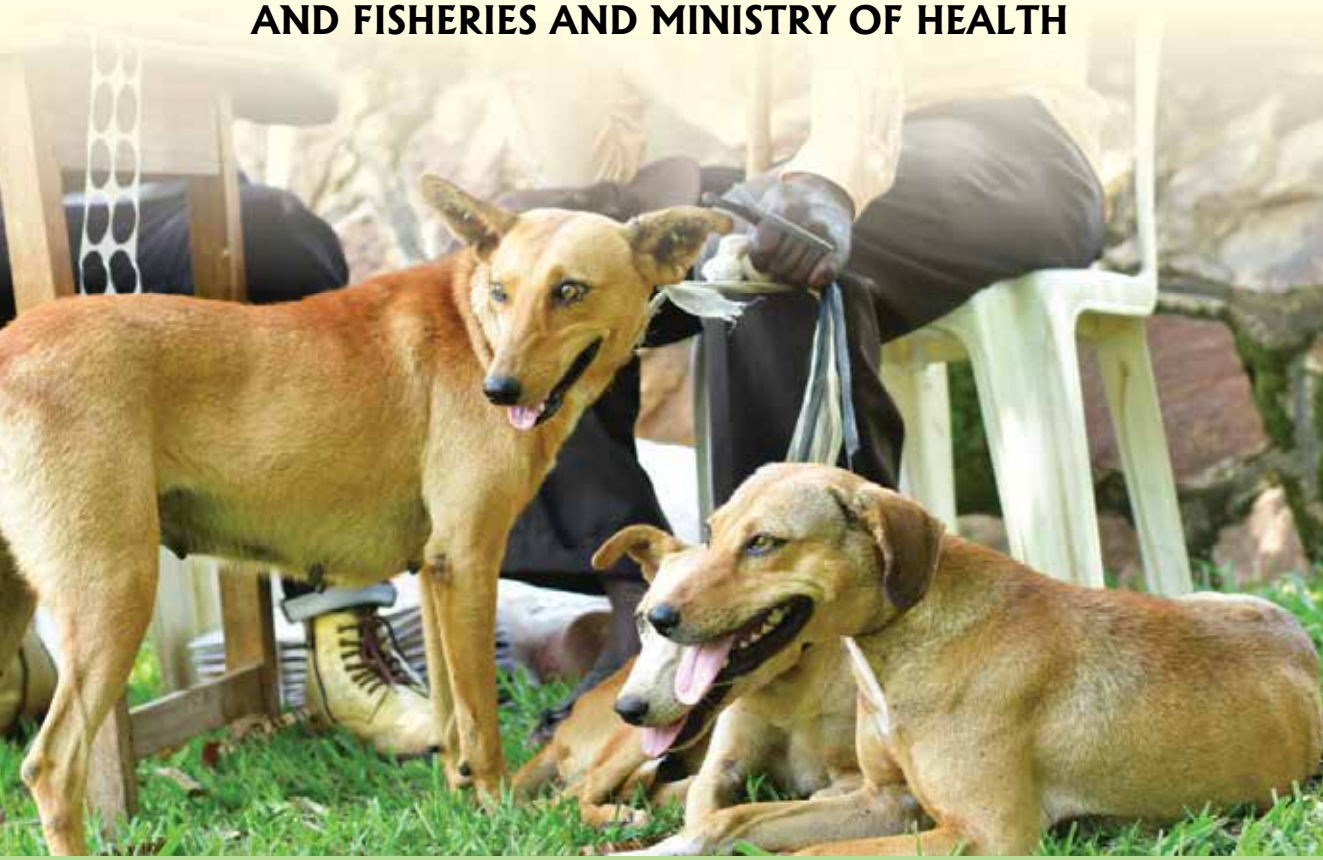
THE REPUBLIC OF UGANDA

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES AND MINISTRY OF HEALTH



National Rabies Elimination Strategy (NRES) for Dog Mediated Rabies in Uganda

2025 - 2030

THE REPUBLIC OF UGANDA

MINISTRY OF AGRICULTURE, ANIMAL INDUSTRY AND FISHERIES AND MINISTRY OF HEALTH

NATIONAL RABIES ELIMINATION STRATEGY (NRES) FOR DOG MEDIATED RABIES IN UGANDA

National Rabies Elimination Strategy (NRES) for Dog Mediated Rabies in Uganda

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List of Acronyms

CAO: Chief Administrative Officer

CDC: Centre for Disease Control and Prevention

CHWs: Community Health Workers

CVO: Chief Veterinary Officer

dFAT: Fluorescent Antibody Technique

DLG: District Local Government

DLGs: District Local Governments

DRETF: District Rabies Elimination Task Force

DRTF: District Response Task Force

DVO: District Veterinary Officer

EBS: Evidence Based Surveillance

ELISA: Enzyme Linked Immunosorbent Assay

EMA-i: Event Mobile Application

FAO: UN- Food and Agriculture Organization of the United Nations

FAT: Direct Fluorescent Antibody Technique

GAVI: Global Alliance for Vaccines and Immunisations

GDRES: Global Dog Rabies Elimination Pathway

HIMS: Health Information Management System

IBCM: Integrated bite case management

ICT: Information Communication Technology

IDDS: Infectious Disease Detection and Surveillance

IDSR: Integrated Disease Surveillance and Response

LCV: Local Council five

M&E: Monitoring and Evaluation

MAAIF: Ministry of Agriculture Animal Industry and Fisheries

MoES: Ministry of Education and Sports

MOH: Ministry of Health

MOUs: Memorandum of understanding

MWE: Ministry of Water and Environment

NADDEC: National Animal Diseases Diagnostic and Epidemiology Centre

NDA: National Drug Authority

NFASS: National Food and Agricultural Statistical System

NMS: National Medical Stores

NOHP: National One Health Platform

NRES: National Rabies Elimination Strategy

NRETF: National Rabies Elimination Task Force

OHTWG: One Health Technical Working Group

WOAH: World Organization for Animal Health

OPD: Out Patient Department

PCR: Polymerase Chain Reaction

PEP: Post-Exposure Prophylaxis

PHEOC: Public Health Emergency Operation Centre (PHEOC),

PPE: Personal Protective Equipment

P-WARE: Practical Work plan towards Achieving Rabies Elimination

RVLs: Regional Veterinary Laboratories

SARE: Stepwise Approach Rabies Elimination

SOP: Standard Operating Procedures

STARC: Settlement Type and Road Connectivity

TDDAP: Tackling Deadly Diseases in Africa

TORs: Terms of References

UAR: United against rabies

UBOS: Uganda Bureau of Statistics

UKAID: United Kingdom Agency for International Development

USD: United States Dollars

UVA: Uganda Veterinary Association

UWA: Uganda Wildlife Authority

VSFG: Veterinaire Sains Frontiers Germany

WHO: World Health Organization

WRD: World Rabies Day

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FOREWORD

The Uganda National Rabies Elimination Strategy (NRES) is intended to guide the country in the efforts to eradicate the dog mediated rabies by the year 2030 in line with the global declaration.

Rabies is a deadly viral zoonotic disease that affects both animals and humans with 100% mortality rate in affected individuals if no treatment is administered. Globally, about 59,000 people die annually due to rabies and 95% of these deaths occur in Africa and Asia. The most vulnerable people are children under the age of 15 years due to their close association that exposes them to dog bites. Rabies is among the top seven priority zoonotic diseases in Uganda and a public good disease supposed to be controlled by the Government of Uganda. Approximately 99% of human rabies cases originate from bites by rabid dogs. Therefore, the infection can be stopped at source through routine mass vaccination of dogs, targeting at least 70% of the entire population as recommended by international standards.

The strategy is aligned to the Stepwise Approach to Rabies Elimination (SARE) as set by the global tripartite (WHO, WOAH and FAO). The SARE has 5 stages and Uganda is currently at stage 2. Each stage has a series of activities and indicators that enables countries to assess their progress toward elimination of rabies by 2030.

The strategies to be employed include; canine mass vaccination, community awareness and education, prevention of human death through timely and affordable access to Post exposure prophylaxis, strengthening surveillance and response, dog population control, strengthening laboratory systems for rabies detection and response, strengthen the legal framework for rabies control, compose and operationalize the National and District Rabies Elimination Task Forces (NRETF and DRETF). The implementation will be done through a One Health approach.

All stakeholders are called upon to support Government efforts in eliminating the rabies disease by the year, 2030

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EXECUTIVE SUMMARY

Rabies is one of the deadliest diseases known to humankind and causes more than 59,000 preventable human deaths every year. Classified by WHO as a Neglected Tropical Disease, Africa and Asia face the highest burden from rabies. Most human cases are transmitted through bites from infected domestic dogs, with children and rural communities being disproportionally affected. Still endemic in Uganda, it therefore places a high burden on families and the healthcare system.

The World Health Organization, World Organisation for Animal Health and the Food and Agriculture Organisation of the United Nations, have set the global goal to eliminate dog bite transmitted human rabies deaths by 2030. Through a phased approach of dog mass vaccination, increased community awareness and improved surveillance, the disease can be eliminated from the canine population. Through elimination in the reservoir species and the promotion of responsible dog ownership and health, long-term strains on the public health system and suffering of the general population can be averted. In addition, elimination of the disease will also relieve the stress the disease puts on the healthcare system in the long-term.

Through a One Health approach, bringing together key stakeholders from human, animal and environmental health, to coordinate targeted field interventions, this strategy aims to align Uganda with the global goal to end human deaths from dog mediated rabies by 2030.

In a phased approach, this strategy aims to eventually vaccinate 70% of the estimated canine population of 1,500,000 on an annual basis and strives to educate at least 80% of the general population.

In addition, the strengthening of public health response system and veterinary surveillance systems, will put Uganda in a better position to react to emerging zoonotic diseases and report findings in a timely manner. This will ultimately benefit not only the health and well-being of the Ugandan people but the region as a whole.

……

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1.0 INTRODUCTION

1.1 Background

Rabies is a viral infectious disease of mammals and it is known to be the most fatal disease to humankind, killing more than 59,000 people annually. The disease is present on every continent with the exception of Antarctica and a third of the global deaths from rabies occur in rural Africa.(1) Bites from rabid dogs account for 99% of human rabies cases, 40% of which are children below 15 years of age. This has led to killing of dogs inhumanely around the world. (2) This indiscriminate killing of dogs however, has little effect on rabies spread and is therefore not deemed to be an effective method to alleviate the burden of the disease from both animals and people. (3) Rabies is a vaccine-preventable viral disease and it is recommended that prevention of dog bites and vaccination of 70% of the dog population in rabies-endemic areas prevents the spread of rabies between dogs and its transmission to people. (2)

This approach of mass vaccination has been demonstrated to be an effective method to eliminate the disease in both domestic dogs and carnivore wildlife in large parts of the Americas, Japan, and in western Europe.(4)(5)(6)(7)

Having been successfully eliminated in most developed countries through canine mass vaccination and targeted public health interventions, the threat of rabies is still significantly neglected in most endemic countries. This is due to inadequate data collection and reporting of both the human and veterinary sectors. This leads to a severe underestimation of the actual disease incidence resulting into inadequate allocation of funds to eliminate this public health threat from communities at risk and the population at large.(8)

In 2015, the World Health Organization (WHO), the Food and Agriculture Organisation of the United Nations (FAO) and the World Organisation for Animal Health (WOAH), set the global target to eliminate dog bite transmitted rabies in humans by 2030.(9) The global goal is also in line with the United Nations Sustainable Development Goals, which advocate for the elimination of Neglected Tropical Diseases within the same timeframe.(10)

The timely decision to develop this National Rabies Elimination Strategy will deliver a multi-sectoral framework for sustainable rabies control in Uganda and help the nation to achieve the goal of freedom from human rabies deaths by 2030.

1.2 Epidemiology of Rabies

1.2.1 Reservoirs of Rabies

In Africa and Asia, domestic dogs are the major transmitters in the rabies virus cycle although other carnivores may also play a role in rabies transmission. This indicates that sufficient levels of vaccination coverage in domestic dog populations will enable the elimination of dog mediated human rabies in many parts of Asia and Africa. In other continents such as America, bats are known as the major source of infection to humans and rabies death consequently. Exposure to infection through bites and interaction with wild carnivores such as foxes, raccoons, skunks, jackals and mongoose was common in European countries. The risk of humans contracting rabies from bats and wild life in Africa and Asia is not significant.

1.2.2 Transmission of Rabies

Rabies is a fatal viral zoonotic disease that is transmissible between humans and animals. The virus is transmitted through saliva of an infected animal, normally via a transdermal bite, or exposure through an open wound, as well as mucosal membranes, such as in the mouth, nose or eyes. The virus is shed in the dogs' and cats' saliva several days before onset of clinical signs hence humans may be exposed without knowing. Airborne transmission is also possible under special circumstances such as in laboratories and caves with an extremely high bat density.

1.2.3 Clinical signs of Rabies

1.2.3.1 Clinical signs in Animals

The incubation period in animals can vary considerably. In dogs and cats, it is between 2 to 12 weeks (14- 82 days), depending on the site of initial infection, although longer incubation periods have also been reported. There are two distinct forms of rabies in animals namely; furious and paralytic forms.

The furious f orm of rabies manifests itself in the classic "mad-dog syndrome", and may be seen in all species. The animal is easily excitable and may display aggression toward inanimate objects, as well as humans and other animals, without provocation. Other clinical signs in affected animals include; excessive salivation, loss of caution and fear of humans and other animals.

The dumb/paralytic form of rabies manifests with ataxia and paralysis of the throat and jaw muscles, often with profuse salivation and the inability to swallow. These animals may not be vicious. Rabid dogs or cats usually die within 10 days of onset of clinical symptoms.

The acute phase of the disease is characterized by aggressiveness and restlessness, which is the classic "mad-dog syndrome". The disease is characterized by paralysis of the muscles of the throat and mouth, often with profuse salivation and the inability to swallow. The paralysis progresses rapidly to all parts of the body leading to coma and death.

1.2.3.2 Clinical signs in Humans

In humans, the incubation period for rabies is typically 1–3 months, but may vary from below one week to more than one year. The initial symptoms of rabies are fever and often pain or unexplained tingling and burning sensations at the bite site. The virus spreads through the central nervous system, culminating in a fatal encephalitis. Two forms of the disease can follow; furious or paralytic rabies. People with furious rabies exhibit signs of hyperactivity, excited behaviour, and hydrophobia (fear of water) and death after a few days. Paralytic rabies develops gradually, the muscles gradually become paralyzed, starting at the site of the bite or scratch and death eventually occurs. This form of rabies is often misdiagnosed, contributing to the underreporting of the disease. In areas with a high incidence of malaria, it has been shown that rabies is in many cases mistaken for cerebral malaria.

2.0 RABIES SITUATION IN UGANDA

2.1 History of Rabies in Uganda

In Uganda, rabies was first confirmed in the West Nile region in 1936. In the past, management and control of some stray dogs was by shooting and killing to protect humans against dogs' bites and support surveillance. Subsequently, there were multi-sectoral collaborations between MAAIF and MoH control rabies. The data indicating the level of spread of the disease is acquired through passive surveillance reports from local governments for animal sector and through the Health Management Information System (HMIS) from the lowest health facilities (Health Centre 11) for the public health sectors.

The government of Uganda through the Ministry of Agriculture, Animal Industry and Fisheries procures rabies vaccines on an annual basis in limited quantities to vaccinate the animals at risk especially dogs and cats to stop the infection at source. The district (Health centre four (HC IV and hospitals) order for post exposure prophylaxis through a voucher system based on the magnitude of reported animal bites, the dog populations and confirmed rabies cases in vets (11).

2.2 Administrative units of Uganda

Uganda is divided into four major regions namely; North, West, East and Central regions with seven cities. Since 2005, the Government has been creating new districts out of the existing ones to enhance service delivery. Currently, there are 145 districts and Kampala, the capital city (146 in total)

Some districts are divided into counties and municipalities. The counties are further subdivided into sub-counties/divisions. Some districts have approximately 6-8 sub counties/ divisions and some have one or two municipalities. The political leadership is headed by the Local council 5 Chairperson (LC5) who is elected to office on a five year term basis. Through the Local Government Act, some services were decentralized including veterinary services.

The DLGs are under Ministry of Local Government and the Chief Administrative Officer (CAO) is head of civil servants in the district. The veterinary services in the District are headed by District Veterinary officer (DVO) with veterinary staff at sub-county level. The office of the DVO is mandated to conduct animal disease control activities and submit monthly animal disease reports to Chief Veterinary Officer at National level.

Northern Region

Abim, Adjumani, Agago, Alebtong, Amolatar, Amudat, Amuru, Apac, Arua, Dokolo, Gulu, Kaabong, Kitgum, Koboko, Kole, Kotido, Lamwo, Lira, Maracha, Moroto, Moyo, Nakapiripirit, Napak, Nebbi, Nwoya, Otuke, Oyam, Pader, Yumbe, Zombo, Omoro, Pakwach, Nabilatuk, Kwania, Kapelebyong, Obongi, Madi-Okollo, Lusot, Karenga, Terego

Central Region

Buikwe, Bukomansimbi, Butambala, Buvuma, Gomba, Kalangala, Kalungu, Kampala, Kayunga, Kiboga, Kyankwanzi, Luweero, Lwengo, Lyantonde, Masaka, Mityana, Mpigi, Mubende, Mukono, Nakaseke, Nakasongola, Rakai, Sembabule, Wakiso, Kyotera, Kasanda.

Eastern Region

Amuria, Budaka, Bududa, Bugiri, Bukedea, Bukwa, Bulambuli, Busia, Butaleja, Buyende, Iganga, Jinja, Kaberamaido, Kaliro, Kamuli, Kapchorwa, Katakwi, Kibuku, Kumi, Kween, Luuka, Manafwa, Mayuge, Mbale, Namayingo, Namutumba, Ngora, Pallisa, Serere, Sironko, Soroti, Tororo, Namosindwa, Butebo, Bugweri, Kalaki

Western Region

Buhweju, Buliisa, Bundibugyo, Bushenyi, Hoima, Ibanda, Isingiro, Kabale, Kabarole (Fort Portal), Kamwenge, Kanungu, Kasese, Kibaale, Kiruhura, Kiryandongo, Kisoro, Kyegegwa, Kyenjojo, Masindi, Mbarara, Mitooma, Ntoroko, Ntungamo, Rubirizi, Rukungiri, Sheema, Kagadi, Kakumiro, Rubanda, Rukiga,Bunnyangabu, Kikuube, Rwampala, Kazo, Rutagwenda, Karenga, Rwampara

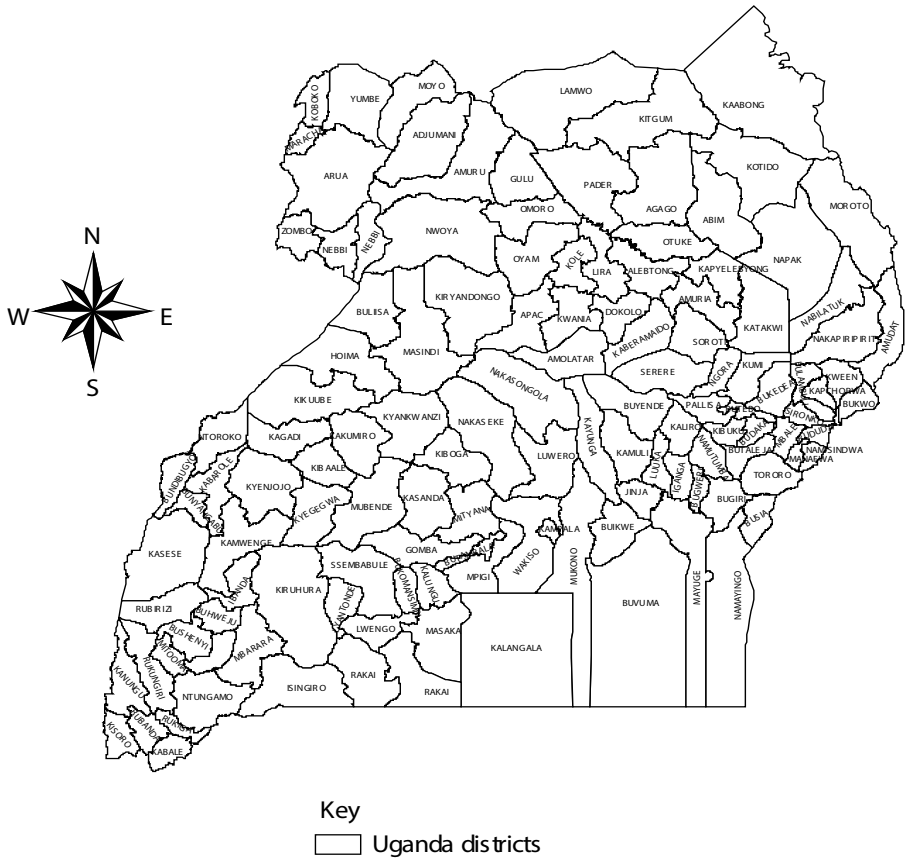

Figure 1: Map of Uganda showing districts in Uganda.

