Strengthening Multisectoral Community Event-Based Surveillance of Zoonotic Diseases in Senegal

Rapid Assessment of a Global Health Security Agenda Project

May 2018

USAID FROM THE AMERICAN PEOPLE

MEASURE Evaluation

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This publication was produced with the support of the United States Agency for International Development (USAID) under the terms of MEASURE Evaluation cooperative agreement AID-OAA-L-14-00004. MEASURE Evaluation is implemented by the Carolina Population Center, University of North Carolina at Chapel Hill in partnership with ICF International; John Snow, Inc.; Management Sciences for Health; Palladium; and Tulane University. Views expressed are not necessarily those of USAID or the United States government. TR-18-255

ISBN: 978-1-64232-031-2

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ACKNOWLEDGMENTS

MEASURE Evaluation acknowledges the United States Agency for International Development (USAID) for its support of this publication.

We thank the following Ministry of Health staff members at the national, regional, and facility levels for their contributions to this report: Dr. Ibrahima Sonko, Dr. Kalidou Ba, Dr. Babacar Guèye, Dr. Moussa Diakhaté, M. Issa Anne, and M. El Hadji Mamadou Mbengue.

We also extend our thanks to the following Ministry of Livestock staff members at the national, regional, and facility levels for their contributions to this report: Dr. Coumba Diouf Faye, Dr. Mathioro Fall, Dr. Adji Marième Gaye, Dr. Rosalie Seck, M. Pape Diao, and M. Yoro Diaw.

For assistance with data collection, thanks to Dr. Babacar Youm, of the Directorate of National Parks, Ministry of Environment.

For facilitating laboratory data collection, thanks to Dr. Koura Coulibaly Diack, of PATH Senegal, and Dr. Momar Talla Seck, Director of the National Laboratory for Livestock Research and Diagnosis, Senegalese Institute for Agricultural Research (ISRA).

Thanks to the knowledge management team of MEASURE Evaluation, University of North Carolina at Chapel Hill, for editorial and production services.

Finally, thanks to the Senegal Global Heath Security Agenda One Health project team members (MEASURE Evaluation, Palladium), for their contribution in transitioning the data collected into a meaningful assessment report.

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ABBREVIATIONS

AI	Assistant nurse
CBSA	Community-Based Surveillance
CEBS	Community Event-Based Surveillance
CDC	United States Centers for Disease Control and Prevention
COUS	Center for Health Emergency Operations
CPV	Livestock Officer, Veterinary post
CSC	Centre for Community Health
CVAC	Committee of Community Health Volunteers
DHIS2	National Health Data Collection and Management Database
DP	Directorate of Prevention
DPN	Directorate of National Parks
DSV	Directorate of Veterinary Services
EISMV	Inter-State School of Veterinary Sciences and Medicine
FAO	Food and Agriculture Organization
FETP	Field Epidemiology Training
GDP	Gross Domestic Product
GHSA	Global Heath Security Agenda
GISRS	Global Influenza Surveillance and Response System
ICP	Nurse, Health post
IDSR	Integrated Disease Surveillance and Response
LNERV	National Laboratory for Livestock Research and Diagnosis
MEPA	Ministry of Livestock and Animal Production
MEval	MEASURE Evaluation
MSAS	Ministry of Health and Social Action
OHCEA	One Health Central and East Africa

PNNK	Niokolo-Koba National Park
RVF	Rift Valley fever
SDEL	District Livestock Service Centre
SFE	State midwives
SIGEL	Senegalese Livestock Management System
SREL	Regional Livestock Service Centre
SSM	Global health security
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organization

REPORT OVERVIEW

Senegal is committed to the Global Health Security Agenda (GHSA) and International Health Regulations 2005. The government has undertaken several initiatives in this direction, and promoting the One Health initiative is part of that approach. Recently, after approval by the Prime Minister, Senegal established a legal structure for the One Health platform. The national One Health platform is taking several steps to advance the One Health agenda in the country. Government ministries involved in advancing the agenda are Health, Livestock, Environment, Interior, Education, and Gender.

The first phase of MEASURE Evaluation's GHSA One Health surveillance program is focused on strengthening multisectoral collaboration in community surveillance of six prioritized zoonotic diseases in two regions, Tambacounda (comprising Tambacounda and Koumpentoum districts) and Saint Louis (comprising Pété and Podor districts). The surveillance activity will be implemented in two additional regions during the next phase; these regions will be selected after consulting with the stakeholders. The activities in the One Health program extend the current work of MEASURE Evaluation in these four districts in the community surveillance of eight priority human diseases. This rapid assessment assessed the preparedness of the participating sectors, i.e., health, livestock, and environment in the four project districts. We also expect that a review of similar activities by other partners in the country could help MEASURE Evaluation find opportunities that complement the current project and avoid any duplication.

Our rapid assessment of the health sector revealed that it is well prepared for the implementation of the activity, in terms of the physical infrastructure, staffing distribution, and presence of organized community health volunteer groups in the four project districts. Community groups have recently undergone training in the surveillance of priority human diseases. Additionally, Senegal has the laboratory capacity for the diagnosis of the six prioritized zoonotic diseases.

The livestock sector is prepared in terms of their service delivery points and staff distribution. In addition to the government veterinarians and para-veterinarians, private veterinarians play a significant role in the delivery of services in certain regions, and therefore, must be included in the One Health activities. The private veterinarians work closely with auxiliary livestock agents from the community. These agents could potentially be included in the community health volunteer groups for detecting outbreaks of zoonotic diseases in animals. The central laboratory (LNERV) of Senegal is equipped to diagnose all the six zoonotic diseases; although, the laboratory capacity needs to be strengthened at the regional levels.

Part of the National Park Niokolo-Koba that is managed by the Ministry of Environment extends to one of the project districts, Tambacounda. The Eco-guides and Eco-guards working in these regions represent the community for surveillance activities, and therefore, could be potential members of the community health volunteer groups. The National Park personnel work closely with the Ministry of Livestock for the diagnosis of diseases. When an outbreak or an unusual health event is reported in the National Park, park personnel report the event to the nearest veterinarian, who then follows the routine surveillance pathway Livestock Sector.

Several partners working in community-based surveillance and One Health complement our project activities, including Food and Agriculture Organization (FAO), World Bank, Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), Catholic Relief Services, PATH, EcoHealth Alliance, and One Health East and Central Africa (OHCEA). It would, therefore, be worthwhile to form a Partners' Forum and schedule regular meetings to exchange information. FAO and OHCEA were identified as two active partners that complement specific activities in the One Health project.

At a national level, the One Health platform in Senegal is led by the Primature, who is responsible for intersectoral coordination, development of national strategy for operationalization of One Health, and other related guidelines. The One Health platform is coordinated by the GHSA technical advisor for health and has a functioning task force.

INTRODUCTION

Within the GHSA, community event-based surveillance (CEBS) and a One Health approach are priority areas that together provide an effective mechanism for early detection and rapid response in the event of a disease outbreak, when integrated at all levels of the national surveillance system. MEASURE Evaluation has an ongoing community surveillance activity in two regions in Senegal, Tambacounda and Saint Louis. Our new project to strengthen multisectoral collaboration in CEBS of zoonotic diseases expands the existing surveillance activities in these regions, embracing the One Health approach. The new project focuses on CEBS of the six prioritized zoonotic diseases: rabies, zoonotic influenza, zoonotic tuberculosis, hemorrhagic fever (Ebola and Marburg), anthrax, and Rift Valley fever (RVF); and, it is coordinated across sectors for health, livestock, and environment. The major areas of focus in this project are strengthening epidemic surveillance through alerts from the community and enhancing intersectoral communication. The first phase of the project will be implemented in the four existing project districts, i.e., the districts of Tambacounda and Koumpentoum in the Tambacounda region and the districts of Pété and Podor in the Saint Louis region. During phase two, the project will be implemented in four additional districts in two regions, that have not yet been determined. This project is the first of its kind in Senegal to use a One Health approach.

