-style-type: none"> • Low diagnostic capacity • Dilapidated laboratories • Unreliable power supply • Improper sample collection, preservation and submission • High laboratory maintenance cost

<p>Rabies Surveillance and outbreak reporting and response</p>	<ul style="list-style-type: none"> • Presence of disease surveillance and reporting systems in the human and animal sectors • Availability of health and livestock extension staffs at various levels • Presence of well structured health delivery facilities • Clear government structure from lower levels to national level • In-country vaccine production unit • Presence of mobile and computing platforms for surveillance • Presence of One Health Coordination Desk at the Prime Minister's Office 	<ul style="list-style-type: none"> • Predominantly paper based reporting system especially in animal sector • Uncoordinated response by various sectors • Inadequate ICT knowledge • Inadequate ICT equipments • Lack of adequate funding 	<ul style="list-style-type: none"> • Presence of ICT technology and infrastructure • Decentralised government system 	<ul style="list-style-type: none"> • Inadequate responsive rural infrastructure for outbreak response • Inadequate data collection tools • Inadequate skills for data collection and simple analysis
<p>Research on rabies in Tanzania</p>	<ul style="list-style-type: none"> • Presence of research institutions and scientists • Presence of higher learning Institutions • Availability of diagnostic laboratories 	<ul style="list-style-type: none"> • Inadequate local government funding for research activities. • Lack of a rabies re-search agenda 	<ul style="list-style-type: none"> • Presence of National COSTECH • Possibility for commercialising re-search findings • Presence of partnership and collaboration with international partners 	<ul style="list-style-type: none"> • Inadequate funding • Intellectual neglect of research on rabies

<p>Advocacy, communication and social mobilisation on rabies prevention and control</p>	<ul style="list-style-type: none"> • Presence of ICT infrastructure • Presence of various media outlets • Good coverage of mobile networks • Existing school health program 	<ul style="list-style-type: none"> • Inadequate knowledge on availability of PEP services • Inadequate knowledge on availability of dog vaccines • Lack of rabies awareness • Unclear legal frameworks to use mobile communication providers for public service announcement 	<ul style="list-style-type: none"> • Possibility of increasing rabies awareness through media use • Possibility of real time communication • Presence of public private partnership • High demand for rabies awareness information 	<ul style="list-style-type: none"> • Lack of adequate funding for awareness creation • Inadequate infra-structure in some places
<p>Partnership and Intersectoral collaboration</p>	<ul style="list-style-type: none"> • Presence of One Health Coordination Desk • Presence of multi-sectoral MOU for participating sectors • Existence of National Rabies Control Committee (NRCC) • Existing collaboration with other organisation (internal and external) 	<ul style="list-style-type: none"> • Inadequate engagement of some partners 	<ul style="list-style-type: none"> • Possibility of multisectoral collaboration 	<ul style="list-style-type: none"> • Changing landscape of partners

Resource mobilisation (funds and skilled man power)

- Presence PPP policy and players
- Presence of medium term expenditure frame work (MTEF)
- Presence of local government structures
- Availability of multi-sectoral resource mobilisation strategy

- Unproportionate allocation of resources by government (MTEF, CCHP, CHOP)
- Low disposable in-come of the masses
- Low philanthropic spirit (willing to contribute money) among the public

- Possibility of involving private entities
- Possibility of local governments to mobilize resources

- Inadequate funding
- Poverty
- Weak internal sources of revenue for rabies

CHAPTER THREE



STRATEGIC FRAMEWORK

3.1 GUIDING PRINCIPLES OF THE RABIES CONTROL STRATEGY

- i. Rabies control is a public good
- ii. Elimination of dog-mediated human rabies in Tanzania is a multi-sector activity
- iii. Rabid domestic dogs transmit at least 98% of human rabies in Tanzania
- iv. In East Africa and Tanzania in particular, rabies cycles are mainly maintained by domestic dogs.
- v. Sustained annual mass dog vaccination (at least 4 consecutive years) of greater than 70% of dog population greatly controls rabies in domestic dogs, and subsequently in humans and other domestic animals.
- vi. More than 70% of dogs in Tanzania are owned and are accessible for parenteral vaccination.
- vii. Rabies elimination through mass dog vaccination is a cost-effective strategy, saves lives and results in a decline of the use of costly human post exposure prophylaxis (PEP).

3.1.1 Vision

A nation free from rabies

3.1.2 Mission

To control and ultimately eliminate human rabies in Tanzania

3.1.3 Goal

To eliminate and maintain freedom from dog-mediated human rabies in Tanzania

3.1.4 General Objective

To eliminate and maintain freedom from dog-mediated human rabies by the year 2030

3.2 KEY STRATEGIC OBJECTIVES FOR RABIES CONTROL AND ELIMINATION

The following key strategic objectives will be addressed in the rabies control and elimination strategy namely;

	Strategic priority	Objectives
3.2.1	Prevention of human rabies	<ul style="list-style-type: none"> a) To increase number of health facilities providing Rabies Post-exposure vaccine to at least four facilities in each district council by 2020 b) To ensure Rabies Immunoglobulin is available at identified rabies referral health facilities c) To ensure sustainably availability of rabies Post-exposure among facilities d) To provide Pre-exposure prophylaxis to all at risk group e) To increase knowledge and skills among and early treatment healthcare providers on managing bite victims
3.2.2	Control and eliminate dog rabies	<ul style="list-style-type: none"> a) To conduct mass dog vaccination targeting greater than 70% of dog population coverage annually for five consecutive years. b) To conduct intensive community sensitization through different media outlets c) To carry out dog population management practices d) To ensure the presence of an updated dog register which will be handled by DVOs e) To enforce legislation and by-laws which insist on responsible dog ownership. f) To increase awareness to the communities on canine rabies control.
3.2.3	Strengthen Rabies Surveillance Using the One-Health Approach	<ul style="list-style-type: none"> a) To strengthen the existing surveillance system for early detection, collection, storage, reporting and evaluation of data b) To enhance a responsive cross border surveillance system between countries c) To enhance community surveillance system across the country using one health approach.

	Strategic priority	Objectives
		<ul style="list-style-type: none"> d) To adopt ICT technologies and other electronic platforms by both the human and animal sectors to collaboratively manage surveillance data. e) To strengthen laboratory capacity for rabies diagnosis. f) To involve private sectors as partners in surveillance. g) To ensure that Integrated Bite Cases Management is developed and implemented
3.2.4	Strengthen institutional capacity for control and eventual elimination of rabies	<ul style="list-style-type: none"> a) To increase awareness among local leaders in different communities b) To train vaccination teams on vaccination standard operating procedures c) To develop and implement protocols for vaccination d) To ensure availability of essential resources for rabies vaccination campaign e) To encourage public-private partnership (PPP) and protocols and overheads promote exchange of knowledge,
3.2.5	Conduct Rabies operational research	<ul style="list-style-type: none"> a) To conduct and promote operational research to support implementation
3.2.6	Conduct Advocacy, Communication and Social mobilization on rabies	<ul style="list-style-type: none"> a) To increase awareness of rabies prevention and control at all levels b) To advocate rabies prevention and control to policy makers c) To improve community participation in rabies prevention and control
3.2.7	Enhance Partnerships and Inter-Sectoral Collaboration	<ul style="list-style-type: none"> a) To enhance partnerships and multizsectoral collaboration among government, NGOs and private sectors for successful implementation of the rabies control program b) To establish a functional multi-sectoral rabies coordinating body to oversee the rabies control program at all levels

	Strategic priority	Objectives
3.2.8	Strengthen Mechanism for Monitoring and Evaluation of Rabies Control Programme.	a) To enhance routine data collection procedures for monitoring and evaluation purposes b) To increase the capacity of local governments in evaluating control interventions
3.2.9	Enhance Resource Mobilisation for Rabies Control and Elimination	a) To mobilize resources to support rabies elimination program b) To attract interested development partners to participate and manage aspects of the program

➤ Prevent Human rabies

Strategies for the prevention of human rabies are aimed at protecting those at highest risk of exposure, post exposure treatment and supportive management for the clinically ill individuals. Specific activities will include;

- Early and appropriate post-exposure treatment
 - i. Local treatment of bite wounds; Reducing the rabies virus at the site of bite by washing the wound using soap and water for 15 minutes.
 - ii. Rabies Immunoglobulin (RIG) for high-risk exposures such as those with severe bites to head and neck; provision of the anti-rabies immunoglobulin for passive immunity before the vaccine takes effect will be strengthened.
 - iii. Human anti- rabies vaccines; use of the cell culture vaccines based on the management guidelines will be enhanced and acceleration of the transition towards intra-dermal vaccination as recommended by the World Health Organization.
- Pre-exposure vaccination-
 - i. Pre-exposure vaccination will be provided to high risk groups like laboratory staff handling the virus and potentially infected materials including veterinarians, animal handlers and catchers, wildlife wardens and quarantine officers.
- Education and training
 - i. Training the public and public health workers on proper dog bite wound cleaning and management, and recognition of suspect rabid animals based on bite history.
 - ii. Continuous education of health professionals on proper dog bite wound cleaning and management including PEP is necessary for effective prevention of human rabies.

- iii. Development and implementation of a primary school animal welfare curriculum/addendum, which includes a chapter about rabies, and dog, bite prevention.

➤ **Control and eliminate dog rabies**

In Tanzania domestic dogs are the main source of infection to humans, with at least 98% of human rabies cases attributable to rabid domestic dogs. The principal method of dog rabies control is mass vaccination, and has been successfully used to eliminate rabies in areas including Malaysia, Philippines, Tunisia, Western Europe and North America, among others.

The World Health Organization recommends the critical percentage of dogs that need to be vaccinated to prevent rabies cases and outbreaks should be at least 70%. This target coverage has been supported by empirical evidence and theoretical observations worldwide investigating the relationship between vaccination coverage and reduction in rabies incidence.

Rabies control and elimination in Tanzania will therefore be achieved through mass dog vaccination campaigns, targeting 70% and above vaccination coverage annually for at least 4 years followed by a maintenance phase. Dogs of all ages will be vaccinated and responsible dog ownership practices such as registration and ensuring annual vaccination for owned dogs will be promoted.

Specific activities will include; Mass dog vaccination

- i. To conduct mass dog vaccination targeting greater than 70% of dog population coverage annually for four consecutive years.
- ii. To conduct intensive community sensitization through radio, TV, posters, mobile phone texts and using public announcement systems in communities, primary schools, churches, mosques, market places, hospitals and other institutions.

