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NATIONAL PROGRAM FOR THE PREVENTION AND FIGHT AGAINST EMERGING AND RE EMERGING ZOONOSES

PERMANENT SECRETARIAT

LANDSCAPE ANALYSIS ON PRIORITY ZOONOTIC DISEASES IN CAMEROON

JULY 2021

Breakthrough ACTION FOR SOCIAL & BEHAVIOR CHANGE

USAID FROM THE AMERICAN PEOPLE

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LIST OF ABBREVIATIONS

AI	Avian influenza
BA	Breakthrough ACTION
BTB	Bovine tuberculosis
CCP	Center for Communication Programs
CDC	Centre for Disease Control and Prevention
CSC	Changement Social et de Comportement
DLMEP	Directorate of Control of Epidemic and Pandemic diseases
EEC	Evaluation Externe Conjointe
EVD	Ebola Virus Disease
GHSA	Global Health Security Agenda
HPAI	Highly Pathogenic Avian Influenza
IHR	International Health Regulations
JEE	Joint External Evaluation
JHU	Johns Hopkins University
KII	Key informant interviews
MINEPDED	Ministère de l'Environnement, de la Protection de la Nature et du Développement Durable
MINEPIA	Ministère de l'Élevage des Pêches et des Industries Animales
MINFOF	Ministère des Forêts et de La Faune
MINISANTE	Ministère de la Santé Publique
MOH	Ministry of Health
MZP	Maladies Zoonotiques Prioritaires
OMS	Organisation Mondiale de la Santé
OSC	Organisations de la Société Civile
PNPLZER	National Program for the Prevention and Fight against Emerging and Re-emerging Zoonoses
RCCE	Risk communication and community engagement
RNA	Ribonucleic acid
RSI	Règlement Sanitaire International
SBC	Social and Behavior Change
TB	Tuberculosis
UNICEF	United Nations Children's Fund
USA	United States of America
USAID	United States Agency for International Development
WHO	World Health Organizations

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EXECUTIVE SUMMARY

Introduction

The National Program for the Prevention and Control of Emerging and Re-emerging Zoonoses (PNPLZER), a `` One Health " platform, was set up in 2014 in Cameroon in response to the awareness of the weight of zoonotic diseases on public health . Indeed, it turns out that 3 of the 5 new human pathologies that appear each year are of animal origin; globally 60% of known human infectious diseases are of animal origin, as well as 75% of emerging human diseases and 80% of pathogens usable for bioterrorism.

Breakthrough ACTION (BA) is a five-year cooperative agreement (2017-2022) from the United States Agency for International Development (USAID) to lead USAID's social and behavior change (SBC) programming around the world. In Cameroon, USAID is currently providing support to the Breakthrough ACTION programming mechanism to increase Cameroon's capacity to implement the Global Health Security Agenda (GHSA) in efforts to accelerate the country's progress toward the implementation of the World Health Organizations (WHO) International Health Regulations (IHR). One of the eight core functions outlined in the IHR is that countries have the capacity to implement risk communication. The IHR define this as the capacity of a country to communicate potential risks its population may face, as well as its ability to engage with communities that are affected by such diseases. In order words, risk communication is the real-time exchange of information, advice and opinions between experts or officials and people who face a threat (hazard) to their survival, health or economic or social well-being to enable them to take informed decisions to mitigate the effects of the threat (hazard) such as a disease outbreak and take protective and preventive action. (IHR working group on risk communication, 2009)

The GHSA initiative has been warmly welcomed in Cameroon in order to accelerate the application of the requirements of the International Health Regulations and facilitate the implementation of other measures relating to global health security. It is in this context that USAID, through the Breakthrough Action Project, supports the PNPLZER in order to make it a powerful guarantor of health security in Cameroon. The Joint External Evaluation (JEE) of the International Health Regulations (IHR), conducted in Cameroon in September 2017 noted that despite the considerable efforts made by Cameroon to improve the response to emergencies, there remain significant challenges to be overcome. to achieve the required capacities for prevention,

detection and response to public health events. Among these capabilities are risk communication.
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In 2016, following the Ebola epidemic in West Africa, Cameroon through the PNPLZER identified 5 priority zoonotic diseases. During a two-day workshop, representatives of the sectors in charge of human, animal and environmental health and other actors identified, using a semi-quantitative tool developed by the Center for Disease Prevention and Control (CDC) Atlanta, a list of zoonotic diseases relevant to Cameroon, defined the criteria for prioritization, as well as the challenges and importance specific to each of them. These diseases included rabies, anthrax, avian influenza, Ebola / Marburg and bovine tuberculosis. In 2020, the list was updated by PNPLZER to include salmonellosis, Lassa fever, trypanosomiasis, monkey pox and brucellosis..

For the update of the list of priority zoonoses in 2020, the prioritization was made by agro-ecological zones (Figure 1) which are distinguished by dominant physical, climatic and plant characteristics. The climate varies depending on the terrain, from tropical along the coast, to semi-arid and hot in the north. The coastal belt is hot and humid. These variable physical and climatic conditions favor the existence and spread of different zoonoses. Therefore, these priority zoonotic diseases have different burdens in different agro-ecological zones. In order to support Cameroon's risk communication and preparedness plans, the Breakthough ACTION GHSA project has set up a whole set of activities to advance the risk communication benchmarks as identified by WHO in the 2019 benchmarks on IHR Capacities. It is expected that the specific activities of the project will induce impactful short-term progress in the indicators under the Joint External Evaluation (JEE) of Cameroon, obtained in 2017. The technical approach includes the use of programs from Cameroon evidence based on behavioral theory to support individual and collective adoption of protective and preventive measures to mitigate the impact of zoonotic diseases. It also relies on the collaboration of government partners and other One Health stakeholders to strengthen risk communication capacity and community engagement (CREC) among GHSA partners. The development of communication and risk preparedness plans requires a complete and transparent understanding of the actors, as well as of the networks and resources available.

To achieve this understanding, PNPLZER with technical and financial support from Breakthrough ACTION conducted a landscape mapping of systems and stakeholder analysis. Through this activity, the PNPLZER has valuable background and information that will be used in the

development of CREC strategies, PNEs and operational protocols. The results of the panoramic analysis will also provide information that will help strengthen the existing coordination mechanisms and structures in the country, as well as a better understanding on the part of the partners of their place in the Cameroonian One Health ecosystem.

The specific objectives of the landscape review were to:

1. Identify stakeholders working on the priority zoonotic diseases (PZDs) (Geographic scope of their intervention, target population, approach & capacity)
2. Identify risky behaviors that contribute to the spread of the PZDs and their determinants and geographic variations.
3. Identify opportunities in the form of platforms or processes that can be strengthened for improved coordination and joint planning to ensure development and use of quality risk communication interventions for both preparedness and response to zoonotic diseases
4. Explore and identify communication processes that can accelerate high-impact behaviors to prevent, mitigate and respond to prioritized zoonotic diseases.
5. Explore and learn how to improve the effectiveness of public communication and how to support GHSA partners to engage communities in prevention, mitigation, and response to priority zoonotic diseases and other public health events.
6. Identify target audiences for risk communication interventions including national, regional, community-level audiences.

Methods

To achieve the above-mentioned objectives, data was gathered using Literature review, Stakeholder, and geographic mapping. Primary data was collected using key informant interviews. Of the five agro ecologic zones, three were included to ensure coverage of most of the priority zoonotic diseases in the country. The three were, Bimodal Humid Forest (represented by the Centre and South regions), Western Highlands (represented by the West region) and the Sudano-Sahelian (represented by the Far North Region)

Results

Key findings will be presented under two sections. This will include sections on literature review and key informant interviews.

Findings from literature review

Findings as presented in table 1 are according to the priority zoonotic diseases in Cameroon identified from literature search.

Table 1: Prevalence and preventive activities of priority zoonotic diseases in Cameroon

Priority zoonotic diseases	**Prevalence and Preventive activities of zoonotic diseases**
Rabies	Animal and human rabies have been notifiable diseases in Cameroon since 2000. Rabies control legislation also requires vaccination of pet dogs and cats and requires that owners of biting animals are recorded in each district. Although rabies control efforts, such as yearly reduced-price pet vaccination events, radio information campaigns, and dog culling, exist in Cameroon, the impacts of these programs are unknown. However, 15 cases of animal rabies were confirmed in 2019, 19 cases confirmed in 2018, 18 cases confirmed in 2017.
Anthrax	Before 2015, sporadic cases of anthrax have been reported in domestic animals in the North, Far-North and Adamaoua regions only. However, in 2015, a case report describes the first outbreak of anthrax o n a cattle farm in Bangangte, in the West Region of Cameroon, where cases of sudden mortalities were reported. Four animals (4%) died out of a 100. This was later found out to be anthrax. In the first half of 2020, four (04) cases of anthrax were reported in cattle in the Northwest Region of Cameroon.
Avian Flu	Two strains have been reported in Cameroon: the first (H5N1) in both the 2006 and 2016-2017 HPAI outbreaks, and the second (H5N8, clade 2.4.4.4) in the 2016-2017 epidemic.
Ebola Virus Disease	There have been no cases of EVD reported in Cameroon but given its evolving situation, there is a considerable risk that cases will appear in currently unaffected countries.
Bovine Tuberculosis	The M. bovis strains circulating in animals, the extent of zoonotic TB due to M. bovis as well as M. bovis maintenance hosts, and the role that they play are unknown in Cameroon. In 2019 however, out of 15 samples suspected of tuberculosis, 11 were confirmed. About 18,318.05 kg of bovine meat were seized for tuberculosis, representing more than 40 million FCFA in 2019. The prevalence of bovine tuberculosis in the slaughterhouses of Yaoundé and Douala was 1.03% in 2011.
Salmonellosis	Little is known about the burden, transmission or its risk factors of Salmonellosis in most parts of Cameroon. In a study carried out in Buea Health District in Cameroon, of 385 patients enrolled, 105 were diagnosed of salmonellosis giving an overall prevalence 27.3
Lassa fever	There have been no cases of Lassa fever reported in Cameroon but given its re-emergence in neighboring Nigeria, there is a considerable risk that cases will appear in currently unaffected countries.
Trypanosomiasis	There are several endemic zones in Cameroon, the most active of which are Fontem and Bafia. Risk is found in Bafia (Mbam Division, Centre Region) and Fontem/Mamfe (Manyu/Fontem Division, South West Region). Mbam Division reports the most cases of this disease. Potential

	areas for recurrence include Far-North region bordering Chad and East Region bordering the Nola area of the Central African Republic
Monkeypox	In 2016, at the Mefou and Afamba primate sanctuary, 3 cases were reported out of 300 exposed chimpanzees. In Cameroon, there have been no human cases of monkeypox reported since 1989 but between April and May 2018, a total of 16 confirmed and suspected cases in humans (one confirmed and 15 suspected cases) were reported to the Directorate of Control of Epidemic and Pandemic diseases (DLMEP).
Brucellosis	Bovine brucellosis is widely endemic in Cameroon and prevalence rates in the range of 3–31% in cattle at individual levels and 16.2–35.0% at herd levels have been reported. In 2014, the prevalence of 6.5 to 12.5% in Cameroon in cattle depending on the region and the season have been reported. In a study in 2018, it was revealed that brucella infection is an important public health problem among abattoir personnel and pregnant women living in Ngaoundéré Cameroon.

Findings from Key Informant Interviews (KII)

Findings from the KII is presented based on thematic areas identified during the data analysis:

Stakeholders Working on the Priority Zoonotic Diseases

The stakeholders involved in zoonotic disease control in Cameroon with a national coverage are mostly actors of the public sector. These are mainly the ministries of Public Health (MINSANTE), Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED), Minister of Forestry and Wildlife (MINFOF) and Ministry of Livestock, Fisheries and Animal Industries (MINEPIA). There are, however, the presence of international organizations and livestock and farmers association that have local coverages in their respective communities. They engage in preventive and curative activities of both animals and humans, targeting different persons depending on the focus of the stockholders.

Risky behaviors that contribute to the spread of the diseases

With agriculture as the backbone of Cameroon's economy, employing 70% of its workforce and with the livestock population of Cameroon estimated at over 90 million, there is considerable risk of zoonotic infections already. Respondents classified the factors responsible for the spread of zoonotic diseases into several broad categories, which are: risky behaviors at individual levels, mostly around individual habits and characteristics; shortcoming on the part of the government; lack of civic-mindedness (need to strengthen norms of civic mindedness by government);

insufficiency of knowledge; insufficiency in resources and inadequacy of collaboration between sectors (need for improved or enhanced coordination).