Rabies is endemic in Uganda, it is one of the top 7 priority zoonotic diseases and a public good disease. The incidence is higher in 50% of the districts, spread in the different regions of the country in accordance with NADDEC-MAAIF reports, Ministry of Health reports, FAO-UN, and informants such as BIG FIX Uganda. These include;

East: Tororo, Busia, Iganga, Bugiri, Namutumba, Buikwe, Serere, Soroti, Kaliro, Buyende, Mbale, Mbale city, Kumi, Jinja, Namisindwa, Manafwa, Namayingo (17)

Central: Masaka, Masaka city, Mukono, Kalangala, Butambala, Mityana, Lwengo, Kampala, Wakiso, Gomba, Luweero, Mpigi (12)

West: Isingiro, Kyenjojo, Kasese, Rakai, Rubirizi, Mbarara, Kabale, Rubanda, Lyantonde, Ntoroko, Bundibujjo, Kagadi, Kiryandongo, Ntungamo, Kabarole, Bunyangabo (16)

North: Maracha, Alebtong, Adjumani, Apac, Arua, Arua city Nwoya, Gulu, Yumbe, Nebbi, pader, Koboko, oyam, Lira, Moyo, Kitgum, Omoro, Amur, Madi-okollo, Moroto, Oyam, Amudat, Napak, Kotido, Kween, Nabilatuk, Terego, Zombo. (28)

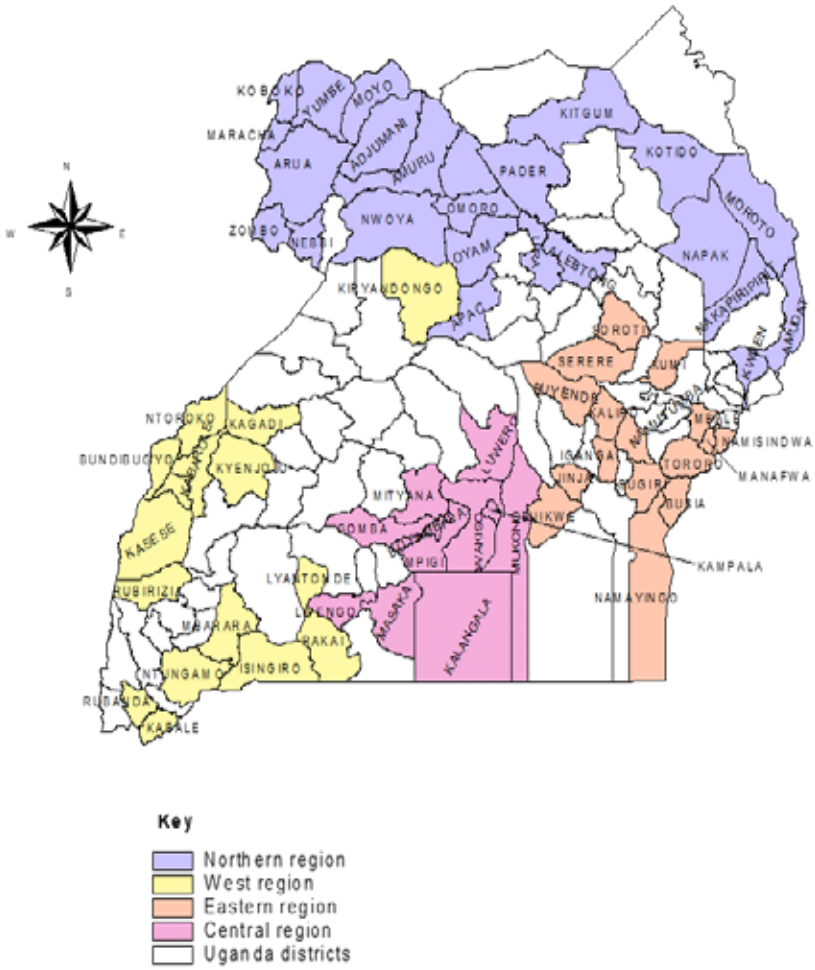

Figure 2: Map of Uganda showing hotspot districts for rabies.

2.3 Dog population demographics

Understanding the local dog population is of utmost importance to ensure adequate planning and resource availability to implement the annual canine mass vaccination campaign. Both the ownership status (owned, community, stray), as well as the confinement status (confined, semi-confined, free-roaming) of the local dog population needs to be assessed and taken into account. The population of home owned dogs was estimated at 2.1 million according to the Uganda Bureau of Statistics (UBOS) livestock census data of 2021.

Estimates of the stray dog population will be provided by the DVOs of the respective districts where the interventions will be conducted. Details on the control strategies for the stray dogs will be well spelt out in the dog population management strategy. A dog population survey will be conducted with DLGs in consultation with UBOS to have more accurate baseline data for the home owned and stray dogs.

2.4. Surveillance, diagnosis, control and reporting of Rabies

2.4.1. Surveillance

In broad terms, surveillance is aiming to demonstrate the presence or absence of a disease and its distribution within a specific geographic area. It can be used to monitor trends in the disease incidence and inform the progression of control measures.

As a zoonotic disease, rabies requires a One Health approach to disease surveillance, taking into account data collected through the public health and veterinary health systems. Whilst some passive animal rabies surveillance is being conducted by reporting animal bites (including cats, swine, dogs, snakes, among others) to DVOs, only a few samples are being submitted for laboratory confirmation to the National Animal Disease Diagnostics and Epidemiology Centre (NADDEC) in Entebbe due to logistical limitations.

At the Ministry of Health, the Department of Integrated Epidemiology, Surveillance, and Public Health Emergencies manages surveillance activities for rabies under the Integrated Disease Surveillance and Response (IDSR) framework. The IDSR guidelines spell out the threshold levels at which to trigger response for priority zoonoses, rabies inclusive.

The Ministry of Health also utilizes the Indicator-based surveillance (IBS) based on the Health Management Information System (HMIS). It generates health facility-based surveillance data that guides public health practice. Standardized paper-based HMIS (registers and forms) and mobile tracking data collection tools are used for capturing patient-level data from the lowest community level to the health unit, health sub district, and district, each contributing to a National Health Databank/Division of Health Information. This data is uploaded to the District Health Information System 2 (DHIS2) platform. Weekly surveillance data on epidemic prone diseases/conditions is verified, analysed, and presented in an epidemiological bulletin that is published and disseminated to stakeholders on a weekly basis.

They also utilize Event Based surveillance (EBS) which entails; electronic IDSR that sends alerts to the Public Health Emergency Operation Centre (PHEOC), Epidemic Intelligence for Open Sources, and Scanning of online media. In addition, they receive data from laboratory based surveillance by academic and research institutions

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Department of Animal Heath utilizes the following forms of surveillance;

Passive surveillance; This is utilized in form of routine monthly reports of animal diseases or events. These reports (paper based) are compiled by the District Veterinary Officers (DVO) and submits them to the CVO through the Chief Administrative Officer. There have been efforts to convert the paper-based tool into electronic forms (using Microsoft Excel) that DVOs can upload onto a Microsoft Access database at NADDEC.

Active surveillance: planned activities/projects designated for specific diseases/conditions during finite periods

EBS: Event-based data is submitted to national authorities through mobile phone application platforms. These include Open Data Kit and Event Mobile Application (EMA-i). Data submitted through the EMA-i platform is aggregated in the Emergency Prevention System (EMPRES-i) database of the Food and Agriculture Organization (FAO). EMA-i was piloted in 25 districts and there is a plan to roll out its use to other districts.

Syndromic surveillance: diseases are reported by the farmers to the DVOs based on the clinical symptoms and eventually confirmed.

Laboratory surveillance: specimens from different parts of the country are brought to NADDEC and other regional laboratories for disease investigation. Surveillance data is reported and stored on a database at the central unit/epidemiological unit of NADDEC. This data is analysed and reported to the commissioner of animal health who, as the Chief Veterinary Officer, maintains the mandate to disseminate data to relevant stakeholders depending on the level of emergency. Surveillance data is also routinely summarized and shared with the DVOs for action

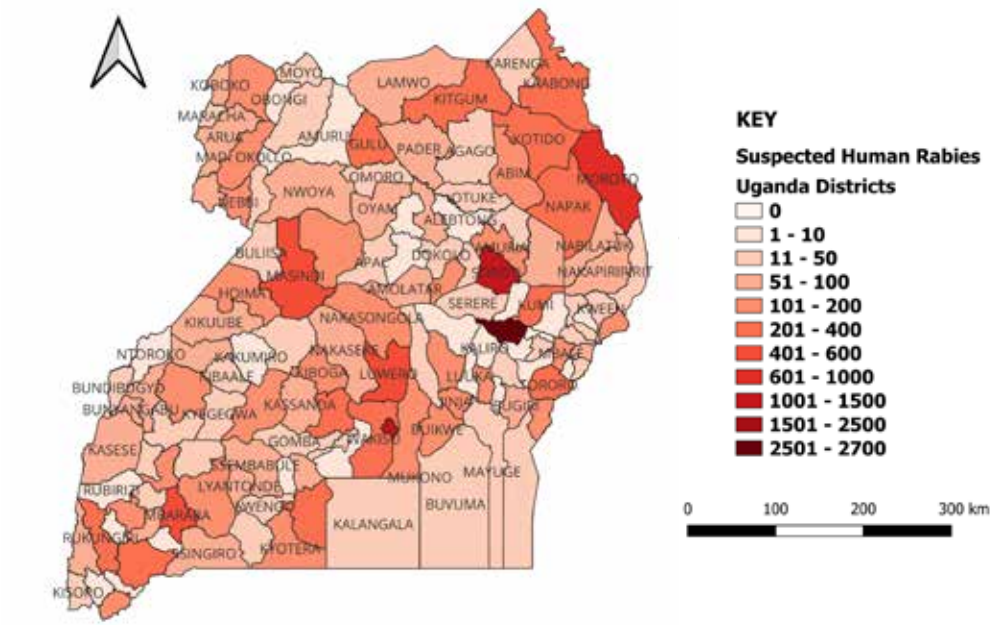

Figure 3: Distribution of dog bites in humans in Uganda in 2021

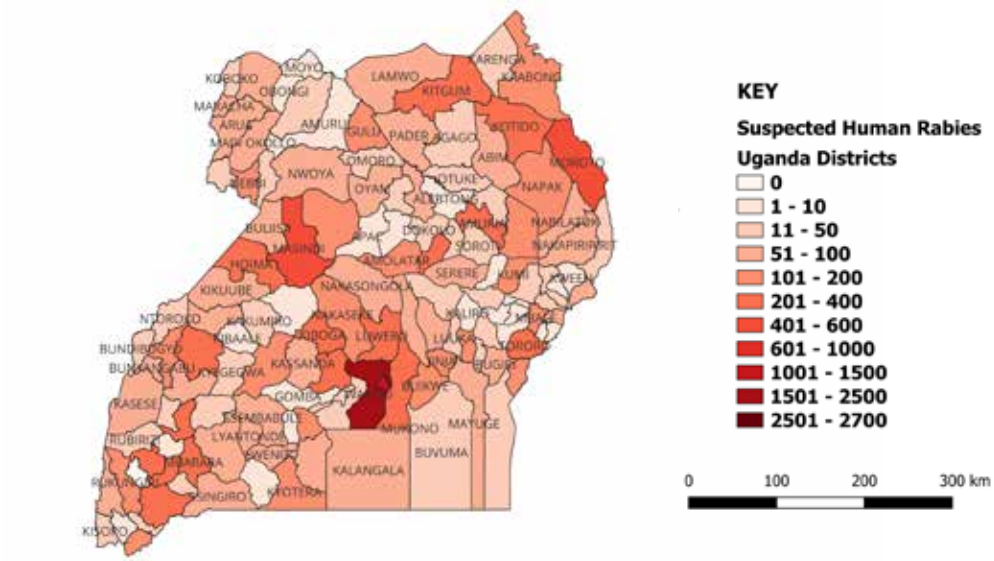

Figure 4: Distribution of dog bites in humans in Uganda in 2022

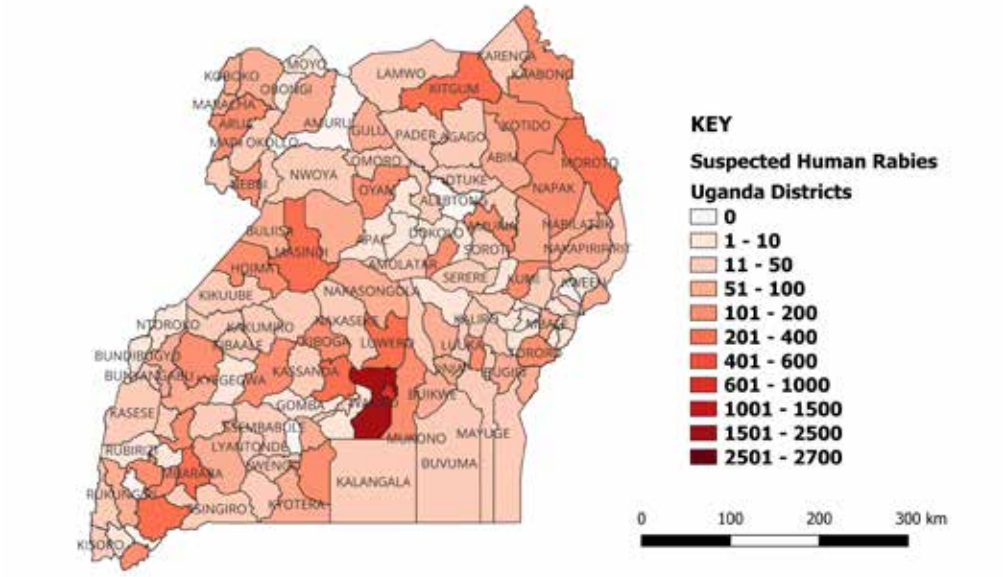

Figure 5: Distribution of dog bites in humans in Uganda in 2023

Formal reports on rabies are compiled on the public health and veterinary side through the Ministry of Health and the Ministry of Agriculture, Animal Industry, and Fisheries, respectively. The public health data is entered in the HMIS and mostly limited on dog bites and clinically diagnosed human rabies cases. The data from MAAIF is entered in the National Food and Agricultural Statistics System (NFAS), the data mainly captured includes; suspected rabid dogs and livestocks, animals at risk and the number dead.

Through the HMIS, the Ministry of Health received 67,393 cases of animal bites from

2021 to 2024 at 100% reporting while MAAIF had 3,770 suspected dog cases registered in the same period at 10% reporting. A total of 190 human deaths and 356 suspected deaths in animals.

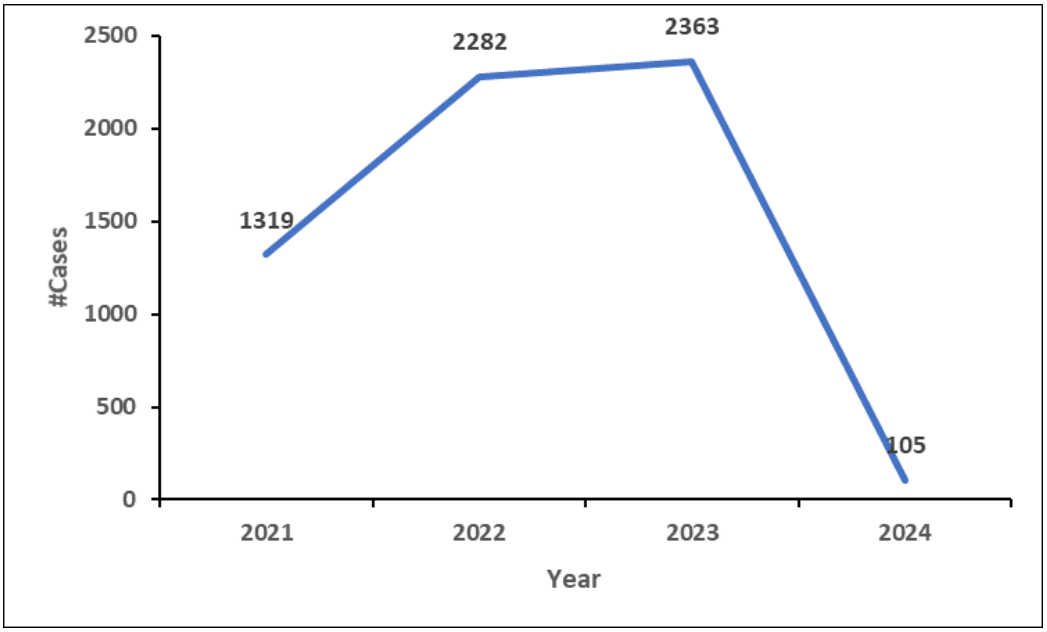

Figure 6: Trend of Animal rabies in Uganda for the period of 2021 to 2024

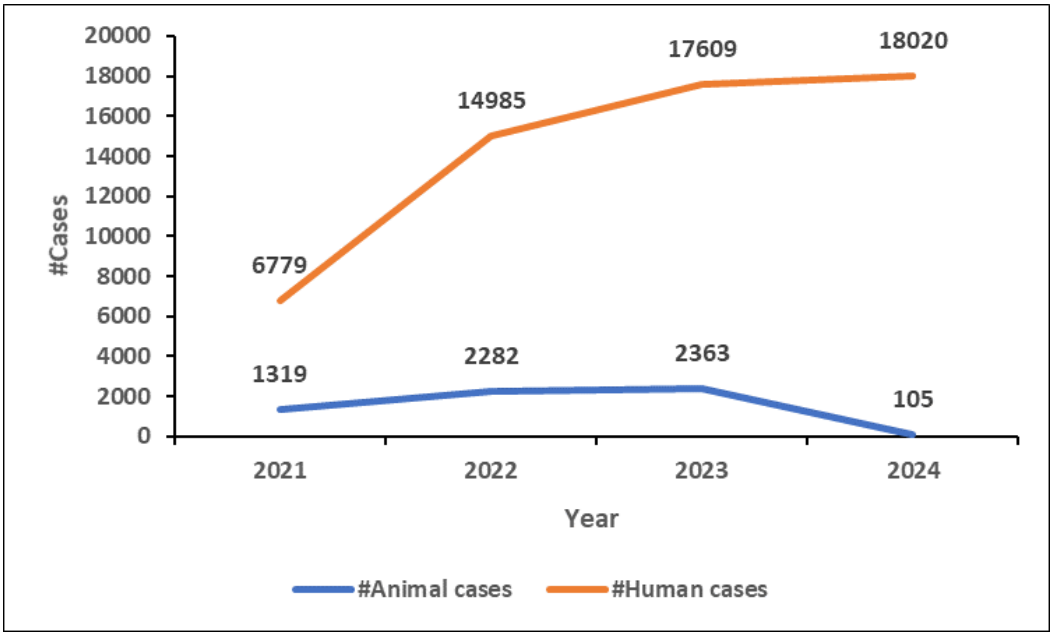

Figure 7: Total Human vs Animal Rabies Cases in Uganda for the period of 2021 to 2024

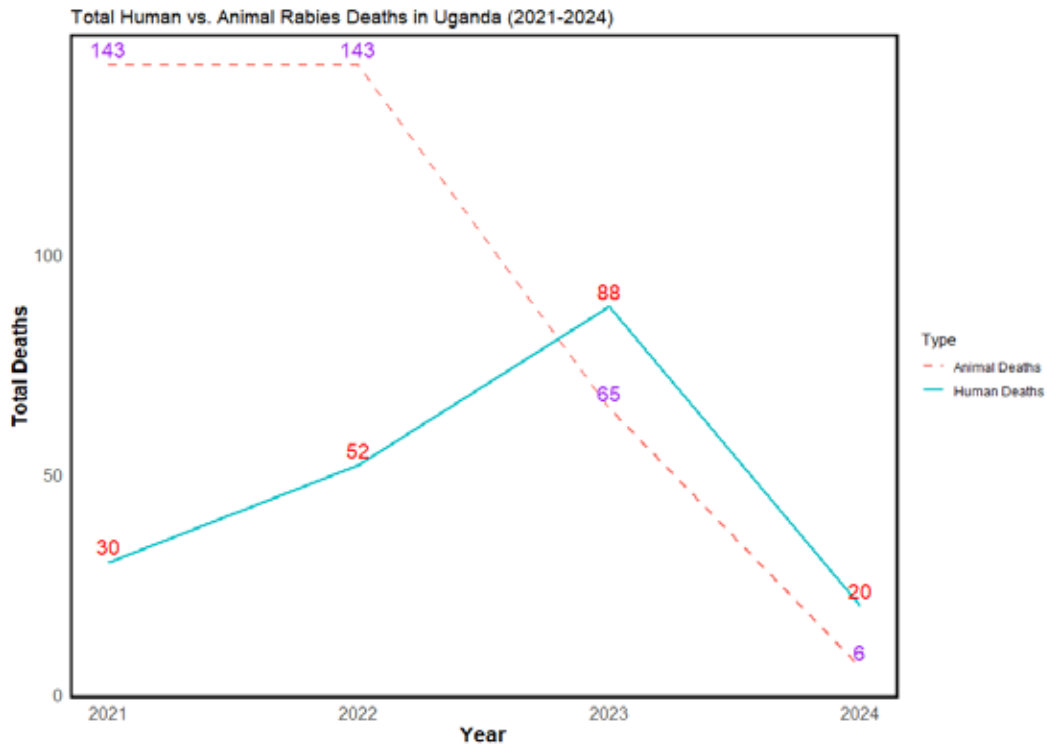

Figure 8: Total human vs. Animal Rabies Deaths in Uganda for the period of 2021 to 2024

2.4.2 Rabies reporting

This rabies elimintion strategy will outline mechanisms to improve rabies surveillance in both public health and veterinary public health and create a cross-sectoral One Health system to provide more reliable and traceable data that will be used to further guide elimination efforts and reduce the impact on the public health system.

2.4.3 Rabies diagnosis

The current system for rabies diagnosis in line with the WHO and WOAH guidelines is limited in its capacity to receive and process animal and human rabies samples.