OBJECTIVE

The goals of our rapid assessment were to provide an overview of the systems within the collaborating sectors in One Health to improve the flow of surveillance information from communities to local authorities and foster the sharing of data among sectors. Our goals will be achieved through the following objectives:

- Assessment of the Health sector in terms of its service delivery points, staff distribution, data and information systems, and Committee of Community Health Volunteers in the project districts
- Assessment of the Livestock sector in terms of its service delivery points, staff distribution, data and information systems, and Committee of Community Health Volunteers in the project districts
- Assessment of the Environment sector in terms of its location, service points, staff distribution, data and information systems, and Committee of Community Health Volunteers in the project districts
- Assessment of other projects and partners in the country working in a similar domain of activity

SENEGAL

Senegal is a country on the Atlantic coast of West Africa. It is bordered by Mauritania to the north, Mali to the east, Guinea to the Southeast, and Guinea-Bissau to the southwest. The Gambia extends eastward into Senegal as a narrow strip of land from the coast (Figure 1). In 2016, Senegal had a population of 15.4 million (The World Bank, 2017), of which, 63 percent resided in urban areas. Nearly one-fourth of the population is concentrated around the city of Dakar. The country is economically stable, with a gross domestic product (GDP) of 6.5 percent in the past two years. The economy has a diversified base in agriculture, fishing, and mining. The economy of Senegal has been traditionally dependent on ground nuts (i.e., peanuts), but has diversified to cultivate other crops, including millet, sorghum, rice, and fodder grasses. The savanna type of vegetation and the climate have encouraged the Senegalese to rear many kinds of livestock, including cattle, goat, sheep, horses, donkeys, camels, and pigs (Clark, Hargreaves, & Camara, 2018). Senegal is endowed with a wide variety of plants and animals because of the variety of ecosystems within the country: coastal, semiarid grassland, and tropical rain forest. Thorn bushes, baobab and acacia trees are common to Senegal.

The country is administratively divided into fourteen regions, which is further divided into forty-five departments and one hundred-thirteen arrondissements. Thirty-six languages are spoken in Senegal. While Wolof is most widely spoken, French is the official language. Ninety-five percent people are practicing Muslims, four percent are Christians, and the rest are animists.

Figure 1. Map of Senegal

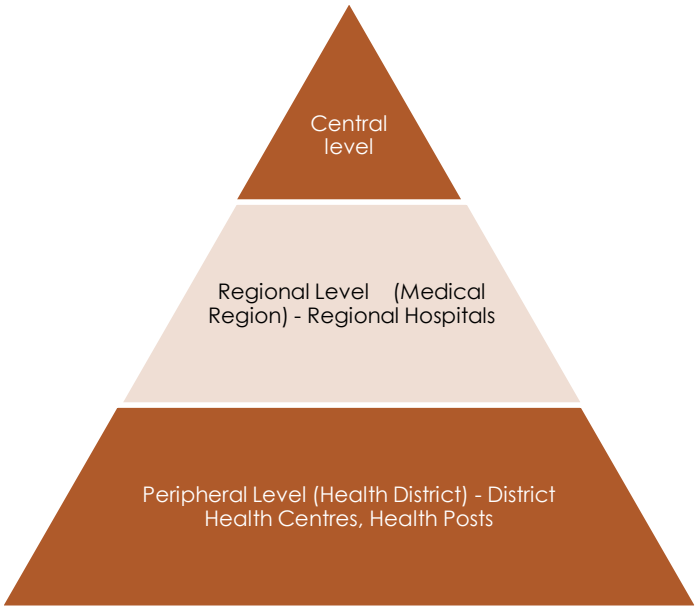
HEALTH SECTOR

The government of Senegal demonstrated its political commitment to radically changing the health sector by initiating two major actions to strengthen disease surveillance. The first action was the adoption of Integrated Disease Surveillance and Response (IDSR) in September 1998 at the 48th Regional Committee of WHO Africa regional office in Harare, Zimbabwe (World Health Organization, 2010). Since then, the health sector undertook several key activities to facilitate the implementation of IDSR in Senegal. This strategy was adopted for developing and implementing comprehensive public health surveillance and response systems. The second major action was the adoption of International Health Regulations in 2005 at the 58th World Health Assembly in Geneva, Switzerland to address the threat to international public health security and trade caused by emerging and reemerging diseases, including public health emergencies of international concern.

Organization of the Health Care System

The health system in Senegal has a pyramidal structure comprising three levels: central, regional and peripheral (Figure 2). The top or central level consists of the office of the Minister of Health, associated branches of health, and related services. The middle or regional level is the medical region, which is responsible for addressing the health care services within regions. The bottom or peripheral level, is the district health, which comprises at least one health center and several small centers. The national health system comprises regional hospitals, district health centers, and health posts.

Figure 2. Health system pyramid in Senegal



The health ministry, called Ministry of Health and Social Action (MSAS), has assigned responsibility of public health surveillance to two offices: the Directorate of Prevention (DP) and the Center for Health Emergency Operations (COUS). Within the DP, the Division of Surveillance and Vaccine Response has been established. Forty-four priority diseases and conditions were selected under the IDSR in Senegal. Of these, eight diseases were included and prioritized in the community-based surveillance (CBSA) in pilot interventions in the St. Louis, Tambacounda, and Diourbel regions.

Health Infrastructure in the Project Districts

The Saint Louis region has two project districts, Pété and Podor, with a population of 182 491 and 239 957, respectively. Of these, only Podor has a hospital, which is located at Ndioum. In the Tambacounda region, the districts of Tambacounda and Koumpentoum have populations of 263 125 and 147 238, respectively. The only hospital in the Tambacounda region is in the Tambacounda district; that hospital also serves as a regional reference hospital. Table 1 provides a list of health units in each project district.

Table 1. Public health infrastructure in project districts

Region	District	Hospital	Health Center	Health Post	Health Point
Saint Louis	Pété	0	2	32	24
	Podor	1	2	35	33
Tambacounda	Tambacounda	1	1	23	37
	Koumpentoum	0	1	18	20
Total		2	6	108	114

Source: Government of Senegal, 2017b, c

Medical doctors are found only in the health centers. They are supervised by the chief medical officers of districts, who specialize in public health. The health district of Pété is headed by a specialist in gynecology and obstetrics. Other specialists are found only in regional hospitals. The health posts are led by nurses (ICP) or state midwives (SFE). Some facilities also have assistant nurses (AI). Table 2 shows the number and distribution of staff in the four pilot districts.

Table 2. Number and distribution of staff in the health units of project districts

Health district	Facility	Doctor	Dentist	Pharmacist	Lab technician or Biologist	IDE/AI	SFE
Pété	CS Pété	2	1	0	3	4	4
	CS Galoya	1	0	0	1	2	2
	PS	0	0	0	0	40	16
	Total	**3**	**1**	**0**	**4**	**46**	**22**
Podor	CS Podor	2	1	0	2	6	5
	Hospital	5	1	1	2	6	7
	PS	0	0	0	0	38	26
Tambacounda	**Total**	**7**	**2**	**1**	**4**	**50**	**38**
	CS Tamba	2	1	0	2	5	7
	Hospital	15	1	2	7	45	12
	PS	0	0	0	0	22	21
	Total	**17**	**2**	**2**	**9**	**72**	**40**
Koumpentoum	CS Koum	2	1	0	1	2	6
	PS	0	0	0	0	13	11
	Total	**2**	**1**	**0**	**1**	**15**	**17**
Grand Total		**29**	**6**	**3**	**18**	**183**	**117**

Sources: Human Resources for Health in 2030, 2017; Government of Senegal, 2017b, c
CS—health center; PS—health post

Lab Infrastructure

In Senegal, national- and regional-level laboratories are led by biologists or pharmacists. At the peripheral level, laboratories are often led by senior technicians or laboratory technicians. The distribution of laboratory personnel in the medical regions of Saint-Louis and Tambacounda is shown in Table 3.

Table 3. Number and distribution of regional laboratory personnel in the project regions

	Engineer Biologist	Nonspec. Pharmacist	Medical Biologist	Pharmacy Biologist	Nurses	Lab Technician	Lab Tech. Assistant	Sr. Biology Technician
Saint-Louis	0	0	0	7	3	12	19	25
Tambacounda	0	1	0	2	0	6	9	7

Source: PATH Sénégal, 2017

Regarding diagnostic capabilities, only three of the eight priority human diseases can be diagnosed at the regional level: cholera, meningitis, and bloody diarrhea. Other diseases are diagnosed at the central laboratory LNERV, most often at the Pasteur Institute in Dakar, a part of the Pasteur Institute Network, which changed status in 2010 from a private foundation to a nonprofit organization and public utility. The following laboratories are engaged in public health activities through the reference centers they host (Pasteur Institute, 2014):

- National Reference Centers for Influenza and Respiratory Viruses, Measles, Poliomyelitis and Enteric Viruses, Rotaviruses, Enterobacteriaceae, and Rabies
- WHO Collaborating Center for Arboviruses and Viral Hemorrhagic Fevers
- WHO Inter-Country Reference Center for Polio