Opportunities in form of platforms or processes that can be strengthened for improved coordination and joint planning

The most mentioned platform by most respondents is PNPLZER and MOH. MOH is already structured to have a national coverage. To strengthen PNPLZER for better coordination, respondents argue that it needs to be extended to the regional levels. Also, quarterly meetings organized by the PNPLZER platform at the national level involving these structures and monthly meetings at the regional level will be great to enhance coordination.

Processes that can accelerate high-impact behaviors to prevent, mitigate and respond to prioritized zoonotic diseases

To prevent, mitigate and respond to prioritized zoonotic diseases, most respondents feel it is vital to identify with the population processes that can accelerate high-impact behaviors. Key informants both at the central and community levels identified the aspects that can accelerate high-impact preventive behavior to prevent and respond to prioritized zoonotic diseases. These aspects range from awareness raising, thorough training, to good governance and intersectoral collaboration

Strategies to improve the effectiveness of public communication

Respondents feel that strategic documents are particularly lacking and those available have not been implemented. Respondents argue that a continuous, effective public communication program that addresses priority zoonotic diseases in Cameroon is necessary if zoonotic diseases are to be addressed. Unfortunately, there is no such system in Cameroon or if it exists, it is very inconsistent and expensive. Respondents argue that such communication programs are sometimes designed and implemented when there is an outbreak and disappears after the outbreak has been put under control, giving room for the re-emergence. Most respondents feel that the lack of a public communication program that addresses priority zoonotic diseases in Cameroon is a hindrance to proper prevention and control of infectious diseases.

Target audience analysis

Depending on the specific zoonotic disease, targeted audiences range from specific individuals like politicians, eco guards, the most exposed populations like butchers, and all those working in slaughter houses, pregnant women, livestock breeders, hunters, consumers, bushmeat sellers and the general population. Cultural practices such as living with livestock in the same house, consumption of raw milk, consumption of poorly cooked animal products, and high contact with animals and animal carcasses, backyard slaughtering contributes to spread of zoonosis and so those involved were though to be targeted audience.

The channel of communication differs between central, regional and community level. Television (TV), Radio, Social media, Leaflets, Posters, Flyers, Banners were cited to be useful channels of communication at the central and regional level while community radios, houses of worship, open doors days at schools and colleges, professional organizations, door to door campaigns, caravans and Civil Society Organizations (CSOs) were cited to be more useful channels of communication at the community level.

Conclusion and recommendations

Conclusions:

The 10 priority zoonotic diseases are not evenly prevalent across Cameroon, with some regions heavily affected while others are not. Cultural practices such as living with livestock in the same house, consumption of raw milk, consumption of poorly cooked animal products, and high contact with animals and animal carcasses, backyard slaughtering contributes to spread of zoonosis.

Most respondents feel there is low awareness of the community on zoonotic disease and their transmission mechanisms. They feel that there is inadequate behavior change intervention (little or no communication materials on the subject) in Cameroon, and weak preparedness and lack of early warning plans in endemic areas contribute to the increasing risk of zoonosis. This assessment also identified weak coordination and information sharing systems among the various actors working in zoonotic diseases prevention and control.

Recommendations:

Based on findings of this assessment, the following recommendations were proposed:

Strengthen Social and behavioral change communication

1. Breakthrough ACTION through the GHSA project in collaboration with relevant sectors should support the design, production and distribution of tailored SBC materials on zoonotic diseases and intervene priority target groups with appropriate approach and channels. The SBC materials should focus on preventive and protective behaviors.
2. Breakthrough ACTION with partners, should design an RCCE strategy and strengthen routine health education focusing on risk of zoonotic diseases, prevention and control strategies, educating farmers, butchers, breeders and other exposed persons to reduce their risk.

Collaboration and coordination monitoring and supervision

1. There is no early warning and rumor tracing system for zoonotic diseases in Cameroon. Therefore, the project should put in place a rumor tracking system and strengthen information sharing and alignment of responses among the various stakeholders from the central to the community level.
2. The current level coordination between the National zoonotic program and other sectors especially at the community levels need to be strengthened. The project therefore should work with partners through strengthening existing One Health coordination mechanisms and also establish similar regional and community level coordination mechanisms.
3. Stakeholder mapping findings indicated there is chronic inadequacy of training on zoonotic disease prevention and control. The project with partners should therefore provide this training for local associations related to zoonotic diseases, breeders and CSOs.
4. Limited data that is not timely and/or geographically representative is a challenge. Breakthrough ACTION and other stakeholders should identify real data need and conduct operational research where needed in order to deepen understanding and narrow the gap. Breakthrough ACTION and other stakeholders should work to improve data quality and data use for decision making on zoonotic diseases prevention and control.
5. Organizational capacity among groups working on zoonotic diseases to address risk communication needs is limited. This projects' risk communication activity should prepare training on leadership on strategic communication and risk communication.

RÉSUMÉ ANALYTIQUE

Introduction

Le Programme National de Prévention et de Lutte contre les Zoonoses Emergentes et Ré émergentes (PNPLZER), plateforme ‘‘Une Seule Santé’’ est mis en place en 2014 au Cameroun face à la prise de conscience du poids des maladies zoonotiques sur la santé publique. En effet, il s’avère que 3 des 5 nouvelles pathologies humaines qui apparaissent chaque année sont d’origine animale ; globalement 60 % des maladies infectieuses humaines connues sont d’origine animale, de même que 75 % de maladies humaines émergentes et 80 % de pathogènes utilisables pour le bioterrorisme.

L'accord de coopération Breakthrough ACTION (BA) de l'USAID (Agence des États-Unis pour le développement international) a été conclu pour cinq ans (2017-2022) dans le but de promouvoir les programmes de changement social et de comportement (CSC) de l'USAID dans le monde. Au Cameroun, l'USAID soutient actuellement le mécanisme de programmation Breakthrough ACTION visant à accroître la capacité du pays à mettre en œuvre le Programme de sécurité sanitaire mondiale (GHSA) et à accélérer les progrès du pays vers l'application du Règlement sanitaire international (RSI) de l'Organisation mondiale de la santé (OMS). L'une des huit fonctions essentielles décrites dans le RSI vise à ce que les pays aient la capacité de mettre en œuvre une communication sur les risques. D'après le RSI, tout pays doit être à même de communiquer les risques auxquels sa population est susceptible d'être confrontée, ainsi qu'à s'engager auprès des communautés touchées par des maladies. En d'autres termes, la communication des risques consiste à échanger en temps réel des informations, des conseils et des opinions entre des experts ou des fonctionnaires et des personnes confrontées à une menace (danger) pour leur survie, leur santé ou leur bien-être économique ou social afin de leur permettre de prendre des décisions éclairées pour atténuer les effets de la menace (danger) comme une épidémie et prendre les mesures adéquates en termes de protection et de prévention. (Groupe de travail RSI sur la communication des risques, 2009).

L’initiative du GHSA a été accueillie au Cameroun avec ferveur afin de permettre l’accélération de l’application des exigences du Règlement Sanitaire International et faciliter la mise en œuvre d’autres mesures relatives à la sécurité sanitaire mondiale. C’est dans ce contexte que l’USAID à travers le Projet Breakthrough Action vient appuyer le PNPLZER afin d’en faire un puissant garant

de la sécurité sanitaire du Cameroun. L'Evaluation Externe Conjointe (EEC) du Règlement Sanitaire International, conduite au Cameroun en septembre 2017 a relevé que malgré les efforts considérables réalisés par le Cameroun afin d'améliorer la réponse aux situations d'urgences, il reste d'importants défis à relever pour atteindre les capacités requises de prévention, de détection et de riposte aux évènements de santé publique. Parmi ces capacités figurent en pôle position la communication sur les risques.

En 2016, suite à l'épidémie d'Ebola en Afrique de l'Ouest, le Cameroun à travers le PNPLZER a identifié 5 maladies zoonotiques prioritaires. Au cours d'un atelier de deux jours, les représentants des sectorielles en charge de la santé humaine, animale, environnementale et autres acteurs ont identifié, à l'aide d'un outil semi-quantitatif développé par le Center for Disease Prevention and Control (CDC) Atlanta, une liste de maladies zoonotiques pertinentes pour le Cameroun, défini les critères de hiérarchisation, ainsi que les défis et l'importance propres à chacun d'entre eux. Ces maladies comprenaient la rage, la fièvre charbonneuse, la grippe aviaire, Ebola/Marburg et la tuberculose bovine. En 2020, la liste a été mise à jour par le PNPLZER pour inclure la salmonellose, la fièvre de Lassa, la trypanosomose, la variole simienne et la brucellose.

Pour la mise à jour de la liste des zoonoses prioritaires en 2020, la priorisation a été faite par zones agro-écologiques (Figure 1) qui se distinguent par des caractéristiques physiques, climatiques et végétales dominantes. Le climat varie selon le terrain, de tropical le long de la côte, à semi-aride et chaud dans le Nord. La ceinture côtière est chaude et humide. Ces conditions physiques et climatiques variables favorisent l'existence et la propagation de différentes zoonoses. Par conséquent, ces maladies zoonotiques prioritaires ont des charges différentes dans les différentes zones agro-écologiques.

Afin de soutenir les plans de communication et de préparation aux risques du Cameroun, le projet GHSA de Breakthough ACTION a mis sur pied tout un ensemble d'activités pour faire progresser les références de communication des risques telles qu'identifiées dans les références 2019 de l'OMS relativement aux capacités face au RSI. Il est attendu que les activités spécifiques du projet induisent des progrès percutants à court terme vers la progression des indicateurs au titre de l'EEC du Cameroun, obtenus en 2017. L'approche technique comprend le recours à des programmes issus de preuves fondées sur la théorie comportementale en vue de soutenir l'adoption individuelle et collective de mesures de protection et de prévention permettant d'atténuer l'impact des maladies

zoonotiques. Elle mise par ailleurs sur la collaboration des partenaires gouvernementaux et d'autres parties prenantes de One Health pour renforcer la capacité de communication des risques et l'engagement communautaire (CREC) parmi les partenaires de la GHSA. L'élaboration de plans de communication et de préparation aux risques nécessite une compréhension complète et transparente des acteurs, ainsi que des réseaux et ressources disponibles.

Pour parvenir à cette compréhension, le PNPLZER avec l'appui technique et financier de Breakthrough ACTION a conduit une analyse panoramique des systèmes et des parties prenantes. Grâce à cette activité, le PNPLZER dispose d'un contexte et des informations précieux qui serviront à l'élaboration de stratégies, de PNE et de protocoles opérationnels de communication des risques et engagement communautaire (CREC). Les résultats de l'analyse panoramique fourniront également des informations qui aideront à renforcer les mécanismes et structures de coordination existants dans le pays, ainsi qu'une meilleure compréhension de la part des partenaires de leur place dans l'écosystème camerounais Une Seule Santé.

Les objectifs spécifiques de l'analyse panoramique étaient les suivants :

1. Identifier les acteurs travaillant sur les maladies zoonotiques prioritaires (MZP) (portée géographique de l'intervention, population cible, approche et capacité).
2. Identifier les comportements à risque qui contribuent à la propagation des MZP, ainsi que leurs déterminants et variations géographiques.
3. Identifier les opportunités sous forme de plates-formes ou de processus susceptibles d'être renforcés pour une meilleure coordination et planification conjointe en vue de promouvoir et diffuser des interventions de communication de qualité sur les risques, et ainsi de faciliter la préparation et la réponse aux maladies zoonotiques.
4. Explorer et identifier les processus de communication permettant de miser sur les comportements à fort impact pour prévenir et atténuer les maladies zoonotiques prioritaires, ainsi que de mettre en place des mécanismes de réponse.
5. Explorer et apprendre comment améliorer l'efficacité de la communication publique et comment aider les partenaires de la GHSA à impliquer les communautés dans la prévention, l'atténuation et la réponse aux maladies zoonotiques prioritaires, parmi d'autres événements de santé publique.

6. Identifier les publics cibles des interventions de communication sur les risques, y compris les publics nationaux, régionaux et communautaires.

Méthodes

Pour atteindre les objectifs mentionnés ci-dessus, les données ont été recueillies grâce à l'examen de la littérature, des parties prenantes et de la cartographie géographique. Les données primaires ont été recueillies à l'aide d'entretiens avec des informateurs clés. Trois des cinq zones agro-écologiques ont été incluses pour assurer la couverture de la plupart des maladies zoonotiques prioritaires dans le pays : la forêt humide bimodale (représentée par les régions du Centre et du Sud), les hauts plateaux de l'Ouest (représentés par la région de l'Ouest) et la région soudano-sahélienne (représentée par la région de l'Extrême nord).