Dog population management

- i. Dog population management comprising education, responsible dog ownership, legislation, registration, sterilization, holding facilities, euthanasia of suspect rabid dogs and in-contact dogs.
 - Have an updated register of dogs which will be handled by DVOs. The register should indicate the dog owner, address and number of dogs.
 - Enforce legislation and by-laws which provide renewable permits for keeping dogs obtained from DVOs indicating the number of dogs to be kept. The by-laws should also state the responsibility of dog owners. The by law should state the penalty in case of failure to comply.
 - Holding facilities: to encourage LGAs and the private sector to establish holding facilities for stray dogs.

- Sterilization: There should be free or low-cost campaigns for free-roaming dog sterilization.
- Ensure controlled access to food leftovers through fencing of dumping areas/ slaughter houses/slabs and proper disposal and management of solid waste.

Education/awareness creation

- i. Education to the community's dog owners and non-dog owners through village meetings, primary school education programs, special TV & Radio programs, posters, other media channels and leaflets in public places.

➤ **Strengthen Rabies Surveillance Using the One-Health Approach**

Effective rabies surveillance in humans and animals allows early detection and reporting of cases, and is vital for initiating timely responses and enabling informed decisions about when and where to intensify rabies control efforts.

Surveillance is essential in generating data to monitor progress or impact of the control efforts, which is essential for their sustainable implementation. As control efforts progress towards rabies elimination, surveillance becomes even more critical in ascertaining rabies free status. Any suspected rabies case can be reported by anyone at the nearest Veterinary Office of the Local Government Authority (LGA), the event shall in turn be reported to the District Veterinary Officer (DVO). The DVO shall investigate the case and report the matter to the ZVC who then reports to the Epidemiology Unit of the Ministry of Livestock and Fisheries (MoLF). The ZVCs in Tanzania are strategically placed to reach any suspected outbreak site within 24 hours.

On the human side, rabies is a notifiable zoonotic disease (required to be reported within 24 hours upon emergence) and is incorporated into the National Integrated Disease Surveillance and Response (IDSR) and the electronic version of it (eIDSR) through mobile phones. Under this system, health facilities submit reports to DMOs who are obliged to submit weekly disease status reports to RMOs. RMOs in turn report to the Epidemiology Unit of the MoHCDGEC. Moving forward, the eIDSR approach should be promoted because of its speedy submission of information for timely action.

Success of any multisectoral zoonotic collaboration is reliant on communication between public and animal health stakeholders to combat priority zoonotic diseases, and implement robust national strategies on the prevention, detection and control of zoonotic pathogens. In Tanzania a One-Health Unit has been established and efforts are underway to develop an integrated zoonotic diseases surveillance guideline in which rabies is prioritized for effective surveillance and control.

Capacities will be built to ensure samples, diagnoses and feedback are handled in a timely manner to allow fast decision making through:

- Strengthening of existing surveillance system. This will involve enhancing monitoring and early detection of disease, collecting, storing, reporting and evaluating data on animal bites, rabies cases in humans and animals as well as surveillance for adverse events following vaccinations. Cross border surveillance will also be a key component.
 - Sensitization and rabies awareness creation to dog owners and community.
 - Use and harmonize ICT technologies and other electronic platforms by both the human and livestock sectors to collaboratively manage surveillance data.
 - Strengthening of the laboratory diagnostic capacity for humans and animal rabies.
 - Involvement of government, private sector, NGOs and the community as partners in surveillance.
- **Strengthening institutional capacity for control and eventual elimination of rabies**
Outbreak response will be coordinated to involve both human and animal health personnel as well as private actors.

Activities will include:

- Sensitization of local leaders and community through mass media, meetings, posters, loudspeakers, leaflets and mobile phones messages
 - Training vaccination teams on vaccination standard operating procedures
 - Development and implementation of protocols for vaccination
 - Development of the outbreak preparedness and response plan
 - Ensure availability of resources essential for rabies vaccination such as vaccine and vaccination teams
 - Build instructional capacity to ensure mass dog vaccination is implemented (procure vaccines, overheads etc)
 - Encourage public-private partnership and promote exchange of knowledge, protocols and overheads
- **Enhance Partnerships and Inter-Sectoral Collaboration**
Partnerships and multi-sectoral collaboration among government, NGO and private sectors will be required for successful implementation of the rabies control program and for best utilization of the available resources. Government agencies involved in rabies control include the ministries responsible for human health, animal health, education, finance wildlife services and administration (PO-RALG& PMO) will also be taken on board.

International organizations like World Health Organization (WHO), World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO) and Centers for Diseases Control and Prevention (CDC) are also important in giving technical and financial support for the planning and implementation of the program.

A coordinating body, the National Rabies Task Force (NRTF), or a similar body, with representation from the various sectors involved in rabies control will be established at the national level. This multi-sectoral task force will provide stewardship and be responsible for the implementation of the different components of the National rabies elimination strategy. Primary Health Care (PHC) at regional, district and village levels will be strengthened to enable them oversee the rabies control activities in their respective areas.

➤ **Enhance Resource Mobilisation for Rabies Control and Elimination**

Resource mobilization means expansion of relations with the resource providers, and the skills, knowledge and capacity for proper use of resources. It denotes the process that achieves the mission and objectives of an organization through the mobilization of knowledge, use of skills, equipment, services etc. It also means seeking new sources of resource mobilization and maximising use of available resources.

Implementation of the rabies control and elimination strategy requires resources in a sustainable manner including human resources, infrastructure and finances. The major areas of spending will be procurement of diagnostics, vaccines, immunoglobulin, animal population control, operational research, surveillance, monitoring and supervision. A funding plan will be developed to ensure that funds are available for every stage of the plan.

Key features of resource mobilisation will be;

- Conduct mapping of potential funding donors at all levels and their areas of interest.
- Prepare proposals for resource mobilization and communicate to interested donors.
- Identify areas/gaps for funding at all levels (district, regional and national).
- Regularly prepare and update list of potential donor at all levels.
- Prepare and update a list of priority needs and share with donors.
- Improve cold-chain facilities at LGA levels (villages/wards/division).

➤ **Strengthen Mechanism for Monitoring and Evaluation of Rabies Control Programme**

It is only through data collection that progress can be evaluated. Collection of baseline data is critical to define the initial situation before intervention measures commence. As intervention measures are instituted, collection and evaluation of data is essential to determine whether progress has been made, where canine rabies still exists and needs more attention, and if other measures are required.

Routine monitoring, periodic assessment and evaluation will be done by the program at all levels to ensure implementation as per plan. A set of objectively verifiable indicators will be used to measure progress and assess the achievement of the elimination program in line against specific milestones.

External independent evaluation will be done to assess the progress and thereby indicate necessary modification in strategies of program implementation.

Key features of the monitoring and evaluation will include;

- Collation of data on the human population
- Collation of data on the dog population
- Collation of data on vaccination coverage and percentages
- Collation of post vaccination transect data
- Collation of data on health economics of rabies control
- Collation of data on animal bite cases, human rabies cases and deaths
- Collation of data on PEP deliveries and usage
- Collation of data on animal rabies cases and submissions for diagnosis
- GIS data and topography

Action points for monitoring and evaluation

- Community sensitization (media, school programs, religious leaders, traditional key in-formants, influential people)
- Developing data collection tools
- Building capacity for data collectors (skills and accessibility)
- Merging data collection tools (to meet with other available tools)
- Identifying areas for data collection (communities, sectoral level)
- Capitalizing on the ICT tool for data collection (mobile phone surveillance system) and management already in place for timely data collection

Stakeholders

- Communities (pupils, elders, dog owners)
- Political leaders
- Religious leaders
- Local government authorities (Health workers, Livestock field officers, community health workers)
- Private animal practitioners
- Herbalists or Traditional Healers

CHAPTER FOUR



IMPLEMENTATION PLAN OF THE STRATEGY

4.1 IMPLEMENTATION APPROACH

This strategy is based on the stepwise approach (SA) as recommended by FAO/GARC. The Stepwise Approach towards Rabies Elimination (SARE) is a comprehensive risk-based model that proposes a graduated approach in the reduction of disease risk, allowing for regional or synchronized activities towards disease elimination. The Rabies SARE consists of six stages (stage 0 to 5).

Each stage has a set of activities that build on each other to continuously reduce the risk of disease, with the area and or country being declared completely free of dog mediated human rabies when it reaches stage 5.

The 6 stages are summarised below;

- Stage 0:** Rabies suspected to be present but limited information is available,
- Stage 1:** Development and adoption of the National Rabies elimination strategy
- Stage 2:** Implementation of the National Rabies Elimination Strategy in pilot areas,
- Stage 3:** Rabies risk reduction through full scale implementation of the strategy
- Stage 4:** Maintaining freedom from dog mediated human rabies and canine rabies
- Stage 5:** Declaration of freedom from canine rabies

Tanzania is currently at stage 1. For the country to move from one stage to the next one, a set of targets must be reached and verified. For example, to move from stage 1 to stage 2, the country must have developed a national rabies control and elimination strategy. Figure 6 summarises the SA for rabies Tanzania.