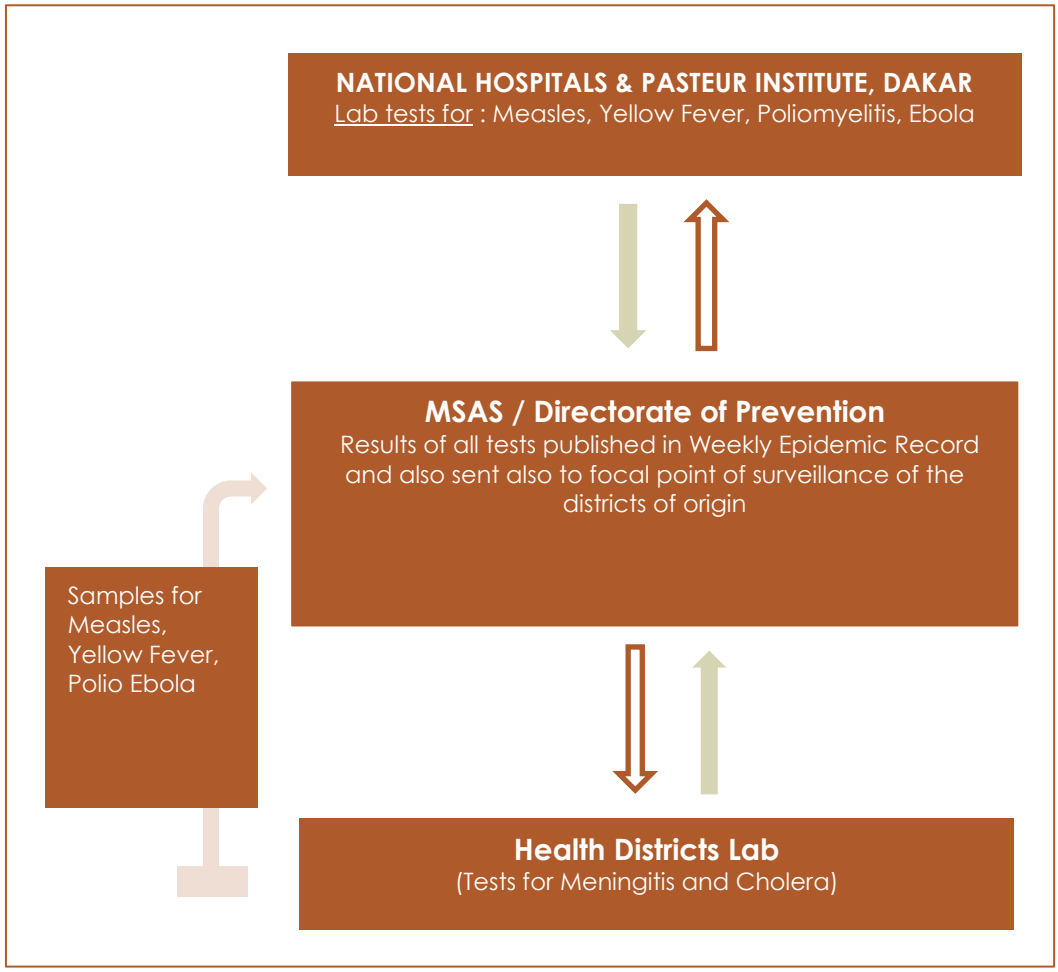
Senegal is part of the Global Influenza Surveillance and Response System, which also serves as a global warning mechanism for the emerging pandemic influenza viruses. In the context of avian influenza, the Pasteur Institute in Dakar has been a WHO reference laboratory for H5 viruses since 2006 and a sub-regional laboratory since the 2009 pandemic.

The country has the laboratory capacity to diagnose the six prioritized zoonotic diseases: rabies, anthrax, avian influenza, hemorrhagic fevers (Ebola and Marburg), and zoonotic tuberculosis. Except for tuberculosis, the other laboratory tests are available at only the national level. Except for meningitis, where a laboratory sample is collected at the district hospital, for all other diseases, trained nurses collect the samples and dispatch them to the laboratory. According to a standard estimate, from the day of sampling it takes three to seven days for a diagnosis of anthrax and hemorrhagic fevers (i.e., Ebola and Marburg); seven to ten days for avian influenza, and RVF, and fifteen days for rabies. At the district level, where tuberculosis testing is performed, there is no specific test to differentiate bovine tuberculosis from human tuberculosis (Figure 3).

Reported Cases of Prioritized Human and Zoonotic Diseases

Bloody diarrhea is the most common disease reported among the eight priority human diseases in the four districts, with six hundred-sixteen cases recorded in 2017. For priority zoonoses, only suspected cases of rabies have been reported, specifically cases of dog, cat, horse, and donkey bites. Forty-six cases of dog bites were reported from across the four districts (Government of Senegal, 2017b,c)

Figure 3. Surveillance system: levels of diagnostic procedures



Data Collection and Surveillance System

District Health Information System 2 (DHIS2) is the national health data collection and management platform, managed by the Health and Social Information Systems Division (DSISS) of the Ministry of Health (Government of Senegal). The surveillance database followed by the Ministry of Health in Senegal is DHIS2 supported by West African Health Organization to consolidate aggregate health data and online integration of data. In the routine surveillance system, the peripheral level is represented by health points and health posts. The nurses are the head of the health posts. They compile all the cases from the health points as well as the health posts and produce weekly reports that are sent to the district focal point for surveillance. The reports are saved either on Excel files or on the DHIS2 database. District supervisory focal points report to regional surveillance monitoring focal points, who in turn report to the central level.

Underreporting in DHIS2 has been noted in several health districts in Senegal. Although nurses have been trained to enter data into DHIS2, most do not. Reports are entered at the district level in an Excel file with the help of input operators. Underreporting has been observed in the four pilot districts, but is most prevalent in Pété and Podor.

mInfoSanté is a mobile platform that represents a major innovation in public health surveillance because it uses text messaging (SMS) and interactive voice messaging with the MSAS and with the support of the United Nations International Children's Emergency Fund (UNICEF; United Nations International Children's Emergency Fund, 2016). Within the MSAS, it is managed by the COUS. This mobile platform operates on RAPIDPRO and allows community health volunteers to communicate with health authorities

in real time, thus strengthening disease surveillance and control of diseases. It is currently used in six of the fourteen medical regions of Senegal for the surveillance of notifiable diseases. The following regions use mInfoSanté: St. Louis, Tambacounda, Ziguinchor, Sedhiou, Kolda, and Kaolack.

The 2017 annual report of the COUS revealed a low rate of data completeness and equally low promptness in sending the reports. The report also mentions that only thirteen of the twenty-four districts (55%) sent weekly reports at the central level. In the four pilot districts of existing community-based surveillance, only the health districts of Pété and Tambacounda sent reports. However, data completeness is low even in these two districts (2% in Pété and 4% in Tambacounda).

mInfoSanté is also used for community-based surveillance in the four pilot districts where COUS works with its partners. In this community-based surveillance project, communities, through the committee of community health workers (CVAC), are involved in the surveillance of eight priority human diseases. The CVAC members have been trained to actively search for cases and alert the responsible ICPs in their areas. The community health volunteers are trained to send SMS alerts to 21345, using the mInfoSanté application on the mobiles distributed to them. After investigating, the ICPs classify the alerts and record suspicious cases in the appropriate register and in the DHIS2. From the health post, the information circuit follows the health pyramid described above.

Committee of Community Health Volunteers

Since the 1990s, the MSAS has tried to capitalize on community leaders, like imams, village chiefs, local elected officials, and traditional practitioners for community health interventions. Committees of Community Health Volunteers were formed and pilot tested initially for the prevention of postpartum hemorrhage. The positive results of the pilot test encouraged the MSAS to organize their membership, roles, and responsibilities and extend their efforts throughout the country. The general objective of CVAC is to improve the health of mothers and children through increased involvement and empowerment of women community leaders in monitoring the implementation of maternal and newborn health promotion activities. The ICPs are responsible for establishing CVACs within a community in consultation with the key health leaders and other influential people in the community. The Centre for Community Health (CSC), under the MSAS, is responsible for the organization of the CVACs (Government of Senegal, 2014). Over time, CVAC members have been assigned more responsibilities. Now, CSC is organizing the roles and responsibilities of the CVAC members to accommodate the added responsibilities in the community.

These CVAC members are used to detect the eight priority human diseases in their communities in the Community-Based Surveillance project. The four pilot districts have well organized the health volunteers. Given the short duration of the community-based surveillance intervention, MEAURE Evaluation decided to take a representative sample of the CVACs in each district to allow for a solid analysis and extrapolations of the data. In addition, exhaustive sampling would not allow enough time for implementation of the previous community-based surveillance project. Thus, sixty-four CVACs were selected in each district, except in Koumpentoum where only fifty-nine CVACs were selected (Table 4). However, in the four project districts, all health posts that have CVAC are represented in the sample (Table 5).