Résultats

Les principales conclusions seront présentées dans deux sections portant sur l'examen de la littérature et les entretiens avec les informateurs clés.

Résultats de l'analyse de la littérature

Les résultats rapportés dans le Tableau 1 sont organisés en fonction des maladies zoonotiques prioritaires au Cameroun identifiées à partir de la recherche documentaire.

Table 2: Prévalence et activités de prévention des maladies zoonotiques prioritaires au Cameroun

Maladies zoonotiques prioritaires	**Prévalence et activités de prévention des maladies zoonotiques**
Rage	La rage animale et humaine est une maladie à déclaration obligatoire au Cameroun depuis 2000. La législation relative au contrôle de la rage exige également la vaccination des chiens et des chats de compagnie et l'enregistrement des animaux mordeurs par leurs propriétaires dans chaque district. Bien que des efforts de contrôle de la rage, tels que des événements annuels de vaccination des animaux de compagnie à prix réduit, des campagnes d'information radio et l'abattage de chiens, soient déployés au Cameroun, les impacts de ces programmes restent inconnus. On peut noter toutefois que 15 cas de rage animale ont été confirmés en 2019, contre 19 cas en 2018 et 18 cas en 2017.
Fièvre charbonneuse	Avant 2015, des cas sporadiques de fièvre charbonneuse ont été signalés chez des animaux domestiques dans les régions du Nord, de l'Extrême-Nord et de l'Adamaoua uniquement. Cependant, en 2015, un rapport de cas a décrit le premier foyer de fièvre charbonneuse dans un élevage bovin à Bangangte, dans la région de l'Ouest du Cameroun, où des cas de mortalité soudaine ont été signalés. Quatre animaux (4 %) sont morts sur 100. Il s'est

	avéré plus tard qu'il s'agissait de fièvre charbonneuse. Au premier semestre 2020, quatre (4) cas de fièvre charbonneuse ont été signalés chez des bovins dans la région du Nord-Ouest du Cameroun..
Grippe aviaire	Deux souches ont été signalées au Cameroun : la première (H5N1) dans les épidémies d'IAHP de 2006 et 2016-2017, et la seconde (H5N8, clade 2.4.4.4) dans l'épidémie de 2016-2017.
Maladie à virus Ebola	Aucun cas de MVE n'a été signalé au Cameroun, mais compte tenu de l'évolution de la situation, il existe un risque considérable que des cas apparaissent dans des pays actuellement non touchés..
Tuberculose bovine	Les souches du M. bovis circulant chez les animaux, l'étendue de la TB zoonotique due au M. bovis, ainsi qu'aux hôtes d'entretien du M. bovis, et le rôle qu'elles jouent sont inconnus au Cameroun. En 2019 cependant, sur 15 échantillons suspectés de tuberculose, 11 cas ont été confirmés. Environ 18 318,05 kg de viande bovine ont été saisis pour tuberculose, représentant plus de 40 millions de FCFA en 2019. La prévalence de la tuberculose bovine dans les abattoirs de Yaoundé et Douala était de 1,03 % en 2011.
Salmonellose	On sait peu de choses sur le poids, la transmission ou les facteurs de risque de la salmonellose dans la plupart des régions du Cameroun. Dans une étude réalisée dans le District de santé de Buea au Cameroun, sur 385 patients, 105 ont été diagnostiqués de salmonellose donnant une prévalence globale de 27,3.
Fièvre de Lassa	Aucun cas de fièvre de Lassa n'a été signalé au Cameroun, mais compte tenu de sa réémergence dans le Nigéria voisin, il existe un risque considérable que des cas apparaissent dans des pays actuellement non touchés.
Trypanosomiase	Il existe plusieurs zones endémiques au Cameroun dont les plus actives sont Fontem et Bafia. Le risque est présent à Bafia (zone du Mbam, région du Centre) et Fontem/Mamfe (zone de Manyu/Fontem, région du Sud-Ouest). La zone du Mbam compte le plus de cas de cette maladie. Les zones potentielles de récurrence comprennent la région de l'Extrême-Nord bordant le Tchad et la région de l'Est bordant la région de Nola en République centrafricaine.
Variole du singe	En 2016, au sanctuaire de primates de Mefou et Afamba, 3 cas ont été signalés sur 300 chimpanzés exposés. Au Cameroun, aucun cas humain de variole du singe n'a été signalé depuis 1989, mais entre avril et mai 2018, un total de 16 cas chez l'homme (1 cas confirmé et 15 cas suspects) ont été signalés à la Direction de la Lutte contre la Maladie, les Épidémies et les Pandémies (DLMEP).
Brucellose	La brucellose bovine est largement endémique au Cameroun et des taux de prévalence de l'ordre de 3 à 31 % chez les bovins au niveau individuel et de 16,2 à 35,0 % au niveau du troupeau ont été signalés. En 2014, des prévalences de 6,5 à 12,5 % au Cameroun chez les bovins selon les régions et les saisons ont été rapportées. Dans une étude en 2018, il a été révélé que l'infection à Brucella est un problème de santé publique important parmi le personnel des abattoirs et les femmes enceintes vivant à Ngaoundéré au Cameroun.

Résultats des entretiens avec des informateurs clés (EIC)

Les résultats des EIC sont présentés sur la base des domaines thématiques identifiés lors de l'analyse des données :

Acteurs travaillant sur les maladies zoonotiques prioritaires

Les acteurs impliqués dans la lutte contre les zoonoses au Cameroun à l'échelle nationale sont majoritairement des acteurs du secteur public. Il s'agit principalement du ministère de la Santé publique (MINSANTE), du ministère de l'Environnement, de la Protection de la Nature et du Développement durable (MINEPDED), du ministère des Forêts et de la Faune (MINFOF) et du ministère de l'Élevage, de la Pêche et des Industries animales (MINEPIA). Certaines organisations internationales et associations d'éleveurs et d'agriculteurs en place disposent de couvertures locales dans leurs communautés respectives. Ils s'engagent dans des activités préventives et curatives des animaux et des humains, ciblant différentes personnes en fonction de l'orientation des parties prenantes.

Comportements à risque qui contribuent à la propagation des maladies

L'agriculture étant l'épine dorsale de l'économie camerounaise, employant 70 % de sa main-d'œuvre, et le cheptel camerounais estimé à plus de 90 millions, il existe déjà un risque considérable d'infections zoonotiques. Les répondants ont classé les facteurs responsables de la propagation des maladies zoonotiques en plusieurs grandes catégories, à savoir : les comportements à risque au niveau individuel, principalement autour d'habitudes et de caractéristiques individuelles ; manquements du gouvernement ; manque de civisme (besoin de renforcer les normes de civisme par le gouvernement) ; insuffisance de connaissance, de ressources et de collaboration entre les secteurs (besoin d'amélioration ou de renforcement de la coordination).

Opportunités sous forme de plates-formes ou de processus susceptibles d'être renforcés pour une meilleure coordination et une planification conjointe.

La plate-forme la plus mentionnée par la plupart des répondants est PNPLZER / MINSANTE. Le MINSANTE, déjà structuré à l'échelle nationale, doit, selon les répondants, avoir une plus grande expression régionale pour renforcer le PNPLZER et bénéficier d'une meilleure coordination. Aussi, des réunions trimestrielles organisées par la plateforme PNPLZER au niveau national impliquant ces structures et des réunions mensuelles au niveau régional seront bénéfiques pour renforcer la coordination.

Processus permettant de miser sur les comportements à fort impact pour prévenir et atténuer les maladies zoonotiques prioritaires et mettre en place des mécanismes de réponse.

Pour prévenir, atténuer les maladies zoonotiques prioritaires et mettre en œuvre des mécanismes de réponse, la plupart des personnes interrogées estiment qu'il est essentiel d'identifier les processus populationnels susceptibles d'accélérer les comportements à fort impact. Les informateurs clés tant au niveau central que communautaire ont identifié les aspects qui peuvent accélérer un comportement préventif à fort impact pour prévenir les maladies zoonotiques prioritaires et y répondre. Ces aspects englobent la sensibilisation, la formation approfondie, la bonne gouvernance et la collaboration intersectorielle.

Stratégies pour améliorer l'efficacité de la communication publique

Les répondants estiment que les documents stratégiques font particulièrement défaut et que ceux qui étaient disponibles n'ont pas été mis en application. Selon eux, il est impératif qu'un programme de communication publique continu et efficace axé sur les maladies zoonotiques prioritaires soit mis en place au Cameroun pour lutter contre les maladies zoonotiques. Regrettablement, ce système n'existe pas au Cameroun et les initiatives en la matière sont incohérentes et coûteuses. Toujours d'après les répondants, de tels programmes de communication sont parfois conçus et déployés lors de flambées épidémiques, puis disparaissent une fois que l'épidémie a été maîtrisée, laissant place à la réémergence. La plupart des répondants estiment que l'absence d'un programme de communication publique qui traite des maladies zoonotiques prioritaires au Cameroun est un obstacle à une prévention et à un contrôle appropriés des maladies infectieuses.

Analyse du public cible

Selon la maladie zoonotique spécifique, les publics cible vont d'individus spécifiques comme les politiciens, les écogardes, les populations les plus exposées comme les bouchers, et le personnel d'abattoirs, les femmes enceintes, les éleveurs, les chasseurs, les consommateurs, les vendeurs de viande de brousse, à la population en général. Les pratiques culturelles telles que la cohabitation avec du bétail dans le lieu de vie, la consommation de lait cru, la consommation de produits d'origine animale mal cuits, les contacts fréquents avec les animaux et les carcasses d'animaux et les abattages dans la basse-cour contribuent à la propagation de la zoonose, toutes les personnes impliquées étant donc considérées comme un public cible.

Le canal de communication diffère entre le niveau central, régional et communautaire. La télévision (TV), la radio, les médias sociaux, les brochures, les affiches, les dépliants, les bannières ont été cités comme étant des canaux de communication utiles au niveau central et régional tandis que les radios communautaires, les lieux de culte, les journées portes ouvertes dans les écoles primaires et secondaires, les organisations professionnelles, les campagnes de porte à porte ou par véhicule itinérants, ainsi que les Organisations de la Société Civile (OSC) ont été cités comme les canaux de communication les plus utiles au niveau communautaire.

Conclusion et recommandations

Conclusions :

Les 10 maladies zoonotiques prioritaires ne sont pas uniformément répandues à travers le Cameroun, certaines régions étant fortement touchées tandis que d'autres ne le sont pas. Les pratiques culturelles telles que vivre avec du bétail dans la même maison, la consommation de lait cru, la consommation de produits d'origine animale mal cuits et le contact élevé avec les animaux et les carcasses d'animaux, l'abattage dans la basse-cour contribuent à la propagation de la zoonose.

La plupart des répondants estiment que la communauté est peu sensibilisée aux maladies zoonotiques et à leurs mécanismes de transmission. Selon eux, les interventions vouées au changement de comportement sont inadéquates (peu ou pas de matériel de communication sur le sujet) au Cameroun. En outre, la faible préparation et le manque de plans d'alerte précoce dans les zones endémiques contribuent au risque croissant de zoonose. Cette évaluation a également identifié la faiblesse des systèmes de coordination et de partage d'informations entre les différents acteurs travaillant dans la prévention et le contrôle des maladies zoonotiques.

Recommandations :

Sur la base des conclusions de cette évaluation, les recommandations suivantes ont été émises :

Renforcer la communication sur le changement social et comportemental

1. Breakthrough ACTION, à travers le projet GHSA, en collaboration avec les secteurs concernés, devrait soutenir la conception, la production et la distribution de matériel de changement de comportement social sur mesure relativement aux maladies zoonotiques et intervenir auprès des groupes cibles prioritaires à travers une approche et des canaux appropriés. Le matériel du changement de comportement social devrait se concentrer sur les comportements préventifs et protecteurs.

2. Breakthrough ACTION, conjointement avec des partenaires, devrait concevoir une stratégie CREC et renforcer l'éducation sanitaire de routine en se concentrant sur le risque de maladies zoonotiques, les stratégies de prévention et de contrôle, en éduquant les agriculteurs, les bouchers, les éleveurs et les autres personnes exposées pour réduire les risques à leur niveau.