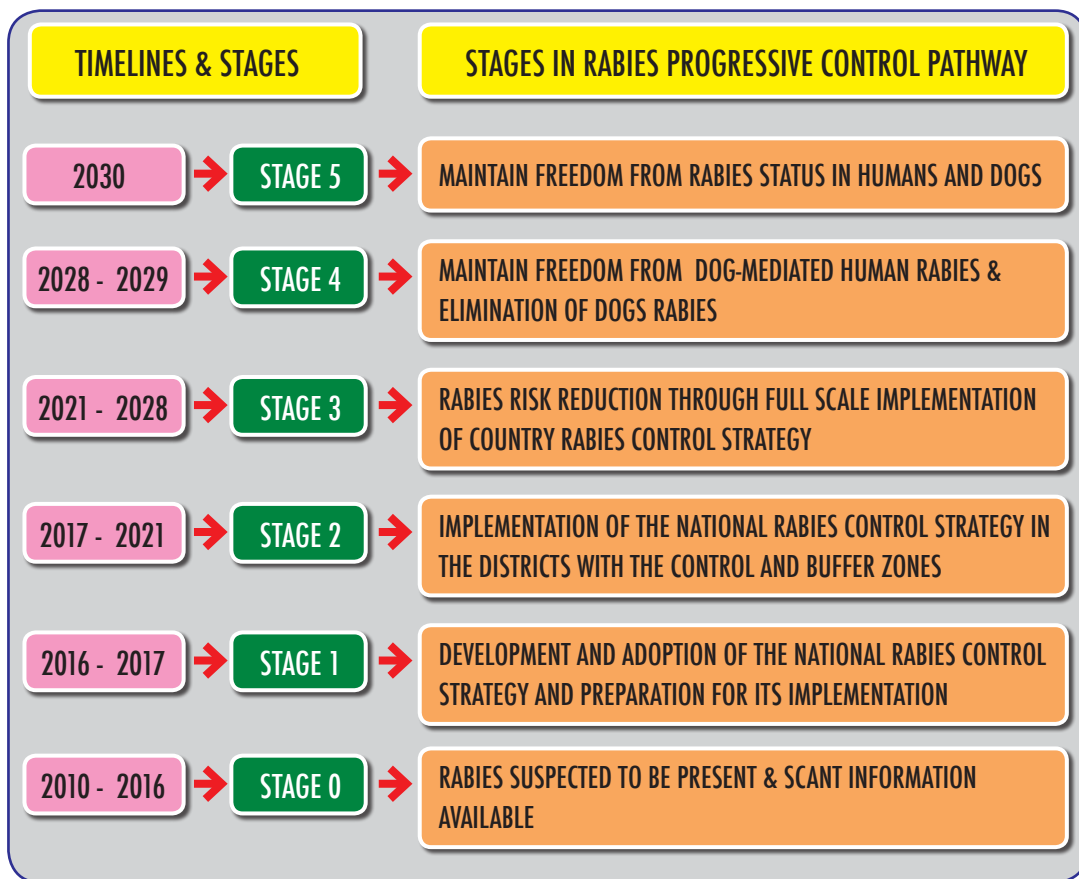


Figure 6: Stages of the stepwise approach for the control and elimination of rabies

4.2 STAGE 1 (2010-2016): PLANNING FOR IMPLEMENTATION OF THE STRATEGY

4.2.1 Establishment of a National Rabies Control Committee (NRCC), or a similar body

The elimination of rabies requires the working together of different sectors within government, non-government organizations, teaching and research institutions, international partners and the public. To coordinate the implementation of the strategy, an inter-sectoral NRTF will be established, comprising of representation from various organizations including;

- Ministry of Health, Community Development, Gender, Elderly and Children and Ministry of Livestock and Fisheries
- Ministry of Natural Resources and Tourism
- President's Office, Regional Administration and Local Governments

- Ministry of Education, Science and Technology
- Research / Training institutions/ Non-Governmental Organizations involved in rabies activities
- Representation from International and regional organizations e.g. FAO, WHO, OIE, CDC, AU-IBAR, SEARG.
- Human and animal health professional associations
- Prime Minister's Office- One Health Coordination Desk

NRCC or a similar body will advise the One Health Coordination Desk on all rabies activities.

To implement the rabies elimination strategy at sub-national level, rabies agenda will be main-streamed into the existing Primary Health Committee (PHC) at the lower levels (region, district, and village levels. However at the village level apart from PHC, Rabies Action Groups will be formed at hamlet level. The NRTF or a similar body will coordinate activities (Figure 7) for these groups to ensure there is progress of the rabies activities as well as coordinate logistical issues where applicable.

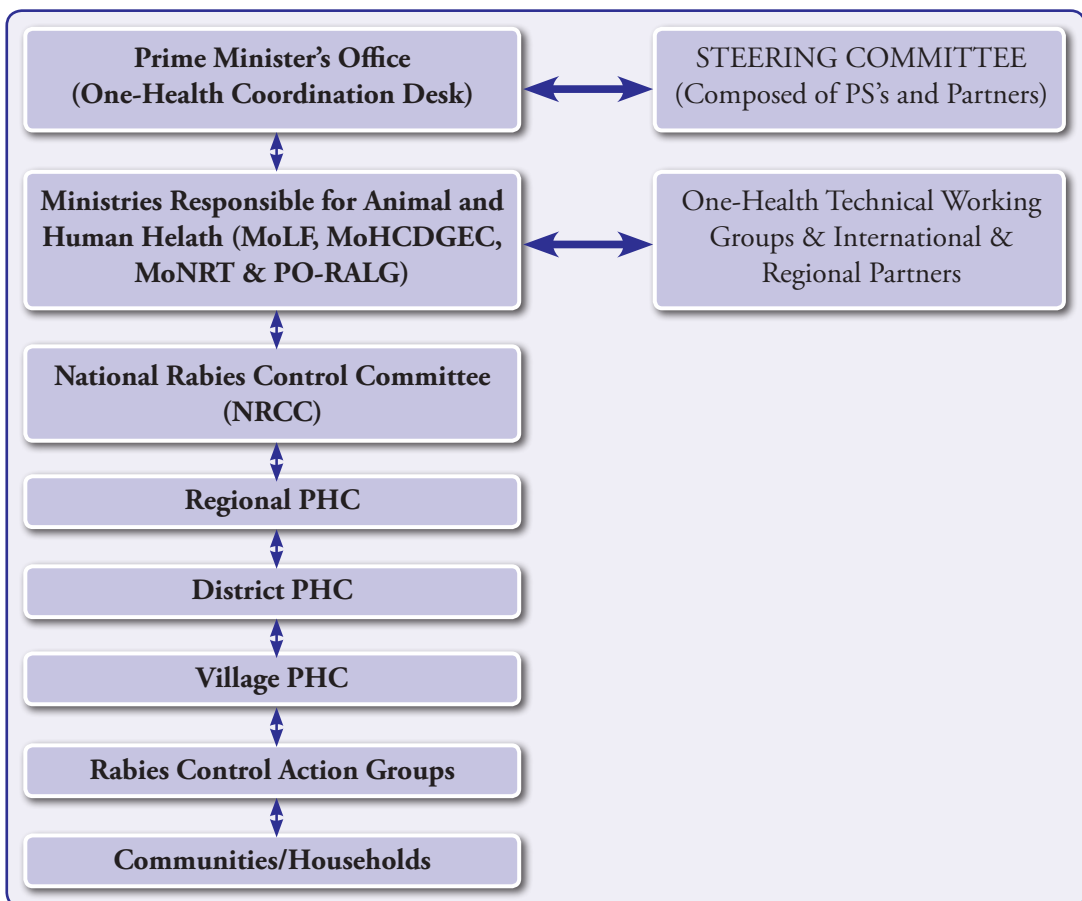


Figure 7: Schematic diagram showing the coordination structure of the National Rabies Control and Elimination Strategy

4.1.2 Roles of The National Rabies Control Committee (NRCC), or similar body

The terms of reference will include:

- Overall responsibility for implementing rabies control strategy (administrative)
- Provide guidance to various rabies committees at lower levels.
- Resource mobilization
- Training and capacity building
- Internally monitor (progress reports) implementation of the strategy
- Receive and review reports from lower level sub-committees,
- Provide technical advice on rabies to the nation.
- Provide regular update to the public and stakeholders on implementation of the rabies and elimination strategy.
- Propose changes and amendments of regulations and laws on rabies control
- Advise the Permanent Secretaries on issues pertaining to rabies

4.1.3 Mainstreaming of Rabies Agenda into One Health Committees at all levels (Regional and District OHC-ROHC & DOHC)

These committees will be empowered to coordinate activities of the rabies elimination strategy. The chairs of the RPHC & DPHC are normally the Regional and District Commissioners' respectively.

The ROHC & DOHC will comprise of the following;

- Health officers
- Clinicians
- Veterinary Officers
- Livestock Field Officers
- Education officer
- Natural Resources and Tourism Officers
- Representatives from Non-Governmental Organizations/Community-Based Organizations/ Faith Based Organisations
- Representative from the private sector
- Representative from the community

4.1.4 Additional Roles of regional, district and village OHC

In addition to their normal roles, the OHC will be charged with the following additional responsibilities;

- Coordinate rabies elimination strategy activities in their respective level (regional and district.)

- Monitor and provide progress report on the implementation status and progress according to the monitoring framework.
- Resource mobilization
- Advocacy
- Supervise activities of the lower level rabies working group
- Provide regular updates to the public on progress of the Rabies elimination strategy

4.1.5 Establishment of Rabies Action Groups (RAG):

Rabies action groups shall be formed in villages at hamlet levels. Each RAG will elect a chairperson who will be officially recognised by the village government. Membership of RAG will be open to all villagers regardless of their dog ownership status.

4.1.6 Roles and responsibilities of RAGs

- Participate in implement activities of the Rabies control and elimination strategy at village level
- Publicity and awareness creation
- Resource mobilization
- Provide regular reports on the status of the rabies at community level
- Participate in various activities of the strategy at their level such as, MDV, dog population management activities, studies and surveys, PEP etc.

4.1.7 Rabies Control and buffer zones

In order to enable easy implementation of the strategy the country will be divided into seven zones namely A, B, One, Two, Three, Four and Five as shown in the Figure 8 below;

- **Zone A** -This is the former WHO/BMGF-funded rabies elimination and demonstration project area in the regions of Lindi, Mtwara, Pwani, Dar-es-salaam, and Morogoro. The areas have natural barriers e.g. water bodies, highway roads and game controlled area and national parks which makes free movement of dogs difficult and therefore may reduce the transmission of rabies in and out of the selected areas. Administratively the area is subdivided into 25 LGAs, 564 wards and villages / streets. The area is estimated to have **2,195,370** households with a total population of **8,828,838** people among them **4,546,505 (51.50%)** are women and **4,282,333 (48.50%)** are men (2012 pop census). The dog population is estimated to be between **150,000 and 200,000** with **1:44** (dogs-to-humans ratio) in the main-land and **1:104** (dogs-to-humans ratio) in the Pemba Island (where the human population is about 472958 and the dog population is about 3777 (National Bureau of Statistics and Office of the Chief Government Statistician 2013).
- **Zone B: The Serengeti Carnivore Project Area**-This area covers eleven (11) LGAs within the Serengeti Ecosystem and includes LGAs of Bariadi, Tarime, It-ilima, Serengeti, Meatu, Musoma, Bunda, Maswa, Ngorongoro, Rorya and Bu-tiama. The area is estimated to

have a population of **3,164,341** people among them **1,643,214 (51.93 %)** are women and **1,521,107 (48.07 %)** are men (2012 pop census). The dog population is estimated to be **446,266** with **1:7.09** dogs: human population ratio.