Table 4. Number and distribution of CVACs per health post

Tambacounda Health District			Koumpentoum Health District		
Health post	**# Total CVAC**	**# CVAC SBC**	**Health post**	**# Total CVAC**	**# CVAC SBC**
Afia	1	1	Bamba	7	7
Bira	2	2	Diam Diam	3	3
Bohé	2	2	CS Koumpentoum	7	7
Botou	1	1	Darou Salam	2	2
Dialocoto	11	6	Fass Gounass	3	3
Dar Salam Fodé	2	2	Kaba	3	3
Darou Salam 1	7	5	Kakhène	3	3
Dawady	1	1	Kanouma	3	3
Dépot	6	4	Kouthiaba	3	3
Djinkoré	5	3	Kouthia Gaidy	2	2
Gouloumbou	3	3	Loffé	2	2
Gourel	2	2	Loumby	2	2
Gouye	2	2	Malème Niani	2	2
Koussanar	21	4	Méréto	7	7
Missirah	4	2	Pass Koto	5	5
Néttéboulou	6	2	Payar	2	2
Pont	2	2	Syll	2	2
Sankagne	7	6	Vélingara Koto	1	1
Saré Guilèle	5	3			
Saré Niana	2	2			

Tambacounda Health District			Koumpentoum Health District		
Sinthiou Malème	12	5			
Tamba Socé	2	2			
Tessan	2	2			
23 health posts	**108**	**64**	**18 health posts**	**59**	**59**

Saint-Louis Medical Region					
Podor Health District			**Pété Health District**		
Health post	**# Total CVAC**	**# CVAC SBC**	**Health post**	**# Total CVAC**	**# CVAC SBC**
Bélel Kéllé	2	2	Aéra Lao	6	4
Dara Haleybé	2	2	Barobé Wassataké	2	2
Diagnoum	2	2	Bodé Lao	2	2
Diamal	2	2	Boguel	1	1
Dimat	2	2	Boké Dialoubé	2	2
Diambo	2	2	Boké Mbaybé	2	2
Diattar	4	2	Boki Sarankobé	2	2
Démette	2	2	Cas Cas	3	3
Dodel	5	2	Diaba	2	2
Donaye	3	2	Diongui	4	4
Fanay	5	2	Diouldé Diabé	2	2
Gamadji Saré	2	2	Dounguel	1	1
Guédé Chantier	2	2	Galoya	3	3
Guédé Village	4	2	Goléré	3	3
Guia	3	2	Lougué	4	3
Loboudou Doué	2	2	Madina Ndiatbé	6	4
Mbiddi	2	2	Mbolo Birane	2	2
Mboyo	5	2	Mboumba	2	2
Namarel	3	2	Méry	3	3
Ndianane	2	2	Ndiayène Peul	3	3
Ndiawara	2	2	Pété	2	2
Ndiayène Pendao	4	2	Saldé	2	2
Ndieurba	2	2	Siwré	2	2
Ndioum	2	2	Thioubalele	2	2
Nguendar	2	2	Walade	2	2
Pathé Gallo	3	2	Yaré Lao	4	4

Saint-Louis Medical Region					
Podor Health District			**Pété Health District**		
Sinthiou Dangdé	3	2			
Tatqui	2	2			
Thialaga	2	2			
Thiangaye	2	2			
Thillé Boubacar	4	2			
Touldé Gallé	7	2			
32 health posts	**91**	**64**	**26 health posts**	**69**	**64**

Comments

The analysis of the health system in the four pilot districts of the CBS highlights the strengths and areas for improvement. This analysis also makes it possible to identify the challenges and constraints related to the implementation of surveillance activities.

In the early 2000s, the government of Senegal initiated local health policies that led to strong health structures in the communities covering the entire geographic area of the four project districts. The health districts are led by qualified doctors with solid expertise in public health.

There is good community engagement in health promotion and surveillance activities through the CVACs, which were established by the Community Health Unit of the MSAS. Originally envisaged for maternal health, these CVAC members now perform a range of public health activities at the community level.

However, there are still many avenues for improvement, disease reporting being the most important among them. Disease and event reporting are low in districts despite the availability of electronic tools (e.g., tablets and smartphones) offered by programs and other technical and financial partners. There is limited use of the various electronic platforms established by the MSAS and its partners.

Challenges faced by MEASURE Evaluation in the existing community surveillance programs within the four project districts include lack of sufficient diagnostic support services, logistical difficulties in reaching the health points, and poor internet connectivity in some rural areas.

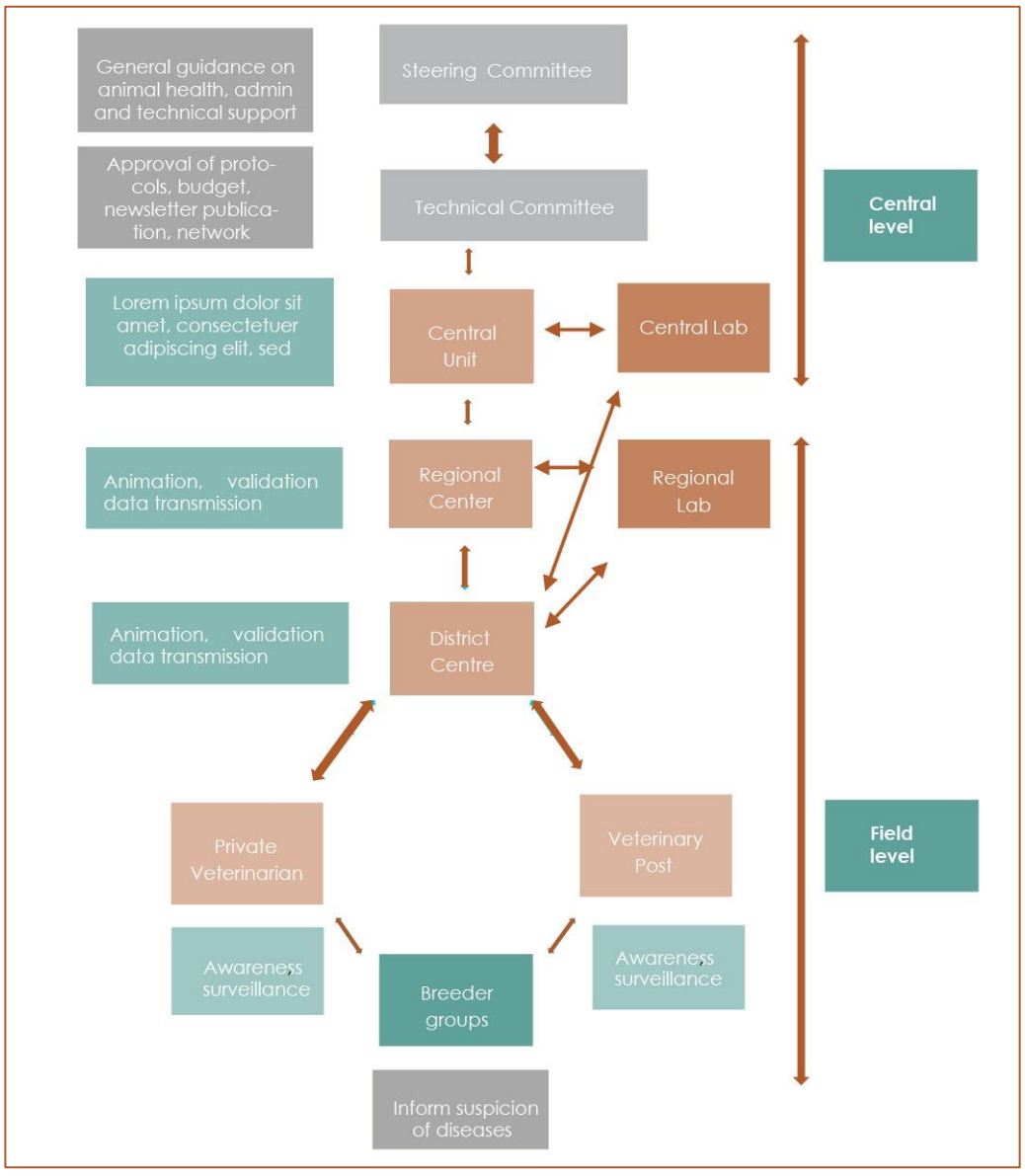
Overall, the health sector in the project districts is well organized in terms of community health volunteer groups who are trained to use the mobile applications to alert nurses throughout the existing community surveillance activity. However, the reporting of cases, including zoonotic diseases, needs improvement. Laboratory facilities at the regional and district levels also need improvement.

LIVESTOCK SECTOR

Organization of Livestock Services

Senegal is considered a rural economy, with the livestock sector contributing 37 percent of the agricultural value and 5.5 percent to the national GDP. Livestock contributes to the livelihood of about 30 percent of Senegalese households. Pastoralists and agro-pastoralists grow cattle, sheep, and goat; whereas, most of the rural households are involved in traditional poultry rearing (Food and Agriculture Organization, 2005). Over time, the proportion of cattle production has decreased, and that of poultry has increased.