Suivi et supervision de la collaboration et de la coordination

1. Pour palier l'absence d'un système d'alerte précoce et de traçage des rumeurs concernant les maladies zoonotiques au Cameroun, le projet devrait mettre en place un système de suivi des rumeurs et renforcer le partage d'informations et l'alignement des réponses entre les différentes parties prenantes du niveau central au niveau communautaire.
2. La coordination au niveau actuel entre le PNPLZER et d'autres secteurs, en particulier au niveau communautaire, doit être renforcée. Le projet, en impliquant des partenaires, devrait donc renforcer les mécanismes de coordination Une Seule Santé existants et mettre en place des mécanismes de coordination identiques aux niveaux régional et communautaire.
3. Il ressort des résultats de la cartographie des parties prenantes qu'il existe une lacune chronique en matière de formation sur la prévention et le contrôle des maladies zoonotiques. Le projet devrait donc, en collaboration avec les partenaires, fournir cette formation aux associations locales liées aux maladies zoonotiques, aux éleveurs et aux OSC.
4. Les données limitées qui ne sont pas opportunes et/ou géographiquement représentatives constituent un défi. Les parties prenantes devraient identifier les besoins réels au niveau des données et mener des recherches opérationnelles si nécessaire afin d'approfondir la compréhension et réduire les écarts. Les parties prenantes devraient œuvrer à améliorer la qualité et l'utilisation des données pour la prise de décision sur la prévention et le contrôle des maladies zoonotiques.
5. La capacité organisationnelle des groupes travaillant sur les maladies zoonotiques pour répondre aux besoins de communication sur les risques reste limitée. L'activité de communication des risques dans le cadre du projet devrait inclure une formation sur le leadership en matière de communication stratégique et de communication des risques.

GENERAL INTRODUCTION

1.1. Introduction

The National Program for the Prevention and Control of Emerging and Re-emerging Zoonoses (PNPLZER), a `` One Health " platform, was set up in 2014 in Cameroon in response to the awareness of the weight of zoonotic diseases on public health . Indeed, it turns out that 3 of the 5 new human pathologies that appear each year are of animal origin; globally 60% of known human infectious diseases are of animal origin, as well as 75% of emerging human diseases and 80% of pathogens usable for bioterrorism.

Breakthrough ACTION (BA) is a five-year cooperative agreement (2017-2022) from the United States Agency for International Development (USAID) to lead USAID's social and behavior change (SBC) programming around the world. The partnership is led by Johns Hopkins Center for Communication Programs (CCP). USAID is currently providing support to Breakthrough ACTION programming mechanism to increase Cameroon's capacity to implement the Global Health Security Agenda (GHSA) in efforts to accelerate the country's progress toward implementation of the World Health Organizations' (WHO) International Health Regulations (IHR). One of the eight core functions outlined in the IHR is that countries have the capacity to implement risk communication. Risk communication is defined by the IHR as both the broad-based communication of potential risk, and engagement with communities that are affected.

Breakthrough ACTION is expected to contribute to prevention, risk mitigation, and response by strengthening risk communication and community engagement (RCCE) for priority zoonotic diseases. These components have been shown to be crucial to addressing the behavioral and social aspects of health risks that precede and follow an emergency. To achieve this objective Breakthrough ACTION, have two intermediate results in this GHSA funding: to (1) strengthen the system for the coordination of RCCE for Infectious Disease and Emergency Risk Communication at the national and subnational levels and (2) build in-country capacity to design and implement RCCE, in conformity with the national emergency risk communication and community engagement plan.

The One Health concept is a collaborative, multi-sectoral, and transdisciplinary approach that optimizes the health outcomes of humans, animals, plants, and their shared environment (1). It is

critical to establish or strengthen a One Health approach that fosters and facilitates multi-sector collaboration in strengthening preparedness and response activities and improving the overall health and wellbeing of the population.

Breakthrough ACTION's activities are designed to help advance the risk communication benchmarks as identified in the WHO's 2019 *Benchmarks for IHR Capacities.* The specific project activities will support impactful, short-term progress towards shifting Cameroon's Joint External Evaluation (JEE) indicator scores that was conducted in 2017. Project activities are organized to strengthen/improve the performance of Cameroon in future JEE activities based on its criteria for the Risk Communication action package. Breakthrough ACTION's technical approach in its USAID agreement emphasizes two broad approaches; 1) utilizing evidence-based programming grounded in behavioral theory and informed by research and programmatic experience to support individual and collective uptake of protective and preventive measures to mitigate the impact of zoonotic diseases; 2) engaging with Government partners and other One Health stakeholders to strengthen RCCE capacity among GHSA partners, government, and media actors, as well as to increase ownership and sustainability of interventions.

Cameroon is a country located in Central Africa with a total land area of 475,440 km2 and a population of about 26 million inhabitants (2). It is bordered by Nigeria to the West, Chad to the Northeast, the Central African Republic to the East and Equatorial Guinea, Gabon, and the Republic of Congo to the South. Cameroon's coastline lies on the Bight of Bonny, which is part of the Gulf of Guinea and the Atlantic Ocean (3).

Cameroon is sometimes described as "Africa in miniature," because it exhibits all the major climates and vegetation of the continent: mountains, desert, rain forest, savannah grassland, and ocean coastland. Cameroon can be divided into five agro-ecological zones (table 2) distinguishable by dominant physical, climatic, and vegetative features. The climate varies with terrain, from tropical along the coast, to semi-arid and hot in the north. The coastal belt is hot and humid; it includes some of the wettest places on earth, such as Debundscha, located at the base of Mt. Cameroon, which has an average annual rainfall of about 10,287 mm(3).

Agriculture is the backbone of Cameroon's economy, employing 70% of its workforce and providing 44% of its gross domestic product and 30% of its export revenue. Dependent on the agro ecologic zone, Cameroon produces several agricultural commodities for export and domestic

consumption as presented in table 2. Animal husbandry is practiced throughout the country and is particularly important in the northern region

Table 3: Major crops cultivated and animal species reared in each agro-ecological zone

Agro Ecological Zones	Main crops and Animal Production
Sudano-Sahelian	Maize, millet-sorghum, rice, cowpea, soybean, onion, sesame, fruits, cotton, cattle and small ruminants
High Guinea Savanna	Maize, yam, cassava, sweet potatoes, rice, cotton, cattle, pig, small ruminants, poultry birds
Western Highlands	Maize, beans, potatoes, rice, sweet potatoes, vegetables, coffee, pig, poultry, cattle, small ruminants, fisheries
Mono-modal Humid Forest	Banana, plantain, cassava, cocoyam, sweet potatoes, maize, vegetables, cocoa, coffee, oil palm, rubber, fruits, poultry, pig, poultry birds, small, ruminants, fisheries
Bimodal Humid Forest	Plantain, cassava, banana, maize, cocoyam, sweet potatoes, cocoa, oil, palm, rubber, coffee, maize, cocoa, oil palm, fruits, poultry, pig, fisheries, small ruminants

The livestock population of Cameroon is estimated at over 90 million and includes over 72 million poultry, 9 million small ruminants, 5 million cattle, and 3 million swine (4). The country is also environmentally diverse, ranging from tropical rainforest to high mountains and arid Sahel. Parts of Cameroon lie within the Congo Basin, where repeated outbreaks of Ebola virus disease have been documented. The country's unique landscape can create a wide range of zoonotic disease threats, including persistent diseases associated with livestock losses in the pastoral north to newly emerging viral pathogens in the forested south.

In 2016, following the outbreak of Ebola Virus in West Africa, Cameroon identified 5 priority zoonotic diseases. During a two days' workshop and using a semi-quantitative tool developed by CDC, representatives at the meeting identified a list of zoonotic diseases relevant for Cameroon, using pre-defined criteria for prioritization, and pre-determined questions and weights relevant to each criterion. These diseases were Rabies, Anthrax and Avian flu, Ebola/Marburg, Bovine TB(5). In 2020, the list was updated and included Salmonellosis, Lassa fever, Trypanosomiasis, monkeypox and Brucellosis.

Cameroon is divided into five agro-ecological zones (Figure 1) distinguishable by dominant physical, climatic, and vegetative features. The climate varies with terrain, from tropical along the coast, to semi-arid and hot in the north. The coastal belt is hot and humid. These varying physical

and climatic conditions favor the existence and propagation of different zoonotic diseases. Therefore, these priority zoonotic diseases have different burdens in the different agro ecologic zones.

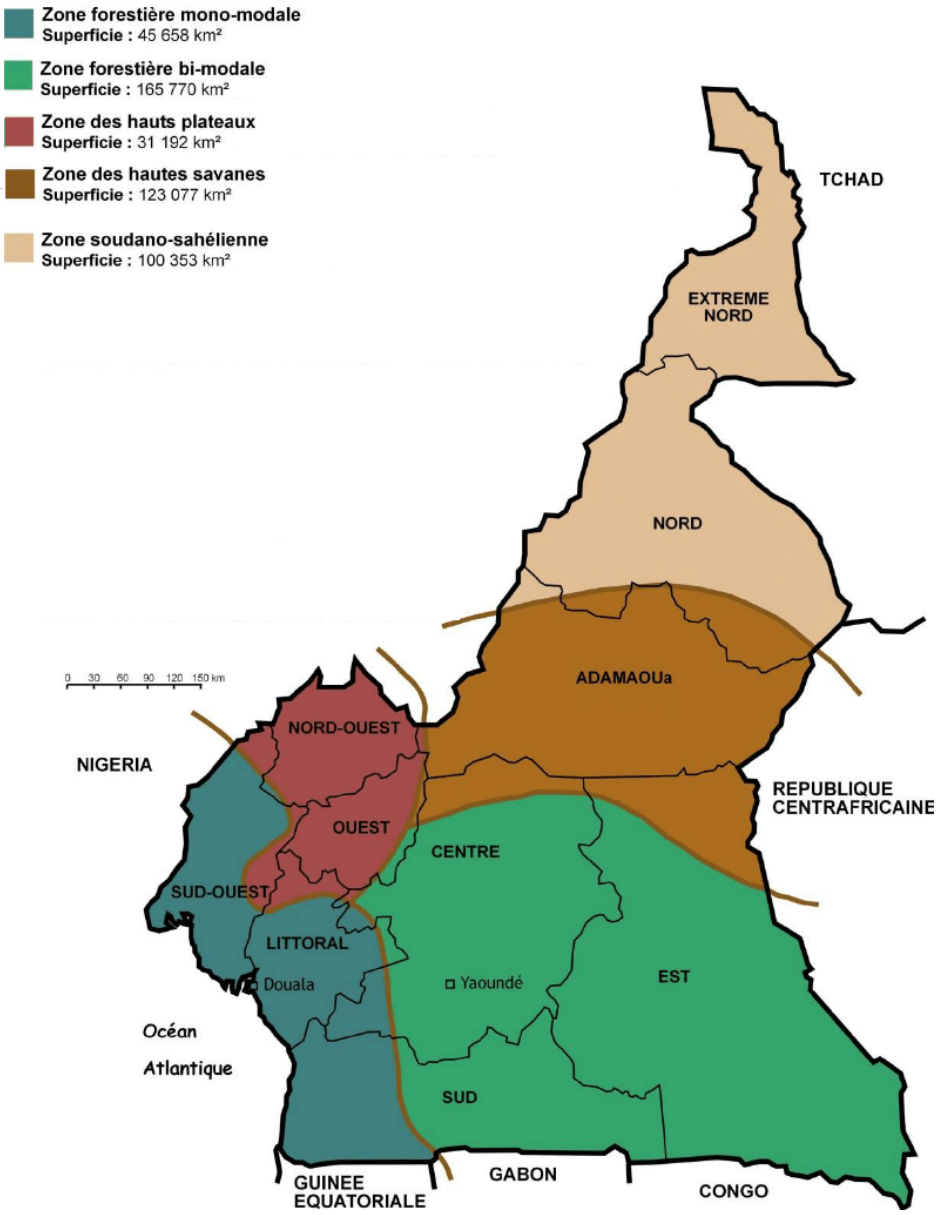

Figure 1: Map showing the agro-ecological zones of Cameroon ***(source :IRAD 2000)***

Developing risk communication and preparedness plans require a complete and transparent understanding of the actors and available networks and resources. To acquire this understanding, Breakthrough ACTION conducted a landscape review and analysis of systems and stakeholders. Through this activity, Breakthrough ACTION will provide the National Program for the

Prevention and Fight against Emerging and Re-emerging Zoonoses (NPPFZRZ) with valuable context that can be used in the development of RCCE strategies, guides, SOPs, and protocols. These lessons will also provide insights that will help to strengthen the existing coordination mechanisms and structures in country, and will provide partners with a better sense of their place in the Cameroonian One Health ecosystem.

As part of the landscape analysis, Breakthrough ACTION collected data from key One Health stakeholders to assess available assets and weaknesses and review existing strategies and One Health documents. Key stakeholders included the public sector, private sector, donors, other implementing partners and civil society organizations.