- Zone One:-** This area will cover an area surrounding the former WHO/BMGF project area and will include forty six 46 LGAs of Bagamoyo, Iringa, Lushoto, Njombe Urban, Tunduru, Korogwe, Mufindi, Songea, Wanging'ombe, Iringa MC, Mbinga, Muheza, Kilolo, Njombe, Songea Urban, Tanga City, Ludewa, Mafinga TC, Namtumbo, Handeni, Makambako TC, Nyasa, Kilindi, Mkinga, Korogwe TC, Handeni TC, Kilosa, Gairo and Pangani, Kigamboni, Ubungo, Masasi TC, Newala TC, Nanyamba TC, Chalınze, Kibiti, Mafia, Malinyi, Ifakara TC, and Unguja 7LGAs:-North A, North B, South, Central, West and Urban. The area is estimated to have a population of **6,084,821** people among them **3,136,474 (51.55 %)** are women and **2,948,347 (48.45 %)** are men (National Bureau of Statistics and Office of the Chief Government Statistician 2013). The dog population is estimated to be **524,039**. This area will act as buffer zone for the zone A which is the former WHO/BMGF project area with **1:11.6** dogs: human population ratio
- Zone Two: -** This is an area which lies on the East of the Serengeti Carnivore Project area and will include sixteen (16) LGAs in the Northern Tourist Corridor namely; Monduli, Rombo, Meru, Arusha Urban, Karatu, Moshi, Hai, Arusha, Moshi MC, Longido, Siha, Babati, Mbulu, Simanjiro, Kiteto and Babati Urban, Mwangi DC, Same DC and Hanang DC. The area is estimated to have a population of **3,763,573** people among them **1,943,847(51.65 %)** are women and **1,819,726(48.35 %)** are men (**2012 pop census**). The dog population is estimated to be **473,264**. This area will act as buffer zone for the zone B which is the current Serengeti Carnivore project area with **1:4.11** dogs: human population ratio.
- Zone Three:-**This is an area which lies on the South and South-West of the Serengeti Carnivore Project. It includes twenty nine (29) LGAs of Iramba, Kon-doa, Nzega, Shinyanga Urban, Igunga, Kishapu, Magu, Mpwapwa, Mwangi, Sin-gida, Kongwa, Nyamagana, Same, Shinyanga, Uyui, Chamwino, Kwimba, Sin-gida Urban, Busega, Ikungi, Sengerema, Ilemela, Mkalama, Tabora MC, Chemba, Misungwi, Kilosa, Gairo and Hanang. This area is estimated to have a population of **8,637,217** people among them **4,421,818(51.20 %)** are women and **4,215,399(48.80 %)** are men (National Bureau of Statistics and Office of the Chief Government Statistician 2013). The dog population is estimated to be **1,007,199** with **1:8.58** dogs: human population ratio
- Zone Four:-** This area will include twenty six (26) LGAs of Geita, Karagwe, Ki-bondo, Bukoba, Kasulu, Nyang'wale, Kigoma, manyoni, Mbogwe, Muleba, Biha-ramulo, Bukombe, Kahama, Urambo, Chato, Dodoma City, Kahama TC, Ngara, Sikonge, Bahi, Buhigwe, Kakonko, Kaliua, Misenyi, Kasulu TC and Kyerwa. This area is estimated to have a population of **7,680,534** people among them **3,920,546(51.04 %)** are women and **3,759,988(48.96 %)** are men (**2012 pop cen-sus**). The dog population is estimated to be **1,018,095** with **1:7.54** dogs: human population ratio.

- Zone Five:** - This area will include sixteen (16) LGAs in the South-Western Tour-ist Corridor namely Chunya, Kalambo, Mbeya, Sumbawanga Rural, Kyela, Makete, Nkasi, Rungwe, Sumbawanga Urban, Ileje, Uvinza, Mbozi, Mbarali, Momba, Mpanda and Mlele. The area is estimated to have a population of **4,171,718** people among them **2152468 (51.60 %)** are women and **2019250 (48.40 %)** are men (*2012 pop census*). The dog population is estimated to be **386,024** with **1:10.81** dogs: human population ratio.

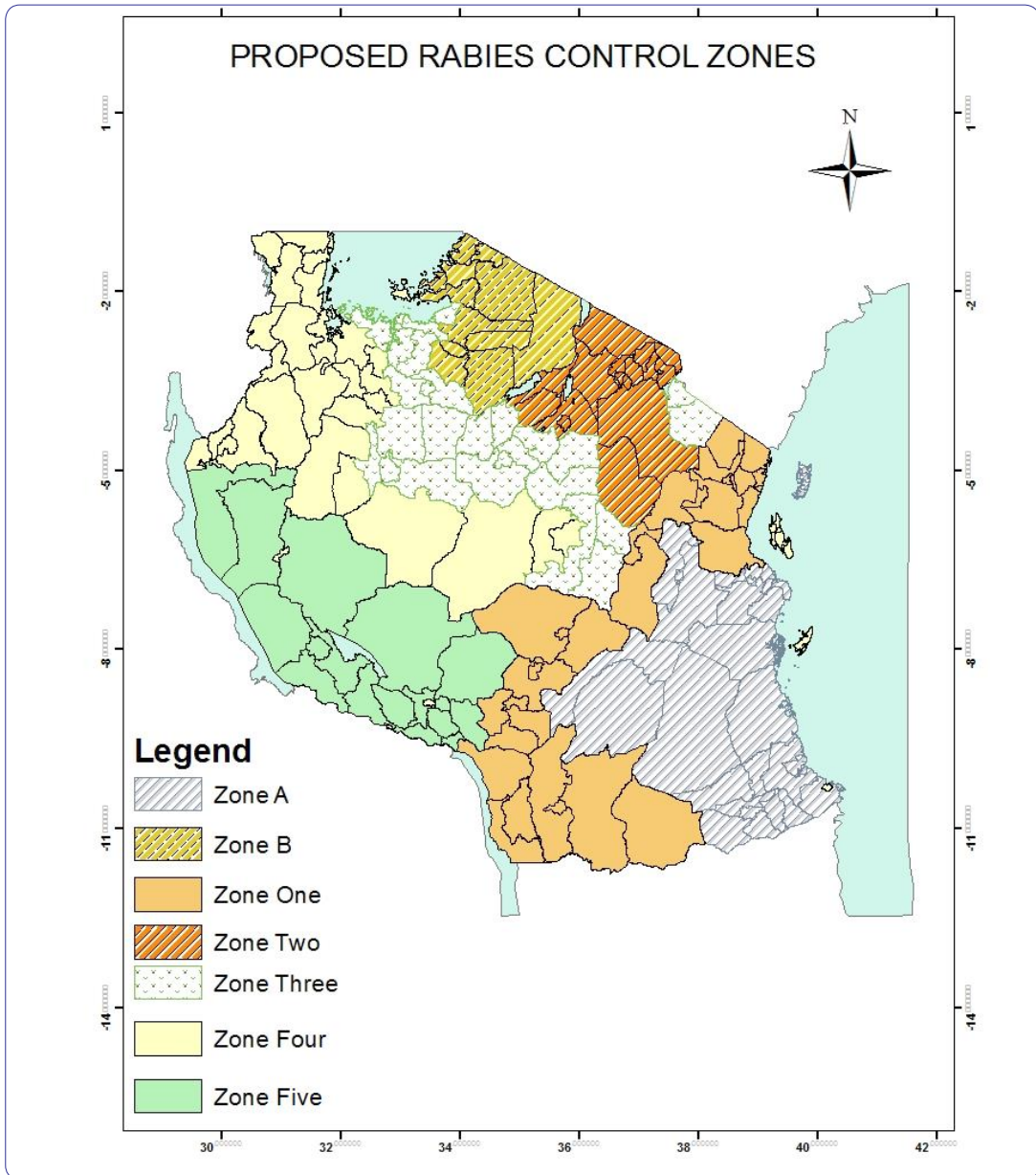


Figure 8: Map of Tanzania showing proposed zones for implementation of the Rabies Control and Elimination Strategy

4.2 STRENGTHEN SURVEILLANCE FOR RABIES USING ONE HEALTH APPROACH

Existing surveillance systems within the MoHCDGEC and MoLF will be strengthened to collect accurate and reliable data on Rabies in the control, buffer area and the country at large. Under the One Health approach, these two systems will be organised to facilitate communication between them. Within the MoHCDGEC, rabies surveillance will be implemented within the IDSR system and within the MoLF; surveillance will be done using the Event Mobile Application-i (EMA-i) reporting and laboratory surveillance systems. Additionally, based on the experience gained from the WHO/BMGF funded project the use Mobile phone data collection, storage and transmission will also be used. The surveillance data to be collected are illustrated in the table below;

Table 5: Surveillance data to be collected Data type

Data type	Data sources
Data on dog bites and suspected human and animal rabies cases	DVO, DMO, Health facilities, private practitioners, NGO's, community
Dog vaccination data and PEP usage	DVO, DMO, NGO's, D-PHC, V-PHC, RAG, private practitioners, chemists
Number of suspect rabies samples submitted and confirmed in the laboratory	DVO, D-OHC, V-OHC, RAG, ZVC, TVLA, Higher Learning Institution laboratories
Dog population data	DVO, V-PHC, RAG

Data from members of the community will be channeled to national level using two routes between sectors. In the animal sector it will go through village, ward, district, region and zones while in health sector, from village, to health facility, district and regional. The NRCC or a similar body will give regular feedback based on the surveillance data. Other activities include:

- Establish a national database on rabies based on the existing surveillance data.
- Improve capacity of the veterinary laboratories for rabies diagnosis.
- Prepare standardized tools for recording dog vaccination, provision of PEP, Immunisation status

4.3 RESOURCE MOBILISATION

- Enhance resource mobilisation that will enable implementation of strategic objective
- Attracting resources for procurement of rabies biological, conducting campaign
- Providing recommendations on increasing number of qualified staff for implementing strategic objectives

4.4 REVIEW AND DEVELOP GUIDELINES

Guidelines and other IEC materials will be developed and distributed to standardize implementation of the rabies activities across country. These guidelines include the following;

- Post-vaccination coverage guidelines and dog ecology survey guidelines
- Design of Mass Dog vaccination campaigns
- Animal (dogs & cats) handling guidelines during vaccination campaigns
- Outbreak response guidelines
- Rabies surveillance guidelines
- SOPs for Rabies suspect sample collection and transportation
- SOPs for Suspected rabies carcass handling and disposal procedures
- SOPs for PPE use when dealing with rabies suspected samples
- Animal (dog, cat etc) bite management guidelines
- Rabies management guidelines
- Protocol for providing pre-exposure prophylaxis to high risk persons/groups
- tray dog environmental control measures
- Responsible dog ownership
- Tools for Monitoring and evaluation

4.5 SUPPLY AND DISTRIBUTE BIOLOGICALS/VACCINES (ANIMAL & HUMAN) AND RIG

- Appropriate number of doses of dog anti-rabies vaccines to cover an estimated dog population present in a given area per year, at least for the first four years will be procured.
- Human and animal biologicals (vaccines and RIG) will be procured, LGA should set a ring fenced revolving funds for this purpose
- Engaging private sectors in the procurement and distribution of human and animal biologicals
- Following elimination, appropriate level of vaccine shall be maintained for minor outbreak responses and routine maintenance vaccinations.
- A vaccines procurement and supply plan will be developed at all levels.