Figure 5. Organogram of the national surveillance system for animal diseases in Senegal



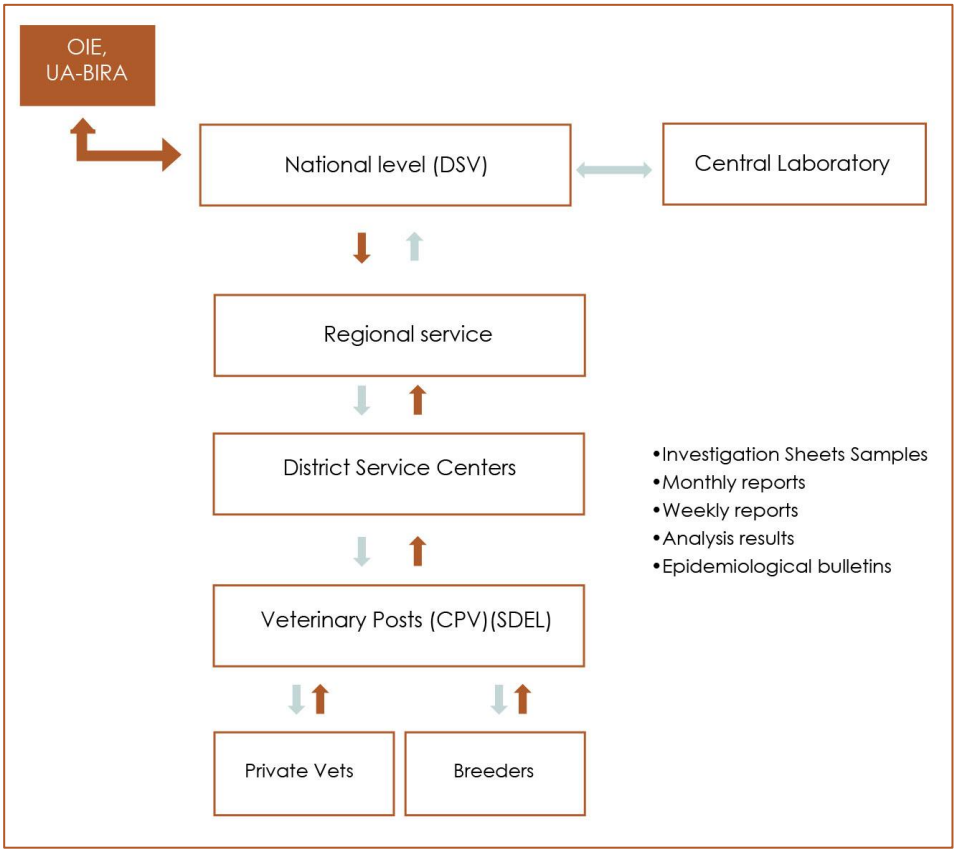
The organization of the livestock services also follows a pyramid structure within the ministry offices at the central level, the regional service centers at the regional level and the district service centers, and the veterinary posts at the peripheral level (Figure 5). The veterinary posts (CPV) are staffed by livestock agents (*agents de travaux d'elevage*) who are assisted by livestock assistants (*auxilaire veterinaire*) in the

community. The agents are paraprofessionals with 2 years of training. The district centers (SDEL) are managed by livestock engineers who are also paraprofessionals with a high school diploma and 3 years of training. Only the service centers, from the regional level and above, have the services of a veterinary doctor. Apart from the government service centers, there are private veterinarians in some of the districts, and where these services are available, the government veterinarian, working at the regional offices, will limit services to administrative affairs alone.

The Ministry of Livestock and Animal Protection (MEPA) oversees several directorates responsible for different disciplines of the livestock sector. At the national level, Department of Veterinary Services (DSV) is the directorate responsible for preserving animal and public health and adapting animal disease control to the new context of trade globalization and the risks of trade in animals and animal products.

Data are collected from the field either as paper or electronic files, and outbreak reports are either created on paper or electronically in the surveillance database system VGTropics. The results of samples sent to LNERV and other reports from the field offices are transmitted to the DSV and data are entered into the centralized reporting systems: SIGEL, Epi-info, or VGTropics. The results of the analysis are usually disseminated through electronic messages, service notes, epidemiological bulletins, reports, or result sheets (Figure 6).

Figure 6. Surveillance: Information flow



Infrastructure in the Project District

The infrastructure of the four pilot districts varies. In Tambacounda, there is a regional service and a departmental service, both Koumpentoum and Podor have a district (departmental) service. The district of Pété, which administratively depends on the department of Podor, has only veterinary posts (Table 6).

Table 5. Veterinary service delivery points in project districts

Region	District	Regional service	District services	Veterinary posts	Livestock agents	Private vets
Saint-Louis	Pété	1	1	5	> 100	0
	Podor	0	1	7	> 100	2
Tambacounda	Tambacounda	0	1	17	250	3
	Koumpentoum	0	0	7	60	2

Source: Government of Senegal, 2017b,c

Laboratory Infrastructure

Senegal has a well-equipped LNERV and six regional veterinary laboratories; however, the regional laboratories are not functional. In addition, there is a FAO reference laboratory for avian influenza and transboundary diseases, which also serves as a reference laboratory of the West African Health Organization. The services available at LNERV include bacteriology, virology, and parasitology; there is no pathology laboratory.

The LNERV is supported by the International Energy Agency and FAO (EPT2 program). For biosecurity, the laboratory receives the support of the Defense Agency for the Reduction of Threats. The laboratory has a cold chain, i.e., a temperature-controlled supply chain, that meets international standards. In terms of energy, the LNERV also has the national electric company SENELEC's power supply of two generators that allow it to be powered twenty-four hours per day, every day of the week.

Since 2013, the laboratory has had a single point-of-contact counter, where all samples are received and processed for biological analysis. This counter called Center for Diagnosis and Analysis is headed by a veterinary doctor. Currently, the laboratory does not have a database for managing the results of biological analyses. However, as part of the laboratory's collaboration with the MEPA, results can be sent to the DSV through the VGTropics platform; although, this is not done on a regular basis. The results are saved on Excel files. Table 7 displays the number and type of staff at the central laboratory.

Table 6. Staffing at the central laboratory

Research Staff	Number of Staff	Support Staff	Number of Staff
Research Leads	2	Administrative Staff	1
Research Officers	9	Administrative Support Staff	3
International Researchers	4	Administrative Technicians	1
Senior Technical Staff	3	Accounting Assistant	1
Research Assistants	1	Accounting Technicians	1
Regular Technicians	2	Administrative Assistant to Director	1
Laboratory Technicians	3	Driver	3
Laboratory Assistants	2	Non-technical workers	2

All six priority zoonotic diseases can be diagnosed at LNERV, expect for Ebola/Marburg, which are diagnosed at the University of California, Davis, California. In terms of biological analyses, LNERV has the skills and capacities to deal with epidemic threats.

Zoonotic Disease Outbreaks

Senegal follows the World Organization for Animal Health sanitary code for terrestrial animals, and accordingly, the Ministry of Livestock has identified one hundred-sixteen animal diseases and thirty-seven notifiable zoonotic diseases. Among the zoonotic diseases, Senegal has prioritized six as national concerns (Table 8): rabies, zoonotic tuberculosis, hemorrhagic fevers (Ebola and Marburg), zoonotic influenzas, anthrax, and RVF). These diseases were prioritized using CDC tools that the following criteria:

- The severity of disease in humans
- The social-economic impact
- The response capacity to the disease in Senegal
- The capacity to prevent the disease in Senegal
- The pandemic/epidemic potential

Table 7. Six prioritized zoonotic diseases in Senegal

Zoonotic disease	Causative agent	Human disease burden	Animal disease burden	Diagnosis, treatment, and prevention
Rabies	Virus	2014: 452 cases (2 deaths) 2015: 2 cases reported (2 deaths) 2016: No data available	Rabies virus is actively circulating in both wild and domestic animals	Animals vaccines Human vaccines post-exposure prophylaxis Treatment for humans: supportive care
Zoonotic Influenza virus	Virus	No human case of highly pathogenic avian influenza has been reported.	No data available.	Senegal has had the capacity to perform molecular diagnostic tests since 2006. Avian influenza vaccines in development. Treatment for humans: supportive care and antiviral agents
Tuberculosis	Bacteria	In Africa, the observed zoonotic tuberculosis rate is 2.8% Zoonotic tuberculosis: 7 cases/100.000	No data available.	Currently, no animal vaccines available in Senegal Human Ebola vaccines in clinical trials Human treatment: supportive care
Hemorrhagic fevers (Ebola, Marburg)	Virus	2014: One case of Ebola in Senegal during the west Africa Ebola outbreak. No current cases of Marburg in Senegal	The fruit bat species (identified as likely reservoir of Ebola in the 2014) are present in Senegal, but the animal disease burden is unknown. No data available on animal burden of Marburg in Senegal	Currently, there are no animal vaccines available in Senegal; Human Ebola vaccines are undergoing clinical trials; treatment for human is supportive care
Anthrax	bacteria	No data available on global incidence Human case rates are highest in Africa and central and southern Asia. In Africa, there can be 10 human cutaneous and	No data available, but is significant among the ruminants near the Gambian borders	Vaccines available for animals and humans. Antibiotics are available for humans

		enteric cases per single animal carcass		
Rift Valley fever (RVF)	virus	RVF outbreaks among humans in Senegal in 2013 and 2014	Multiple outbreaks of RVF among animals in recent years	Several vaccines available, but require multiples doses or induce only low-level protection, so are not routinely used. There is no licensed human vaccine