1.2. Purpose and objectives of the Landscape Analysis

1.2.1. Purpose

The purpose of this landscape analysis is to explore and identify availability of resources that can contribute to the development of quality RCCE strategies, guides, and protocols that can facilitate implementation of a coordinated implementation of Infectious Disease and Emergency Risk communication plan in Cameroon. The specific objectives are as follows:

1.2.2. Specific objectives

I. Identify stakeholders working on the five diseases (Geographic scope of their intervention, target population, approach & capacity)

II. Identify risky behaviors that contribute to the spread of the diseases and their determinants and geographic variations.

III. Identify opportunities in the form of platforms or processes that can be strengthened for improved coordination and joint planning to ensure development and use of quality Risk Communication interventions, products, and activities.

IV. Explore and identify processes that can accelerate high-impact behaviors to prevent, mitigate and respond to prioritized zoonotic diseases.

V. Explore and learn how to improve the effectiveness of public communication and how to effectively support GHSA partners to effectively engage communities in prevention, mitigation, and response.

VI. Identify target audiences for risk communication intervention including national, regional, community-level audiences.

METHODOLOGY

This landscape analysis employed literature review, stakeholder mapping and collection of primary data using Key Informant Interview.

2.1. Data Collection:

2.1.1. Literature review

The literature review covered both published and unpublished literatures, including journal articles, books, reports, and policy and strategy guidelines. Relevant policy, strategy and plan documents, draft strategy documents on Rabies, Anthrax and Avian flu, Ebola/Marburg, Bovine TB among other zoonotic diseases and various reports were part of the review. Reviewed documents were mostly in country documents. However, documents from WHO, CDC and other countries like Ethiopia that had implemented such a review served as a guide. Zotero was used to manage the literature search.

The Cameroon BA GHSA team conducted the review. The team first agreed on appraisal criteria to identify valuable materials for review. The criteria included timeliness of the study, the scope of the study (sample size, geography-national/regional/district level) and the soundness of the method used for data collection. Then, the literature was categorized by priority zoonotic diseases. The burden of the diseases, risk behaviors including knowledge, attitude, practice, risk group were considered to organize the findings.

2.1.2. Stakeholder and geographic mapping

As part of the landscape review, the study team visited various stakeholders directly involved in the prevention and control of zoonotic diseases. The NPPFZRZ first provided a list of these stakeholders, then snowballing was done and one stakeholder directed us to another and the list was completed during KII. This included relevant associations, government bodies, private sector players, and regional establishments where available. The assessment gathered data on type of organization, geographical scope, reach and role in the Prevention and control of zoonotic diseases.

2.1.3. Primary data collection

Key informant interviews (KII) were conducted with relevant stakeholders using semi-structured in-depth interview guide. To capture context specific data, to be used for programmatic purposes, two interview guides were used for data collection: one for the broad strategic level issues from national and regional stakeholders and the second tool was used to capture community-level information. To capture nationwide information, key informants from stakeholders with national coverage were prioritized, followed by those with regional coverage. The election of key informants at regional levels was guided by the agro-ecologic characteristics of the region which were selected in a way that most of the priority zoonotic diseases were covered. As presented in table 3, the agro ecologic zones covered were the Bimodal Humid Forest, the Western Highlands and the Sudano-Sahelian zones.

Table 4: Agro ecologic zones involved in the landscape review

S/N	Agro-Ecologique Zone	Concerned Regions (location)	Priority Zoonotic Diseases	Other critical Zoonotic Diseases	Comments
1	Bimodal Humid Forest	Center, South et East	Bovine TB	Rabies, Monkey Pox and Avian flu	Selected
2	Mono-modal Humid Forest	Littoral, South West	Avian Influenza	Lassa fever, Ebola, Bovine TB	Not selected
3	Western Highlands	Ouest, North West	Avian Influenza	Anthrax, Lassa fever Bovine TB	Selected
4	High Guinea Savanna	Adamawa	Bovine TB	Lassa fever, Trypanosomiases and Monkey pox	Not selected
5	Sudano-Sahelian	North, Far North	Rabies	Anthrax, Bovine TB and Lassa fever	Selected

2.2. Data Processing and Analysis

Interviews transcribed in the original language by professionals. De-identified transcriptions were typed in Microsoft Word and then transferred to Nvivo. The major analytic approach was the identification of main (and sub-themes) related to the objectives of the study. Pertinent quotes were also identified to illustrate relevant points in the study report. Data was then coded, sorted, and used for reporting.

2.3. Ethical considerations

The following ethical procedures were followed in the conduct of the study:

- Data collectors were trained on ethical issues in research involving human subjects to ensure they uphold basic ethical principles during interviews.
- Verbal consent was obtained from the respondents by the interviewer after the purpose of the study was duly explained.
- Data was kept confidential and used only for the purpose of the review
- Transcripts of KII were de-identified

2.4. Limitations

1. Of the 5 agro ecologic zones, only three were selected for data collection. However, this selection was informed by the distribution of priority zoonotic diseases and selection was in a way that ensured coverage of most of the priority zoonotic diseases in the country as presented in table 2.
2. There was a lack of literature and insufficient information on the distribution of some priority zoonotic diseases. This was the case in Salmonellosis and Avian Flu

RESULTS

This section presents the main finding from both the literature review on zoonotic diseases in Cameroon and the in-depth interviews with key informants

3.1. Key findings from literature review

3.1.1. Prevalence and preventive activities of priority zoonotic diseases in Cameroon

1. Rabies

Causes and transmission

Rabies is a viral zoonosis caused by negative-stranded RNA (ribonucleic acid) viruses from the Lyssavirus genus. Genetic variants of the genotype 1 Lyssavirus (the cause of classical rabies) are maintained in different parts of the world by different reservoir hosts within 'host-adaptive landscapes. Although rabies can infect and be transmitted by a wide range of mammals, reservoirs comprise only mammalian species within the Orders Carnivora (e.g. dogs, raccoons, skunks, foxes, jackals) and Chiroptera (bats). As stated by Knobel *et al.,* (2005), from the perspective of human rabies, the vast majority of human cases (>90%) result from the bites of rabid domestic dogs and occur in regions where domestic dogs are the principal maintenance host(6).

Rabies in Cameroon

According to Sofeu *et al.,* (2018), animal and human rabies have been notifiable diseases in Cameroon since 2001; all animals suspected of rabies must be quarantined and reported to local and national veterinary authorities, and since 2014, bites from suspected rabid animals are reported weekly by district health centers to the regional health delegations(7). Rabies control legislation also requires vaccination of pet dogs and cats and requires that owners of biting animals are recorded in each district. Although rabies control efforts, such as yearly reduced-price pet vaccination events, radio information campaigns, and dog culling exist in Cameroon, the impacts of these programs are unknown(7).

In a MINEPIA case definition document(8), 15 cases of animal rabies were confirmed in 2019, 19 cases confirmed in 2018, and 18 cases confirmed in 2017.

2. Anthrax

Causes and transmission

Anthrax is caused by the bacterium Bacillus anthracis. It is primarily a disease of herbivores. Humans almost invariably contract the disease directly or indirectly from animals or animal products(9). Bacillus anthracis has always been high on the list of potential agents with respect to biological warfare and bioterrorism. It has been used in that context on at least two occasions, prepared for use on several other occasions, and has been the named agent in many threats and hoaxes. The anthrax letter events that happened in the United States of America (USA) in 2001 is one of several examples(10). In the African Region, the Integrated Disease Surveillance and Response (IDSR) framework define human diseases priorities, where anthrax is the only bacterial zoonosis featured(11)

Anthrax in Cameroon

Before 2015, sporadic cases of anthrax have been reported in domestic animals in the North, Far-North and Adamaoua regions of Cameroon(8). However, in 2015, a case report by Wade and Kamdjo(12) described the first outbreak of anthrax on a cattle farm in Bangangté in the West Region of Cameroon, where cases of sudden mortalities were reported. Four animals (4%) died out of a 100. This was later discovered to be anthrax. In the first half of 2020, four (04) cases of Anthrax were reported in cattle in Northwest Cameroon(8).

3. Avian Flu

Causes and transmission

Avian influenza (AI) is a highly contagious viral infection, primarily affecting avian species. A highly pathogenic avian influenza (HPAI) virus causes severe disease and death of poultry. HPAI causes serious economic consequences in the agricultural sector through mass destruction of poultry. The virus poses a threat to human health as well as economic security. The HPAI H5N1 has been described as a highly contagious viral disease in several avian species. The disease is characterized by high morbidity and mortality and could be potentially contracted by humans and other warm-blooded animals thus making it an emerging pandemic of zoonotic importance(13). Infected birds can shed influenza virus in their saliva, nasal secretions and feces(14). Human influenza is transmitted by inhalation of infectious droplets and droplet nuclei, by direct contact

and perhaps, by indirect (Fomite) contact, with self-inoculation onto the upper respiratory tract or conjunctival mucosa(15)

Avian Flu in Cameroon

So far, two strains have been reported in Cameroon: the first (H5N1) in both the 2006 and 2016-2017 HPAI outbreaks, and the second (H5N8, clade 2.4.4.4) in the 2016-2017 epidemic. However, basic epidemiological data on HPAI in Cameroon are unavailable(16).

4. **Ebola Virus Disease**

Causes and transmission

Ebola virus disease (EVD), formerly known as Ebola hemorrhagic fever, is a severe, often fatal illness affecting humans and other primates. The virus is transmitted to people from wild animals (such as fruit bats, porcupines and non-human primates) and then spreads in the human population through direct contact with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids(17).

The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests. The 2014–2016 outbreak in West Africa was the largest and most complex Ebola outbreak since the virus was first discovered in 1976. There were more cases and deaths in this outbreak than all others combined. It also spread between countries, starting in Guinea then moving across land borders to Sierra Leone and Liberia(17).

Ebola Virus Disease in Cameroon

There have been no cases of EVD reported in Cameroon but given its evolving situation, there is a considerable risk that cases will appear in currently unaffected countries.

5. **Bovine Tuberculosis**

Causes and transmission

Bovine tuberculosis (TB) is a chronic disease of animals caused by a bacterium called *Mycobacterium bovis*, (*M. bovis*) which is closely related to the bacteria that cause human and avian tuberculosis. This disease can affect practically all mammals, causing a general state of illness, coughing and eventual death(18). *Mycobacterium bovis* is not the major cause of human

tuberculosis, which is caused by *M. tuberculosis*, but humans are susceptible to bovine TB. Humans can be infected both by drinking raw milk from infected cattle, or by inhaling infectious droplets(19).

Bovine Tuberculosis in Cameroon

Bovine tuberculosis (BTB) is a neglected endemic zoonotic disease in Cameroon(20). The prevalence of human tuberculosis (TB) is also considered very high in the country. The diagnosis of TB in animals is based mostly on detecting the characteristic macroscopic lesions found at slaughter and during meat inspection in abattoirs.

The *M. bovis* strains circulating in animals, the extent of zoonotic TB due to *M. bovis* as well as *M. bovis* maintenance hosts, and the role that they play are unknown(20) In 2019 however, out of 15 samples suspected of tuberculosis, 11 were confirmed. About 18,318.05 kg of bovine meat were seized for tuberculosis, representing more than 40 million FCFA in 2019. The prevalence of bovine tuberculosis in the slaughterhouses of Yaoundé and Douala was 1.03% in 2011(8).

6. **Salmonellosis**

Causes and transmission

Salmonella infection (salmonellosis) is a common bacterial disease that affects the intestinal tract. Salmonella bacteria typically live in animal and human intestines and are shed through feces. Humans become infected most frequently through contaminated water or food.

Typically, people with salmonella infection have no symptoms. Others develop diarrhea, fever and abdominal cramps within eight to 72 hours. Most healthy people recover within a few days without specific treatment(21).

Salmonellosis in Cameroon

Salmonellosis continues to be a health problem worldwide causing 16 million illnesses globally and 600,000 deaths (22). It is primarily found in developing countries where sanitary conditions are poor(22)

Despite this marked public health burden, little is known about the carriage, transmission of Salmonellosis or its risk factors in most parts of Cameroon. In a study carried out in Buea health

District in Cameroon, of 385 patients enrolled, 105 were diagnosed with salmonellosis giving an overall prevalence 27.3%(23).

7. Lassa fever

Causes and transmission

Lassa fever is an acute viral haemorrhagic illness caused by Lassa virus, a member of the arenavirus family of viruses. It is endemic in parts of West Africa including Sierra Leone, Liberia, Guinea and Nigeria. Neighboring countries are also at risk, as the animal vector for Lassa virus, the "multimammate rat" (*Mastomys natalensis*) is distributed throughout the region. The illness was discovered in 1969 and is named after the town in Nigeria where the first cases occurred(24).