Only NADDEC has the capacity to process samples utilizing Direct Fluorescent Antibody Technique (dFAT). The capacity should be rolled out to other institutional and regional veterinary laboratories. Capacity also needs to be established for advanced diagnostic techniques such as Real-Time Reverse Transcriptase Polymerase Chain Reaction (RT-PCR).

2.5 Legal and Regulatory framework

Rabies Act, Chapter 44

This Act provides for the suppression of rabies. It gives power to seize, detain or destroy stray dogs and further specifies the duties of owners and persons in charge of diseased dogs and provides for mandatory annual dog vaccination by the dog owners.

Animal disease Act, Chapter 38

This Act provides for control of animal diseases including separation of diseased animals and reporting to the Commissioner Animal Health.

Public Health Act, Chapter 238

This Act empowers any person who becomes aware of any unusual sickness or mortality in animals to immediately report to a local authority or to a medical officer of health.

Prevention of Cruelty to Animal's Act, Chapter 39

This Act provides for penalties for injury, torture, ill treatment, beating and any inflictions done to animals inhumanely.

Animal Straying Act, Chapter 40

This Act gives powers to seize and dispose straying animals.

2.6 Dog population management

This will be achieved through; teaching the population on responsible dog ownership, management of waste in urban areas, and surgical methods (castration and spaying)

In Uganda, there are two types of population; the home owned (confined and free roaming) and stray dogs (not owned). There are different laws on responsible dog ownership and elimination of the stray dog population. According to the Animal Disease Act chapter 44 section 2;

1. An administrative officer, veterinary officer, police officer or any person authorised by the commissioner Animal Health may seize and detain any stray dog in a proclaimed district.
2. In any proclaimed district an administrative officer, veterinary officer, police officer or any person expressly authorised to do so by the commissioner Animal Health may shoot or otherwise destroy any stray dog found in any public place or any stray dog which he or she has reason to suppose to be suspected.

Under section 3;

The Commissioner has the authority to detain seized stray dogs until the pays up all the expenses incurred and if not claimed by the owner in 3 days, it is destroyed or sold.
The dog owners have the responsibility to report their dogs if suspected to be rabid. Failure

to comply calls for a penalty in shillings and or imprisonment for 6 months.
An administrative officer, veterinary officer, or police officer have the mandate to investigate the suspected dog to destroy it or treat it as may deem fit.
In case of an outbreak of rabies or suspected rabies outbreak, the commissioner can authorize the use of humane euthanasia to handle suspected dogs or stray dogs.
The Animal Stray Act stipulates that the magistrate can authorize the destruction or seizing of stray dogs or roaming animals whose ownership is unknown.
From these laws, districts develop ordinances and sub-counties develop bye--laws that can enable the promotion of responsible dog ownership and the control and, elimination of stray dogs in the districts.

2. 7 Challenges in the control of Rabies

There are several challenges in the control of rabies in Uganda. Some of these include:

- Weak surveillance systems leading to inadequate and inconsistent reporting of suspected rabid animal and human animal bite cases and the lack of sufficient data to guide rabies control.
- Inadequate laboratory capacity at district, regional and national laboratories making confirmation of cases difficulties; hence suspected bites are regarded as rabies cases in most cases.
- Lack of adequate awareness among the communities on rabies as a zoonotic disease and responsible pet ownership principles especially for dogs and cats. The different myths and beliefs about rabies within communities and control measures, such as vaccination.
- Lack of accurate data on dog populations in the country.
- Lack of harmonised surveillance at the border (porous nature of the border).
- Lack of national rabies campaign (designated.
- Inadequate facilitation of staff to carry out vaccination.
- Poor maintenance/storage of vaccines due to cold chain issues.
- Lack of proper pet identification.

All these factors make rabies control efforts very difficult and need to be addressed comprehensively in order to progress along the SARE to eventually eliminate the disease by 2030.

2.8 Opportunities for Rabies elimination

2.8.1 Global pathway for control of Rabies

Developed by the FAO and the Global Alliance for Rabies Control in 2012, the Stepwise Approach for Rabies Elimination (SARE) provides an invaluable self-evaluation tool to measure the progress of a country's rabies control and elimination efforts. The workshop-based SARE involves relevant stakeholders and their input into a standardized evaluation matrix, which generates an outcome score that gives workshop participants the means to

compare the progress made on a national and international level. It also produces a list of tangible outcomes that inform the next steps to be undertaken to progress in the rabies elimination efforts.

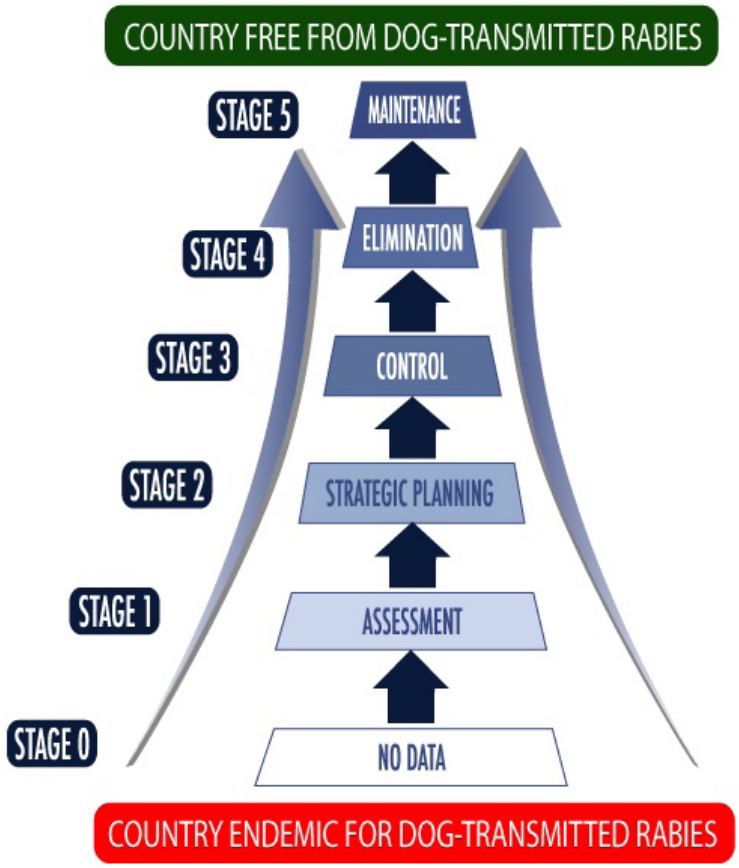

Figure 9: Stepwise Approach to Rabies Elimination stages (https://rabiesalliance.org/tools/planning-tools/sare)

The outcome score of the SARE is divided in 6 stages (with 'half stages' in-between) – from Stage 0 where there is no data about rabies available on a national level and no documented rabies elimination efforts are underway, to Stage 5 where the country reached freedom from both human, as well as canine rabies and can be declared free from the disease.

Each of the SARE stages contains 'essential' elements that must be fulfilled in order to progress to the next stage. These elements are often linked to the implementation of fundamental rabies related policies and standard operating procedures, as well as allocation of resources across departments to ensure that the rabies elimination strategy is on track and progressing towards the final goal of freedom from rabies.

2.8.2. The One Health approach

The concept of One Health describes the interconnectivity of animal health, human health, and ecosystem health.

The importance of this approach to improve human health through interventions in animal health and the health of the environment, has been recognized in Uganda for nearly a decade.

The One Health approach relies on the close communication and coordination between various stakeholders that work in the different arenas, all working towards a common goal across ministerial boundaries.

In 2017, the One Health Zoonotic Disease Prioritization Workshop for Multi-Sectoral Engagement in Uganda recognized that rabies should be a high priority zoonotic disease in Uganda. The workshop participants, consisting of representatives of the key stakeholders in zoonotic disease control, such as Ministry of Health, Ministry of Agriculture, Animal Industry, and Fisheries, Ministry of Environment, and the Uganda Wildlife Authority, evaluated the impact of 48 zoonotic diseases and placed rabies in the top tier of the seven prioritized diseases.

Rabies is a prime example of a disease that still poses an unnecessary risk to the people of Uganda and requires a One Health approach to alleviate the suffering from the disease. The elimination of the disease in the main reservoir, domesticated dogs (Canis familiaris), will ultimately result in the freedom from rabies in people. This interconnectivity highlights the need for investment in a veterinary intervention (canine mass-vaccination) to save expenses in the public health system (post-exposure prophylaxis) and the general negative impact of the disease on the gross domestic product (through loss of productivity, pre-mature death, and disability).

The NRES will ride on the One Health teams that have been formed in selected districts by the National One Health platform to act as the District Rabies Elimination Taskforces (DRETF).

3.0 THE NATIONAL RABIES ELIMINATION STRATEGY

The National Rabies Elimination Strategy has been drafted in line with the global strategy for rabies elimination by the tripartite; WOAH, FAO and WHO and the implementation plan, SARE (Stepwise Approach to Rabies Elimination). According to the national data, approximately 60% (71) of the districts are known to be endemic with rabies. The strategy intends to roll out a pilot phase of mass vaccination and public health interventions in the hotspot districts in the first year and roll out to the whole country to the 2nd to 5th year. It has been ascertained that there is a high risk for rabies at the border districts and those surrounded by national parks, game forest reserves and forests. So, these will be prioritized in the pilot phase. By the end of the implementation phase, the country is expected to be at stage 4 of the SARE.

3.1 Problem Statement

Rabies remains a serious endemic disease in Uganda with an estimated 60% of the districts as hotspots. Despite its endemicity, epidemiology of rabies is not well documented. The problem is compounded by lack of collated data on numbers of dog and other animal mediated rabies both in the animal health and public health sectors. Besides the uncertainty of the national dog population, an estimated 74% of the dogs in rural areas roam freely in search for food and cover long distances during the breeding season increasing risk of infection (12). The rabies vaccination coverage of the dog population is still inadequate partly due to fewer doses procured by government and less prioritization by the private sector with resultant low numbers of dogs being vaccinated. Many cases go unreported due to low community awareness, cultural norms and beliefs. There is also a delay in accessing PEP due to low socio-economic status, low level of education, and reliance on traditional healing practices (13). In some rural communities, rabies symptoms are attributed to spiritual causes, further delaying timely medical intervention .

Several root causes underlie Uganda's rabies burden. Low dog vaccination coverage, often below the recommended atleast 70% herd immunity threshold, stems from inadequate veterinary infrastructure, limited vaccination campaign resources, and insufficient cold-chain systems among other gaps (14). Uncontrolled stray dog populations, exacerbated by weak enforcement of the Rabies Act Cap. 44 and limited sterilization programs, serve as reservoirs for the disease (12). Poor domestic waste management further increases human-animal interactions, heightening the risk of rabies transmission Uganda Ministry of Health.

Delayed access to post-exposure prophylaxis (PEP) compounds the problem. Stockouts at government health facilities and prohibitively high costs, ranging from UGX 70,000 to 200,000 per person per dose shot, place this life-saving treatment beyond the reach of many rural households (15)(16) since a victim needs between 3-5 shots for a complete a dose as recommended by WHO within a month time interval in addition to managing other complications that come with the dog bite. Socio-cultural misconceptions about rabies further discourage timely treatment and vaccination, with some communities relying on traditional remedies instead of professional medical care (17).

The continued fragmented multi-sectoral coordination under the One Health framework weakens rabies control efforts in Uganda. While the Ministry of Health (MoH), the Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF), and the Uganda Wildlife Authority (UWA) have distinct roles, their siloed approaches create inefficiencies, bureaucracies, competing priorities and missed opportunities for collaboration, coordination and communication. Gaps in surveillance and data systems exacerbate the issue, leading to underreporting of cases and vaccination coverage, which hinders evidence-based planning, timely outbreak responses and poor monitoring and evaluation (18).

These systemic and socio-cultural barriers threaten Uganda's ability to achieve its 2030 rabies elimination target. Addressing these root causes requires prioritizing interventions based on their potential impact, feasibility, and urgency.

The capacity for rabies diagnosis at national level is still insufficient, utilizing the Fluorescent Antibody technique (FAT) at the National laboratory (NADDEC) while other

techniques such as PCR, ELISA, use of rapid kits are not available. There is no available capacity for rabies diagnosis at regional veterinary laboratories, yet most suspected rabies cases occur in upcountry districts. Both the veterinary laboratory at Makerere University and the public health laboratories utilize histopathology. There is no capacity for more efficient methods of diagnosis. The NRES therefore, will guide the country to properly understand the epidemiology and gravity of rabies by collating data at MAAIF and MoH; build technical capacities, catalyse mass awareness on rabies and support vaccination.

3.2 Justification

The human rabies cases are fatal where Post Exposure Prophylaxis (PEP) is not available. This happens in rural areas leading to loss of lives with 100% fatality rate. Studies have established that home owned dogs in rural communities where most of the population stays roam freely which also poses a great risk for exposure to rabies. A total of 190 human deaths and 356 suspected animal deaths were recorded at the Ministry of Health and at the National Animal Disease Diagnostic and Epidemiology Centre—MAAIF respectively from 2021—2024.

From a study that was conducted in randomly selected health facilities, it was estimated that in the absence of post-exposure prophylaxis (PEP) treatment, 592 human deaths would be registered and 210 deaths annually, if they did not complete their full dose of PEP treatment since 41% of them did not complete the dose (1).

Important to note is that the reporting levels are still low and the impact of rabies is known to be greater if the surveillance system is strengthened.

Rabies is an economically important zoonosis and the costs mainly result from consequences of human deaths, loss of livestock, disability from bites and the costs involved in preventive measures such as vaccination and PEP. The global monetary expenses resulting from rabies stands at $695 million annually excluding human deaths (19). The comprehensive study that took into considerations all the possible losses indicated a global economic loss of $1.2 billion annually.

The government of Uganda through the National medical stores and non government organizations through the J procure approximately 50,000 doses of PEP annually at about 1.8 billion Uganda shillings (487,000 USD). Nevertheless, post-exposure prophylaxis is not readily available to individuals with suspected cases of human rabies who often travel long distances to access the vaccine (20). Analysis of national surveillance data between 2013 and 2017 revealed that 18% of people with animal bites do not receive post-exposure prophylaxis (21) and those who receive can't complete the dosage because of the insufficiency. The consequences of the disease are grave hence require robust interventions. The government procures 500,000 doses of rabies vaccine for animals annually, this is still insufficient.

Therefore, this strategy emphasizes strengthening surveillance, laboratory capacity, massive awareness creation and public education, mass vaccination campaigns for dogs targeting 70% of the dog population in the target districts and availability of sufficient doses of PEP at local level.

3.3 Guiding Principles

The principles to be applied in elimination of rabies include;

3.3.1 One Health approach: All stakeholders who are key in rabies control will work together each playing their role.

3.3.2 Rabies vaccination: This will involve routine annual vaccination by the districts with vaccines provided by the government. Mass vaccination campaigns which will coincide with the World Rabies Day commemoration and individual vaccination initiatives through small animal clinics and veterinary offices at the district.

3.3.3: Pre and Post exposure prophylaxis: Ease of access to PEP for all suspected rabid animal bite victims and vaccination of humans at risk.

3.3.4 Strengthen the surveillance system: Surveillance is the continuous collection, analysis and interpretation of data to inform control and preventive measures on health matters. Both the animal and public health sectors surveillance systems will be strengthened to have accurate and timely data to inform rabies elimination efforts.

3.3.5 Stakeholder engagement: Different stakeholders have various roles, they be mapped and brought on board in the implementation of activities.

3.3.6 Capacity building: The human resource needs to be trained on various aspects of rabies, the control and elimination in phases.

3.3.7 Call for action for elimination of rabies in domestic dogs, cats and humans by 2030

3.4 Vision

A Ugandan population free of rabies

3.5 Goal

Elimination of dog mediated rabies from Uganda by the year 2030

3.6 Mission

Control rabies using strategic interventions as stipulated in the Step wise Approach to rabies elimination by the global tripartite (WOAH, WHO and FAO).

3.7 Objectives

The objectives are derived from the Global Strategic Plan to Eliminate Human Deaths from Dog-mediated Rabies by 2030 and they include;

1. To effectively use vaccines, medicines, tools, and technologies in the control of rabies
2. To generate reliable data to inform rabies prevention and control efforts
3. To strengthen institutional coordination in the prevention and control of rabies

3.8 Strategic fit

The Uganda National Rabies Elimination strategy is aligned to the third National development plan (NDPIV) 2025/2026 to 2029/2030 which aims at achieving higher household incomes, full monetization of the economy, and employment for sustainable socio-economic transformation and the MAAIF strategic plan under the intervention of "strengthening systems for management of pests, vectors and diseases." This will be achieved through elimination of rabies, a disease which possess a huge burden to the country through loss of lives in terms of premature deaths and the high costs of treatment of the victims.

4.0 INTERVENTIONS AND ACTIVITIES TO ACHIEVE THE PROPOSED OBJECTIVES

4.1 Objective 1: To effectively use vaccines, medicines, tools, and technologies in the elimination of rabies

This objective will be achieved through the the following interventions:

i. Canine mass vaccination
ii. Canine population management
iii. Community awareness and education
iv. Integrated bite case management

4.1.1 Canine mass vaccination

The overwhelming majority of human rabies cases and subsequent deaths is caused by the bite of an infected dog. The elimination of the disease in the reservoir species is therefore the most important component of this strategy.

The activities will include;

i. Training of workforce at all levels of the implementation chain.
ii. Acquire adequate quantities of high-quality rabies vaccine and disposables
iii. Acquire vaccination logistics and consumables
iv. Conduct pilot mass rabies vaccination in hotspot districts
v. Mobilisation of dog owners and dog breeders
vi. Scale up mass vaccination in other districts to ensure at least 70% vaccination coverage of the local dog population
vii. Carrying out post-vaccination surveys in Phases 1, 2, 3 and 4
viii. Conduct service learning for veterinary institutions of higher learning during rabies mass vaccination
ix. Engage private sector and civil society organization in dog rabies vaccination

4.1.2 Canine population management

Dog population management is very important in rabies control and eventual elimination. This includes the behavioural component of responsible dog ownership that requires understanding of human behavior and the systematic application of proven behavior change models. Simple awareness campaigns, have often proven insufficient for sustaining long-term behavioral shifts.
The activities to be conducted include;

i) Embrace Good Hygienic Practices in communities to keep away stray dogs especially in urban centres
ii) Conduct stray dog population surveys in hotspot districts
iii) Humane euthanasia for suspected rabid stray dogs /ownerless dogs
iv) Promotion of behavioural change among communities to embrace responsible dog ownership.
v) Sensitization of dog owners about dog sterilization (castration and spaying) to avoid accumulating huge numbers of puppies for which they have no capacity to care.
vi) Registration of dog breeders in the country, dog owners and the individual dogs
vii) Coordinate and supervise the work done by Non Government Organisations (NGOs) and animal charity organisatins to support the country in dog population management.

4.1.3 Increase access to post-exposure prophylaxis (PEP)and rabies immunoglobulin (RIG)

The activities will include;

i) Acquire sufficient doses of Post Exposure Prophylaxis
ii) Acquire sufficient doses of human rabies vaccine
iii) Training of over 700 workforce

4.1.4 Community awareness and education

All activities within the national rabies elimination strategy rely on the effective and widespread communication of information to all communities in rural and urban settings across all districts.

The education and awareness materials will be developed by a multisectoral team at national level, the materials will be tested at subnational level for ability to deliver the required information. The materials will be distributed in the districts through the District Rabies Taskforces.

For effective implementation, we shall bring on board Non state actors and other partners to support this implementation.

The following activities shall be employed, in order to achieve the maximum availability and dissemination of information:

i. Education of primary school children as part of the national curriculum. The topics for training are in Annexe II
ii. Edutainment
iii. Holding Focus group discussions with opinion leaders both physical and online
iv. Hold community functions and events (Barazas, funerals, weddings and market days
v. Community radio Loudspeaker announcements particularly in rural areas
vi. Working with opinion leaders, local leaders, cultural and religious leaders
vii. Include rabies education and sensitization in health community outreaches.
viii. Creation of social media pages on all relevant platforms, such as Facebook,

Twitter, Instagram and LinkedIn (e component)Creation of an education journal as a communication tool

ix. Radio and TV adverts and spot messages
x. TV appearances in key formats
xi. Use of social media platforms
xii. Printing media articles, leaflets and posters
xiii. Dissemination of information on rabies through national telecommunication network providers.

4.1.5 Integrated bite case management

The activities will include;

i. Sensitization of the communities about first aid for a dog bite (Annexe: First Aid after a dog bite)
ii. Provide adequate high-quality and WHO-approved human rabies post-exposure prophylaxis (PEP) and rabies immunoglobulin (RIG)in health facilities
iii. Training health workers in intradermal injection techniques
iv. Implement integrated bite case management system
v. Administration of Pre Exposure Prophylaxis to the groups at risk of rabies particularly professionals.
vi. Timely administration of post exposure prophylaxis to the bite victims
vii. Follow up on vaccinated individuals and manage cases.

4.2 Objective 2: To generate data in the prevention and control of rabies

This objective will be achieved through the the following interventions:

4.2.1 Strengthening surveillance and response while utilising ICT

Electronic solutions for effective data collection and management for both vaccination and surveillance efforts will be utilised. The country will utilise available mobile applications to collect surveillance data and document vaccination numbers. These will be connected to the National Food and Agriculture Statistical System (NFASS) for collection of all data at national level and only available for use on request. Manual data colletion will still be done as back up for the electronic system. The hospitals and health centres handling rabies cases will continue utilising the DHIS2 system to capture data as before.