Table 8. Zoonotic diseases reported in animals during 2017 in two regions and overall in Senegal

Disease	Saint Louis		Tambacounda		Senegal	
	Suspected	Confirmed	Suspected	Confirmed	Suspected	Confirmed
Bovine TB	0	0	0	0	12	8
Rabies	2	0	0	0	20	19
LPAI	1	0	0	0	31	31

LPAI, low pathogenic avian influenza ; TB, tuberculosis

Data Collection and Surveillance System

The data collected at the central level are used in three different types of programs: Epi Info, SIGEL, and VGTropics. All the data for analysis are entered into Epi Info at the central level, whereas the economic data, including the livestock production details, are included in Senegalese Livestock Management System (SIGEL). The surveillance database of the Ministry of Livestock is VGTropics. Trained staff at the district office of Livestock Engineers enter the data into VGTropics at the district level. VGTropics has an interface, called VGTropics One Health, which can be reached by applying the relevant filters and it gives a report on the zoonotic disease outbreaks in the country. VGTropics One Health has been developed with the assistance of FAO.

VGTropics operates on a different software program than DHIS2, and its server is maintained by Medex, an organization in Belgium. Medex Belgium, a consortium of nongovernmental organizations, is responsible for the development of VGTropics in six countries. Senegal is one of the pilot countries to adopt that program. The partnership with Medex commenced in 2007, with only technical support from Medex. Prior to VGTropics, Senegal was using SIGEL for online entry of animal health data; however, the deficiencies of it led the country to switch to VGTropics.

VGTropics, although operational, is not considered to be fully functional yet. It was expected to become fully functional in January 2018, including all training and retraining of field staff, and removal of all training data. Currently, Senegal lacks the skill to make modifications or changes to the database to make it interoperable with the surveillance database of the health sector, or with the mobile application mInfoSanté. Not all field staff have been trained to input information into VGTropics; therefore, its use is limited. Moreover, internet connectivity in remote areas is another serious hurdle in accessing the online surveillance database and entering the information. GPS coordinates have been established for

15,000 villages in Senegal, the Ministry of Livestock is working for validation of cases at district and regional levels before it is accessible to the Central level.

Livestock Assistants

Presently, auxiliary livestock assistants work in villages where doctors are not available and work closely with veterinarians in the community. The health sector has organized groups of CVACs to support the health care activities in the villages. Some of the CVAC members may be livestock assistants or cattle breeders. However, the CSC is updating the guidelines for organizing these volunteers in each village to ensure the inclusion of livestock assistants in the future.

The Ministry of Livestock, in principle, agrees that livestock assistants could be a part of the CVAC for sending alerts on zoonotic diseases. They propose that these agents should at least have completed their eighth-grade education so they can understand how to use mobile applications.

Comments

The livestock sector has a pyramidal structure. Livestock institutions can be found across the country, even in the remotest villages, and each institution has a network of livestock assistants to work with the community. The pyramidal service structure in Senegal provides for veterinary doctor service only at the regional level.

The whole country is currently dependent on the central laboratory for all the diagnoses. The central laboratory is well equipped to conduct diagnostic tests. However, there is a dire need to revamp the six regional laboratories; this task will be undertaken by FAO and World Bank in 2018.

The surveillance database is not yet functional. The country needs to focus on improving the routine reporting mechanism using the available surveillance database (i.e., VGTropics) by providing training to all concerned office staff and ensuring internet connectivity in all regions.

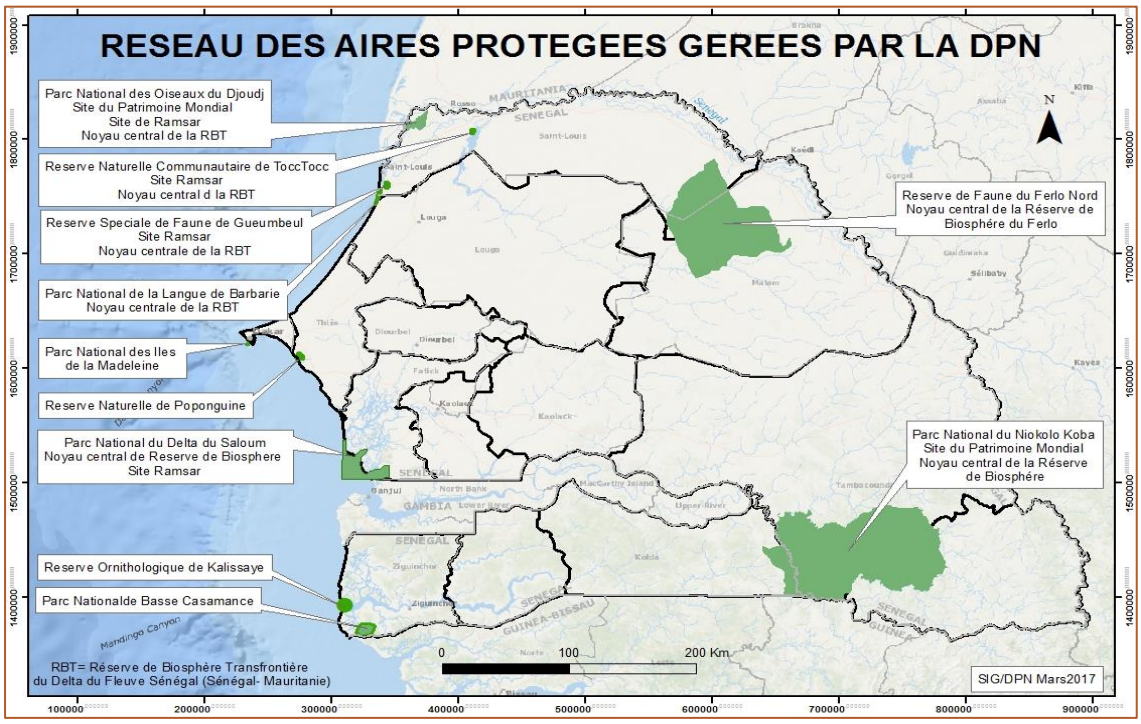
The livestock assistants who currently work closely with the veterinarians and para-veterinarians can be included in the existing CVAC and function effectively to capture the outbreaks of zoonotic diseases among animals in a community or village.

ENVIRONMENT SECTOR

The Directorate of National Park (DPN) and the Directorate of Marine Protected areas, under the Ministry of Environment, are responsible for managing the different eco-geological terrains of Senegal, in three major regions. These three large complexes occupy an area of approximately 18,081 km², or 9.2 percent of the national territory (Figure 9).

1. Niokolo-Koba National Park (PNNK), home to large and medium wildlife
2. Coastal wetlands and marine areas
3. The Sahelian ecosystem, consisting of mainly Ferlo Nord Wildlife Reserve

Figure 8. Network of protected areas managed by the DPN



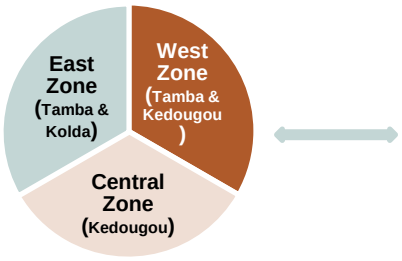
Source: Government of Senegal, 2016

The Niokolo-Koba National Park, extending over 913,000 hectares, is the largest park in Senegal. The park is spread over three regions: Tambacounda, Kolda, and Kédougou. Tambacounda is one of the project regions, and therefore, the PNNK requires special attention for this project. The park is considered the last refuge of the great fauna in West Africa, including lion, elephant, wild dog, Derby moose, and chimpanzee. Senegal's National Monograph of Biodiversity (1998) reveals that the park's fauna comprises about 80 mammal species, 330 bird species, 36 reptile species, 20 amphibian species, 60 fish species, and various species of entomofauna. The large- and medium-sized wildlife in the park are representative of savanna animals (Government of Senegal, 2016). More than 100,000 villages surround the Park, representing several different cultures.

Organization of the Park

The Park is divided into three zones for ease of administration: East, West, and Central Zones. The East zone comprises the area of the Park, partly in Tambacounda and Kolda regions, West zone includes part of Tambacounda and Kedougou regions, and the Central Zone is in Kedougou region (Figure 10). Each zone is under the purview of a conservator (an agriculturist with a bachelor's degree and minimum five years of experience) who is assisted by support staff under the national parks administration. Each zone is further subdivided into three to four sectors, depending on the size and place under a Sector Chief (engineers who are with a bachelor's degree and minimum three years of experience). They are further assisted by technical agents. Each sector has two to four guards (chef de posts).