An estimated 100,000 to 300,000 infections of Lassa fever occur annually, with approximately 5,000 deaths. Surveillance for Lassa fever is not standardized; therefore, these estimates are crude. In some areas of Sierra Leone and Liberia, it is known that 10-16% of people admitted to hospitals annually have Lassa fever, demonstrating the serious impact the disease has on the region(24).

Lassa fever in Cameroon

There have been no cases of Lassa fever reported in Cameroon(25) but given its re-emergence in neighboring Nigeria, there is a considerable risk that cases will appear in currently unaffected countries.

8. Trypanosomiasis

Causes and transmission

Human African trypanosomiasis, also known as sleeping sickness, is a vector-borne parasitic disease. It is caused by infection with protozoan parasites belonging to the genus Trypanosoma. They are transmitted to humans by tsetse fly (Glossina genus) bites which have acquired their infection from human beings or from animals harboring human pathogenic parasites(26).

Tsetse flies are found just in sub-Saharan Africa though only certain species transmit the disease. For reasons that are so far unexplained, in many regions where tsetse flies are found, sleeping sickness is not. Rural populations living in regions where transmission occurs and which depend

on agriculture, fishing, animal husbandry or hunting are the most exposed to the tsetse fly and therefore to the disease(26).

Trypanosomiasis in Cameroon

Gambian sleeping sickness is endemic over a vast territory of West and Central Africa, and remains a serious threat to human health. There are several endemic zones in Cameroon, the most active of which are Fontem and Bafia(27). Risk is found in Bafia (Mbam Division, Centre Region) and Fontem / Mamfe (Manyu/Fontem Division, South-west Region). Mbam Division reports the most cases of this disease. Potential areas for recurrence include Far-North Region bordering Chad and East Region bordering the Nola area of the Central African Republic(28).

9. Monkeypox

Causes and transmission

Monkeypox virus is an orthopoxvirus that causes a disease with symptoms similar, but less severe, to smallpox. While smallpox was eradicated in 1980, monkeypox continues to occur in countries of Central and West Africa(29)

Infection of index cases results from direct contact with the blood, bodily fluids, or cutaneous or mucosal lesions of infected animals. Secondary, or human-to-human, transmission is relatively limited. Infection can result from close contact with respiratory secretions, skin lesions of an infected person or recently contaminated objects. Transmission via droplet respiratory particles usually requires prolonged face-to-face contact, which puts health workers and household members of active cases at greater risk(29)

Monkeypox in Cameroon

In 2016, at the Mefou and Afamba primate sanctuary, 3 cases were reported out of 300 exposed chimpanzees.

In Cameroon, there have been no human cases of Monkeypox reported between 1989 and 2017 but between April and May 2018, a total of 16 confirmed and suspected cases (one confirmed and 15 suspected cases) were reported to the Directorate of Control of Epidemic and Pandemic diseases (DLMEP). These cases were located in five districts of Cameroon: Njikwa Health district (n=6 suspected, n=1 confirmed) Akwaya Health District (n=6 suspected), Biyem-Assi Health District

(n=1 suspected), Bertoua Health District (n=1 suspected), and Fotokol Health district (n=1 suspected). There were 2 reported human cases in Ayos in 2019 and one human case in the East in 2020.

10. Brucellosis

Causes and transmission

Brucellosis is an infectious bacterial zoonotic disease caused by member of genus Brucella.

Brucella abortus, *Brucella melitensis*, and *Brucella suis* infect cattle, small ruminants, and swine, respectively, making these species of particular importance in human and livestock infections worldwide(30). Other species of concern include *Brucella canis*, infecting dogs, and *Brucella ovis*, infecting sheep. Brucellosis is among the most widely distributed zoonosis of economic importance in developing countries. Most of the zoonotic diseases including brucellosis are poorly controlled, and endanger economically disadvantaged communities(31)

In animals, brucellosis is highly contagious and cross species transmission of certain Brucella species can occur. Mucosal contact with aborted fetuses and fetal membranes, which contain large amounts of the bacteria, is an important means of transmission in livestock(32). Infected livestock exhibit clinical signs of great economic significance to stakeholders (i.e., small scale livestock farmers, the meat and milk industry, human communities, etc.), including reduced fertility, spontaneous abortion, and a substantial decline in milk production over an animal's lifespan(31).

Brucellosis in Cameroon

Bovine brucellosis is widely endemic in Cameroon and prevalence rates in the range of 3–31% in cattle at individual levels and 16.2–35.0% at herd levels have been reported(33). In 2014, the prevalence of 6.5 to 12.5% in Cameroon in cattle depending on the region and the season have been reported(8). In a study in 2018, it was revealed that brucella infection is an important public health problem among abattoir personnel and pregnant women living in Ngaoundéré Cameroon(34)

3.1.2. Summary on Priority zoonotic diseases in Cameroon

As expected, the priority zoonotic diseases are not evenly distributed in Cameroon. Their distribution is summarized in table 4

Table 5: Summary of presence of priority zoonotic diseases in Cameroon

Agro Ecologic Zones	Region	Priority zoonotic diseases								
		Rabies	Anthrax	Avian Flu	Ebola Virus Disease	Bovine Tuberculosis	Salmonellosis	Lassa fever	Trypanosomiasis	Monkey pox
Bimodal Humid Forest	Central				No reported case		No data available	No reported case		
	East									
	South									
Mono-modal Humid Forest	Littoral									
	Southwest									
Western Highlands	Northwest									
	West									
High Guinea Savanna	Adamawa									
Sudano-Sahelian	Far North									
	North									

Table legend: Green cells indicates high prevalence of diseases in the region

Cameroon is divided into five agro-ecological zones distinguishable by dominant physical, climatic, and vegetative features. The climate varies with terrain, from tropical along the coast, to semi-arid and hot in the north. As revealed in the literature, these varying physical and climatic conditions favor the existence and propagation of different zoonotic diseases. Therefore, priority zoonotic diseases have different burdens in the different agro ecologic zone as presented in table 4.

3.2. Key findings from Key Informant Interviews

Findings for this section are presented based on the objectives and on thematic areas identified during the data analysis. During transcription, a convention of coding key informants was arrived at; the first two letters represent the region while the following 2 digits represent the serial number of the key informant. The last letter is either "C" if the key informant's organization is at a strategic level or "CO" if the key informant's organization is at a community level. For reference, strategic level is the level where decisions are taken. Here we make refence to the central level and regional levels for organizations that have regional coverage. Community level is the implementation level. For example, informant CE01CO is the first key informant from the central region and their organization operate at a community level, while informant EN04C is the fourth key informant from the far north region and their organization operate at a strategic level

3.2.1. Stakeholders working on the priority zoonotic diseases

When taking a multisectoral, One Health approach, it is important that the relevant stakeholders are identified and included as early as possible in the planning process so that all perspectives are represented. Stakeholders are defined as any individual or group that is or should be involved as a partner in preventing or managing zoonotic diseases or other shared health threats at the human-animal-environment interface. Stakeholders include those who impact, are impacted by, or perceive themselves to be affected by zoonotic disease threats, including those who may be affected by measures to address zoonotic diseases.

The stakeholders involved in zoonotic disease control in Cameroon with a national coverage are mostly actors of the public sector. An extensive list of stakeholders identified is presented in table 6 below. As informant OU03C puts it *"MINSANTE, MINEPDED,MINFOF, Programme zoonose"* are those actors responsible for activities against zoonotic diseases. Where they mainly coordinate human and animal health activities and implement governmental policies on fight against zoonosis as a participant said:

"…Coordination des activités sanitaires de la région de l'Ouest" et *"Suivi de la mise en œuvre de la politique environnementale du Cameroun dans la région de l'Ouest"* (informant OU01C)

3.2.1.1. Approach

The approaches used thus far in the country are mainly prevention and treatment of both animals and humans affected by the zoonosis.

1. **Prevention**

The main preventive activities conducted include sensitization of the public about the dangers of these zoonotic diseases the inspection of veterinary services and the immunization of animals. Active and passive surveillance is also being practiced but mostly by stakeholders with national coverage (MINSANTE, MINEPDED, MINFOF, LANAVET, MINEPIA and PNLZER) to detect foci of these diseases and contain its propagation. There is also passive and active surveillance to detect and contain the disease as some key informant puts it,

"Assure la gestion durable des forets et de la faune, nous assurons la mise en place de la vision au niveau regional"; *"La vaccination des animaux et les inspections vétérinaires"*; *"sensibiliser les acteurs de chaine de production sur les mesures de biosécurité"* (informant CE06C) and *"La surveillance passive et active des maladies animales (détection de foyers, circonscrire la zone pour empêcher la propagation, assainissement puis éradiquer"* (informant SU03C)

2. **Treatment of both animals and human**

Treatment of affected animals is also a strategy currently used. Though not practiced by many organizations, some few do concentrate on diagnosing and treating animals with these diseases. In most cases there is culling (Mass slaughter). One of the key informants said

"Nos services portent sur la médecine et la chirurgie veterinaires, les consultations, les vaccinations, la pharmacie veterinaire" (informant OU07CO)

3.2.1.2. Geographic scope

Almost all the actors involved are public actors. Therefore, the geographic scope of the intervention is national but with regional delegations at the regional level. Their regional delegations act locally with context specifications depending on the agro-ecologic zone.

3.2.1.3. Target population

Concerning the target population, the actors' opinions were divided. This is understandable considering the different approaches employed.

Specific populations are targeted like those particularly involved in manipulating animal and animal products like butchers, fishermen and animal rearers as one of the responded noted

"Acteurs de la phase de production des denrées d'origine animale (éleveurs, transformateurs, transporteurs, bouchers)" (informant EN03C)

On the other hand, as these diseases can be transmitted from animals to people, some actors actually target the entire population as noted by this key informant: *"….., toute la population camerounaise"* (informant EN03CO). However, some key informants pointed out that their target population are persons living in the rural areas. *"Les personnes vivantes en milieu rural car leur alimentation en protéine animale dépend principalement de la chasse"*. (informant SU08CO).

Hence, depending on the context and the zoonosis being targeted, the targeted population ranges from specific individuals to the general population.

3.2.2. Risky behaviors that contribute to the spread of the disease

With agriculture as the backbone of Cameroon's economy, employing 70% of its workforce and with the livestock population of Cameroon estimated at over 90 million, there is considerable risk of zoonotic infections already. This risk is considerably increased by certain factors.

The risky behaviors that contribute to the propagation of these zoonotic diseases were identified by key informants at both the strategic and community level as presented in the table below

Table 6: Risky behaviors and factors contributing to the spread of the diseases

Individual habits and characteristics	Traditional eating habits such as the consumption of bushmeat (Consumption of inappropriately cooked meat)
	Persons of tertiary age
	Individual behavior, some people do not like to report cases of sick animals, they prefer to sell them for fear of being seized, and this encourages the spread of zoonotic diseases.
	Poor handling of bushmeat (Lack of hygiene during transport or butchering)
	Contact with animals or the remains of animals (Living with livestock in the same house, high contact with animals and animal carcasses)
	Populations of border regions. These people living in communities that border other countries have increased traffic of people or animals which could carry disease
	Non-compliance with hygiene like handwashing, proper preparation of meat measures
Shortcoming on the part of the government	Proliferation of livestock farmers without real training or coordinated monitoring

	Lack of PPE during interventions by health personnel
	Non-vaccination of animals due to lack of information from the government and lack regular supply of vaccine
	Non inspection of meat
	Lack of motivation of field agents due to due to lack of resources needed to support them and lack of incentives for supervision
Low risk perception	Non-compliance with breeding standards as prescribed by law, non-compliance with biosecurity and bio-safety by many breeders in the locality
	The consumption of bushmeat found dead in the forest
Lack of civic-mindedness	The illegal, undocumented or unauthorized slaughtering of cattle by butchers (backyard slaughtering)
	The negligence that some person operates (they have the awareness but don't perceive it as a threat)
Insufficiency of knowledge	The misinformation and disinformation of populations
	The negligence that some person operates
	Negligence on the part of those who have an idea
	Ignorance on the part of the population (Lack of knowledge of the disease, its risks and the different steps to take to prevent it)
Insufficiency in resources	Lack of resources to implement operational plans
	Lack of resources to conduct mass media campaigns
Inadequacy of collaboration between sectors	Lack of communication between sectors
	Low level of collaboration possibly because of insistence of a platform for collaboration

1. Stakeholders training needs

The need for training and refresher training for partners and stakeholders was expressed as almost none indicated that they have been trained in recent times. There is therefore the need to update the knowledge of partners especially at the regional and community level on burning issues on zoonotic diseases like their geo-distribution, prevalence, mode of transmission and method of prevention.