4.6 CONDUCT AND PROMOTE OPERATIONAL RESEARCH

This is an important component of the strategy that will address the following key information gap areas and will be based on operational research guidelines

- Baseline survey on animal bites and rabies cases
- Household surveys on dog populations, ecology and demography
- Socio ecological studies, socio-cultural factors, dog management and ownership practises
- Assessment of the healthcare seeking behaviour of the community
- Promote research on PEP schedule and PEP follow-up studies
- Dog vaccination coverage studies
- Mapping of rabies biological supply chains
- Rabies baseline surveys (disease burden demographics, knowledge attitude and practices studies)
- Studies on the basic parameters of dog populations (size, turnover, accessibility and ownership status) in different dog sub-populations
- Studies on stray dog population specifically; identifying factors and sources, estimating numbers, distribution, and ecology
- Post vaccination surveys (vaccination coverage)
- Impact assessment surveys (determine reduction in rabies incidence, PEP usage and cost analysis)
- Assessment of best approaches to increase awareness about rabies and to improve health-care-seeking behavior for PEP.
- Evaluation of the rabies surveillance system
- Socio-economic impact of rabies elimination
- Health utilization survey
- Studies on alternative communication and data collection technologies such as mobile phone surveillance, e-surveillance etc
- Genetic and molecular analysis studies
- Molecular epidemiology
- Vaccine effectiveness and costs effectiveness studies
- Risk factors

4.7 DEVELOP A RABIES COMMUNICATION STRATEGY

Early, regular and consistent involvement with the communities, media and other stakeholders will be necessary to ensure that reporting is responsible, accurate and informative, promoting awareness of the issues involved and ensuring that the necessary control measures are understood and accepted.

Key features of the communications strategy will include:

- Agreed key messages that cover several strands (awareness, risk reduction, context and proportionality, acceptance and support for government interventions)
- Public awareness campaigns to increase knowledge of the risks and risk reduction measures
- Targeted communications aimed at dog owners and those at higher risk of contact with suspect cases to facilitate cooperation with control measures, either voluntary or compulsory.
- Appropriate channels of communication will be identified for relaying key information to various audiences.
- Communications plan for each stage of an outbreak (suspect case, disease confirmed, during control measures, ongoing controls)

4.8 KEY INDICATORS IN STAGE 1

To move from Stage 1 to 2 the following will be the key indicators:

- National Rabies Control Committee is operational.
- Surveillance programme is able to capture about 80% of all cases
- Approved budget plan for vaccine procurement and distribution

4.9 STAGE TWO (2019 - 2021): IMPLEMENTATION OF THE ELIMINATION STRATEGY IN PILOT AREAS

This stage describes how the strategy activities will be rolled out in pilot areas of the country. The following activities will be conducted in the pilot areas;

- Mainstreaming rabies agenda into the existing R-OHC, D-OHC, V-OHC
- Creation of RAG at community level.
- Advocacy, communication and social mobilization
- Training of staff
 - o This will be conducted as part of building capacity for the implementation of the strategy. The guidelines for trainings will be developed by NRCC and implemented by the R-OHC and D-OHC.

- o The training will target animal and human health workers. These training will focus on: Dog vaccination campaigns, rabies surveillance, dog bite wound management, provision of rabies post exposure vaccine, laboratory diagnosis, community mobilization and sensitization, dog population management and responsible dog ownership
- Resource mapping of laboratory diagnostic and health facilities, staff establishments and cold chain facilities
- Procurement and distribution of both human and animal vaccines and other supplies
- Collating existing rabies related baseline data
- Enhancing existing rabies surveillance system in the control and buffer areas. This should incorporate modern technology including use of mobile phone based surveillance to improve reporting.
- Conducting mass dog vaccinations based on the guidelines
- Operational research
 - o Post vaccination surveys
 - o Impact assessment - the outcome measure in humans will be the number of animal bite cases, PEP usage and human rabies cases. In animals, the outcome measure will be the number of confirmed animal cases.
 - o Cost Analysis -Accurate records of all expenditures on rabies control efforts will be useful to perform the cost analyses during the implementation or at the end of the programme.
- Cross border engagements to reduce the risk of re-introduction of disease in the implementation areas
- Pre-positioning of the vaccines and other biological to regions and districts with vaccine storage facilities.
- Outbreak response in areas within and outside the control and buffer zones

4.9.1 Key indicators in stage 2

To move from stage 2 to 3, the following are the indicators

- 50-80% reduction in incidence of rabies in animal populations in the pilot area
- No human deaths due to rabies reported for 12 months in the pilot area

4.10 STAGE 3 (2021-2028): IMPLEMENTATION OF THE RABIES ELIMINATION STRATEGY OUTSIDE THE PILOT AREAS

In this stage, rabies control and elimination activities conducted in the pilot areas will be extended progressively to the rest of country. From the pilot areas (zone one and two), the country will be zoned into five (5) zones as shown in figure 8.0 above. The elimination

activities conducted in the pilot areas (zone one and two), will be rolled out in other areas of the country. Activities to be conducted here include;

- Rabies elimination activities similar to those conducted in the pilot areas.
- Routine dog vaccinations will continue in the pilot areas.
- Success of the implementation of the strategy, best practices and lessons learnt at the pilot sites during implementation will guide the roll out in the rest of the country.

4.10.1 International Cross Border Engagements

Zoo-sanitary controls at border crossings and ports of entry (e.g. zoo-sanitary inspection points, police check-points, harbours and airports) and road checks, including checks on dogs and cats will be strengthened.

4.11 IDENTIFICATION OF RABIES FREE ZONES

Vaccination of dogs will be discontinued in a defined area when there are no incidences of dog rabies reported for two years, provided adequate surveillance is in place. If there are no rabies cases within six months when vaccinations have been discontinued within an area/zone, then the area/zone will be declared as having achieved “freedom from rabies”. This will be self-declaration of freedom by the Director of Veterinary services as guided by the regulations for self-declaration.

Surveillance for rabies will be sustained and there will be adequate vaccine stocks and resources for emergency response for containment of new outbreaks if they occur. Advocacy, communication and social mobilization will continue in this phase.

4.11.1 Indicator to move from stage 3 to 4

- No dog-transmitted human rabies cases for 12 months
- 50-80% reduction in incidence of rabies in animal population

4.12 STAGE 4 (2028-2029) - MAINTAINING FREEDOM FROM DOG-MEDIATED HUMAN RABIES AND ELIMINATION OF CANINE RABIES

- Routine dog vaccinations
- Enough stocks of vaccines and biological for outbreak response
- Continue with surveillance
- Outbreak response plan – outbreaks addressed immediately
- Cross border surveillance -international
- Continue advocacy, communication and social mobilization

4.12.1 Indicator for movement from stage 4 to 5

- No human rabies cases or deaths for 12 months
- No dog rabies cases for 12 months

4.13 STAGE 5 (2029-2030) –MAINTAIN FREEDOM FROM RABIES IN HUMANS AND DOGS

In this stage, the country will be declared to be free from rabies and the DVS will apply for certification from international bodies. Surveillance will also be enhanced to detect new cases and timely response mounted.

4.14 VACCINATION IMPLEMENTATION OPTIONS

4.14.1. Overview of Tanzania : Area and population

Tanzania is a vast country with about 945,087 square kilometers and an estimated human population of about 50,045,131 people (National Bureau of Statistics and Office of the Chief Government Statistician 2013). The dog population by 2012 census was estimated at 2,316,000. Given the surface area it is important to divide the country into zones for implementation of the vaccination campaigns. The zones are as shown in Figure 7 below.

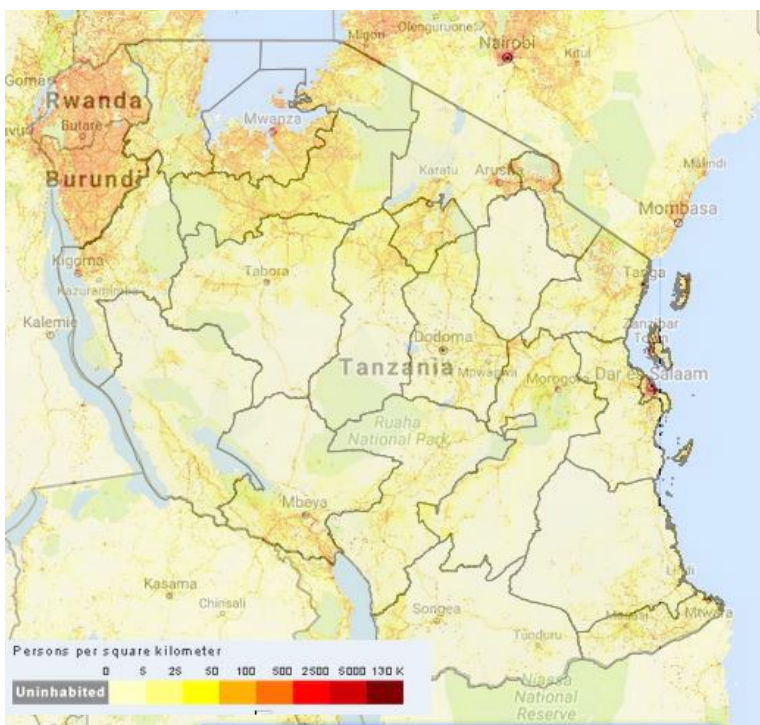


Figure 9: Human population distribution of Tanzania by the 2012 census shows the population distribution with most people concentrated along the coastal and lake zone as well as in the northern and southern highlands.

4.14.2 Past and current rabies control projects

Over the years there have been several systematic projects aimed at controlling rabies in strategic areas.