Figure 9. Zoning of Niokolo-Koba National Park, Tambacounda



Staff	Number
Conservator of the national park	03
Work engineers	15
Technical qgents	64
Guards	85
Military staff	01
Contractual staff	07
TOTAL	175

Disease Surveillance

In the absence of specific guidelines for surveillance and sample collection, PNNK follows the system of passive surveillance. Because it is spread over a vast area, it is difficult to catch animals and conduct any type of active surveillance. Instead, the Eco-guards and Eco-guides report any unusual deaths they observe during their routine visits. Veterinarians have no specific guidelines for the collection of samples; they base it on a suspected disease. When an outbreak is suspected, the Eco-guards report it to the park officials responsible for outbreaks. In the Tamba region of the PNNK, the park official responsible for outbreaks reports to the Zone Chief, who reports it to the DPN office at Dakar. The routine is to report diseases, deaths, or other unusual events through radio transmissions each morning. The DPN coordinates with the DSV of the Ministry of Livestock when a disease or an outbreak is reported, and the veterinarian in the nearest region is responsible for collecting samples in the park, dispatching them to LNERV, and reporting the incident. It then follows the routine system of surveillance like any other case and is followed-up through veterinary hospitals.

Not many outbreaks have been reported from the PNNK, except for individual cases among animals. But, an outbreak of RVF was reported in 2013. During this outbreak, several aborted gazelle fetuses were discovered. During this outbreak, park officials enacted a visitors' ban, quarantined all the affected female gazelles, collected samples for laboratory testing, and vaccinated the remaining gazelles.

Involvement of Community

The Eco-guards and Eco-guides are people from the community living around the park who work closely with government agents in the Park. While Eco-guards are park employees, Eco-guides are voluntary tourist guides, who are also responsible for increasing the awareness in their own communities and enforcing Park regulations, such as preventing community encroachment into Park areas for hunting the animals, cutting down trees, and taking domestic animals into the reserve areas for grazing. In the project districts adjacent to the Niokolo-Koba National Park, the Eco-guards and Eco-guides are the people who act as livestock agents and they are included in the CVAC.

Comments

The communities living in the periphery of the National Park are at risk of contracting the diseases because of their close proximity to the animals. The Eco-guards and Eco-guides could be included in the CVAC groups, trained to detect diseases among animals in these communities, and send alerts to the local veterinary officer.

OTHER PROJECTS IN SENEGAL

In addition to MEASURE Evaluation, other national and international agencies are working in Senegal in community health, surveillance, and One Health approach.

Regional Disease Surveillance Systems Enhancement Project: World Bank

This World Bank-funded project has two aims: (1) to strengthen national and regional cross-sectoral capacity for collaborative disease surveillance and epidemic preparedness in West Africa, and (2) to provide immediate and effective response to an eligible crisis or emergency. The project has five components as follows:

(1) Implementing surveillance and information systems to support the enhancement of national surveillance and reporting systems and their interoperability at the different tiers of the health systems.

(2) Strengthening of laboratory capacity to establish networks of efficient, high-quality, accessible public health; veterinary and private laboratories for the diagnosis of infectious human and animal diseases; and to establish a regional networking platform to improve collaboration for laboratory investigation.

(3) Enhancing preparedness and emergency response to support national and regional efforts of enhancing preparedness and response capacity for infectious disease outbreaks.

(4) Managing human diseases for effective disease surveillance and epidemic preparedness is cross-cutting given that animal and human health workers form the backbone of disease surveillance, laboratories and preparedness and response.

(5) Building institutional capacity, project management, coordination, and advocacy focusing on all aspects relating to project management.

Support to the Global Health Security Program in the Fight Against Zoonoses and the Strengthening of Animal Health in Africa: FAO

The FAO supports the GHSA in the fight against zoonoses and to strengthen animal health in Africa. The project is funded by United States Agency for International Development (USAID) and covers fourteen African countries, including Senegal. The project helps countries strengthen capacities to better prevent, detect, and rapidly and effectively respond to the pandemic threats of emerging and re-emerging diseases. FAO works on five areas of activity: zoonotic surveillance, biosecurity and biosafety, laboratory system, staff development, and antimicrobial resistance.

In 2018, FAO's planned activities for community surveillance include the following:

- Contributing to the establishment of community case definitions, in collaboration with the DSV
- Training thirty people (field staff, para-veterinarians) in participatory approaches to improve syndromic surveillance, community awareness, and risk communication
- Organizing community surveillance training for priority zoonotic diseases using the One Health approach in target areas
- Equipping the national livestock laboratory with tools and reagents
- Rehabilitating three regional livestock labs
- Training fifteen veterinarians in field epidemiology

One Health Work Force: OHCEA

One Health Central and East Africa is a network of Public Health and Veterinary Higher Education Institutions located in eight countries. It collaborates with the School of Veterinary Sciences and Medicine (EISMV) and the Institute of Health and Development to train the current and future workforce in various sectors, such as human health, animal health, and environment. The OHCEA works jointly with the Senegal's Ministry of Environment to define the skills required for staff to implement the One Health strategy. They assist EISMV in the development of programs, training modules, and other learning tools and opportunities to ensure that future graduates are prepared to address barriers related to detection, prevention, and disease control in Senegal.

Funded by USAID, OHCEA's main goal is to deliver future leaders with the capacity to address complex health challenges using the One Health approach. Key activities for 2018 include:

- Organizing a field epidemiology activity on zoonotic diseases in wildlife for students' One Health Club
- Monitoring the implementation of an action plan to address zoonotic diseases and public health threats
- Organizing a continued training seminar to strengthen One Health leadership competencies of operations staff involved in health systems

PREDICT2: EcoHealth Alliance

The PREDICT2 project is funded by USAID to assist the government in the surveillance of Ebola and related viruses that have the potential to trigger pandemics, as well as behaviors, practices, and conditions associated with the evolution, amplification and spread of viruses. In addition, PREDICT 2 is working to strengthen the government's capacity to define predictive modeling to better target surveillance and risk mitigation strategies to prevent the spread of animal-derived viruses, such as Ebola, in human communities. The project is implemented through a partnership between the EISMV, the Senegalese Agriculture Research Institute, and the University Cheikh Anta Diop. Implementing Partners include University of California-Davis, EcoHealth Alliance, Metabiota, Smithsonian Institution, and Wildlife Conservation Society.

PREDICT2 activities include training the workforce in biosafety, safe wildlife capture and sampling, human syndromic surveillance, proper use of cold chain supply chain, sample storage and transportation, and data management.

Field Epidemiology Training Program: CDC

Field Epidemiology Training Program (FETP) is a CDC-funded program that supports Senegal and other countries establish trainings that strengthen their surveillance capacity in epidemiology and response in the event of an epidemic. The FETP program has a pyramidal structure with the following three levels and corresponding duration of training: frontline (peripheral level: 3 months), intermediate (regional level: 1 year), advanced (central level: 2 years). The project in Senegal has been focusing on the peripheral trainings.

Community Surveillance Project: Catholic Relief Services

Catholic Relief Services, with the support from CDC, implemented a pilot project for integrated disease surveillance at the community level in the Diourbel region between October 2016 and September 2017. This project is aligned with the vision and strategy of MSAS as the key component of the global health security agenda. Catholic Relief Services plans to add three additional regions in 2018: Kolda, Tambacounda and Kedougou.

Global Health Security Agenda Surveillance Project: PATH

PATH is supporting surveillance activities in Senegal through an initiative of the GHSA and funding by the CDC. PATH supports the following areas:

- Strengthening the interoperability of infectious disease surveillance systems to rapidly detect and report threats, efficiently monitor trends, and produce data for better decision-making
- Strengthening of laboratories capacity to use rapid, high-quality diagnostics and have strong links with information systems
- Strengthening of health information systems to integrate immunization data, surveillance reporting, and laboratory diagnostics

Comments

In Senegal, several agencies are working in community surveillance and One Health. Identifying these partners and their activities will enable MEASURE Evaluation to partner with agencies that could complement the GHSA project on One Health and avoid duplication of activities.

The FAO works with the Government of Senegal with similar objectives. It is possible for us to work with FAO in several activities at the national level, as well as in field activities.

The OHCEA organization has substantial experience working with the Ministry of Environment in areas around national parks. There is a potential to partner with this organization for two reasons: (1) the current project has limited its scope of activities to the two major sectors in the One Health approach at the peripheral level and (2) the PNNK is in a project district.

Field Epidemiology Training program could be pursued by the government in the context of community surveillance of zoonotic diseases, to train the professionals in both the sectors at the district, regional, and national levels. The current project will focus on training in zoonotic diseases for nurses and para-veterinarians at local medical and veterinary posts and in the community.