3.2.2.1. Summary of Stakeholder mapping

Stakeholders as presented in table 5 have been classified into national, international and regional. Some of the stakeholders don't operate in the entire region but only some communities in the regions, these have however been classified as regional since there are present in all the regions to be classified as national

Table 7: Summary of Stakeholder Mapping

Stakeholders		Intervention (focus)	Coverage
Government stakeholders	MINESUP	Research and training of veterinarians and health personnel and animal production	National
	MINSANTE	Prevention of the occurrence of epidemics by logical epidemiological surveillance Preparation and response to a possible epidemic, pandemic	
	MINEPDED	In charge of environmental management in Cameroon	
	MINFOF	implements government policy on livestock, fisheries and animal industries and intervene in case of suspicion of an outbreak of disease	
	LANAVET	Animal disease diagnosis, surveillance and analysis	
	MINEPIA	Popularization of livestock, ISV, slaughter control, consumer protection, vaccination, awareness	
	PNLZER	Implement government policies in the domain of animal health. In charge of the prevention and the fight against zoonoses at the national level	
	MINTOUL	Development of the promotion of tourism	
Churches and Mosque		Harmonious life between man, his environment and his God	
Traditional rulers		Ensure population live in conformity with the norms and values of the cultural entities	
International organizations	CICR	International organization to support victims in arm conflicts and other situations	International
	FAO	International organization to ensure food supply to person in need	
	USAID	Strengthen the capacities of countries in all GHSA areas, strengthen the capacities of the Government in the fight against infectious diseases, especially those which pass from animals to humans	
	CDC	Ensures humans and animal leave in good health in one Environment	
	WHO	Ensures humans and animal leave in good health in one Environment	
	DFID	An international aid agency committed to the Sustainable Development Goal (SDG) and have an over-arching objective to alleviate poverty	
	OIE	informs governments of the occurrence of animal diseases and of ways to control these diseases, of coordinating studies devoted to the surveillance and control of animal diseases and of harmonizing regulations to facilitate trade in animals and animal products	
Local organizations	SGM	Protected area which ensures the protection of the wildlife and forest heritage in the area defended by the State	Regional

Veterinary health facilities	CAVEEM ET's Moulvoulaye	Veterinary services reporting and monitoring all diseases related to animal health	Regional
	Commence de Bogo	Veterinary services reporting and monitoring all diseases related to animal health	
Livestock breeders	COUTAL	Mainly does animal husbandry and agriculture and Poultry farming	Regional
	SOCOOCUVINK COOP-CA	Deals in agriculture and livestock farming (agriculture, pig farming, poultry farming)	
	GIC APAGEG	Production of village chicken	
	FEREBO	Supervision of Cattle Breeder	
	UPEPVIC	Production and supply of village chickens	
	COOPEB Coop-CA	Cows breeding, processing of milk into yoghurt / butter and marketing	
	IPAVIC	(Interprofessionnel Avicole du Cameroun) Defend, protect, boost the actors of the poultry sector in Cameroon	
	ABF	Association bringing together Foumban butchers, butchers and members	
	CNEB-CAM	Support to the organization of breeders	
	Federation des Eleveurs (FEB) Far North	Support to the organization of breeders	
	Poultry farmers associations	Chicken farming and sales of chicken inputs	

3.2.3. Opportunities in form of platforms or processes that can be strengthened for improved coordination and joint planning

Engaging stakeholders at all levels is essential for the success of any control program because effective zoonoses control cuts across the conventional discipline boundaries and government service structures, bringing together all stakeholders to discuss how to tackle a disease problem is even more important, as dialogue between different groups is unlikely to happen otherwise. The engagement process involves formal and informal contacts with a variety of groups which include individuals, organizations, communities, industry, agencies, etc. This enhances cooperation, increases communication, improves decision-making, maximizes the effectiveness of each participant's resources and eliminates redundancy.

Apparently, the only coordination platform in Cameroon is the zoonosis program hosted by MINEPIA (and also serves as the One Health Platform in the country) and the ministry of health (MOH). These are the two structures that are frequently heard about though little is known about the mandate to collaborate and their collaborative mechanisms. Key informants at community and strategic level refer to this platform using various name: *"A part le programme zoonose logé à Yaoundé, nous ne connaissons rien d'autre",* said informant OU05C, a key informant at the strategic level.*"CERPLE qui sont sous utilisés pour le moment mais déjà bien impliqués",* said informant CE06C. another key informant at the strategic level. And *"Programme/projet 'une santé'"* informant SU07C, yet another key informant at community level. At the community level, the same platform comes up but with different names: "*En dehors du MINEPIA, personne d'autre"* saids informant EN06CO). a key informant at the community level; "*....le MINEPIA et MINISANTE (MOH)"* said informant CE05CO), another key informant at the community level.

To strengthen these platforms for better coordination, the zoonotic program needs to be extended to the regional levels as noted by some key informants: *"Actuellement le programme zoonose n'est fonctionnel qu'au niveau central, il est nécessaire de décentraliser celui-ci en créant des comités régionaux et même départementaux"*(informant SU05C). Yet another participant noted that *"Pour une meilleure coordination et planification conjointe, il faut un cadre de rencontres multisectorielles, fonctionnel au niveau régional (réunions mensuelles/trimestrielles) rendant compte au comité technique national, de façon régulière. Le comité technique, national définit de communication fiable et sécurisé des multisectoriels nationaux et régionaux".* (informant

OU06C). Also, quarterly meetings organized by the coordination platform and monthly meetings at the regional level will be great to enhance coordination as noted by a key informant *"Afin d'assurer une meilleur coordination, organiser des rencontres trimestrielles par zone et mensuelles par région afin d'être au même niveau d'information, mettre en place une réelle plateforme de communication facilitant l'accès à l'information à temps réel et surtout un bon mécanisme de coordination"* (informant SU02C).

The zoonosis program is a welcome program that should be maximally used to turn things around for the betterment of the health of Cameroonians when it comes to zoonotic diseases. This is noted by almost all the key informants. The ministry of health and that of forestry and wildlife comes next in the list and should be made to be heavily involved and actively taking part in activities of the zoonosis program which is the One Health Platform in the country.

As a summary, the most mentioned platform by respondents is PNPLZER and MOH. MOH is already structure to have a national coverage and to strengthen PNPLZER for better coordination, respondents argue, needs to be extended to the regional levels. Also, quarterly meetings organized by the PNPLZER platform at the national level involving these structures and monthly meetings at the regional level will be great to enhance coordination.

3.2.4. Processes that can accelerate high-impact behaviors to prevent, mitigate and respond to prioritized zoonotic diseases

To prevent the transmission, mitigate the impact and respond to prioritized zoonotic diseases related, it is vital to identify with the population processes that can accelerate high-impact behaviors. Key informants both at the strategic and community levels identified the following that can accelerate high-impact behavior and prevent, mitigate and respond to prioritized zoonotic diseases. As presented in table 6, there are grouped into awareness raising, training, and good governance and intersectoral collaboration

Table 8: Processes that can accelerate high-impact behaviors to prevent, mitigate and respond to prioritized zoonotic diseases

Domain	Specifications
Awareness raising on the prevention of zoonotic diseases	Carry out extensive information and awareness campaigns on the priority zoonotic diseases
	Sharing related information and raising awareness among breeders
	Increase awareness at festivals, shows and trade fair
	Sensitize actors on the definition of the cases, the modes of contamination and the precautionary measures permanent
Awareness raising on the One Health System	Educating the actors to accept the role of the One Health Platform and not struggling to create parallel platforms
	Setting up a platform where sectors will exchange and share information
Training	Training and equipping support structures
	Training and regular rehearsal courses for stakeholders involved in the prevention and control of zoonosis
Good governance and intersectoral collaboration	Facilitate all actions to be carried out through official correspondence
	Regular data collection monitoring and supervision
	Facilitating collaboration and defining roles and responsibilities
	Material equipment (like computers) of structures in charge
	Improve / strengthen intersectoral collaboration
	Create functional a platform with a direct funding mechanism
	Make available drugs and vaccines
	Organize mass vaccination campaigns

3.2.5. Strategies to improve the effectiveness of public communication

Continuous, effective communication, across the government and within and among partner organizations and other relevant stakeholders, including media and the public, is necessary if zoonotic diseases are to be addressed. Trustworthy, transparent and consistent communication establishes credibility with national and international stakeholders and partners.

Modern technology (e.g., mobile telephone networks, the internet) allows people to receive information about zoonotic disease outbreaks from many sources, which may result in misinformation and confusion. Preparedness and response teams should include specialists in communication so that stakeholders receive accurate, timely, comprehensive, and consistent messages. Identifying and training spokespeople from all sectors, and from communities, can ensure messages are delivered and build trust with all audiences. In addition to accurate, timely, comprehensive, and consistent messages, engagement and dialogue with communities and systems

that have functional mechanisms to involve communities and respond to feedback (before an event, during and event and after an event) are also a critical part of risk communication - and responding to community concerns in a way that supports confidence in the information or advice given.

1. Existence of Strategic documents on zoonosis

Strategic documents are necessary for policy implementation. However, only a few of the respondent admitted the existence of a strategic document and far less admitted that it has been implemented as explained a key informant at the strategic level; *"Fiche d'alerte, oui mais CAHIS, une phase pilote a été en oeuvre dans le Mfoundi et la Haute Sanaga. mais pas encore opérationnelle dans l'ensemble du pays"* (informant CE04C).

Continuous, effective public communication program that addresses priority zoonotic diseases in Cameroon is necessary if zoonotic diseases are to be addressed. Unfortunately, there is no such system in Cameroon or if it exists, it is very inconsistent and expensive as noted by most key informants *"Il y'a une communication qui se fait au besoin lorsqu'une situation arrive mais cette communication n'est pas continue"* (informant OU05C); *"Non excepté le plan de communication sur la grippe aviaire"* (informant EN07C). Therefore, the lack of a public communication program that addresses priority zoonotic diseases in Cameroon is a hinderance.

2. Main promoters of the communication program and their target audiences

For the One Health communication program that exist temporally, MINEPIA, MOH, MINFOF and some partners UNICEF, USAID, CDC, and WHO are those who promote it. Because this communication is not continuous and only promoted when there is acute need (link in the cause of an epidemic), the target also varies as noted by a key informant from the south region *"les cibles varient en fonction de la maladie en cause"* (informant SU03C), but generally targets some of the general population in some specific communities. *"agents connus au contrôle, Ecogarde, villageois"* (informant SU03C). and *"Communautés"* (informant EN05CO).

3. Lapses and communication program how they can be improved

The main lapse identified by the key informant is that of the inconsistent nature of the communication program *"....le travail n'était pas constant*" said informant CE08C, a key

informant in the Central region and *"cette communication est intermittente et réactive au problème"* reiterated by informant SU03C, from the south region.

Lack of community involvement is also noted as in most cases, the communication is at the regional and national level with little relay to the community level with the local languages understood by most of the community duelers. This is noted by most of the key informants like this one in the Far North Region *"Dans la plupart des cas il manque des relais communautaires permettant de rendre la communication opérationnelle au niveau communautaires"* (informant EN08CO).

Remedies to this includes an establishment of a communication program that will permanently keep the population informed on zoonosis. *"Mettre en place un programme de communication dans la plateforme 'une santé' pour sensibiliser les populations en continu. Que le Gouvernement mette en place un budget pour la communication, pour mettre en œuvre les activités de communication*" (informant OU05C). Also, the system should not limit communication at the national and regional level. The local population of the afflicted communities should be involved and messages relayed to them using local means of transport. "*A ce titre il ne faudrait pas limiter la communication aux canaux nationaux et régionaux. Ainsi les communauté territoriales décentralisées, ainsi que leurs canaux de communautaires devraient être impliqués notament les communautaires*" said informant EN02C, a key informant in the Far north region.