Activities include;

i. Acquire computers and GIS gadgets
ii. Acquire vehicles and motorcycles
iii. Collection, Packaging and submission of samples from livestock and wildlife of suspected rabid animals to NADDEC for testing and confirmation.
iv. Designation of Bite Case Management officers from existent veterinary staff in each district
v. Acquire cold chain equipment and power back up to support vaccination at district level

vi. Recruitment and Training of central laboratory and district personnel in sample collection, rabies diagnosis and reporting of results
vii. Designing, Training and rolling out electronic data collection tools for rabies information
viii. Training on rabies data collection, analysis, interprentation and presentation.
ix. Training designated officers in data collection and analysis
x. Acquire laboratory consumables for rabies diagnosis
xi. Acquire and administer adequate quantities of animal rabies vaccine
xii. Acquire and administer adequate quantities of rabies immunoglobulin for human
xiii. Facilitate staff to undertake rabies vaccination exercise and surveillance in the field
xiv. Capacity building of field data analysis at NADDEC
xv. Intergrate human and animal surveillance systems to enable sharing of data.

4.2.2 Strengthening laboratory systems for rabies detection and response

i. Acquire and distribute Rabies Rapid Test kits for hotspot districts, regional veterinary laboratories and NADDEC
ii. Acquire and distribute rabies anti-body test kits for rabies post vaccination monitoring
iii. Stock reagents for use in rabies diagnosis
iv. Provide Personal Protective Equipment (PPEs) for use in the laboratories and the field
v. Vaccination of proffessionals at risk of exposure to rabies
vi. Continuous training of laboratory technicians at district, regional and national level in rabies diagnostics, biosafety, sample packaging and shipment
vii. Renovate and equip 10 regional veterinary laboratories
viii. Establish laboratory twinning partnerships
ix. Build capacity for molecular diagnostic techniques
x. Conduct laboratory quality assurance at national and regional levels
xi. Conduct cross border meetings and engagements

The National Rabies Elimination Taskforce under the leadership of MAAIF will conduct comprehensive risk assessment for rabies.

4.3 Objective 3: To strengthen institutional coordination in the control and elimination of rabies

This objective will be attained through the following interventions:

4.3.1 Strengthen the legal framework for rabies control

The activities below will enable the attainment of this intervention:

i. Review of the existing legal framework
ii. Develop guidelines and standard operating procedures (SOPs) for the NRES.

4.3.2 Compose and operationalize the National and District Rabies Elimination Taskforces

The activities below will enable the attainment of this intervention:

i. Facilitate activities for the National Rabies Elimination Task force (NRETF)
ii. Compose the District Rabies Elimination Task Forces (DRETFs)
iii. Facilitate activities for the District Rabies Elimination Task Forces (DRETFs)
iv. Participate in cross border regional collaboration meetings
v. Conduct SARE workshops annually
vi. Participate in the Global Dog Rabies Elimination Pathway (GDREP) exercise
vii. Conduct budget advocacy for the central government and development partners

Note: All activities conducted within the framework of this national strategy shall be conducted in strict adherence to and compliance with the *WHO International Health Regulations* and the *WOAH Terrestrial Animal Health Code and Manual*. This includes, but is not limited to, control strategies outlined in aforementioned documents, as well as the relevant laboratory techniques and practices.

5.0 IMPLEMENTATION ARRANGEMENTS

This section will elaborate how the planned activities will be achieved in line with the SARE tool and monitoring framework.

5.1 The SARE tool within the framework of the NRES

As an internationally recognized tool to measure progress of national rabies elimination efforts, the SARE tool is recommended to be used to measure the progress of this strategy and ensure continuous stakeholder engagement, as control efforts progress.

An initial SARE workshop to assess the rabies elimination stage of Uganda was undertaken in 2017 with a final score of 0.5, indicating significant steps need to be undertaken to achieve the 2030 goal.

Following the ratification of this strategy, a SARE workshop will be organized by the Department of Animal Health, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) to establish a new baseline SARE score, which will highlight the progress made since 2017 and help to measure the progress of this strategy in subsequent years as indicated in table 1.

Table 1: SARE Stage descriptions

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
No information on rabies available, but rabies is suspected to be present	Assessment of the local rabies epidemiology, elaboration of a short-term rabies action plan	Development of a national rabies control and prevention strategy	Full-scale implementation of the national rabies control strategy	Maintenance of freedom from canine -mediated human rabies; Elimination of rabies	Freedom from human and dog rabies

Following the initial baseline SARE workshop, it is recommended to repeat the self-evaluation on an annual basis to record the progress that has been made and to update the timeline of activities needed to proceed to the next stage. The results of the SARE feed back into the National Rabies Taskforce, which coordinates the on-going implementation and adjustment of this strategy.

Through the use of the P-WARE (Practical Work plan towards Achieving Rabies Elimination) version of the SARE, the outcome of the baseline SARE workshop will also provide the NRTF with a detailed work plan outlining the concrete next steps that need to be taken to proceed to the next stage.

Recommended stakeholders to participate in both the baseline and subsequent annual SARE workshops include, but are not limited to, representatives of the following entities:

- Ministry of Agriculture, Animal Industry and Fisheries
- Ministry of Health
- Ministry of Education and Sports
- Ministry of Finance, Planning and Economic Development
- Uganda Wildlife Authority

- Ministry of Water and Environment
- Representatives from District Rabies Taskforces (1 per region)
- One Health Technical Working Group
- Representatives of international organizations in the country (WHO, CDC, etc.)
- Representatives of civil society organizations active in rabies control in the country (such as Bix Fix Uganda, Mission Rabies, VSF Germany etc.)

It is recommended to have the first workshop facilitated by an experienced facilitator, who will in turn train representatives of the National Rabies Taskforce to conduct the workshops in subsequent years.

5.2 The National Rabies Taskforce

The Ministry of Agriculture, Animal Industry and Fisheries and Ministry of Health will take on leadership in the implementation of the National Rabies Elimination Strategy (NRES) and each will have a focal person. For oversight and effective coordination across several ministerial departments, a National Rabies Taskforce is proposed, which will serve as a liaison between the implementing agencies and a central body of reporting to the relevant government entities.

The main operational activities within the NRES are coordination of mass canine vaccination, provision of sufficient doses of PrEP and PEP, rabies surveillance and diagnostics, rabies sensitization and education. The task force will have representation from the following ministries; the Ministry of Agriculture, Animal Industry and Fisheries, the Ministry of Health, the Ministry of Water and the Environment, the Ministry of Education and Uganda Wildlife Authority, Ministry of Local Government and Office of the prime minister.

The taskforce will consist of at least 2 representatives from MAAIF, MoH and Ministry of Local government and 1 member from each of the aforementioned entities, to ensure adequate representation and expertise.

In addition to these 10 permanent representatives, key stakeholders, such as representatives of the ministries, as well as representatives of international organisations and civil society can be invited as observers to the Taskforce meetings. Notably, the established One Health Technical Working Group will be invited to participate as observers to lend their technical expertise and ensure alignment with other One Health interventions in Uganda.

The taskforce will have clear terms of reference and shall convene itself at least once every quarter for a regular meeting, with the option to have extraordinary meetings as required in-between.

Following the inauguration of the NRETF, similar taskforces will be instated in the districts to ensure the execution of rabies elimination activities in their respective districts and the reporting of data to the national databases. The chairperson of every district rabies taskforce will be responsible for the liaison with the NRETF.

5.3 Establishment of the National Rabies Elimination Task Forces (NRETF)

The composition will involve government structures in rabies control as described in the strategy and their roles will include; Spearhead the implementation of the rabies elimination strategy, Resource mobilization, Technical advice on rabies control, Advocacy, Supervise and review reports from sub-committees on rabies control, Provide updates on the implementation of the strategy.

5.4 Establishment of the District Rabies Elimination Task Forces (DRETFs)

These committees will be formed through the already existent structures for multi-sectoral collaborations at district level. Their roles will include; active participation in the rabies control activities at local levels, mass sensitization on rabies control within their areas, advocacy, provide progress reports to NRETF.

5.5 Selection of focal pilot areas

The country has a total of 146 districts and cities with five official subdivisions; Central, East, West, North and South. The initial implementation of the strategy will be done in 50% (73 districts) of the districts in the first year which are regarded as key high-risk districts. The districts were selected based on the risk levels through qualitative risk analysis. The lessons learnt and success stories will inform the implementation of the strategy in the whole country from the 2nd to 5th year . The pilot districts include;

East: Tororo, Busia, Iganga, Bugiri, Namutumba, Buikwe, Serere, Soroti, Kaliro, Buyende, Mbale,Mbale city, Kumi, Jinja, Namisindwa, Manafwa, Namayingo (17)

Central: Masaka, Masaka city, Mukono, Kalangala, Butambala, Mityana, Lwengo, Kampala, Wakiso, Gomba, Luweero, Mpigi (12)

West: Isingiro, Kyenjojo, Kasese, Rakai, Rubirizi, Mbarara, Kabale, Rubanda, Lyantonde, Ntoroko, Bundibujjo, Kagadi, Kiryandongo, Ntungamo, Kabarole, Bunyangabo (16)

North: Maracha, Alebtong, Adjumani, Apac, Arua, Arua city, Nwoya, Gulu, Yumbe, Nebbi, pader, Koboko, oyam, Lira, Moyo, Kitgum, Omoro, Amur, Madi-okollo, Moroto, Oyam, Amudat, Napak, Kotido, Kween, Nabilatuk, Terego, Zombo. (28)

Data on dog population will be drawn from the Uganda National Bureau of Statistics and consultation with the DVO to get a baseline data that will form the basis for the required 70% vaccination coverage. The pilot will be conducted in the 1st year. The success stories and challenges will be documented and will form the basis for national wide implementation of the strategy from the 2nd to 5th year.

5.6 Training

The sustainable delivery of canine mass vaccination is highly dependent on adequate training of all personnel involved in the implementation of the campaign.

Members of the National Rabies Taskforce and the national coordinators are selected based

on existing technical knowledge and expertise with rabies control in Uganda. In the spirit of knowledge exchange, a delegation consisting of the members of the Taskforce, as well as the technical leads should liaise with their counterparts in other countries in the wider region with active rabies control programmes, such as Namibia, Kenya, Tanzania, and Malawi.

The training of field level staff is following the cascade model from the national level down to the district level and coordinated by the National Rabies Elimination Taskforce. Training for vaccination staff must cover;

- Injection techniques
- Safe and appropriate handling of vaccines
- Dog restraint techniques
- The contents of the rabies education curriculum
- Use of the data collection application
- Basic first aid in the field
- Risk awareness

5.7 Research

The NRES implementation will be grounded on evidence-based strategies. Operational research can be conducted during interventions on rabies control (e.g. vaccination, dog population control) to collect, analyse and interpret data to better inform future strategies and policies. For human health interventions, research areas focused on PEP options and education and awareness strategies are relevant. The main areas that have been identified for operational research include:

- KAP (knowledge, attitudes and practices) surveys;
- Multi-disciplinary anthropological, socio-cultural, and economic studies;
- Dog ecology studies;
- Dog population control studies;
- Rabies vaccination in combination with dog population control studies;
- Research into new, cost-effective biologicals and shorter PEP regimens; and
- Studies to better define the economic burden of rabies in communities and countries.

Advanced research can also be conducted to enhance rabies diagnostic capacity and characterization of strain in different species and ecosystems. Scientific research can be done on molecular epidemiology using techniques such as; PCR and sequencing. Furthermore, supporting twinning projects to enhance the competency of officers in diagnostics.

From the research that will be conducted, a journal will be created as a communication tool to keep the national and international stakeholders updated on the progress of rabies elimination efforts in the country.

5.8. Radio and TV messages

The package for radio and television talk shows will include:

i) The national rabies elimination strategy

ii) Facts and myths about rabies (Clinical signs, causes, mode of transmission, epidemiology, prevention, diagnosis)

iii) Solid waste management in relation to stray dog population

iv) First aid for animals and humans suspected to be bitten by rabid animals

v) Legal framework on rabies in the country

vi) Community engagement in rabies prevention and control

vii) Stakeholder roles in rabies control

5.9. Vaccination Strategy

The roll out of the annual nationwide canine mass vaccination will follow a phased approach to test and adjust the methodology as needed in order to achieve the 2030 goal.

Figure 10: Phased approach to scaling mass dog vaccination in Uganda

The Chief Veterinary Officer utilizing available data on suspected rabid dog bites will guide the selection of the pilot 50% districts from each of the 5 regions (East, West, Central, North, and South) in consultation with key stakeholders for the initial roll out of the rabies mass vaccination campaign. The Settlement Type and Road Connectivity (STARC) mapping tool that was developed by the US CDC and mission rabies can be utilized to prioritize resource allocation and conduct optimal mass vaccination campaigns. The tool categorises geographic regions according to human population distribution (as a proxy for dog population) and inter-connectivity by road networks. All inhabited areas of a country are mapped using open access reference data generated by machine learning extraction of building rooftops from satellite imagery. Polygons representing contiguous areas of population are created by applying a buffer around each building and merging the resulting shapes. These polygons are labelled according to human population using open access data and classified by connectivity through overlay of the national road network.

Training in the application of this tool will be requested from the developing organisations to train technical officers named by the NRETF. These officers will be responsible for the creation of STARC maps for Uganda. The outcome is a national picture of inhabited areas

labelled by a STARC code and dog population to aid the planning of optimal mass dog vaccination campaigns for rabies control. The maps form a basis for the initial vaccination team direction during early campaigns but can be rapidly adapted and iterated when mobile technology platforms are integrated into the campaign to accelerate the aggregation and standardization of campaign data.

The District Veterinary Officer (DVO) under the guidance of the District Rabies Elimination Task Force (DRETF), will spearhead the planning and coordination of the campaign in their district.

The data provided through the livestock census and household surveys will be utilized in the selection of an adequate vaccination method which will inform sufficient resource and staff allocation in the pilot districts.

Table 2: Overview of vaccination methods

Static Point	Fixed vaccination clinics to which dog owners can bring their animals.
Door-to-Door	Vaccinators move through a designated area, actively seeking out dog owners to offer their animal the vaccine.
Catch-Vaccinate-Release	Vaccinators use humane capturing devices in order to restrain free-roaming dogs without an identifiable owner.
Oral Bait	Targeted distribution of baits containing oral rabies vaccine to otherwise inaccessible dogs.

Evans et al. (2019) have demonstrated that a static point approach is the most effective and economic method to reach the majority of the owned dog population even in rural areas.(22) These static vaccination clinics are placed in strategic locations around the communities of the pilot area and should be operative during times that people can most likely access them.

Each field team must consist of at least two people who can vaccinate and issue vaccination certificates

The field teams must report their vaccination data on a daily basis to the DVO, who then in turn assesses the results of the day to plan the subsequent campaign days. Then, submit reports to national level.

Veterinary and para-veterinary workforce shall participate in the pilot phase districts, using the campaign as a training exercise for the roll out phase from the 2nd year. The roll out phase will require mass vaccination to take place in all districts in the country. DVOs and select veterinary staff from the districts in the region surrounding the pilot district will participate in the roll out campaign to ensure practical experience in the running of the annual mass vaccination campaign.

Once the roll out phase is reached in 2nd year, the annual mass vaccination campaign shall take place around World Rabies Day (28th September), with the aim to work in every district for a maximum of 10 working days, to ensure that there is no impact on other activities of

importance of the veterinary services and to facilitate easier communications.

Throughout all the phases, the target is to vaccinate 70% of the local dog population to achieve herd immunity and therefore elimination of the rabies over time.

The vaccine used for the implementation of this strategy must comply with Chapter 3.1.17 of the WOAH Terrestrial Manual.

The vaccine used should meet the following requirements:

- Be thermo-stabile (supported by published research), safeguarding against a potential break in the cold chain especially in rural areas
- Have antigen levels of above 1 IU per ml of vaccine
- Preferably, be registered for use in dogs, cats, cattle, sheep, goats, equines & wild carnivores to ensure coverage of multiple species as required
- Require the same dose (1ml) for all registered species
- Be registered for use in animals less than 3 months' old
- Be safe for use in pregnant bitches

Following the ratification of this strategy, the National Rabies Elimination Taskforce under the leadership of the Chief Veterinary Officer of Uganda, will draft and send a proposal to the WOAH Rabies Vaccine Bank to request an adequate amount of canine rabies vaccines for all the phases of the vaccination campaign.

5.10. Post-vaccination surveys

Immediately following the static point vaccination campaign, all working areas in pilot phase (Phase 1) and a statistically representative sample of working areas in Phase 2 (roll out phase) will be selected for post-vaccination assessment. This step is paramount to ensure a minimum 70% of homogeneous vaccination coverage has been achieved.

5.11. Rabies surveillance

The Integrated Bite Case Management (IBCM) was developed to address the need for better rabies surveillance following the WHO's call for IDSR. Successfully implemented by the government of Haiti in collaboration with the US Centers for Disease Control and Prevention (CDC), IBCM now serves as the blueprint for a rabies surveillance system that does not only collect the data needed to assess the burden of disease but also enables national public health systems to distribute resources in the most effective and economical way. It has since been implemented in multiple countries like Malawi and India and will provide the basis for rabies surveillance in Uganda, in line with the provisions in Chapter 1.4 and Article 8.14.12 of the WOAH Terrestrial Code and Chapter 3.1.17 of the WOAH Terrestrial Manual.

In each district, at least 1 IBCM Officer per district will be nominated from the existent veterinary and medical staff and will be based at the District. The IBCM officer will be trained in verbal autopsy techniques and rabies epidemiology. Their daily duties include:

i. Collation of the day's dog bite information reported to veterinary staff and health

centres from within the district

ii. Phone consultations with all dog bite victims that reported a dog bite and advice based on information provided
iii. Entering the data collected during the phone consultations into the rabies surveillance system
iv. Assignment of field investigations in case rabies case is suspected
v. Quarantine follow-up calls
vi. Communication of final case investigation results
vii. In person investigation of potential rabies cases, their humane capture ad euthanasia
viii. Investigation of potentially exposed people
ix. Investigate potentially exposed animals for signs of exposure

IBCM Officers will require access to transport means, as well as a mobile phone and animal restraint equipment and licensed veterinary euthanasia pharmaceuticals.

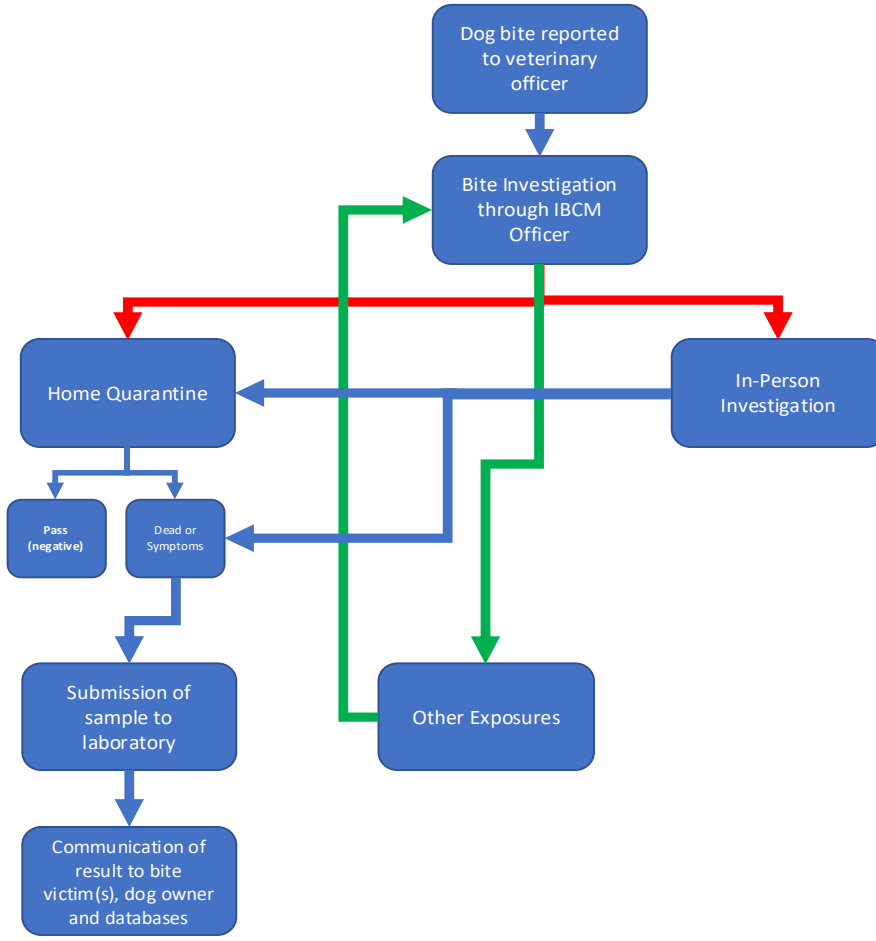

Figure 11: Flow Diagram of Integrated Bite Case Management System

5.12. Animal Sample Submission

In addition to samples submitted through the IBCM system, the DVO in each district shall also encourage the reporting and submission of samples from livestock and wildlife that have been reported to DVO staff as potentially rabid. The IBCM Officers in the district can aid in humanely euthanizing these animals where necessary and retrieve adequate samples for laboratory testing.

Any dead dog found in communities, should also be considered to be submitted to laboratory testing to ensure the cause of death was not rabies.

5.13. Laboratory personnel training needs and diagnosis

The WOAH Laboratory Twinning programme will be approached for further training staff of the NADECC, CoVAB, CTPHL as well as the regional laboratories in a train-the-trainer format. Participation in ring-tests will further ensure the adequate application of the training in the day-to-day practice.