Serengeti National Park: There have been efforts to control rabies to protect wildlife in the Serengeti ecosystem through vaccination of dogs to prevent transmission of the disease to the wildlife.

Rabies Elimination Demonstration Project in Southeastern Tanzania and Pemba: this project started in 2010 and covered an area consisting of about 8 million people. It aimed to eliminate rabies through control of the disease in the dogs.

Other efforts by NGOs: there have been several efforts to control rabies through dog vaccinations, dog population management and advocacy. Most of these efforts are around the north and lake zones (Meru DC, Arusha City, Kahama and Shinyanga). Other NGOs have been involved in the isles, such as the World Animal Protection efforts in Unguja, Zanzibar.

4.14.3. Vaccination coverage/implementation options

Given the ongoing efforts in various places and the vastness of the country, it is challenging to implement campaigns throughout the country simultaneously. The country is thus divided into zones (Figure 7) and here we present possible vaccination coverage/implementation options.

Start with zones with highest human density first

To reduce human fatalities from rabies, we suggest implementing vaccination campaigns in zones with high human densities and where there have been rabies control activities recently or presently. From the population density map, these zones are Zone A, Zone B, Zone 1 and Zone 2. After this, vaccination campaigns should then focus on Zones 3, 4 and 5 by which stage the country will be fully covered and hence at stage 3 of the SARE framework (Refer to Figure10).

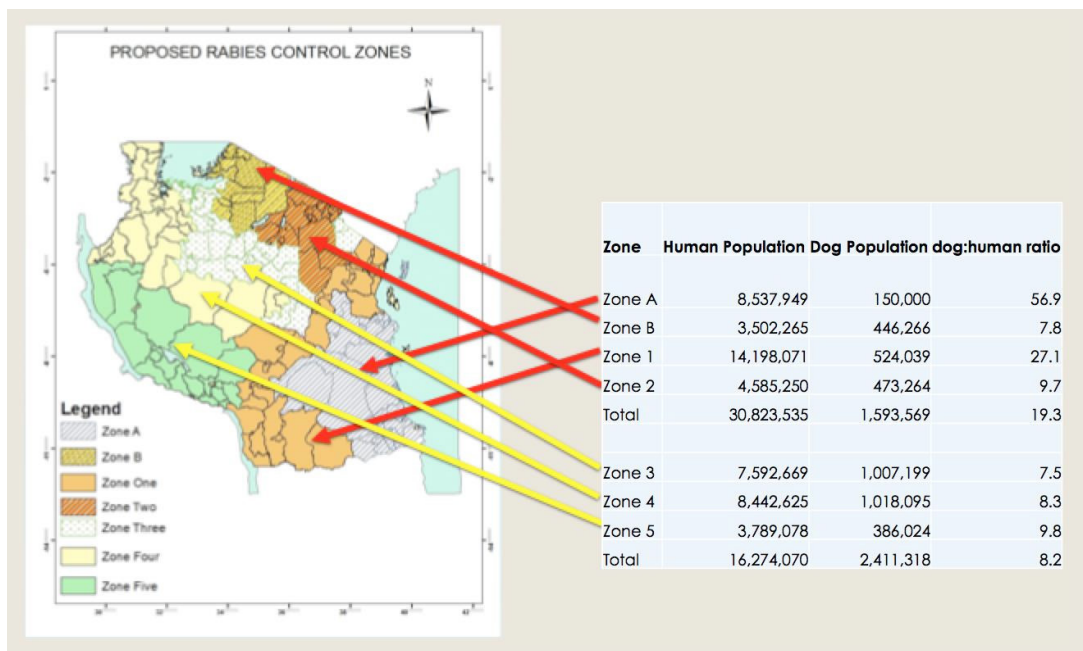


Figure 10: Plan for vaccination where zones with the highest density of human population are vaccinated first and then maintained for a rabies-free state while vaccination proceeds to zones with the lowest human population density.

4.14.4 Timing of vaccination phases in line with the SARE framework

2017 – 2023 : Zone A, Zone B, Zone 1 and Zone 2 (Stage 2 and 3 of SARE framework)

2024 – 2026 : Zone 3, Zone 4 and Zone 5 (Stage3 of SARE framework) while Zones A, B, 1 and 2 (Stage 4 of the SARE framework)

2027 – 2028 : All zones(Stage 4 of the SARE framework)

2029 – 2030 : All zones (Stage 5 of the SARE framework). See Figure 11 below.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
ZONE A	DV	DV	DV	DV	M	M	M	M	M	M	M	M	M	M
ZONE B	S	DV	DV	DV	DV	M	M	M	M	M	M	M	M	M
ZONE 1		S	DV	DV	DV	DV	M	M	M	M	M	M	M	M
ZONE 2			S	DV	DV	DV	DV	M	M	M	M	M	M	M
ZONE 3				S	DV	DV	DV	DV	M	M	M	M	M	M
ZONE 4					S	DV	DV	DV	DV	M	M	M	M	M
ZONE 5						S	DV	DV	DV	DV	M	M	M	M
											SARE Stage 4		SARE Stage 5	

DV - Dog Vaccination
M - Maintenance
S - Sensitization

Figure 11: Timing of vaccinations where zones with the highest density of human population are vaccinated first and then maintained for a rabies-free state while vaccination proceeds to zones with the lowest human population density.

NOTE:

The current assumption of the presented vaccination implementation options is that the vaccination campaigns will be centrally organized in terms of coordination and access to vaccines. However, LGAs capable of mobilizing funds for conducting vaccinations should do so in close and prior consultation with the lead ministry (MoLF).

CHAPTER FIVE

INSTITUTIONAL AND FINANCIAL ARRANGEMENT

5.1 INSTITUTIONAL ARRANGEMENT

The rabies control program/strategy will be implemented through the existing Central Government Ministries, Local Government Authorities and other stakeholders' structures and procedures. It will utilise existing staffing arrangements in these institutions. There shall be national rabies control committee, which will principally report to the ministries responsible for animal and human health and coordinated by One Health Coordination Desk at Prime Minister office. At regional, district and village levels the respective OHC will be responsible in their respective areas. At the levels of MoLF and MoHCDGEC in the Directorates of Veterinary Services and Preventive Services, respectively, there shall be a coordinator for overseeing the day-to-day activities of the programme. The One Health Coordination Desk – at the Prime Minister's office shall be coordinator of multi-sectorial activities for One Health. The programme will cover all the districts/LGAs of United Republic of Tanzania.

NOTE:

In the case of Zanzibar, the second part of the URT; (i) the executive agency/agencies shall be the responsible ministries of the RGZ (ii) policy, legislation, and laws/regulations purposive to the RGZ will apply.

Table 6: Institutional responsibilities and roles

Institution	Roles/Responsibility
Ministry responsible for Finance	Provision of funds and other resources Oversees budget preparation and execution
Ministry responsible for of Livestock and Fisheries	Formulation and harmonisation of policies and strategies Information and data collection Provision of technical support and implementation of activities

Ministry responsible for of Health, Community Development, Gender, Elderly and Children	Formulation and harmonisation of policies and strategies Information and data collection Provision of technical support and implementation of activities
Ministry responsible for of Natural Resources and Tourism	Formulation and harmonisation of policies and strategies Information and data collection Provision of technical support and implementation of activities
Ministry responsible for Education	Rabies awareness and control are integrated in schools curriculum
President's Office, Regional Administration and Local Government (PO-RALG)	Implementation of antirabies activities Creation of rabies awareness Collection of data
Ministry of Home Affairs	Enforcement of government laws
Ministry responsible for of Justice and Constitution Affairs	Interpretation and custody of government laws
Prime Minister's Office – One Health Coordination Desk	Coordination of multi-partners and multi-sectorial activities related to One-Health and resource mobilization
TFDA	To ensure the availability of good, quality, safety and effectiveness of medicines by evaluation and registering of good quality vaccines, control the importation of vaccines and conducting post marketing surveillances for vaccines
TVLA	Diagnosis and research
TANAPA	Coordination of wildlife related activities and control of rabies in wildlife buffer zones
ZVC and ZVIC	Surveillance in animal
Academic and Research Institutions (Eg: NM-AIST, KCMC, SUA, MUHAS, IHI, TAWIRI, TALIRI, TVI etc)	Research, training, diagnosis, consultancy and vaccine manufacture
PAHSP	Data collection, provision of veterinary services and reporting
NGO both local and International	Provides technical support, funding and linkages with communities
Development Partners (eg. BMFG, WHO, OIE, FAO, etc)	Support of anti-rabies activities

5.2 FINANCIAL ARRANGEMENT

Funding will be sourced from the Tanzania central government ministries (Ministry of Finance, Ministry of Livestock and Fisheries (MoLF) and Ministry of Health, Community Development, Gender, Elderly and Children, Ministry of Natural Resources and Tourism, President's Office, Regional Administration and Local Government(PO-RALG), Prime Minister's Office, etc), Ministry of Education, Local and International partners. Interested partners, regional and international organizations and NGOs willing to contribute in dog rabies control will be invited to support and sustain rabies elimination program in the country.

5.3 BUDGET SUMMARY

The rabies control strategy covers nine (9) strategic objectives which are considered important areas. The indicative budget for each outcome for each strategic objective is given in Table 10 below. The budget estimates for implementing the various interventions under each strategic objective over a period of four (4) years is shown in annex 2.

CHAPTER SIX

MONITORING AND EVALUATION

Routine monitoring, periodic assessment and evaluation will be done by the lead ministries (MoLF and MoHCDGEC) coordinated by One Health Coordination Desk at the Prime Minister's Office (PMO). A survey based on the established national rabies control strategy M & E monitoring plan will be conducted to gather baseline data and set up monitoring protocols upon which subsequent M & E will be based. A set of objectively verifiable indicators will be used to measure progress and assess the achievement of elimination program. External independent evaluation will be done to assess the progress and thereby indicate necessary modification in strategies of program implementation.

6.1 MONITORING

Monitoring will be done by log books and standardized forms, and mobile phone technology to gather close to real time information should be promoted. A separate Dog Bite Incident Log Book should be made available to all hospitals, government and private ones. The National Rabies Control Committee or a similar body will conduct quarterly performance monitoring meetings to review progress of implementation against targets in the annual work plan, address implementation bottlenecks and refocus as necessary. Bi-annual stakeholder performance monitoring and review meetings at district, regional and national levels will be done to review performance against targets, address any constraints to implementation and refocus activities if needed.

The NRCC, or a similar body will conduct annual data quality audits and make official routine rabies surveillance data available on a quarterly basis.