4. Prioritization of messages

Geographic areas with history of epidemics should be given priority and the messages shouldinclude the signs and symptoms of the disease. The type of messages proposed by key informants to be diffused using various channels are simple, easily understandable, illustrative messages taking into account Cameroon's cultural diversity that include mode of transmission, preventive measures, and signs of illness in both animal and man and the what to when one comes across a case. More specification is presented in table 7

Table 9: Characteristics of messages to be propagated

Community level	Messages that propose what should be used or done as alternatives, not only restricting or emphasizing on what should not be done
	Messages that show the validity of knowledge about zoonotic diseases and their impact on society

	Messages which aim to change the mentalities and behaviors of certain people with regard to the breeding activity
	Messages on the impact of these diseases on humans and their environment
	Messages that invite each other to change their behavior and respect the principles
	Message in local languages, that talk on the diseases that are transmitted from animals to man
Strategic level	Messages on the main pillars: prevention, mitigation and response
	Develop messages in partnership with the communities, clear messages, easy to understand contextualized, in a language that the communities understand
	Simple, easily understandable, illustrative messages taking into account Cameroon's cultural diversity
	Make an inclusive awareness that takes into account all the targets Illustrious households in local language presenting the risk of zoonosis and impact on households and communities
	Message of prevention, care or what to do with a suspected or confirmed case.
	The danger that humans run in catching these diseases
	Explain the risk and danger will send Measures and barrier methods against these diseases

3.2.6. Target audience analysis

1. Targeted audience

Public health communication strives for lasting behaviour change and a sustained public health impact. However, lasting behaviour change is a result of decisions made at the individual level. To address this, a targeted audience must be decided upon before designing the message. This means that messages should be designed to speak to the needs/interests/motivations of a specific audience group. To facilitate voluntary behaviour change a campaign must appeal to the values and cost–benefit evaluation of each audience group targeted.

Depending on the specific zoonotic disease, targeted audiences range from specific individuals like eco guard, fishermen, politicians (parliamentarians, member of the government) to the general public.

- Politicians (parliamentarians, member of the government)
- Eco guard
- To the most exposed populations (depending on the diseases in question)
- Livestock breeders

- Hunters
- Consumers
- Bushmeat sellers
- General population

2. Preferred channel of communication

Audience-centered health communication efforts with a consumer perspective are much more effective in motivating target audiences to change their behaviour. This requires designing and delivering messages that are adapted to the needs, perceptions, preferences and situations of the intended audiences. The channel of communication becomes very important if such audiences have to be attained.

Chanel of communication here differs between central/regional level and community level with the community enhancing on person-to-person communication while mass and social media communication remains important at the central and region levels as presented in table 8

Table 10: Preferred channel of communication as suggested by the KI participants

Central and Regional level	**Community**
Television	Community radio
Radio	Houses of worship
Social networks	Associations
Leaflets	Open doors days at schools and colleges
Posters	Professional organizations
Flyers	Door to door
Banners	Caravans
	Civil Society Organizations

CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

Socio-cultural practices such as living with livestock in the same house, consumption of inappropriately cooked meat, and milk, and high contact with animals and animal carcasses, backyard slaughtering contributes to spread of zoonosis. Low awareness of the community on zoonotic diseases and their transmission mechanisms, inadequate behavior change intervention (little or no communication materials on the subject); shortage of vaccines and laboratory reagents, inadequate case diagnostic knowledge and experience of health workers, weak preparedness and early warning plans also contribute to the increasing risk of zoonosis. This assessment also identified weak coordination and information sharing system among the various actors working in zoonotic diseases prevention and control in Cameroon

4.2. Recommendations

Based on the findings the following recommendations have been proposed;

4.2.1. Social and behavioral change communication

1. Breakthrough ACTION through the GHSA project in collaboration with different sectors should support the design, production and distribution of tailored SBC materials on zoonotic diseases and develop interventions with priority target groups with appropriate approach and channels. The SBC materials shall focus on:
    i. Proper preparation of meat and milk before consumption;
    ii. Proper removal and disposal of dead animals and their carcasses
    iii. Avoid contact with infected animals; promote separate shelter for animals
    iv. Promote proper handwashing (with soap and clean water) when coming in contact with animals
    v. Educate the benefit of cleaning and disinfecting poultry farm surroundings,
    vi. Promote timely vaccination of both animal and people,
    vii. Promote early treatment seeking for sick animals and human
2. Breakthrough ACTION and partners should design risk communication strategy and strengthen routine health education focusing on risk of zoonotic diseases, prevention and

control strategies, educating farmers, butchers, breeders and other exposed persons to reduce their risk.

4.2.2. Collaboration and coordination monitoring and supervision

3. No early warning and rumor tracking system for zoonotic diseases in Cameroon. Therefore, the project should put in place a rumor tracking system and strengthen information sharing and alignment of responses among the various stakeholders from the central to the community level
4. Weak coordination between the National zoonotic program and other sectors especially at community level. The project therefore should work with partners through strengthening existing One health coordination mechanism and also establishing similar regional and community level coordination mechanisms.
5. Stakeholder mapping findings indicated there is chronic inadequacy of training on zoonotic disease prevention and control. The project with partners should therefore provide the necessary training, targeting local associations related to zoonotic diseases, breeders and CSOs.
6. Organizational capacity among organizations working on zoonotic diseases to address risk communication needs is limited. This project's risk communication activity should prepare training on leadership on strategic communication and risk communication.
7. PNPLZER and MOH are the two structures identified by key informants that serve as coordination platform. MOH is already structure to have a national coverage, to strengthen PNPLZER for better coordination, it is recommended that it should be extended to the regional levels.
8. Also, to enhance coordination, quarterly meetings organized by the PNPLZER platform at the national level involving all the One Health stakeholders and monthly meetings at the regional level.
9. Cameroon has two official languages and about 250 national languages some of which widely are spoken, written and read in the respective regions. Production and dissemination of sensitization materials should take into consideration the targeted local targeted context. It is for this reason that the preferred channel of communication differs widely between central/regional level and the community level.

REFERENCES

1. One Health | CDC [Internet]. 2021 [cited 2021 May 11]. Available from: https://www.cdc.gov/onehealth/index.html

2. Cameroon Demographics 2020 (Population, Age, Sex, Trends) - Worldometer [Internet]. [cited 2021 Apr 15]. Available from: https://www.worldometers.info/demographics/cameroon-demographics/

3. Ghogomu T. Introduction of the Cameroonian Agricultural Terrain on @pragma_int by Tangunu Ghogomu [Internet]. Pragma. Pragma International; 2020 [cited 2021 Apr 14]. Available from: https://pragma.international/article/introduction-of-the-cameroonian-agricultural-terrain

4. Animal population of Cameroon, 2015 estimate [Internet]. World Health Organisation for Animal Health; 2015. Available from: http://www.oie.int/ wahis_2/public/wahid.php/Countryinformation/Animalpopulation

5. USAID. Zoonotic Disease Prioritization for Inter-sectoral Engagement in Cameroon [Internet]. 2016. Available from: https://www.cdc.gov/onehealth/pdfs/Cameroon-english-508.pdf

6. Knobel DL, Cleaveland S, Coleman PG, Fèvre EM, Meltzer MI, Miranda MEG, et al. Re-evaluating the burden of rabies in Africa and Asia. Bull World Health Organ. 2005 May;83(5):360–8.

7. Sofeu CL, Broban A, Njimah AN, Momo JB, Sadeuh-Mba SA, Druelles S, et al. Improving systematic rabies surveillance in Cameroon: A pilot initiative and results for 2014-2016. PLoS Negl Trop Dis. 2018 Sep 6;12(9):e0006597.

8. MINEPIA. Definition de certaines zoonoses. 2020.

9. Prasad J. Zoonotic Diseases of Public Health Importance [Internet]. Available from: https://ncdc.gov.in/WriteReadData/l892s/File618.pdf

10. World Health Organization, Food and Agriculture Organization of the United Nations & World Organisation for Animal Health. (2008). Anthrax in humans and animals, 4th ed.. World Health Organization; 2008 [cited 2021 Apr 16]. Available from: https://apps.who.int/iris/handle/10665/97503

11. WHO, FAO,, OiE. The Control of Neglected Zoonotic Diseases-From advocacy to action. Geneva, Switzerland : New York; 2014.

12. Wade A, Kamdjo G. Investigation into The First Anthrax Outbreak in A Cattle Farm in West Cameroon. Biomed J Sci Tech Res. 2019 Mar 15;16(1):1–2.

13. Kabir SML. Avian flu (H5N1): threat of "global pandemic" is growing and it's impact on the developing countries' economy. Afr J Microbiol Res. 2010 Jun 18;4:1192–4.

14. CDC: Highly Pathogenic Asian Avian Influenza A(H5N1) Virus | Avian Influenza (Flu) [Internet]. 2018 [cited 2021 Apr 16]. Available from: https://www.cdc.gov/flu/avianflu/h5n1-virus.htm

15. Salbago CD, Barry MF, Kerry KH, Hayden FG. Influenza in the acute hospital setting. Lancet Infect Dis. 2002 Mar 1;2(3):145–55.

16. Kouam MK, Tchouankui HN, Ngapagna AN. Epidemiological Features of Highly Pathogenic Avian Influenza in Cameroon. Vet Med Int. 2019 Jan 27;2019:e3796369.

17. WHO: Ebola virus disease [Internet]. [cited 2021 Apr 16]. Available from: https://www.who.int/westernpacific/health-topics/ebola

18. Ayele WY, Neill SD, Zinsstag J, Weiss MG, Pavlik I. Bovine tuberculosis: an old disease but a new threat to Africa. Int J Tuberc Lung Dis Off J Int Union Tuberc Lung Dis. 2004 Aug;8(8):924–37.

19. WHO | The challenges of preventing bovine tuberculosis [Internet]. WHO. World Health Organization; [cited 2021 Apr 16]. Available from: http://www.who.int/bulletin/volumes/96/2/18-020218/en/

20. Awah Ndukum J, Egbe Nkongho F, Ngu Ngwa V. The Status of Bovine Tuberculosis in Cameroon. In 2019. p. 283–303.

21. NIH: Salmonella Infections [Internet]. National Library of Medicine; [cited 2021 Apr 16]. Available from: https://medlineplus.gov/salmonellainfections.html

22. Crump JA, Luby SP, Mintz ED. The global burden of typhoid fever. Bull World Health Organ. 2004 May;82(5):346–53.

23. Amin E, Njumkeng C, Fualefac A, Fondugallah J, Njukeng P, Patrick A, et al. Trends of Salmonellosis and Its Resistance to Antimicrobials in the Buea Health District, Cameroon. 2019 Oct 1;

24. CDC: Lassa Fever. 2019 [cited 2021 Apr 16]. Available from: https://www.cdc.gov/vhf/lassa/index.html

25. Donald SG, Daniel GB: Lassa Fever - an overview | ScienceDirect Topics [Internet]. [cited 2021 Apr 16]. Available from: https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/lassa-fever

26. WHO: Trypanosomiasis, human African (sleeping sickness) [Internet]. [cited 2021 Apr 16]. Available from: https://www.who.int/news-room/fact-sheets/detail/trypanosomiasis-human-african-(sleeping-sickness)

27. Asonganyi T, Suh S., Tetuh MD: Prevalence of domestic animal trypanosomiasis in the Fontem sleeping sickness focus, Cameroon. Rev Elev Med Vet Pays Trop [Internet]. 1990 [cited 2021 Jun 14];43(1). Available from: https://pubmed.ncbi.nlm.nih.gov/2263747/.

28. Cameroon: Sleeping Sickness | IAMAT [Internet]. [cited 2021 Apr 16]. Available from: https://www.iamat.org/country/cameroon/risk/sleeping-sickness-african-trypanosomiasis

29. WHO: Monkeypox [Internet]. [cited 2021 Apr 16]. Available from: https://www.who.int/westernpacific/health-topics/monkeypox

30. Yohannes M, Mersha T, Degefu H, Tolosa T, Woyesa M. Bovine Brucellosis: Serological Survey in Guto-Gida District, East Wollega Zone, Ethiopia. 2012;5.

31. Pagani P, Wossene A. Review of the new features of the Ethiopian poultry sector Biosecurity implications. :29.

32. Poester FP, Samartino LE, Santos RL. Pathogenesis and pathobiology of brucellosis in livestock. Rev Sci Tech Int Off Epizoot. 2013 Apr;32(1):105–15.

33. Domenech J. Lucet PH, Vallat B. Stewart CH. Bonnet JB, Hentic A: La brucellose bovine en Afrique centrale. III. Résultats statistiques des enquêtes menées au Tchad et au Cameroun. Rev. Elev. Méd. vét. Pays trop., 1982, 35 (1) : 15-22.

34. Awah-Ndukum J, Mouiche MMM, Kouonmo-Ngnoyum L, Bayang HN, Manchang TK, Poueme RSN, et al. Seroprevalence and risk factors of brucellosis among slaughtered indigenous cattle, abattoir personnel and pregnant women in Ngaoundéré, Cameroon. BMC Infect Dis [Internet]. 2018 Dec 3 [cited 2021 Apr 16];18. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6276266/