Through the introduction of the IBCM system, a better pathway to identify suspected and probable animal rabies cases will be established throughout the country. This will also lead to an increased number of samples that need to be submitted by each DVO's office to the relevant regional veterinary laboratory in a safe and timely manner.

Due to the distances that have to be covered for a sample to reach the nearest regional laboratory, the district rabies taskforce will identify the most accessible and reliable transport or courier service. In some instances, similar systems for human samples already exist and can potentially be used to transport rabies samples as well. Adequate packaging and labelling according to WOAH Terrestrial Manual Chapter 1.1.3 have to be provided to the DVO, together with training on how to use these materials for DVO staff and IBCM Field Officers.

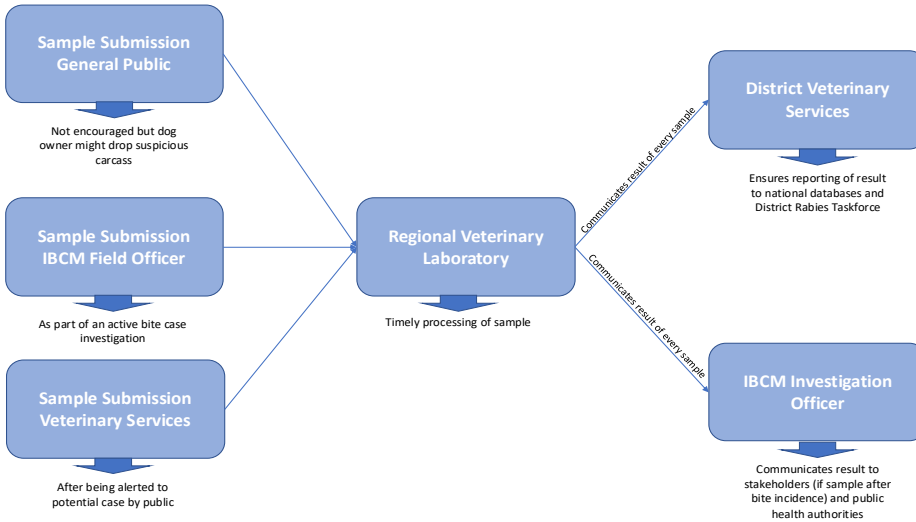

Figure 12: Sample submission and communication flowchart once capacity in RVLs is available

The increase in capacity throughout the country together with the creation of a sustainable and efficient sample submission chain will ensure the timely processing of animal rabies samples. Prompt communication of the test results will assist both veterinary and public health services to provide the appropriate response to rabies incidences in the affected communities.

Similarly, the submission of samples from humans who are suspected to have succumbed to rabies is encouraged, however this might not be culturally acceptable to communities or individuals. The reporting of human rabies cases will take into consideration whether a laboratory test was performed and will be reflected in the national statistics as a clinically diagnosed rabies case, if no sample was processed.

5.14 Post-Exposure Prophylaxis

The use of high-quality and WHO-approved human rabies post-exposure prophylaxis (PEP) and rabies immunoglobulin (RIG) are indispensable tools in the fight against rabies.

Currently, one of the greatest challenges for bite victims in Uganda is the accessibility and timely administration of these preventive treatments. This is due to a lack of availability at local health centres combined with a national lack of doses at the National Medical Stores (NMS). RIG, which is required for unvaccinated individuals with WHO Category III bite wounds, is not available anywhere in the country, making the recommended treatment of such severe bites impossible and unnecessarily exposing bite victims to a greater risk of contracting the disease.

Individuals who have reported their dog bites to veterinary or public health officials are currently sent to hospitals or local health centres for wound treatment and PEP, where the biting dog has been assessed as potentially rabid. In most cases, bite victims still receive the 5-dose intramuscular ‘Essen’ regimen. This poses and economic burden on the public health system and the bite victims themselves, as they require five trips to the health centres which often leads to incomplete courses of PEP and therefore an increased risk of contracting the disease.

In their third expert consultation of rabies, WHO recommended a new 2-day intradermal regimen that not only reduces the number of visits to health centres and therefore increases patient compliance, but also reduces the economic impact through a smaller volume of rabies biological needed each visit.

Table 3: WHO-recommended PEP regimens (taken from 3rd Expert Consultation on Rabies)

PrEP regimen	Duration of course	Number of injection sites per clinic visit (days 0,3,7,14,21-28)	References
WHO-recommended intradermal regimen			
Two visits	7 days	2-0-2-0-0	1-4
WHO -recommended intramuscular regimen			
Two visits	7 days	1-0-1-0-0	5
PrEP under specific circumstances			
Single visit, intradermal	1 day	2-0-0-0-0	6-9
Single visit, intramascular	1 day	1-0-0-0-0	6-9

The Global Alliance for Vaccines and Immunisations (GAVI) has indicated to include the procurement and distribution of rabies vaccines in its 2021-2025 strategy. To benefit from the support GAVI might provide towards the prevention of human rabies deaths, the following steps will be taken:

i. Training for intradermal injection techniques will be included in the nurse education curriculum
ii. Nurses currently working in hospitals and health centres that distribute rabies PEP will be trained in intradermal injection techniques on a district level
iii. The District Health Service procurement officer will liaise with the DRETF and IBCM Investigator to ensure sufficient doses of PEP will be procured based on exposures recorded in the district
iv. RIG should be procured on a level that at least district hospitals have sufficient doses that can be administered to WHO Category III bite cases
v. The national guidance on rabies PEP will be changed to reflect current WHO recommendations

5.15. Rabies data base and electronic data collection

In order to fulfil all national and international reporting requirements and ensure the detailed monitoring of the effectiveness of the activities in this strategy, there is need to create a digital national rabies database, collating all relevant rabies data elements in Uganda.

Minimum data elements have been developed by the United Against Rabies (UAR) coalition and they form the basis for the national rabies database, which will then serve as a resource for all stakeholders in rabies elimination in Uganda.

Recent developments in mobile technology and the increasing availability of both network services and end-user devices have created novel applications to remotely manage and collect all necessary data from the field.

The most widely used applications in the field of rabies elimination have been described by Gibson et al. (2018)(23) and Coetzer et al. (2019)(24) and consist of a field component, as well as a cloud-based database or management system.

Detailed data collection along every step of implementation of this strategy is of the utmost importance to track the progress of the interventions and ensure a timely and economic service delivery. The minimum requirements for the system include;

- Easy to implement, using mostly already available resources
- Translatable into local languages for ease of access
- Consisting of a tiered access system to protect personal information
- Providing an environment that allows for flexibility and adjustment as the campaign progresses
- Built for resource limited settings and low on running costs
- Collecting all data necessary for the monitoring and evaluation of the strategy, as well as fulfilling the statutory reporting duties to national and international databases
- Enabling the easy management of multiple field teams
- Easy to interface with already existing databases

5.16. Dog population management

This will be implemented by the District Rabies Elimination Task forces, the IBCM officer under supervision of the NRETF and oversight of the commissioner Animal Health

6.0. FINANCING OF THE STRATEGY

Long-term sustainable procurement and ring fencing of funds is paramount for the success of this strategy and achievement of freedom from dog-mediated human rabies deaths.

The adoption of this strategy and the identification of rabies as a priority disease for Uganda will provide a case to create a separate budget line in the national budget to ensure adequate funding will be provided within Uganda.

Potential shortfalls in funding through the national budget and ministerial contributions will be identified and funding proposals created to approach development partners and international financing mechanisms. Civil society organizations, Non-government organisations will also be approached to support the strategy in terms of resources and technical expertise.

The GDREP which was formed by the US CDC is an excel based tool for estimating a territory's timeframe and the costs of eliminating canine rabies will be utilised to monitor the resources for rabies elimination. Often used in conjunction with SARE workshops, this tool will be used in regular intervals within the framework of this NRES to ensure the financial requirements to implement the different stages of this strategy are in line with international experiences and the implementation budget.

7.0 MONITORING AND EVALUATION OF THE STRATEGY

Through the creation of a national rabies database and the local DRETFs, the NRETF will be able to monitor the progress of this strategy on a detailed level.

Quarterly progress reports by the DRETFs to the NRETF are expected to contain:

i. The number of dogs vaccinated
ii. The geographical distribution of the canine vaccinations
iii. Estimated vaccination coverage in the district
iv. Education and awareness activities conducted
v. Number of people reached through education and awareness activities
vi. Number of reported dog bites and IBCM investigations
vii. Number of reported animal rabies cases (clinical/lab-confirmed)
viii. Number of reported human rabies cases (clinical/lab-confirmed)

The expected vaccination coverage in areas targeted for vaccination should exceed 70% and the method used to evaluate this coverage must be explained in the report.

At least 80% of the estimated population in each district should benefit from rabies education and awareness on an accumulated annual basis.

The number of dog bite investigations and rabies cases over time will serve as an indicator for the impact of the interventions. It is expected that the number of reported dog bites will rise initially, as reporting mechanisms become more well-known in the general population and surveillance increases.

In addition to these quarterly and annual goals, this strategy aims to propel rabies elimination efforts on a national scale along the SARE stages.

***The key indicators to achieve this Stage 3 include*:**

i. Development and adoption of the rabies elimination strategy
ii. Existence of the National Rabies Elimination Task Force (NRETF) and the District Rabies Elimination Task Force (DRETF)
iii. Up to date database on rabies
iv. Establishment of guidelines that support the implementation of the strategy. Rolling out the communication strategy to enhance awareness among the different target audiences
v. Capacity building for animal and public health staff on different key subjects important for rabies control using already developed guidelines
vi. Collating existing rabies related baseline data
vii. Enhancing rabies surveillance in pilot districts
viii. Conducting mass vaccination of dogs based on the guidelines
ix. Carry out operational research; post vaccination surveys, impact assessment, cost analysis.

In the longer term future, this strategy aims to progress from the scale-up stage to the elimination and ultimately 'freedom from rabies' stage. An on-going review of these long-term goals in conjunction with the annual progress on a district level will be conducted through the annual SARE workshops and ensure continuous progress towards the Mission and Vision of this strategy.

The key indicators from stage 3 to 4 include:

Over 70% vaccination coverage in the pilot areas, over 70% reduction in the incidence of rabies and no dog rabies death in humans for 12 months.

Elimination phase:

The elimination phase involves the following;

At this phase, rabies control activities will be rolled out to the rest of the country and these will include;

i. Zoning the areas where the interventions will be done

ii. Routine vaccination of pets

iii. Mass awareness campaigns

iv. Adoption of best practices and lessons from pilot areas.

v. Enhance vigilance at the points of entry, check points and carry out road checks for evidence of vaccination against rabies.

vi. Identification of free rabies zones; surveillance will be strengthened to enable detection of areas where rabies cases have not been reported for two consecutive years to stop vaccination and if no case is reported within six months after vaccination, then the area is declared free from the disease. Surveillance will be sustained in those areas and there should be sufficient vaccine reserves and resources for response if an outbreak occurred.

8 .0. ANNEXES

ANNEX I: Stakeholder mapping

No.	Name of Organization	Category of Organization,	Brief description	Scope of coverage	Area(s) of focus.
1	MAAIF	Government	Government entity with the mandate on animal disease control	National	Print, radio, television, social media, stakeholder engagements, community engagements, research
2	MoH	Government	Government entity with the mandate to ensure public health	National	stakeholder engagements, print, radio, television, testimonials, social media, community engagement, research
3	MWE	Government	Government entity with the mandate to ensure environment health	National	stakeholder engagements, print, radio, television, community engagement
4	UWA	Government	Government entity with the mandate to ensure wildlife health	National	stakeholder engagements, print, radio, television, testimonials, community engagement, research
5	UVA	NGO	Umbrella organization for veterinarians charged with advocacy	National	Advocacy, print, radio, television, testimonials, stakeholder engagements
6	MUK-COVAB	Government	Academic institution of higher learning	National	Community engagement, public education
7	Office of the Prime Minister	Government	Coordinator for government Ministries and agencies	National	Community engagements, radio, tv, print
8	Kampala Capitl City Authority	Government	Agency that oversees gov't business in the capital city	Regional	Print, radio, television, community engagement
9	One Health Coordinating Office	NGO	Coordinating One Health activities in Uganda	National	Stakeholder engagement, print, radio, television
10	Parliament of Uganda	Government	Legal framework in the country	National	Stakeholder engagements, community engagement, radio, television, print
11	Uganda Police	Government	Governmennt entity with the mandate to keep law ad order	National	Community engagement, radio, television

No.	Name of Organization	Category of Organization,	Brief description	Scope of coverage	Area(s) of focus.
12	New Vision	Government	Print media	National	Print , radio, television
13	Daily Monitor	Private sector	Print media	National	Print , radio, television
14	Radio stations	Private sector		National	Radios
15	NTV	Private sector	Visual	National	Television
16	NBS	Private sector	Visual	National	Television
17	NDA	Government	Government entity with the mandate to regulate veterinary and human medicine	National	Stakeholder engagements, radio, television, print, community engagements, social media
18	NMS	Government	Procurement of PEP	National	Stakeholder engagement, televission, radio, print
19	MOES	Government	Government entity with madate to regulate Education services in the country	National	Public education, radio, television, print
20	District Local Governments	Government	Implementation of gov't programs and extension at local levels	National	stakeholder engagements, community engagements, radio, testimonials
21	Primary schools	Government and Private	Education services	National	Commuity engagements
22	Secondary schools	Government and Private	Education services	National	Commuity engagements
23	Universities	Government and Private	Education services at higher levels	National	Commuity engagements
24	Uganda Law Society	NGO	Advcacy and legal guidance	National	Stakeholder engagements
25	UNICEF	NGO	Provides emerence food and health care to women and children	National	Stakeholder engagements, commuinity engaements, radio, television
26	AFROHUN	NGO	Network of Universities charged with OH capacity development	National	Stakeholder engagements, community engagements, social media,
27	CHURCH		Religious entities	National	Community engagements
28	MOSQUES		Religious entities	National	Community engagements
29	ILRI	NGO	Research organisation	National	Community engagements
30	UNCST	NGO	Coordinates the formulation of policies on science and technology	National	Stakeholder engagements

No.	Name of Organization	Category of Organization,	Brief description	Scope of coverage	Area(s) of focus.
31	VSF Germany	NGO	Human, animal and environmental health	National	Community engagements, radio, print
32	BIG FIX UGANDA	NGO	Rabies control in Northern Uganda	National	Community engagements, testimonials
33	Uganda Society for Small Animal Practitioners (USAP)	Private sector	Small animal clinics	National	Community engagements
34	USPCA	NGO	animal welfare	National	Community engagements
35	SBCA	NGO	Risk communication entity	National	Community engagements, radio, television, print, tesstimonials, stakeholder engements, public education
36	UVB	Government	Regulation of veterinary services	National	Stakeholder engagements
37	IDI	NGO	Human health and zoonotic disease control	National	Community engagements, radio, television, print, tesstimonials, stakeholder engements, public education, research
38	USAID	NGO	Donor entity	National	Stakeholder engagements
39	EU	NGO	Donor entity	National	Stakeholder engagements
40	WORLD BANK	NGO	Donor and credit facilities	National	Stakeholder engagements
41	Uganda Red Cross	NGO	Humanitarian organization in Uganda	Nationaal	Stakeholder engagements
42	UNHCR	NGO	International organization for refugees	National	Stakeholder engagements
43	FAO-UN	NGO	Animal health	National	Stakeholder engagements
44	WHO-UN	NGO	Public health	National	Stakeholder engagements
45	AU-IBAR	NGO	Animal heaalth	National	Stakeholder engagements
46	NARO	Government organization	Research organization (crop, animal and fish)	National	Stakeholder egagements, research

ANNEX II: Log frame for the Uganda National Rabies Elimination Strategy for 5 Years

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Objective 1: To effectively use vaccines, medicines, tools, and technologies in the prevention and control of rabies	Rabies induced dog bites in humans reduced from approximately 10,000 bites per year to non by the 5th year.	Surveillance reports	
	Rabies induced dog bites in animals reduced to non by the 5th year.	Surveillance reports	
	Human deaths due to rabies reduced from 50 per year to none by the 5th year (zero human deaths by 5th year by dog bite induced rabies).	MoH annual reports	
Intervention 1.1: Canine mass vaccination	70% of the dog population vaccinated against rabies for 4 years	MAAIF and district reports	
Activity1.1.1: Training of workforce	30 MAAIF staff, 10 MoH staff, 20 NRETF members, 1466 district vaccinators, 146 District public health staff, 18 regional laboratory technicians trained annually for 5 years	Training reports	There is availability of expertise. Availability of funds
Activity 1.1.2: Acquisition of canine rabies vaccines	1.2 million doses of rabies vaccine procured by 5th year	Procurement records	Funds are available
Activity 1.1.3: Acquisition of vaccination logistics and consumables	1000 cool boxes acquired for 146 districts with in the first 3 years	Procurement records	Funds are available
	10 fridges acquired for 10 regional veterinary laboratories and 146 fridges for 146 districts within the first 3 years	Procurement records	Funds are available
	4,000 boxes of 100 syringes and needles acquired annually for 5 years	Procurement records	Funds are available
	1500 dog muzzles acquired within the first year	Procurement records	Funds are available

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 1.1.4: Conduct pilot mass rabies vaccination in pilot districts	Carry out mass vaccination campaign in 50% of the high risk districts in the first two years	Vaccination reports	Availability of the vaccine. Dog owners are willing to present their dogs for vaccination
Activity 1.1.5: Mobilise dog owners and dog breeders	Dog owners in all rabies hotspot districts mobilized for mass vaccination One annual world Rabies day celebration event conducted	Consent forms Event report	
Activity 1.1.6: Scale up the mass vaccination campaigns to other districts annually beginning 2nd year	Carry out mass vaccination campaigns in all districts from 2nd to 5th year. 146 districts, cities and municipalities facilitated to conduct mass rabies vaccination campaigns annually	Vaccination reports MAAIF and district reports	Availability of the vaccine. Dog owners are willing to present their dogs for vaccination
Activity 1.1.7: Post-vaccination monitoring	1 post-vaccination survey conducted annually	survey reports	Adequate staffing and funding available for the surveys; All Phases are reached in the targeted time frame
Activity 1.1.8: Conduct service learning for veterinary institutions of higher learning during rabies mass vaccination	At least 2 veterinary training institutions involved in canine mass vaccination annually	Vaccination and training reports	Learners are available and the Resources to support their involvement
Activity 1.1.9: Engage private sector and civil society organization engagement in dog rabies vaccination	450,000 dogs are vaccinated by the private sector and civil society organizations by the 5th year at about 56,000 dogs annually	Quarterly reports from animal clinics	Private sector is willing to participate in dog vaccination
Intervention 1.2:Dog population management	Reduction of the stray dog population by the 5th year		
Activity 1.2.1: Undertake a baseline study for stray dog population.	One baseline study for stray dog population by the 2nd year	Baseline report	availability of funds
Activity 1.2.2: Registration of dog breeders, dog owners and individual dogs	70% of dog breeders, owners and individual dogs registered by the 3rd year	Registers for dog breeders, owners and dogs and activity reports	

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 1.2.3: Sensitization of communities on responsible dog ownership and importance of sterilization as a dog population control measure.	200 households in high risk districts sensitized annually	Community sensitization reports	
Activity 1.2.4: Conduct trainings in communities with MDAs on Good hygienic practices to facilitate proper solid waste disposal.	One training carried out in each of the 73 high risky districts by the 2nd year.	Meeting minutes with signed attendance	Commitment by stakeholders
Activity 1.2.5: Community outreach in partnership with private veterinary clinics and veterinary academic institutions to conduct spaying and castration	Outreach visits conducted in 10 districts annually	Out-reach reports	Private sector and academia are willing to participate in community outreach
Activity 1.2.6: Coordinate work done by NGOs and charity organization on rabies control	Involvement in work done by 50% of the NGOs and charity organizations by 3rd year	Profile of NGOs and charity organizations and their activity reports	
Activity 1.2.7: Acquire and distribute Euthanasia medicine	73 high-risk districts receiving authorized euthanasia pharmaceuticals annually	District reports	Funds are available. Community and technical acceptance to use euthanasia
Intervention 1.3: Increase access to post-exposure prophylaxis (PEP)and rabies immunoglobulin (RIG)	100% of the reported rabid victims receive PEP to completion	Health facility records	
	100% of animal and public health workers at risk of rabies receive rabies pre-exposure prophylaxis	Health facility records	

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 1.3.1: Acquire sufficient doses of Post Exposure Prophylaxis	1.1 million doses of PEP acquired by the 5th year.	Purchase records	Funds are available
Activity 1.3.2: Acquire sufficient doses of human rabies vaccine	2000 doses of human rabies vaccine acquired annually	Purchase records	Funds are available
Activity 1.3.3: Training of workforce	5 health workers handling rabies cases trained in rabies bite wound management and intradermal injection technique in all districts by the 3rd year.	Training reports	Funds are available
Intervention 1.4: Community awareness and education	80% of the households aware of rabies prevention and control in the target districts	Survey report	
Activity 1.4.1: Develop a rabies communication SOPs and guidelines	Rabies communication SOPs and guidelines developed by 2nd year	Endorsed SOPs and guidelines	Availability of expertise
Activity 1.4.2: Hold discussion with opinion leaders	Discuss with atleast 5 opinion leaders per district	Activity reports	
Activity 1.4.3: Conduct school out reaches on rabies control	At least 85% of the schools in the target districts sensitized on rabies control and prevention	Activity reports	Sufficient human resource capacity to conduct the activity
Activity 1.4.4: Conducting radio adverts	64 radio adverts run in all regions of the country	Radio recordings	Funds are available
Activity 1.4.5: Conducting drama skits on TV and radio stations	Drama skits run on selected radio and TV stations quarterly countrywide	Radio and tv recordings	Funds are available
Activity 1.4.6: Conducting radio and TV talk shows	One radio and One TV talk show for the 8 regions of the country per quarter	Radio and tv recordings	Funds are available
Activity 1.4.7: Creating social media pages for rabies	Rabies information page created on Twitter, Facebook, LinkedIn, Instagram in the first year.	Active social media pages	Technical expertise and funds are available