Annual review meeting: As part of the commitment to performance monitoring, all stakeholders will meet annually to review achievements against targets and milestones in the strategic plan and annual work plans. These meetings will also define and finalize priorities for the following year.

6.2 EVALUATION:

Internal evaluation will be done by respective officers at all levels under the guidelines that will be developed, and external evaluation will be performed by an appointed external evaluator.

A separate monitoring and evaluation plan for the first 5 years is attached in Annex 7.1.

CHAPTER SEVEN

LOGICAL MATRIX FRAMEWORK FOR RABIES CONTROL STRATEGY (2017-2026)

Table 7: Logical Matrix Framework for Rabies Control Strategy

Summary of Objectives/activities	Objectively verifiable Indicator(s)	Means of verification	Source of information	
GOAL: To eliminate dog-mediated human rabies in Tanzania				
PURPOSE- Adoption and implementation of the endorsed rabies elimination strategy	National Rabies Control Strategy adopted and implemented	-Signed document -Reports of activities	-One	Health Coordination Desk and lead ministries (MoLF and MoHCDGEC)
STRATEGY OUTPUTS				
I. PREVENTION OF RABIES IN HUMANS				
1.1. Early and appropriate post-exposure treatment				
1.1.1. To increase awareness on importance of local wound treatment after bite by 95% in 5 year	% of patients that present at facilities having washed the wound with soap and water for at least 15 minutes	Review of Hospital records, KAP surveys	MoHCDGEC reports,	scientific publications
1.1.2. To increase availability of Rabies Immunoglobulin (RIG) in referral facilities by at least 50% for high risk exposures	% of referral health facilities with RIG	Review of Hospital records, KAP surveys, HH surveys	MoHCDGEC reports,	scientific publications
1.1.3 (a) To ensure the availability of human post exposure vaccine in each district	% of health facilities providing Post exposure vaccines in each district	Review of hospital records, surveys	Annual report	MoHCDGEC
1.1.3 (b) to enhance proper use of Post-exposure vaccine as recommended by the National Treatment Guideline	% of health facilities providing vaccine based on National Treatment Guideline	Review of hospital records and KAP surveys	Annual report	MoHCDGEC
1.2. Pre exposure vaccination				
1.2.1. Provision of pre-exposure vaccination to high risk groups	% of high risk groups received pre-exposure vaccination	Review of Hospital records, KAP surveys	Annual report	MoHCDGEC

1.3. Education and training

1.3.1(a) At least 80% of the public health workers trained on proper dog bite and wound cleaning and management,

% of public health workers involved in wound management trained on proper dog-bite wound cleaning and management

Review of Hospital records, KAP surveys

Annual Hospital and MoHCDGEC reports

1.3.1(b) At least 50% of bite victims are able to recognise a rabid animal

% of bite victims able to recognise rabid animals

Review KAP surveys

Survey reports, MoLF reports

2. ELIMINATION OF RABIES IN DOGS

2.1. Mass dog vaccination

2.1.1 To conduct mass dog vaccination targeting at least 70% of dog population coverage annually for five consecutive years

Proportions of villages and streets covered during vaccination campaigns

Post vaccination surveys in each of the sub-districts.

MoLF reports

vaccination

Proportion of dogs vaccinated in targeted areas

Number of dogs vaccinated, Post vaccination surveys in each of the sub-districts.

MoLF reports

vaccination

% of districts with 70% vaccination coverage within the targeted districts

% of districts with 70% vaccination coverages

MoLF, Study reports

2.1.2. To conduct intensive community sensitization through different media outlets

Number of media outlets used

Review of KAP survey, TV / Radio station report

MoLF, stations,

TV/Radio

Number of programs aired through the media outlets

Review of Districts Reports

MoLF, District reports

Number of sensitization meetings conducted

2.2. Dog population management

2.2.1 Have in place an updated register of dogs which will be handled by DVOs	% of Districts with updated registers	LGA's Annual reports	MoLF, DVO
2.2.2. Enforce legislation and bylaws which insist on responsible dog ownership	% of dog owners keeping dogs responsibly	KAP surveys, LGA's annual reports	LGAs, MoLF
2.2.3. Encourage LGAs and the private sector to establish holding facilities for stray dogs	% of LGA's with holding facilities for free roaming dogs	LGA's reports,	LGA's, MoLF reports
2.2.4. Establishment of free or low-cost campaigns for free-roaming dogs sterilization	Number of campaigns established % of dogs sterilized	LGA's reports, KAP surveys	LGA's, MoLF, Publications
2.2.5. Control of access to food leftovers	Number of districts advocated on fencing dumping areas/slaughter facilities	Advocacy reports	MoLF, LGA's, PO-RALG,
2.3. Education/awareness creation			
2.3.1. Increasing community awareness on rabies prevention and control	Number of school programs conducted	Review of Districts Reports	MoLF, District reports
	Number of posters, leaflets and mobile phone texts produced and disseminated		
	Number of sensitization meetings conducted		
3. STRENGTHEN SURVEILLANCE AND OUTBREAK RESPONSE			
3.1 Strengthening existing surveillance using One Health approach	Number of outbreak detected and reported using one health approach	KAP surveys, LGA's annual, reportsSurveillance system evaluation report / Records review,	LGAs, MoLF, MoHCDGEC
	Number of functional crossborder surveillance system that	contact tracing and Household surveys	
	TVLA reports		

include rabies

Number of rabies
action groups
established at
community levels

District Veterinary and
Medical officer reports

A functional
electronic platform
by both human
and animal sector
that is collabora-
tively managed

% of LGA's using
Electronic based
surveillance
system

% of laboratories
equipped with
necessary diagnos-
tic equipment and
supplies

% of laboratory
personnel trained
in diagnostics

Number of private
sectors involved in
surveillance

Number of dis-
tricts trained on
IBCM

3.4.

TVLA reports, MoLF, MoHCDGEC,
Ministry reports, strategy reports
records reviews,
training reports

4. STRENGTHENING INSTITUTIONAL CAPACITY FOR CONTROL AND EVENTUAL ELIMINATION OF RABIES

4.1. Sensitization of local leaders and community

Number of local
leaders sensitized
Number of com-
munity sensitiza-
tion meetings

LGA's quarterly LGA, DHOs, DVOs,
reports, KAP surveys Lead Ministries

4.2. Training of vaccination teams on vaccination standard operating procedures	Number vaccination teams trained on SOP per each district	Ministry reports, records reviews, training reports	MoLF, LGA, strategy reports
4.3. Development and implementation of protocols for vaccination	Protocols for vaccination in place	Ministry reports	MoLF, MoHCDGEC
4.4. Development of the outbreak preparedness and response plan	Outbreak preparedness plan in place	One Health Coordination Desk report	One Health Coordination Desk Reports, MoLF, MoHCDGEC
4.5. Ensure availability of resources essential for rabies vaccination	Presence of vaccines Presence of vaccination supplies	Review of Ministry reports	MoLF reports
4.6. Advocate public-private partnership in the implementation of rabies elimination strategy	Number of activities supported by PPP	implementation reports	LGAs, Ministries, NGO reports
5. OPERATIONAL RESEARCH ON RABIES CONTROL			
To increase financial investment for evaluative research in rabies	Number of evaluative research works in a year	Review of LGA reports, review of publications	LGA reports and publications
6. CONDUCT ADVOCACY, COMMUNICATION AND SOCIAL MOBILIZATION ON RABIES			
Communications plan for each stage of control strategy	Number of awareness campaign conducted at each level Number of advocacy meetings to policy makers Number community rabies action groups established Presence of the communication plan for each stage of control strategy	Review of LGA communication reports	LGA reports

7. ENHANCE PARTNERSHIPS AND INTER-SECTORAL COORDINATION

7.1 To establish partnerships and multi-sectoral collaboration among line ministries other government agencies, NGO and private sectors	No. of international organizations/ funding agencies providing support to the project A functional multisectoral rabies coordinating body that oversee rabies control program at all levels in place	Memorandum of Agreement with local, regional and international development partners	NRCC Annual reports
7.2 To have a functional NRCC in the first year of implementation	Number of meetings	List of nominated persons Terms of reference NRCC meeting minutes	NRCC reports
7.3 Integrate rabies control interventions into regional and districts council management plans (CMP)	Number of councils that have included rabies into CMP	Terms of reference LGA reports	Annual reports
7.4 having rabies as an agenda in routine regional and council meetings	Number of meetings that include rabies in their agenda each month	Meeting reports	LGAs, MoHCDGEC MoLF
8. RESOURCE MOBILISATION.			
8.1 Conduct mapping of potential funding donors/development partners at all levels and their areas of interest	Presence of potential funding and donors mappings	Review of donor maps	LGA, Developer partners/Donor mapping reports, line ministries, One Health Desk
8.2 Prepare proposals for resource mobilization and communicate to interested donors	Number of proposals prepared, submitted and granted	Review of resource mobilization reports	Resource mobilization reports, other reports, MTEF
8.3. Identify gaps/areas for funding at all levels (national, regional district)	Number of gaps/areas for funding identified	LGA's development strategic plan National strategies	LGA's. sectoral ministries, One Health Coordination Desk
8.4. Integration of rabies control budget into planning and budgeting systems at all levels	Number of LGAs with rabies budget line item	Approved budget and record of budget allocation by ministries	Records of fund allocation at LGA

8.5. Regularly prepare and update list of potential donor at all levels	Numbers of partners involved in the project	Budget report	Annual reports
8.6. Prepare and update a list of priority needs and share with donors	Presence of priority lists and number of participating donors	Annual plan lists (LGA, Line Ministries and One Health Coordination Desk)	LGA, Line Ministries and One health Coordination Desk
9 MONITORING AND EVALUATION			
9.2. Developing data collection tools	Presence of data collection tools	Ministries, DVOs office, Laboratories	Ministries, One Health Coordination Desk,
9.3. Building capacity for data collectors in terms of skills and accessibility	Number of data collectors trained	Ministry reports, records reviews, training reports	MoLF, MoHCDGEC, strategy reports
9.4 Merging data collection tools from various sectors	Presence of integrated data collection tools from various sectors	Integrated data collection tool	LGAs, Ministries, One Health Coordination Unit
9.6. Capitalizing on ICT tools for data collection	-Number of mobile phones provided per LGA -% of users trained and reporting using mobile phone in LGA -Server procured to store electronic data.	-Procurement and training reports -Mobile phone surveillance data	MoLF, MoHCDGEC, LGA, NGOs/Partners.