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 1.4.8: Dissemination of rabies information using outdoor media	Loudspeaker dissemination carried out in all sub counties of the high risk districts for 5 years.	Activity reports	Funds are available
Activity 1.4.9: Dissemination of messages on rabies control through telecommunication partnerships	8 million mobile phone subscribers receiving text messages on rabies quarterly	MoUs with telecommunication companies. Data from telecommunication firms on the subscribers reached	There is willingness by telecommunication firms to partner
	5 million mobile phone subscribers with rabies awareness information as their caller tune by the 6th year	MoUs with telecommunication companies. Data from telecommunication firms on the subscribers reached	There is willingness by telecommuinication firms to partner
Objective 2: To generate reliable data to inform rabies prevention and control efforts.	An interoperable rabies database that provides information for decision making put in place in the 1st year.	Operational reports	Availability of funds and technical capacity Willingness of stakeholders to share data
Intervention 2.1: Strengthening rabies surveillance	90% of the rabies cases captured by the surveillance system by the 5th year	Annual reports	
Activity 2.1.1: Collection of samples from suspected rabid domestic animals	Samples from 80% of reported suspected rabid domestic animal cases collected annually.	District reports	There is capacity, consumables and equipment to collect the samples. All the suspected animals are reported
Activity 2.1.2: Collection of samples from suspected rabid wildlife	Samples from 50% of reported suspected rabid wildlife cases collected annually.	Reports from UWA	There is capacity, consumables and equipment to collect the samples. All the suspected animals are reported. There is cooperation from UWA
Activity 2.1.3: Submission of collected samples to NADDEC	100% of the samples collected submitted for confirmatory diagnosis	NADDEC and district reports	There is cooperation from stakeholders

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 2.1.4: Nomination of IBCM officers from veterinary and medical district staff	Integrated Bite Case Management field officer nominated in 1st year of the program per district	Appointment letters	There is commitment from the nominated people
Activity 2.1.5: Aquire laptops for IBCM officers and coordinators	Acquire300 laptops in the 2nd year	Acquisition records	Funds are available
Activity 2.1.6: Aquire tablets for IBCM officers and coordinators	Acquire 300 tablets in the 2nd year	Acquisition records	Funds are available
Activity 2.1.7: Design rabies data collection tools and database.	Rabies database and tools to capture rabies data real time developed by the second year	Presence of the tools developed	Funds are available
Activity 2.1.8: Establish the rabies database that communicates with the National Food and Agricultural Statistical System (NFASS) at MAAIF	Rabies database in place by the second year.	Database in place	There is trained Human resource to maintain the database
Activity 2.1.9: Traininng of districts' staff, MAAIF and MoH staff in data collection and analysis and use of ICT in data management	200 staff trained by 2nd year	Training reports	Funds are available
Activity 2.1.10: Procure motor vehicles and accessories for Rabies surveillance (MAAIF, MoH, Districts)	81 vehicles procured by the 3rd year	Procurement records	Funds are available
Activity 2.1.11: Procure mortocycles and accessories for Rabies surveillance at subcounty level	70 motorcycles procured for subcounties in 70 high risk districts	Procurement records	Funds are available
Activity 2.1.12: Publish rabies quarterly bulletins	Quarterly rabies surveillance bulletins	Published bulletins	Commitment of stakeholders to write the bulletins

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Intervention 2.2: Strengthening laboratory systems for rabies detection and response	Proportion of rabies collected samples that are diagnosed		
Activity 2.2.1: Procurement of Rabies Rapid Test kits for high-risk districts, regional veterinary laboratories and NADDEC	60 district veterinary laboratories, 11 regional veterinary laboratories and NADDEC equipped with 50 rabies rapid test kits annually.	Procurement records. Signed delivery notes	Funds are available
Activity 2.2.2: Procurement of rabies anti-body test kits for rabies post vaccination monitoring	Procurement of 4 anti-body test kits for monitoring 25% of the districts annually.	Procurement records. Signed delivery notes	Funds are available
Activity 2.2.3: Procurement of reagents for use in rabies diagnosis	Procurement of conjugates, acetone and PBS tablets for NADDEC to conduct rabies confirmatory tests annually	Procurement records. Signed delivery notes	Funds are available
Activity 2.2.4: Procurement of Personal Protective Equipment (PPEs) for use in the laboratories and the field	146 districts supplied with PPEs for year	Procurement records	Funds are available
Activity 2.2.5: Training of laboratory technicians at district, regional and national level in rabies diagnostics, biosafety, sample packaging and shipment	300 staff trained by 5th year	Training reports	Funds are available
Activity 2.2.6: Renovate 10 regional veterinary laboratories	10 regional laboratories renovated by the 5th year	Certificate of completion of engineering works	Funds are available
Activity 2.2.7: Establish laboratory twinning partnerships	Two regional and two international laboratory twinning opportunities by 2nd year	Signed MoUs	Willingness of reference laboratories to partner
Activity 2.2.8: Conduct laboratory quality assurance at national and regional levels	One quality assessment conducted in 10 laboratories annually	Laboratory quality assurance audit reports	There is local capacity to do quality assurance

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 2.2.9: Conduct comprehensive risk assessment for rabies	3 risk assessment undertaken at a 3 year interval	Risk assessment reports	Funds are available
Objective 3: To strengthen institutional coordination in the control and elimination of rabies			
Intervention 3.1: Conduct research on rabies virus, risk at the domestic-wildlife interface control efforts among others.	25 articles published in peer reviewed journals by the 5th year		
Activity 3.1.1: Facilitate 5 MSc and 5PhD students to conduct research on rabies	25 articles published in peer reviewed journals by the 5th year	Articles published and transcripts issued	Resources will be available to undertake research
Activity 3.1.2: Conduct operational research	10 articles published on the modalities of rabies prevention and control in the field	Articles published	Resources will be available to conduct research
Intervention 3.2: Strengthen the legal and regulatory framework for rabies control	3 acts reviewed and 11 sets of guidelines and SOPs developed by the 4th year		
Activity 3.2.1: Review of the existing legal instruments on rabies control	Three (Rabies Act, Animal straying Act, Prevention of cruelty) legal instruments reviewed and updated by 4th year	RIA reports	There is legal acceptance of the proposed reviews
Activity 3.2.2: Develop guidelines and standard operating procedures (SOPs) for the NRES.	Eleven sets of guidelines and SOPs developed in the 1st year (Guidelines/SOPs for; dog vaccine storage, rabies vaccination in animals, post vaccination surveys, rabies surveillance, sample collection and laboratory diagnosis, PEP, IBCM, health safety, child safeguard and M&E) by the 2nd year	Signed copies of the developed guidelines/ SOPs	Funds are available

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity 3.2.3: Facilitate districts to develop bi-laws on dog population management and rabies control	One set of bye-laws made in hot spot districts by the 4th year	Endorsed copies of the bylaws made	There is political willingness to support rabies control at district level
Intervention 3.3: Compose and operationalize the National and District Rabies Elimination Taskforces	Functional National and District task forces in place		
Activity 3.3.1: Hold regular meetings by the National Rabies Elimination Task force (NRETF)	2 biannual meetings held	Meeting minutes with signed attendance	Funds are available
Activity 3.3.2: Supervision of rabies control activities by the NRETF and line ministers (MOH&MAAIF)	Quarterly supervisory visit	Activity reports	Funds are available
Activity 3.3.3: Compose the District Rabies Elimination Task Forces (DRETFs)	100% of districts with constituted DRETFs by the 3rd year.	District reports	Willingness by the district staff to serve on the task force
Activity 3.3.4: Community mobilisation and active engagement of DRETFs in vaccination campaigns, sensitisation meetings and surveillance	At least 3 community mobilisation and engagement activities undertaken at district level annually	District reports	Political and community willingness to participate in rabies control activities
Activity 3.3.5: Participate in regional collaboration meetings	Two regional meetings attended annually by the Rabies focal persons.	Meeting minutes	Funds are available
Activity 3.3.6: Conduct SARE assessment workshops annually	One Annual assessment workshop conducted	Annual SARE progress	Funds are available

INTERVENTION LOGIC	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
Activity: 3.3.7: Conduct STARC worksho p at the beginning of implementation for strategic resource allocation by experienced trainer	One STARC workshop conducted	Resource allocation maps	Funds are available
Activity 3.3.8: Participate in the Global Dog Rabies Elimination Pathway (GDREP) exercise	Annual GDREP conducted	GDREP reports	Funds are available
Intervention 3.4: Partnerships and collaboration among government agencies, development partners and private sector in the implementation of the rabies control program	At least 10 agencies and/or development partners and/or private sector actors involved in rabies prevention and control activities annually	MoUs	Willingness of the partners to participate in rabies control activities
Activity 3.4.1: Conduct advocacy meetings	Two advocacy meetings held with development partners annually for five years	Meeting minutes	Willingness of the partners to participate in advocacy meetings

ANNEX III: Monitoring and Evaluation Plan for the Ugandan National Rabies Elimination Strategy for 5 years

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Objective 1: Effectively use vaccines, medicines, tools, and technologies in the prevention and control of rabies		Rabies induced dog bites in humans reduced from approximately 10,000 bites per year to non by the 5th year.	**10000**	**8000**	**6000**	**4000**	**2000**	**0**	MOH, MAAIF, DLGs, UVA, Veterinary training institutions
	Reduce rabies dog bites in animals by 90%	**Number of animal rabies induced dog bites**	**2500**	**1800**	**1000**	**600**	**300**	**0**	MOH, MAAIF, DLGs, UVA, Veterinary training institutions
	Reduce human deaths due to rabies by 98%	**Number of human deaths due to rabies**	**50**	**40**	**30**	**20**	**10**	**0**	MOH, MAAIF, DLGs, UVA, Veterinary training institutions
Intervention 1.1: Canine mass vaccination	***Increase dog vaccination coverage to 70%***	***Percentage of the dog population vaccinated annaully in the target areas***	***33***	***40***	***50***	***70***	***70***	***70***	*MAAIF, MOH, UBOS, DLGs, UVA, NRETF, veterinary institutions*
Activity 1.1.1: Training of w:orkforce	1.1.1: Workforce trained	Number of workforce trained	0	360	360	360	360	360	MOH, MAAIF, DLGs, UVA, veterinary institutions

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 1.1.2: Acquisition of canine rabies vaccines	1.1.2: Canine rabies vaccines acquired and administered	Million doses of rabies vaccine acquired	0.5	0.7	1	1.2	1.2	1.2	MAAIF, Private Pharmaceuticals
Activity 1.1.3: Procurement of vaccination logistics and consumables									
1.1.3.1: Cool boxes procured		Number of cool boxes acquired and distributed to districts	0	250	250	500			MAAIF,DLGs, Development parrtners
1.1.3.2: Fridges acquired and distributed		Number of fridges acquired and distributed to districts	0		40	40	40	40	MAAIF, DLGs, Development partners
1.1.3.3: Syringes acquired and distributed		Quantity of syringes acquired	0	400,000	400,000	400,000	400,000	400,000	MAAIF, DLGs, Development partners
1.1.3.4: Effective dog restraint during vaccination		Number of dog muzzles procured	0		500	500	500		MAAIF, DLGs, Development partners
Activity 1.1.4: Conduct pilot mass rabies vaccination in pilot districts	1.1.4: Mass rabies vaccination undertaken in pilot districts	Number of districts successfully conducting out the mass vaccination in the 1st two years	0	71	71				MAAIF, DLGs

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 1.1.5: Scale up the mass vaccination campaigns to other districts annually beginning 2nd year	1.1.5: Mass vaccination campaigns undertaken in other districts	Number of districts successfully conducting out the mass vaccination from 3rd to 5th year	30	71	71	142	142	142	MAAIF, DLGs, NRETF
Activity 1.1.6: Post-vaccination monitoring	1.1.6: Post-vaccination monitoring undertaken	Percentage of districts receiving rabies vaccines in which post vaccination surveys conducted	0	25%	25%	25%	25%	25%	MAAIF, DLGr, NRETF
Activity 1.1.7: Conduct World Rabies Day commemoration	1.1.7: World Rabies Day celebrations undertaken	Rabies day commemoration activities carried out in one selected district	1	1	1	1	1	1	MAAIF, DLGs, MoH, MoES, MWE, UWA, OHTWG
Activity 1.1.8: Service learning for veterinary institutions of higher learning during rabies mass vaccination	1.18. Veterinary students engaged in mass vaccinations	Percentage of veterinary institution involved in the mass vaccination campaign		2	2	2	2	2	MAAIF, DLGs, COVAB, Bukalasa Agriculture college, Busiteema University.
Activity 1.1.9: Facilitate districts to conduct rabies vaccination campaigns	1.1.9: Districts facilitated to conduct rabies vaccination campaigns	Number of the districts facilitated with resources to conduct mass vaccination campaigns annually	0	40	40	142	142	142	MAAIF, MoH, DLGs, Development partners

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 1.1.10: Private sector engagement in canine rabies vaccination	1.1.10: Private sector engaged in canine rabies vaccination	Number of dogs vaccinated by the private sector	60000	100000	150000	200000	250000	300000	MAAIF, DLGs, Animal clinics
Intervention 1.2: Dog population management	***Reduction of the stray dog population by 90%***	***Percentage of stray dog population in the target districts***		***10%***	***30%***	***50%***	***70%***	***90%***	*MAAIF, DLGs, MOH, MWE, UWA, COVAB*
Activity 1.2.1: Undertake a baseline study for stray dogs	1.2.1: Know the stray dog population	Number of stray dogs captured			1	1			MAAIF, UBOS, DLGs
Activity 1.2.2: Sensitization of communities on responsible dog ownership	1.2.2: Inculcate a habbit of responsible dog ownership	Number of dog keeping households sensitized on responsible dog ownership	0	200	200	200	200	200	MAAIF, DLGs
Activity 1.2.3: Conduct training on proper solid waste disposal with relevant MDAs	1.2.3: Increase stakeholder awareness on waste disposal in relation to stray dogs	Number of trainings	0	35	36	36	36		MWE, MAAIF, MoH
Activity 1.2.4: Community outreach in partnership with private veterinary clinics and veterinary academic institutions to conduct spaying and castration	1.2.4 Spaying and castration of dogs	Number of outreach visits conducted	0	10	10	10	10	10	MAAIF, DLGs, Private veterinary clinics

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 1.2.5: Procure and distribute Euthanasia medicine	1.2.5: Humane destruction of rabid dogs	Number of districts receiving authorized euthanasia pharmaceuticals	0	71	71	71	71	71	MAAIF
Intervention 1.3: Increase access to post-exposure prophylaxis (PEP)and rabies immunoglobulin (RIG)	***Increase coverage of PEP to 100% of rabid human victims***	***Percentage of reported rabid victims receiving PEP***		***40%***	***50%***	***60%***	***80%***	***100%***	*MoH*
	Increase the reception of rabies immunoglobulin by health workers to 100%								*MoH*
Activity 1.3.1: Acquiresufficient doses of Post Exposure Prophylaxis	1.3.1. PEP Acquired and administered	Doses of PEP acquired	70,000	200,000	200,000	100,000	100,000	100,000	*MoH, NMS, DLGs*
Activity 1.3.2: Acquisition of sufficient doses of anti-rabies human immunoglobulin	1.3.2: Human rabies vaccine acquired and administered	Doses of rabies vaccine acquired	200	500	500	500	500	500	MoH, NMS, DLGs
Activity 1.3.3: Training of workforce	1.3.4: Workforce trained	Number of health officers handling rabies cases that are trained	0	355	355	355	355		MoH, OHTWG
Activity 1.3.4: Acquistion of rabies vaccines for professionals	1.3.4: rabies vaccines acquired and administered	Doses of rabies vaccines acquired	0	2000		2000		2000	

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Intervention 1.4 Community awareness and education	***Household awareness in rabies prevention and control increased***	***Percentage of households aware of rabies prevention and control***	***10%***	***20%***	***40%***	***60%***	***80%***	***80%***	*MAAIF,DLGs*
	Individual awareness about rabies prevention and control increased	***Number of mobile phone subscribers with caller tunes (million subscribers)***	***0***	***0.5***	***1.5***	***3***	***4***	***5***	*MAAIF, MoICT*
Activity 1.4.1 Develop a rab:ies communication SOPs and guidelines	1.4.1. Communication SOPs developed	Number of SOPs developed	0		2				MAAIF, MoH, NRETF
Activity 1.4.2: Conduct school out reaches on rabies control	1.4.2. School outreaches conducted	Percentages of schools visited on rabies control and prevention missions	0	0.05	15%	25%	35%	45%	MAAIF, MoH, MoES, MoICT
Activity 1.4.3: Conducting radio adverts	1.4.3. Radio adverts conducted	Annual radio adverts run	0	64	64	64	64	64	MAAIF, MoH, MoICT
Activty 1.4.4: Conducting drama skits on TV and radio stations	1.4.4. Drama skits conducted	Annual dramma kits run	0	96	96	96	96	96	MAAIF, MoH, MoICT
Activity 1.4.5: Conducting radio and TV talk shows	1.4.5. Radio and TV talk shows conducted	Annual talk shows carried out	0	64	64	64	64	64	MAAIF, MoH, MoICT

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activty 1.4.6: Creating social media pages for rabies	1.4.6. Social media pages for rabies created	Number of major social media platforms with rabies pages	0	4					MAAIF, MoICT
Activity 1.4.7 Dissemination of rabies information using outdoor media	1.4.7. Rabies information disseminated using outdoor media	Number of subcounties in which loudspeaker dissemination is done	0		72	72	72	72	MAAIF,DLGs
Activty 1.4.8: Telecommunication partnerships	Text messages on rabies control and prevention sent to mobile phone subscribers	Number of mobile phone subscribers receiving text messages (million subscribers)	0		8	8	8	8	MAAIF, MoH,MoICT, UCC
Telecommunication partnerships	Messages on rabies control and prevention uploaded as caller tunes	Number of mobile phone subscribers with caller tunes (million subscribers)	0	0.5	1.5	2.5	3.5	4.5	MAAIF, MoH, MoICT,UCC
Objective 2: To generate reliable data to inform rabies prevention and control efforts.	**Routine generation and utilisation of rabies data for decision making**	**Rabies database in place**	**0**	**1**	**1**	**1**	**1**	**1**	
Intervention 2.1: Strengthening rabies surveillance	***Increase surveillance for rabies***	***Number of surveillance reports for rabies received monthly for both vet and public health sectors***	***0***	***146***	***146***	***146***	***146***	***146***	

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 2.1.1: Collection of samples from suspected rabid domestic animals	2.1.1. Samples from suspected rabid domestic animals collected	Proportion of reported suspected rabid cases with samples collected.	0	80%	80%	80%	80%	80%	MAAIF, DLGs, Private Veterinary practitioners
Activity 2.1.2: Collection of samples from suspected rabid wildlife	2.1.2. Samples from suspected rabid wildlife collected	Proportion of reported suspected wildlife rabid cases collected.	0	50%	50%	50%	50%	50%	UWA, MAAIF
Activty 2.1.3 :Submission of collected samples to NADDEC	2.1.3. Samples submitted to NADDEC	Proportion of collected samples submitted for confirmatory diagnosis	2.50%	10%	40%	60%	100%	100%	UWA, DLGs, Private veterinary clinics and practitioners
Activity 2.1.4: Nomination of IBCM officers from veterinary and medical district staff	2.1.4. Nomination of IBCM officers	Number of districts with IBCM officers nominated	0	146					MAAIF, MoH, DLGs
Activity 2.1.5: Acquire laptops for IBCM officers and coordinators	2.1.5. Laptops acquired	Number of laptops acquired	0		300				MAAIF, MoH, Development partners
Activty 2.1.6: Acquire tablets for IBCM officers and coordinators	2.1.6. Tablets acquired	Number of tablets acquired	0		300				MAAIF, MoH, Development partners

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 2.1.7 Design rabies data collection tools.	2.1.7. Data collection tools designed	Rabies data collection tools in place	0	1	1				MAAIF, DLGs
Activity 2.1.8: Establish the rabies database that communicates with the National Food and Agricultural Statistical System (NFASS) at MAAIF	2.1.8. Database in place	A rabies data base inplace			1				MAAIF, Development partners
Activity 2.1.9: Training of districts' staff, MAAIF and MoH staff in data collection and analysis and use of ICT in data management	2.1.9. Staff trained	Number of staff trained by 2nd year	0	100	100				MAAIF, MoH, DLGs
Activity 2.1.10: Acquire motor vehicles and accessories for Rabies surveillance (MAAIF, MoH, Districts)	2.1.10. Aid movement for surveillance by the centre	Number of vehicles acquired	0		40	41			MAAIF, MoH, DLGs, Development partners
Activity 2.1.11: Acquire mortocycles and accessories for Rabies surveillance at subcounty level	2.1.11. Aid movement for surveillance at district level	Number of motorcycles acquired			35	35			MAAIF, MoH, DLGs, Development partners
Activity 2.1.12: Publish rabies quarterly bulletins	2.1.12. Dissemination of rabies surveillance information	Number of quarterly rabies bulletins published		4	4	4	4	4	MAAIF

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Intervention 2.2 Strengthening laboratory systems for rabies detection and response	***Increase laboratory diagnostic capacity for rabies***	***Proportion of rabies collected samples that are diagnosed***		***20%***	***40%***	***60%***	***80%***	***100%***	
Activity 2.2.1: Acquisition of Rabies Rapid Test kits for hotspot districts, regionl veterinary laboratories and NADDEC	2.2.1: Rabies Rapid Test kits acquired and distributed	Number of targeted veterinary laboratories equiped with rabies rapid test kits annually	0	30	72	72	72	72	MAAIF, Development partners
Activity 2.2.2: Acquisition of rabies anti-body test kits for rabies post vaccination monitoring	2.2.2: Rabies anti-body test kits procured and utilised	Number of kits procured annually	0	4	4	4	4	4	MAAIF, Development partners
Activity 2.2.3: Acquisition of reagents for use in rabies diagnosis	2.2.3: Increased laboratory capacity for rabies diagnosis	Reagents acquired		1	1	1	1	1	MAAIF, MoH, Development partners
Activity 2.2.4: Acquisition of Personal Protective Equipment (PPEs) for use in the laboratories and the field	2.2.4:. Personal Protective Equipment (PPEs) acquired and distributed	Number of districts supplied with PPEs by 5th year	0	142	142	142	142	142	MAAIF, MoH, Development partners

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 2.2.5: Training of laboratory technicians at district, regional and national level in rabies diagnostics, biosafety, sample packaging and shipment	2.2.5: Laboratory technicians trained in rabies diagnostics, biosafety, sample packaging and shipment	Number of staff trained	20	60	60	60	60	60	MAAIF,DLGs
Activity 2.2.6: Rennovate 10 regional veterinary laboratories	2.2.6: Regional veterinary laboratories renovated	Number of regional laboratories renovated	0	2	2	2	2	2	MAAIF, DLGs, Development partners
Activity 2.2.7: Establish laboratory twinning partnerships	2.2.7: Laboratory twinning partnerships established	Number of twinning opportunities established by the 2nd year	0		2		2		NRETF
Activty 2.2.8: Conduct laboratory quality assurance at national and regional levels	2.2.8: Laboratory quality assurance at national and regional level conducted	Number of veterinary laboratories assessed	0	10	10	10	10	10	MAAIF, External quality auditors
Activty 2.2.9: Conduct comprehensive risk assessment for rabies	2.2.9: Risk assessment for rabies conducted	Number of risk assessments conducted	0		1			1	MAAIF, DLGs, MoH

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Objective 3: To strengthen institutional coordination in the control and elimination of rabies	**Increase public and private sector engagement in rabies prevention and control**								
Intervention 3.1: Conduct research on rabies virus, risk at the domestic-wildlfie interface control efforts among others.	Research articles on rabies published in international journals	Number of research articles published		5	5	5	6	5	
Activty 3.1.1: Faciitate 5 MSc and 5PhD students to conduct reserch on rabies	3.1.1. Articles on rabies published	Number of research articles published	0	3	3	3	4	3	MAAIF, MoH, Veterinary training institutions, Development partners, DLGs
Activity 3.1.2: Conduct operational research	3.1.2. Articles on rabies published	Number of research articles published		2	2	2	2	2	MAAIF, MoH, Veterinary training institutions, Development partners, DLGs
Intervention 3.2: Strengthen the legal and regulatory framework for rabies control	***Improve the legal and regulatory framework for rabies control***	***Laws and policies in relation to rabies reviewed***		***4***			***2***		

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 3.2.1: Review of the existing legal instruments on rabies control	3.2.1. Laws reviewed	Number of legal instruments upated and approved by the 4th year.	0				3		MAAIF, MoH, DLGs
Activity 3.2.2: Develop guidelines and standard operating procedures (SOPs) for the NRES.	3.2.2. Guidelines and SOPs developed	Sets of guidelines or SOPs developed	0	5	6				MAAIF, MoH, DLGs
Activity 3.2.3: Facilitate districts to develop bi-laws on dog population management and rabies control	3.2.3: Bi-laws developed	Number of districts with bylaws on dog population management or rabies control	0	5	10	15	25	30	MAAIF, MoH, DLGs
Intervention 3.3: Compose and operationalize the National and District Rabies Elimination Taskforces	***Increased coordination of rabies prevention and control activities at national and district level***								
Activity 3.3.1: Hold regular meetings by the National Rabies Elimination Task force (NRETF)	3.2.1. Regular meetings held	Number of meetings held	0	2	2	2	2	2	NRETF

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 3.3.2: Supervision of rabies control activities by the NRETF and line ministers (MOH&MAAIF)	3.2.2. Vaccination campaigns, sensitisation meetings, surveillance and rabies diagnostics activities supervised	Number of supervisory visits made	0	4	4	4	4	4	MAAIF, MoH, NRETF
Activity 3.3.3: Compose the District Rabies Elimination Task Forces (DRETFs)	3.2.3. District Rabies Elimination Task Forces instituted	Number of districts with DRETFs	0	30	60	100	135		MAAIF, MoH, NRETF
Activity 3.3.4: Community mobilisation and active engagement of DRETFs in vaccination campaigns, sensitisation meetings and surveillance	3.2.4. Functional DRETFs	Number of community engagement activites undertaken	0	213	213	426	426	426	MAAIF, MoH, NRETF, DLGs
Activity 3.3.5: Participate in regional collaboration meetings	3.2.5. Regional collaboration meetings attended	Number of meetings attended annually	0	2	2	2	2	2	NRETF
Activity 3.3.6: Conduct SARE workshops annually	3.2.6. SARE workshops conducted	SARE meeting conduted annually	0	1	1	1	1	1	NRETF

Intervention logic	Output	Verifiable Indicators	Baseline	Target Y1	Target Y2	Target Y3	Target Y4	Target Y5	Responsibility
Activity 3.3.7: Conduct STARC workshop at the beginning of implemetation for strategic resource allocation by experiened trainer	3.2.7 STARC workshops conducted	Number of STARC workshops conducted	0	1					NRETF
Activity 3.3.8: Participate in the Global Dog Rabies Elimination Pathway (GDREP) exercise	3.2.8. Participation in the Global Dog Rabies Elimination Pathway (GDREP) exercise	Number of GDREP conducted		1	1	1	1	1	NRETF
Intervention 3.4: Partnerships and collaboration among government agencies, development partners and private sector in the implementation of the rabies control program	***Increase multi-sectoral collaboration in rabies prevention and control***	***Number of parties involved in rabies prevention and control***		***10***	***10***	***10***	***10***	***10***	
Activity 3.4.1: Conduct advocacy meetings	3.4.1. Partnerships among government agencies, development partners and private sector in the implementation of the rabies control program undertaken	Number of meetings held		2	2	2	2	2	NRETF

ANNEX IV: Budget for the Uganda National Rabies Elimination Strategy by Intervention

Budget in millions (UGX '000,000)

Interventions	Budget Y1	Budget Y2	Budget Y3	Budget Y4	Budget Y5	Total Budget
1.1. Canine mass vaccination	4136	6041	7321	7261	7236	31,995
1.2. Dog population management	649.4	719.4	379.4	299.4	299.4	2,347
1.3. Increase access to post-exposure prophylaxis (PEP)and rabies immunoglobulin (RIG)	4005	3225	2525	2175	2005	13,935
1.4. Community awareness and education	3933	9544	14284	19084	23884	70,729
2.1. Strengthening rabies surveillance	2540	39890	14310	2060	2060	60,860
2.2. Strengthening laboratory systems for rabies detection and response	1418	1548	1318	1318	1498	7,100
3.1 Conduct research on rabies virus, risk at the domestic-wildlfie interface control efforts among others.	450	550	675	650	650	2,975
3.2. Strengthen the legal and regulatory framework for rabies control	700	720	675	750	300	3,145
3.3. Compose and operationalize the National and District Rabies Elimination Taskforces	1435	1335	2400	2400	2360	9,930
3.4. Partnerships and collaboration among government agencies, development partners and private sector in the implementation of the rabies control program	50	50	50	50	50	250
Grand Total	**19,316.4**	**63,622.4**	**43,937.4**	**36,047.4**	**40,342.4**	**203,266**

ANNEX V – Rabies Curriculum

Globally, a large proportion of dog bites and subsequently rabies deaths are affecting children under the age of 15.

With published data about the composition of the dog population in Uganda indicating that the majority of the dogs in the country is owned, it is to be expected that children in primary school age form one of the biggest rabies risk groups. Hence a special emphasis needs to be placed on providing children with all the necessary tools to prevent them from contracting the disease in the first place and advice on access to medical care.

The Ministry of Education develops a curriculum to be adopted at the earliest opportunity following the implementation of this strategy.

Topic	Description
Basic rabies facts and prevention	Rabies is a deadly disease that can affect all mammals. Dogs are the most likely source of rabies infections. The disease is preventable through vaccination of dogs and post-exposure prophylaxis after a bite. How and where vaccines for people and dogs are available.
Recognizing rabies	Change in bark, unprovoked aggression, jaw paralysis, salivation, lethargy.
Responsible Dog Ownership	Dogs are great companions and can be fulfilling important roles in the communities. Providing veterinary care and not lot letting the dog roam freely outside the house aide the elimination of diseases, such as rabies.
Dog language	Recognizing when not to approach a dog. Signs of an agitated dog.
Bite Prevention	Do not disturb dogs engaged in other activities. Do not hurt dogs and don't run past/from dogs. If a dog growling or barking dog approaches, turn away from the dog, look away and avoid eye contact.
Bite first aid	If bitten, wash the wound with soap and running water for 15 minutes; apply an antiseptic (if available); tell parents or teacher; get post-exposure prophylaxis.

ANNEX VI: Stakeholders' Workshop to Discuss National Rabies Elimination Strategy 10th To 11th March,2022 at Source of the Nile Hotel, Jinja

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ANNEX VII: Communication SOP for rabies control

Community Sensitization and Education Plan

Well informed communities are a cornerstone in the aim to eliminate rabies. Through coordinated community sensitization and education, mass-vaccination efforts can be aided and the risk to conduct rabies during the interim period between endemicity and elimination can be significantly reduced.

A multi-media approach that takes into account the differences between the communities and the way community members consume and digest information is therefore of the highest priority.

The topics in Annex II of this strategy are a suggestion based on the curriculums employed in other countries in the region and the Ministry of Education, in collaboration with the NRTF, will be selecting pertinent topics and adjust the detailed content for the Ugandan setting to ensure a maximum impact and retention of knowledge in the communities.

The approach to influence positive behaviour change and mobilise the communities to participate in canine mass vaccination efforts and enable them to avoid dog bites and rabies infection consists of three interlinking strategies:

1. Education of learners in the primary education setting
2. Community sensitization
3. Multi-media public awareness campaign

Education programme

With children under the age of 16 being one of the strata of the population with the greatest risk of contracting rabies, educating the primary school learners is one of the key objectives of the education component of this strategy.

(1) Rabies is preventable; description of the disease, the cause of rabies and methods to control the disease (including vaccination and reporting suspect rabid cases) (2) Care for dogs; explanation of good dog interaction and generation of responsibility for dog health (including humane dog population control). (3) Dog bite prevention; understanding risky canine behaviour for bites and actions to avoid bites. (4) Anecdotally, this knowledge has been shown to not just benefit the learners but also the wider communities through the early identification of the signs of rabies in animals by the learners.

Lessons will be delivered by trained staff in an engaging and informative way, using role play and demonstration of dog behaviour to effectively communicate the life-saving information.

The school education programme should be timed in a way that it precedes the canine mass vaccination component of this strategy to also aid the timely dissemination of information about the vaccination schedule to the communities.

Best synergistic effects can be reached through running the education component roughly one week before the vaccination programme occurs in the areas covered by the schools.

Community Sensitization

In order to achieve maximum coverage during the vaccination component and achieve long-term engagement with the rabies elimination programme, communities need to be effectively informed of the schedule of the vaccination. To achieve the maximum penetration of communities in vaccination areas, the community structure needs to be taken into account. This will particularly vary between urban and rural areas targeted for vaccination. The identification of these structures is of paramount importance to the NRTF to ensure a smooth and efficient delivery of the strategy and all associated programmes and components.

Communicating basic rabies prevention messages similar to the education component and informing communities about ways to report suspected rabies cases and dog bites through existing networks in the communities, such as traditional authorities and leaders and community based organisations, will help to increase the reach and therefore effectiveness of these components.

Regular workshops and focus group meetings in communities will provide a platform to communicate in particular in relation to general rabies prevention and the reporting of incidences.

Preceding the vaccination campaign by one week, additional effort should be made to reach communities to ensure active engagement with the canine mass vaccination which in turn will lead to achieve the targeted coverage.

The use of community announcers has also been shown to be an effective addition to communicate the vaccination programme on the day the vaccinations happen in an area and should be incorporated into the schedule DRTFs will prepare for their districts on an annual basis.

Community Health Workers and staff of health centres can also act as multipliers to communicate messages to the communities at risk. An initial training and annual refresher in the identification of rabies signs, dog bite prevention and the reporting of suspect rabid animals and dog bites will be conducted to leverage the positive influence this particular group can have in the fight against rabies.

Multi-Media Public Awareness Campaign

In rapidly changing societies, every effort to reach all strata of the population must be made.

The use of traditional media, such as newspapers, radio, and television, as well as the advent of social media and online communication provide multiple avenues to communicate important messages to all members of the public.

In particular in rural areas, the use of radio adverts and plays has been demonstrated as an effective tool to reach communities. The plethora of local radio stations enable a targeted communication of vaccination schedules and should begin broadcasting the dates and areas covered by the vaccination teams at least one week before the date and during the day vaccinations occur. During World Rabies Day, a radio play explaining how to avoid rabies, how to identify a rabid dog, responsible dog ownership and what to do in case one gets bitten will be broadcast to boost the awareness of the nation's effort to eliminate rabies. All broadcasts should also contain information about how to communicate rabies suspected animals and human exposures.

Appearances of officials on the most watched news programmes will be scheduled around the campaign to highlight the engagement at the highest level, encouraging the public to participate in this national effort to eliminate rabies. These appearances should occur on World Rabies Day and before vaccination is scheduled to occur in urban areas, where consumption of TV programmes is higher.

Groups and pages on popular social media platforms will be set up in order to enable the public to engage with the elimination programme directly and report suspect cases. These social media outlets will also be used to communicate the vaccination schedules and the means to report suspect rabid animals and dog bites.

Objectives and time-frames

Objectives	Indicators	Responsibilities	Time-frames
Reduced human mortality from rabies	1. Rabies prevention knowledge increased in children under 16 2. Increased participation in vaccination drive 3. Reduced dog bite cases and human fatalities	a. Ministry of Education b. NRTF c. DRTFs	i. Rabies lessons to children delivered one week before vaccination ii. Community network communications one month-one week before vaccination iii. Radio adverts one week before vaccination iv. TV appearances and newspaper articles on World Rabies Day v. Focus groups in between annual vaccination efforts
Improved moral perception of dogs	1. Proportion of community participation in vaccination drive 2. Fear of dogs reduced 3. Support for humane dog population control	a. Ministry of Education b. Ministry of Agriculture, Animal Industry and Fisheries c. DRTFs	i. Implementation of lessons in national curriculum ii. Year-round moderated social media output
Increased surveillance and reporting of rabies related data	1. Number of reported dog bites 2. Number of reported and tested suspect rabies samples	a. MAAIF b. DRTFS	i. Regular output on social media ii. Annual announcements of reporting methods iii. Annual training of CHWs iv. Annual radio Play on WRD

Annex VIII: Protocol for a well-performed rabies post-exposure prophylaxis delivery

Protocol for a well-performed rabies post-exposure prophylaxis delivery

To read along with the decision trees

1- Wound Risk Assessment and 2 - PEP Risk Assessment

Protocol for a well-performed rabies post-exposure prophylaxis delivery

To read along with the decision trees
1- Wound Risk Assessment and 2 - PEP Risk Assessment

1. Wound treatment

Thorough wound washing is a life-saving measure to mechanically reduce the viral inoculum at the wound site and is crucial in all exposures but especially when the patient's trip to the healthcare facility is long or no rabies biologicals are readily available.

1.1. Wash and flush the wound (or all wounds, if more than one) with copious amounts of water (preferably running water, if available) and soap or detergent for 15 min.

1.1.1. *If* eyes or mucosa were exposed, thoroughly rinse them with water.

1.2. Apply an antiseptic (e.g., povidone-iodine) thoroughly on the wound.

1.3. Since the wound is likely contaminated with dirt or soil, administer tetanus vaccination to the patient, either as a primary series or a booster if the last dose was received more than 10 years before (or as per the national vaccination guidelines). Consider broad-spectrum antibiotics to prevent bacterial infection especially in deep wounds, and follow the dosage recommended by the manufacturer.

1.4. Advise the patient against applying home-based remedies to the wound.

1.5. Do not close or tightly cover the wound with dressings or bandages and advise the patient against doing this.

1.6. Avoid suturing. If not possible (e.g., continued bleeding, risk of visible scar), try to delay it at least for some hours after the administration of rabies immunoglobulin or rabies monoclonal antibodies (if this rabies biological is necessary) to allow its infiltration through the tissues. If suturing cannot be delayed, sutures should be loose and minimal.

2. Risk evaluation and assessment of the need for rabies biologicals

2.1. Check the severity of the wound.

2.1.1. Assess the number of wounds and their depth, and determine the WHO wound category:

- ***Category I:*** The skin is still intact (test: the patient feels no burning sensation when surgical spirit is applied on intact skin): animal licks on intact skin, touching or feeding animals. This is not an exposure.
- ***Category II:*** The skin is broken but there is no bleeding (test: the patient feels a burning sensation when surgical spirit is applied on broken skin): minor scratches or abrasions, nibbling of uncovered skin. This is a mild exposure.
- ***Category III:*** The skin is broken and the wound is bleeding, mucous membrane or broken skin has been contaminated with saliva or direct contact with wild animals (including bats) has occurred. This is a severe exposure.

2.2. Consider the anatomical position of the wound.

2.2.1. Assess if it is a wound to a body part that is close to the brain or highly innervated, hence making it easier and faster for the virus to reach the brain. Such high-risk areas are the head, neck, face, genitals, or hands.

2.3. Assess if the patient is immunodeficient.

2.3.1. Ask the patient whether they suffer from any immune system disorder, or are HIV positive and on any anti-retroviral treatment, or are on long-term steroids or anti-cancer drugs.

2.4. Assess the vaccination history of the patient.

2.4.1. Ask the patient whether they have ever received any rabies vaccination (preferably with proof of vaccination, e.g., vaccination card), either before any exposure (as pre-exposure prophylaxis, PrEP) or after any exposure (as PEP).

2.4.2. *If* the patient has ever received any rabies vaccination before, ask the patient how many doses they have received. At least two doses of a cell culture vaccine received on an appropriate schedule before discontinuation count as PrEP. If the patient cannot remember the number of doses received or vaccination dates, or cannot show proof of prior vaccination, consider them unvaccinated patients.

2.4.3. *If* the patient has ever received any rabies vaccination before, ask the patient when they have received these doses. If complete PEP has been received in the last 3 months, immediate vaccination is not recommended. Since the patient might not know for sure whether they received the rabies vaccine, or another vaccine, proof of prior vaccination is recommended.

2.4.4. *If* the patient has ever received any rabies vaccination before, ask the patient whether they had any adverse events after vaccination. If the patient had a mild local reaction (e.g., pain, redness or swelling), they can continue PEP using the same brand of rabies vaccine. If they had a severe local or systemic reaction, another type of rabies vaccine should be used, if available (e.g., purified chick embryo cell vaccine, purified vero cell rabies vaccine).

2.5. Gather information from the patient on the animal involved in the exposure.

2.5.1. Ask the patient what animal they were exposed to and determine whether it's a rabies-susceptible animal. Only mammals are susceptible to rabies, although to different extents (e.g., rabies is rare in rodents, and no rodent bite is known to have caused a human rabies death).

2.5.2. Ask the patient to give you any further information about the animal and the exposure to it (**Table 1**).

2.6. Use all the information obtained to decide whether rabies vaccines and rabies immunoglobulin or rabies monoclonal antibodies are needed right away, can be delayed or are not applicable. For guidance on wound categorization and assessing the animal status, decision trees can be consulted (**Figure 1 – Wound risk assessment** and **Figure 2 – PEP risk assessment**).

2.7. Fully and clearly explain to the patient the provided treatment (including any injection other than rabies biologicals, to avoid confusion in the patient) and the proposed rabies vaccination schedule, specifying how many visits and injections will be necessary (**Figure 3**). Whenever possible, use the local language and choose words that are understandable to illiterate patients.