PROJECTED BUDGET FOR THE RABIES ELIMINATION STRATEGY (2019 – 2020) IN “000,000” TZSHs

Table 8: Projected budget for the rabies elimination strategy (2019 - 2028)

KEY STRATEGIC OBJECTIVE	ACTIVITIES	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. PREVENTION OF HUMAN RABIES	1.1.3. Human anti-rabies vaccine	224.00	235.20	246.96	259.31	272.27	150.00	157.50	230.00	241.50	253.58
	1.1.2. Rabies immunoglobulin for high risk exposures	80.00	84.00	88.20	50.00	52.50	55.13	57.88	60.78	63.81	67.00
	1.2.1. Provision of pre-exposure vaccination to high-risk groups	5.00	5.25	5.51	5.79	6.08	6.38	6.70	7.04	7.39	7.76
	1.3.1. Training of the public and public health workers on proper bite wound cleaning and management, and use of IID route	100.00	105.00	100.00	105.00	50.00	52.50	55.13	80.00	84.00	88.20
2. CONTROL AND ELIMINATE DOG RABIES	Develop and implement rabies prevention and control programme including animal welfare, for primary school children.	150.00	130.00	150.00	150.00	100.00	100.00	100.00	120.00	126.00	132.30
	Subtotal	559.00	559.45	590.67	570.10	480.85	364.01	377.21	497.81	522.70	548.84
2. CONTROL AND ELIMINATE DOG RABIES	2.1. Purchase of vaccine, syringes, certificates, markings	812.00	852.60	895.23	939.99	986.99	1,036.34	1,088.16	1,142.57	1,199.69	1,259.68
	2.1.1. Conduct mass dog vaccination targeting >70% of dog population	2,353.00	2,470.65	2,594.18	2,723.89	2,860.09	3,003.09	3,153.25	3,310.91	3,476.45	3,650.28

3. STRENGTHEN RABIES SURVEILLANCE USING THE ONE-HEALTH APPROACH	2.1.2. Conduct intensive community sensitization through various media	30.00	31.50	33.08	34.73	36.47	38.29	40.20	42.21	44.32	46.54
	2.2. to increase awareness of MDG to communities	20.00	21.00	22.05	23.15	24.31	15.00	15.75	16.54	17.36	18.23
	2.2.1. Dog population management activities, sterilization, control access to food left overs, holding facilities	460.80	483.84	508.04	533.44	560.11	588.12	617.52	648.40	680.82	714.86
	2.3. Enforcement of legislations and bylaws	5.00	5.25	5.51	5.79	6.08	6.38	6.70	7.04	7.39	7.76
	Subtotal	3,680.80	3,864.84	4,058.09	4,260.99	4,474.04	4,687.22	4,921.58	5,167.66	5,426.04	5,697.34
	3.1. Strengthening of existing surveillance system by enhancing monitoring and early detection of disease	40.00	30.00	31.50	33.08	20.00	21.00	22.05	24.00	25.20	26.46
	3.2. Sensitization and awareness creation of dog owners and community	20.00	21.00	22.05	23.15	24.31	25.53	26.80	28.14	29.55	31.03
	3.3. Use and harmonize ICT technologies and other electronic platforms by both the human and animal sectors	25.00	26.25	27.56	28.94	30.39	31.91	33.50	35.18	36.94	38.78
	3.4. Strengthening of the laboratory diagnostic capacity for humans and animal rabies	5.00	5.25	5.51	5.79	6.08	6.38	6.70	7.04	7.39	7.76
	Subtotal	90.00	82.50	86.63	90.96	80.78	84.81	89.05	94.36	99.07	104.03

4. STRENGTHENING INSTITUTIONAL CAPACITY FOR CONTROL AND EVENTUAL ELIMINATION OF RABIES	4.1. Sensitization of local leaders and community	63.00	66.15	69.46	72.93	76.58	80.41	84.43	88.65	93.08	97.73
	4.2. Training of vaccination teams on vaccination SOPs	25.00	26.25	27.56	28.94	10.00	10.50	11.03	11.58	12.16	12.76
	4.3. Development and implementation of protocols for vaccination	10.00	10.50	11.03	11.58	12.16	12.76	13.40	14.07	14.77	15.51
	4.4. Development of outbreak preparedness and response plan	20.00	20.00	5.00	5.25	5.51	5.79	6.08	25.00	5.00	5.25
	4.5. Ensure availability of resources essential for rabies vaccination (through gov budgets, partners)	-	-	-	-	-	-	-	-	-	-
	4.6. Encourage public-private partnership and promote exchange of knowledge, protocols, and overheads	10.00	10.50	11.03	11.58	12.16	12.76	13.40	14.07	14.77	15.51
	Subtotal	128.00	133.40	124.07	130.27	116.40	122.22	128.33	153.37	139.78	146.77
5. CONDUCT RABIES OPERATIONAL RESEARCH	Conduct and support operational research	15.00	30.00	31.50	10.00	5.00	30.00	31.50	7.00	7.35	7.72
	Subtotal	15.00	30.00	31.50	10.00	5.00	30.00	31.50	7.00	7.35	7.72
6. CONDUCT ADVOCACY, COMMUNICATION AND SOCIAL MOBILIZATION ON RABIES	6.1 To increase awareness of rabies prevention and control at all levels	10.00	20.00	21.00	22.05	23.15	24.31	25.53	26.80	28.14	29.55
	6.2 To advocate rabies prevention and control to policy makers	30.00	30.00	15.00	15.75	16.54	5.00	5.25	5.51	5.79	6.08
	6.3 To improve community participation in rabies prevention and control	20.00	21.00	22.05	23.15	24.31	25.53	26.80	28.14	29.55	31.03
	Subtotal	60.00	71.00	58.05	60.95	64.00	54.84	57.58	60.46	63.48	66.65

REFERENCES:

- Anderson, R. M., H. C. Jackson, et al. (1981). "Population dynamics of fox rabies in Europe." Nature **289**(5800): 765.
- Awah, N. J., J. Tchoumboue, et al. (2002). "Canine and human rabies in Cameroon." Tropical Veterinarian **20**(3): 162-168.
- Bögel, K. and F. Meslin (1990). "Economics of human and canine rabies elimination: guidelines for programme orientation." Bulletin of the World Health Organization **68**(3): 281.
- Cleaveland, S. and C. Dye (1995). "Maintenance of a microparasite infecting several host species: rabies in the Serengeti." Parasitology **111**(S1): S33-S47.
- Cleaveland, S., E. M. Fevre, et al. (2002). "Estimating human rabies mortality in the United Republic of Tanzania from dog bite injuries." Bulletin of the World Health Organization **80**: 304-310.
- Cleaveland, S., M. Kaare, et al. (2006). "Canine vaccination—providing broader benefits for disease control." Veterinary microbiology **117**(1): 43-50.
- Deressa, A., A. Ali, et al. (2010). "The status of rabies in Ethiopia: A retrospective record review." Ethiopian Journal of Health Development **24**(2).
- Fitzpatrick, M. C., K. Hampson, et al. (2012). "Potential for rabies control through dog vaccination in wildlife-abundant communities of Tanzania." PLoS neglected tropical diseases **6**(8): e1796.
- Fooks, A. R., A. C. Banyard, et al. (2014). "Current status of rabies and prospects for elimination." The Lancet **384**(9951): 1389-1399.
- Hampson, K., L. Coudeville, et al. (2015). "Estimating the Global Burden of Endemic Canine Rabies."
- Hampson, K., A. Dobson, et al. (2008). "Rabies exposures, post-exposure prophylaxis and deaths in a region of endemic canine rabies." PLoS neglected tropical diseases **2**(11): e339,.
- Johnson, N., K. Mansfield, et al. (2010). "A new outbreak of rabies in rare Ethiopian wolves (*Canis simensis*)." Archives of virology **155**(7): 1175-1177.
- Lembo, T., K. Hampson, et al. (2010). "The feasibility of canine rabies elimination in Africa: dispelling doubts with data." PLoS neglected tropical diseases **4**(2): e626.
- Lembo, T., M. Niezgodna, et al. (2006). "Evaluation of a direct, rapid immunohistochemical test for rabies diagnosis." Emerging infectious diseases **12**(2): 310.

- Mallewa, M., A. R. Fooks, et al. (2007). “Rabies encephalitis in malaria-endemic area, Malawi, Africa.” Emerging infectious diseases **13**(1): 136.
- National Bureau of Statistics and Office of the Chief Government Statistician (2013). The 2012 Population and Housing Census (PHC). National Bureau of Statistics and Office of the Chief Government Statistician. Dar es salaam Tanzania, National Bureau of Statistics.
- Rupprecht, C. E., C. A. Hanlon, et al. (2002). “Rabies re-examined.” The Lancet infectious diseases **2**(6): 327-343.
- Townsend, S. E., T. Lembo, et al. (2013). “Surveillance guidelines for disease elimination: a case study of canine rabies.” Comparative Immunology, Microbiology and Infectious Diseases **36**(3): 249-261.
- Townsend, S. E., I. P. Sumantra, et al. (2013). “Designing programs for eliminating canine rabies from islands: Bali, Indonesia as a case study.” PLoS neglected tropical diseases **7**(8): e2372.
- Vigilato, M. A. N., A. Clavijo, et al. (2013). “Progress towards eliminating canine rabies: policies and perspectives from Latin America and the Caribbean.” Philosophical Transactions of the Royal Society of London B: Biological Sciences **368**(1623): 20120143.
- Woodroffe, R., K. C. Prager, et al. (2012). “Contact with domestic dogs increases pathogen exposure in endangered African wild dogs (*Lycaon pictus*).” PloS one **7**(1): e30099.
- World Health Organization (2018). Rabies vaccine: WHO position paper - Weekly Epidemiological Record. Switzerland, World Health Organization: 18.
- World Health Organization (website). “From concept to completion” from http://www.who.int/neglected_diseases/news/fromconcept-to-completion-elimination-of-canine-rabies/en/.

For further information please contact:

Director of Veterinary Services
MoLF
P.O Box 2847
40487 Dodoma
Phone: +255 026 2322610
Fax: +255 026 2322613

Director of Preventive Services
MoHCDGEC
University of Dodoma,
Faculty of Science and Community Development,
Building No 11
P.O Box 743, Dodoma

The Coordinator,
One Health Coordination Desk,
Prime Minister's Office
2 Railway Street, P. O. Box 980, 40480 Dodoma,