2.8. Obtain consent to proceed as per local law and regulations.

Wound risk assessment

Animal: mammal? N → Species not susceptible for rabies: no PEP indicated, wash exposed areas with soap and water

Animal: mammal? Y → Animal: rodent? Y → Rodents rarely transmit rabies: no PEP indicated, wash exposed areas with soap and water

Animal: rodent? N → Mucous membrane: contaminated with saliva? N → Skin: broken? N → Category I

Mucous membrane: contaminated with saliva? Y → Animal: bat? Y → Wound: bleeding? Y → Category III

Animal: bat? N → Wound: bleeding? N → Category II

Category I

WHO wound category I

Animal licks on intact skin, touching or feeding the animal

No PEP indicated, wash exposed areas with soap and water

Category II

WHO wound category II

Minor scratches or abrasions, nibbling of uncovered skin

Patient: immunocompromised? Y → Wound washing[1], RIG/RmAbs and ARV immediately[2]

Patient: immunocompromised? N → Patient: ever received any rabies vaccination?[3] Y → Patient: completed PEP less than 3 months ago? Y → No PEP indicated, wash exposed areas with soap and water

Patient: ever received any rabies vaccination?[3] N → Wound washing[1] and ARV

Patient: completed PEP less than 3 months ago? N → Wound washing[1] and ARV[4]

Wound washing[1] and ARV → Proceed with PEP Risk Assessment[6]

Wound washing[1] and ARV[4] → Proceed with PEP Risk Assessment[6]

Category III

WHO wound category III

Transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva, exposure to a bat

Patient: immunocompromised? Y → Wound washing[1], RIG/RmAbs and ARV immediately[2]

Patient: immunocompromised? N → Patient: ever received any rabies vaccination?[3] Y → Patient: completed PEP less than 3 months ago? Y → No PEP indicated, wash exposed areas with soap and water

Patient: ever received any rabies vaccination?[3] N → RIG/RmABs availability: limited? Y → Patient: high-risk?[5] Y → Wound washing[1], RIG/RmAbs and ARV

Patient: completed PEP less than 3 months ago? N → Wound washing[1] and ARV[4]

RIG/RmABs availability: limited? N → Wound washing[1], RIG/RmAbs and ARV

Patient: high-risk?[5] N → Wound washing[1] and ARV

Wound washing[1], RIG/RmAbs and ARV → Proceed with PEP Risk Assessment[6]

Wound washing[1] and ARV → Proceed with PEP Risk Assessment[6]

ARV = Anti Rabies Vaccine
PEP = Post-Exposure Prophylaxis
RIG = Rabies Immunoglobulin
RmAbs = Rabies Monoclonal Antibodies
Y = Yes, N = No

1 Wash the wound thoroughly with copious amounts of water and soap for 15 min and apply an antiseptic. This is a life-saving practice especially for immuno-compromised patients.
2 When feasible, the RABV neutralizing antibody response should be determined 2–4 weeks after vaccination to assess whether an additional dose of vaccine is required.
3 This includes Pre-Exposure Prophylaxis (PrEP), previous PEP, or patients beyond the 7th day of PEP.
4 If PrEP or previous PEP was received: shorten the current vaccination schedule accordingly.
5 Patient with multiple bites, deep wounds, bites to highly innervated parts of the body (such as head, neck, face, genitals and hands), severe immunodefi-ciency, bites from an animal with probable (clinically) or confirmed (laboratory) rabies, exposure to a bat (bite, scratch or exposure of mucous membrane).
6 If your program does not have adequate surveillance to assess the offending animal (as recommended in the PEP Risk Assessment Decision Tree), PEP should be initiated immediately.

PEP risk assessment

Did the exposure occur >10 days ago? — Y → Is the animal still alive?[1] — Y → PEP not indicated/ can be discontinued

Is the animal still alive?[1] — N/U → Start PEP immediately

Did the exposure occur >10 days ago? — N → Is the victim <14 years? **OR** Does the bite victim have multiple deep wounds? **OR** Does the bite victim have bites to highly innervated areas?[2]

Is the victim <14 years? **OR** Does the bite victim have multiple deep wounds? **OR** Does the bite victim have bites to highly innervated areas?[2] — Y → Start PEP immediately

Is the victim <14 years? **OR** Does the bite victim have multiple deep wounds? **OR** Does the bite victim have bites to highly innervated areas?[2] — N → Has the animal been tested for rabies?

Has the animal been tested for rabies? — Y → Test positive → Start PEP immediately

Has the animal been tested for rabies? — Y → Test pending/inconclusive → Start PEP immediately

Has the animal been tested for rabies? — Y → Test negative → PEP not indicated/can be discontinued[4]

Has the animal been tested for rabies? — N/U → Did the animal show any signs of disease consistent with rabies?[3] **OR** Did the animal die within 10 days of the exposure?[1] **OR** Did the animal bite 2 or more people or animals?

Did the animal show any signs of disease consistent with rabies?[3] **OR** Did the animal die within 10 days of the exposure?[1] **OR** Did the animal bite 2 or more people or animals? — Y/U → Is the animal still alive? — Y → Is the animal up-to-date on vaccination? — Y → Was the animal exposed to rabies risk in the last 12 months? — N → Is the animal available for assessment and quarantine? — Y → Delay PEP pending assessment and quarantine results[1]

Is the animal still alive? — N/U → Start PEP immediately

Is the animal up-to-date on vaccination? — N/U → Start PEP immediately

Was the animal exposed to rabies risk in the last 12 months? — Y/U → Start PEP immediately

Is the animal available for assessment and quarantine? — N/U → Start PEP immediately

Did the animal show any signs of disease consistent with rabies?[3] **OR** Did the animal die within 10 days of the exposure?[1] **OR** Did the animal bite 2 or more people or animals? — N → Is the animal available for assessment and quarantine?

Is the animal available for assessment and quarantine? — Y → Is the animal up-to-date on vaccination?

Is the animal up-to-date on vaccination? — N/U → Was the animal provoked to bite /scratch? — Y → PEP not indicated/ can be discontinued[4]

Was the animal provoked to bite /scratch? — N/U → Start PEP immediately

Is the animal up-to-date on vaccination? — Y → Was the animal provoked to bite/scratch? — N/U → Delay PEP pending assessment and quarantine results[1]

Was the animal provoked to bite/scratch? — Y → PEP not indicated / can be discontinued[4]

PEP = Post-Exposure Prophylaxis
Y = Yes, N = No, U = Unknown

1 Dogs, cats and domestic ferrets being healthy 10 days post-exposure present no rabies risk and PEP is not indicated. The infectious periods of other animals are not well characterized, and a more conservative 14-day clinical investigation is recommended.

2 Such as bites to the head, neck, face, genitals and hands.

3 Clinical signs of rabies in an animal include hypersalivation, paralysis, lethargy, unprovoked abnormal aggression (e.g. biting two or more people or animals and/or inanimate objects), abnormal vocalization, diurnal activity of nocturnal species. Hydrophobia is not a sign of rabies in dogs.

4 This risk assessment is made at one point in time with the available information. If new information is provided or the status of the animal changes, PEP might be indicated.

Table 1: Questions for patients about the animal involved and the exposure to it

- When did exposure occur?
- Is the animal still alive?
  - If not, when did it die?
- Was the animal tested for rabies?
  - If yes, what is the result of the test?
  - If no, is the animal available for testing or quarantine?
- Do you know for sure whether the animal was vaccinated against rabies?
- How did the bite/scratch/exposure happen? What was the animal doing and what were you doing?
- Did the animal show any symptoms like:
  - Hypersalivation?
  - Paralysis?
  - Lethargy?
  - Abnormal aggression (e.g., biting two or more people or animals and/or inanimate objects)?
  - Strange vocalization?
  - Diurnal activity (in case of nocturnal species)?
- Has the animal scratched/bitten other people/animals? If yes, inform them about the need for PEP, through local human and animal healthcare providers.

3. Administration of RIG/RmAbs

The timely administration of rabies immunoglobulin (RIG), or any approved rabies monoclonal antibodies (RmAbs), provides passive immunization by neutralizing the rabies virus at the wound site before the immune system responds to the vaccine. Therefore, the products need to be administered into and around all wounds. RIG is derived from human blood (hRIG) or equine blood (eRIG). Strong evidence shows that both RIG versions have similar efficacy. In clinical trials, several RmAb products against rabies have proved to be safe and effective in neutralizing a broad panel of globally prevalent rabies virus isolates. Advantages of RmAb products include large-scale production with standardized quality, high effectiveness and reduced risk of adverse events. RIG and RmAb products that are licensed for use in humans should be prioritized. WHO has recommended use of mAb "cocktails" containing at least two antibodies against the rabies virus.

3.1. Take the RIG/RmAb box out of a properly functioning refrigerator.

3.2. Calculate the maximum amount of RIG/RmAbs that the patient could receive: 20 IU (international unit)/kg of body weight for hRIG, 40 IU/kg of body weight for eRIG, 3.33 IU/kg of body weight for single RmAb and 40 IU/kg body weight for cocktail RmAbs.

3.2.1. ***If*** the wound is small, estimate the maximal quantity that is anatomically feasible to infiltrate and ensure not to exceed it.

3.3. Draw the needed amount of RIG/RmAbs into a new syringe.

3.4. To thoroughly infiltrate large and/or multiple wounds, dilute RIG/ RmAbs with the appropriate diluent (saline or 5% dextrose in water) based on manufacturer recommendations.

3.5. ***For RIG:*** infiltrate the entire necessary amount or as much as possible carefully deep into or as close as possible to all wound(s) or exposure sites, avoiding any compartment syndrome. Injecting the remaining RIG volume intramuscularly at a distance from the wound provides no additional protection against rabies (see exception below). ***For RmAbs:*** follow the manufacturer's instructions.

3.5.1. ***If*** there is a high likelihood that there are additional small wounds (e.g., if a child does not report all wounds), exposure was to bats, or exposure was other than through a scratch or bite, inject the remaining RIG volume intramuscularly as close as possible to the presumed exposure site, to the degree that is anatomically feasible.

3.5.2. ***If*** exposure was in the mucosa, rinse the exposed part with RIG.

3.5.3. ***If*** exposure was via aerosols (e.g., in a laboratory), inject RIG intramuscularly.

3.6. Observe the patient for 15–20 min after the administration for potential adverse events. ERIG should be administered under conditions that allow the management of an anaphylactic reaction (i.e., a severe, potentially life-threatening allergic reaction to a substance such as a vaccine component). Nevertheless, the risk for an anaphylactic reaction is low (1/150,000) and the reaction is generally treatable.

3.7. Keep the open vials and, when other patients come on the same day, draw the necessary doses using new needles.

3.8. At the end of the day, discard open vials.

4. Administration of rabies vaccine

Since 1984, WHO has strongly suggested the discontinuation of old-fashioned nerve tissue vaccines and their replacement with modern, concentrated, purified cell culture and embryonated egg-based rabies vaccines (CCEEVs). Modern rabies CCEEVs are safe and well tolerated and should comply with the recommended potency of ≥ 2.5 IU per vial. All vaccines can be used both for intramuscular administration (i.e., injection in the muscle) and intradermal administration (i.e., injection in the upper layer of the skin). For dose-, cost- and time-saving reasons, WHO recommends intradermal administration in a shortened, 1-week vaccination schedule (Figure 3). Rabies vaccines are safe to be used intradermally even when they are only labelled for intramuscular use (off-label use).

4.1. *If* available, use WHO-prequalified cell culture vaccines (an updated list is available on the WHO website). If WHO-prequalified cell culture vaccines are not available, use the cell culture vaccines recommended in national guidelines.

4.2. Take the rabies vaccine box out of a properly functioning refrigerator. Rabies vaccines must be refrigerated at 2–8 °C, kept away from sunlight, and not stored in the refrigerator door (because the temperature may fluctuate when opening and closing it). The temperature of the refrigerator needs to be monitored and adjusted as necessary, especially in case of power cuts.

4.2.1. *If* an unopened vial is used, reconstitute the rabies vaccine according to the manufacturer's instructions. All rabies vaccines are lyophilized and need reconstitution before use with the accompanying sterile diluent. Shake the vial 2–3 times before withdrawing the vaccine into the syringe.

4.2.2. *If* an already opened vial is used, check if it was stored hygienically and opened less than 6–8 h before. No need for reconstitution is there. Rabies vaccines must be used immediately after dilution, or within 6–8 h only if stored at 2–8 °C and protected from sunlight. Shake the vial 2–3 times before withdrawing the vaccine into the syringe.

4.3. Draw up 0.2 mL of rabies vaccine with an insulin syringe.

4.4. Inject 0.1 mL of vaccine intradermally in the deltoid area for adults and the anterolateral area of the thighs for young children aged < 2 years. Rabies vaccines should never be administered in the gluteal area because this results in lower neutralizing antibody titres and should never be administered in the same anatomical site as RIG/RmAbs.

4.4.1. Insert the needle into the upper layer of the skin, with the bevel facing upwards, at a 45-degree angle and approximately 2 mm into the skin (similar to the Mantoux tuberculin skin test).

4.4.2. Start injecting and notice whether you feel any resistance. If not, the needle may wrongly be in the subcutaneous tissue. In this case, withdraw the needle and repeat the injection in a new site.

4.4.3. Inject 0.1 mL until you see a small (i.e., 6-8 mm in diameter) bleb with an "orange peel" appearance (Figure 4).

4.4.4. Do not rub the injection site.

4.5. Repeat the same on the other arm.

4.5.1. *If* the wound(s) is on an arm, the vaccine should be administered intradermally in the anterolateral area of the thighs or the suprascapular areas.

4.6. Safely dispose of the used syringe and needle.

4.7. Observe the patient for 15–20 min after the administration for potential adverse events.

4.8. Store the opened vial hygienically.

4.9. Hand out a rabies-specific vaccination card and remind the patient about the follow-up visits to complete PEP.

4.10. If the patient knows of any other person who was exposed to the same animal, ask the patient to promptly inform them about where to go to receive PEP.

4.11. Register the information about exposure and treatment for national surveillance. The number of reported animal exposure cases in humans and the number of people receiving PEP (disaggregated by sex, age, species of exposed animal, and WHO exposure category) are key rabies indicators that need to be part of any national rabies surveillance systems.

4.12. After 6–8 h from opening the vial, dispose of it.

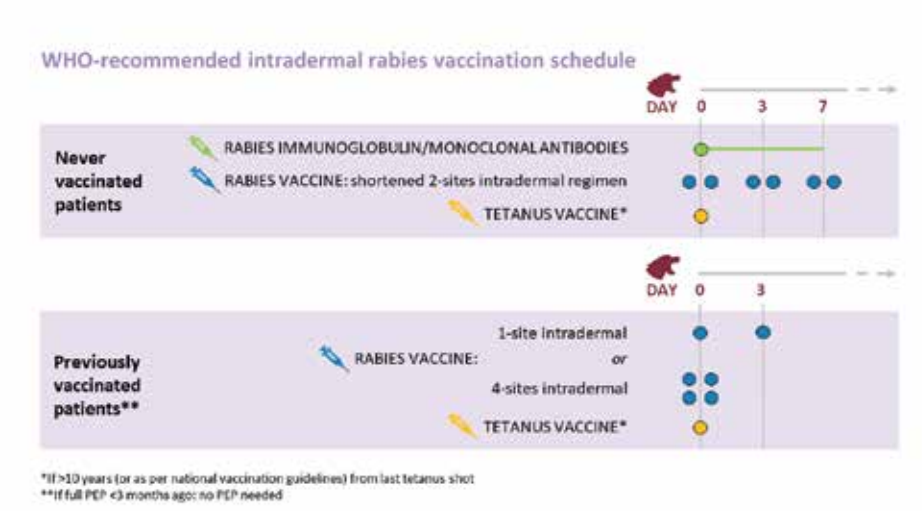

Figure 3: WHO-recommended 1-week intradermal post-exposure prophylaxis vaccination schedule. For exposed individuals who have not been previously immunized, WHO recommends a 1-week vaccination schedule on days 0, 3 and 7, with a 2-site intradermal injection on each day.

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Figure 4: Confirmation of correct intradermal rabies vaccine administration. When the rabies vaccine is correctly injected into the upper skin area (over the deltoid muscle in adults or the lateral thigh area of infants), a distinctive bleb with an 'orange peel' appearance is visible.

5. Patient counselling

5.1. Get ready to answer the questions that your patients may have (Table 2A).

5.2. Get ready to answer the questions that the less experienced colleagues may have (Table 2B).

Table 2A: Questions frequently asked by patients

I was scratched/bitten a long time ago. Do I still need rabies vaccination?	Yes, because the rabies incubation period can be very long.
If I start rabies vaccination, will I need to change my diet?	No, you can eat whatever you want.
Will you give me many injections in the stomach?	No, that was done with the outdated nerve tissue vaccine (NTV). Modern vaccines only require a few doses and a normal injection in the arm, as with any other injectable vaccine.
Will there be adverse effects?	As with any vaccination, there may be adverse effects. But they are likely to be minor (such as redness, pain or swelling at the site of injection) or, even unlikely, mild (such as some fever, headache, dizziness or gastrointestinal symptoms). Serious adverse effects like allergic reactions are rare.
What happens if I forget to come for the next vaccination?	Make sure you don't forget by having your relatives/friends remind you about it. But if you forget, come as soon as possible and we will continue the vaccination, not restart it.
I had milk from a rabid animal. Do I need rabies vaccination?	No, you don't need any PEP, but avoid it next time and, anyway, milk should best be boiled before consumption.
I had meat from a rabid animal. Do I need rabies vaccination?	No, you don't need any PEP, but avoid it next time and, anyway, meat should best be cooked before consumption.
I processed the meat of a rabid animal. Do I need rabies vaccination?	Probably yes. Tell me more.

I was bitten by a mouse/small rat. Do I need rabies vaccination?	No, there is no risk of rabies.
I am pregnant. Is rabies vaccination safe for me and my baby?	Yes.
I am breastfeeding. Is rabies vaccination safe for my baby?	Yes.

Table 2B: Questions frequently asked by healthcare providers

Does the dose of rabies vaccine depend on age or weight?	No. Age only determines the site of rabies vaccination: the deltoid area for adults and the anterolateral area of the thighs for children <2 years. Weight only determines the maximum amount of RIG/RmAbs to use: 20 IU/kg of body weight for hRIG, 40 IU/kg of body weight for eRIG, 3.33 IU/kg body weight for single mAb and 40 IU/kg body weight for cocktail mAb.
Can I change the administration route or vaccine product during the vaccination schedule?	Yes, if unavoidable, you can do it. Don't restart vaccination, just continue it.
How does intradermal vaccination work when the dose is so small?	The antigen-presenting cells in the dermis are more effective in presenting the vaccine/antigen to the immune system than the ones in the muscles, so they can stimulate a very strong and prompt immunologic/antibody response.
The rabies vaccine box only mentions intramuscular vaccination. Can I administer the vaccine intradermally?	Yes, all vaccines can be given both intramuscularly and intradermally, but choose the intradermal route whenever possible because it's cheaper for the healthcare system and the patient, requires fewer visits, and one vaccine vial can be shared across many patients. However, check the rabies vaccines that your national drug regulatory authority approves for intradermal use.
Can I inject the rabies vaccine in the gluteal area?	No, the vaccine would not be fully absorbed and effective because of the fat present in that body part.
If the wound(s) is on an arm, where should I inject the rabies vaccine?	You should inject the vaccine intradermally in the anterolateral area of the thighs or the suprascapular areas. RIG must be injected in the wound(s).
If RIG/RmAbs is not available on day 0, should I delay rabies vaccination?	No, never. But refer the patient to a healthcare facility where RIG/RmAbs is available, after administering the first dose of rabies vaccine.
Can I administer RIG/RmAbs later on in the vaccination schedule?	Yes, if RIG/RmAbs is not available on day 0, but never after day 7. Anyway, RIG/RmAbs should be given as soon as possible after exposure.
Can I give RIG/RmAbs to a patient who has already received any rabies vaccination in their lifetime?	No, thanks to the previous vaccination, there are already demonstrable antibody titres or immune memory cells. In case of re-exposure, 1-site intradermal rabies vaccine administration on days 0 and 3 *or* 4-sites intradermal rabies vaccine administration on day 0 will produce good antibodies due to anamnestic response.
Should I perform a skin test before administering eRIG?	No, because they poorly predict severe adverse events and their results must anyway not be the reason for not giving eRIG if it is needed. However, all RIG should be administered under conditions that would allow management of an anaphylactic reaction.

Can I give rabies biologicals to a patient who is receiving treatment with chloroquine or hydroxychloroquine?	Yes, given the fatal outcome of rabies, there is no contraindication to the concomitant use of any medication.
Can I give rabies biologicals to a patient who is receiving other vaccines in this period?	Yes, given the fatal outcome of rabies, priority is given to rabies biologicals (rabies vaccine and RIG/RmAbs). If the patient receives RIG, live vaccines should be postponed for 3-4 months, if possible.
Should I perform an antibody test on the patient following rabies vaccination?	No, unless the patient is immunocompromised. In this case, a Rapid Fluorescent Foci Inhibition Test (RFFIT) or a Fluorescent Antibody Virus Neutralization (FAVN) test should be performed 2–4 weeks after vaccination to assess whether an additional vaccine administration is needed. Consultation with an infectious disease specialist or an immunologist is advised.
Are there special recommendations for patients undergoing chemotherapy?	Yes, they are to be treated as immunocompromised patients. So: emphasis on proper wound washing; immediate RIG/RmAbs and rabies vaccine, even if previously immunized, for category-II and -III exposure; complete rabies vaccination course; Rapid Fluorescent Foci Inhibition Test 2–4 weeks after vaccination.
Are all HIV-infected individuals considered immunocompromised?	No. HIV-infected individuals who receive antiretroviral therapy and are clinically well and immunologically stable (i.e., normal CD4% > 25% for children aged < 5 years or CD4 cell-count ≥ 200 cells/mm^3 if aged ≥5 years) are not considered immunocompromised.
Can intradermal administration be used for immunocompromised individuals or individuals receiving chloroquine, hydroxychloroquine drugs or long-term corticosteroid or other immunosuppressive therapy?	Yes.

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