ONE HEALTH INITIATIVES IN SENEGAL

Legal Framework

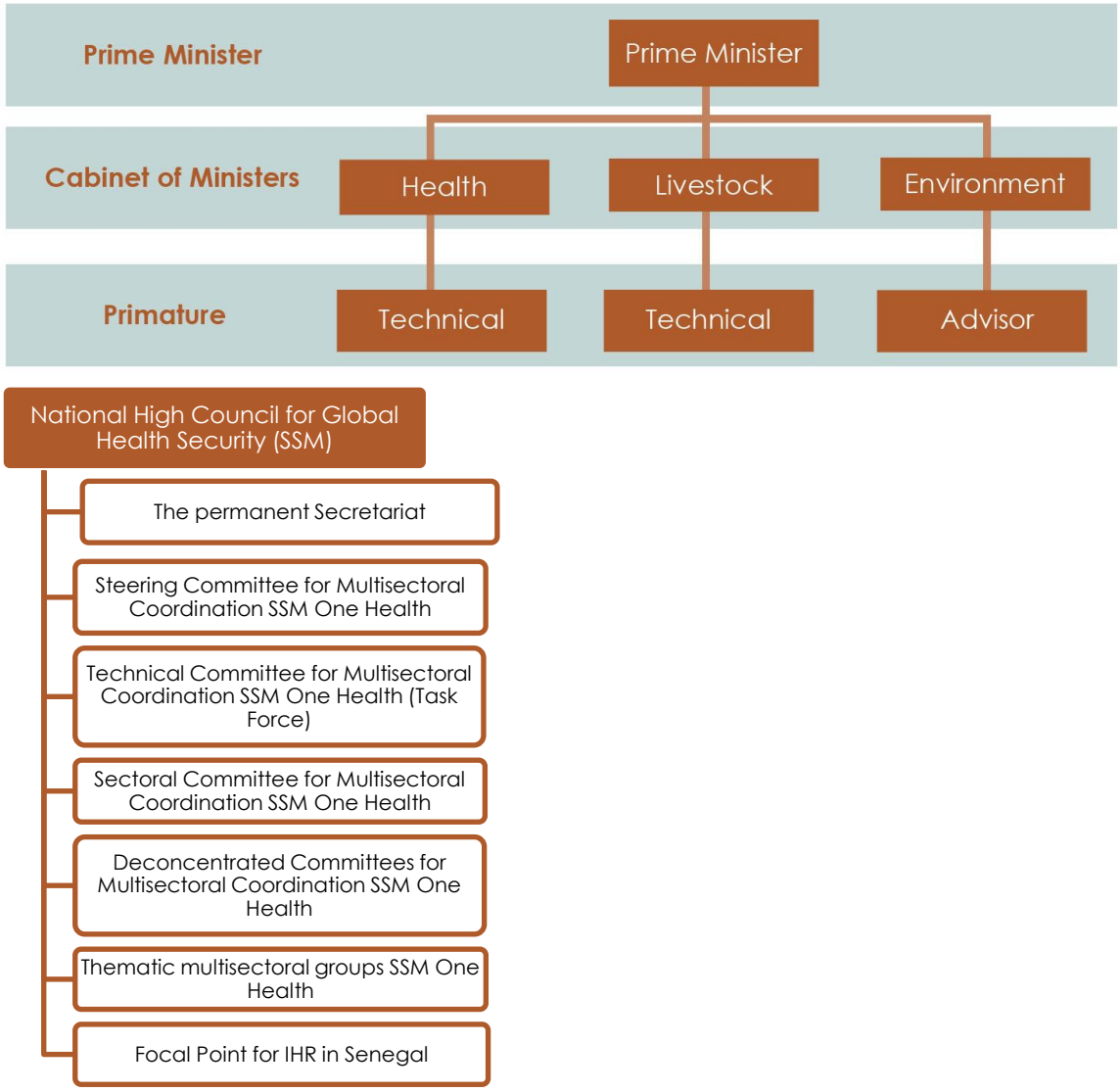
The government of Senegal is committed to the goals of the GHSA. As a part of this commitment, the Prime Minister has legally created a structure at the national level for overseeing the One Health activities (Figure 10) (Government of Senegal, 2017a). The National High Council for Global Health Security (SSM) One Health was created within the Primature with the mission of defining the strategic directions of the One Health Global Health Security program within the framework of International Health Regulations, which is an international legal instrument. The SSM is also responsible for ensuring the synergy and complementarity of the sectors in charge of human health, animal health, environmental health, food and nutrition security, food safety, and public and civil security. The One Health platform and related initiatives receive technical and financial support from donors, including USAID, WHO, CDC, the World Bank, and FAO.

Among the different organs of the SSM, the Multisectoral Technical Committee (One Health Task Force) is responsible for the following:

- Developing multisectoral plans for the Global Health Security Program
- Ensuring the coordination and monitoring of the multisectoral response of any international or national human and animal health event and environmental event with the affected sectors
- Sharing the thematic groups' conclusions to monitor the implementation of the steering committee's directives and recommendations to help build capacity and disseminate the One Health approach to Global Health Security

The One Health Task Force has been holding monthly and quarterly meetings since it was established in 2017.

Table 9. Organization of National One Health Platform in Senegal



Comments

One Health Task Force is in the initial stages of setting the stage to implement One Health in Senegal at the national level. The technical committee, with the GHSA technical advisor for health as the coordinator, is working with One Health focal points that have been identified in each of the stakeholder sectors.

The central One Health platform needs to be supported in its activities by developing national strategic plans and guidelines for the activities. This platform needs to be further extended to regional and local levels for the One Health approach to function effectively in Senegal.

EXPECTED CONTRIBUTION OF GHSA ONE HEALTH PROJECT ACTIVITIES TO COMMUNITY SURVEILLANCE AND ONE HEALTH IN SENEGAL

Existing Surveillance

Based on the assessment of how well the stakeholder sectors are functioning, it is expected that the current GHSA One Health activity will strengthen the surveillance mechanisms through the following three specific activities.

Event-based community surveillance: Although event-based surveillance was recommended by the International Health Regulations, One Health project appears to be a pioneering project, adopting it as a major objective and implementing it in the four pilot project districts. This project will train communities to detect outbreaks of the six prioritized zoonotic diseases, or any unusual event in humans and animals, and report it, using mobile phones, to the nearest peripheral facility ICP or livestock agent at CPV. This will help strengthen existing surveillance systems in the health and livestock sectors by reducing the time between the occurrence of a disease or event and reporting, which will lead to early diagnosis, response, and ultimately prevention of disease outbreaks in the communities.

Mobile-based surveillance: The existing mobile platform mInfoSanté will be used by the community to send alerts to the local nurse or veterinary agent. The use of this mobile application has been proven effective in sending alerts through the existing community-based surveillance activity for eight priority human diseases, and will now be extended to zoonotic diseases. The extensive mobile coverage of Senegal was considered when planning to implement this strategy for community surveillance. This mobile mechanism is, therefore, considered to extend the surveillance activities to the community in a way that enhances the effectiveness of the surveillance activities of both sectors through the CVAC members.

Routine surveillance: The GHSA One Health project envisages having regular meetings with CVAC members at the health and veterinary posts to establish regular communication between them to enhance the quality of the members reporting. It will also improve the routine surveillance by directly verifying the entry of alerts into the register at the posts maintained by the nurses and livestock agents.

The district supervisors of MEASURE Evaluation will work with the district management team to ensure the alerts are entered in the mInfoSanté dashboard via the mobile alerts and the nurse's registers are appropriately represented in DHIS2/VGTropics. These activities will improve the routine surveillance mechanism.

One Health Approach

The government of Senegal has established a legal framework for the functioning of the One Health activities and has a functioning One Health Task Force as the apex technical body. The One Health activities in Senegal are expected to be further strengthened through promoting regular intersectoral workshops and meetings, hosting an annual One Health conference to share the experiences and ideas relating to One Health, interacting at regular intervals with other partners working on One Health, and assisting the government of Senegal to develop a national strategy plan for the operationalization of One Health approach on community surveillance.

CONCLUSION

A rapid assessment of the stakeholder sectors in the project districts was performed to assess the sector readiness for the implementation of community surveillance projects in zoonotic diseases. The new One Health project is an extension of the ongoing community surveillance in eight priority diseases in the health sector. Health sector has a presence in all the areas of the health districts, with CVAC organized in the project districts. It also has the capacity to diagnose all six zoonotic diseases in the country. The livestock and environment sectors are similar, except that the community volunteers for these sectors need to be included in the CVAC. The project activities by other partners were reviewed to identify areas of possible partnership. The One Health platform is functional in the country and coordinated by the Primature technical advisors for health and livestock.

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This publication was produced with the support of the United States Agency for International Development (USAID) under the terms of MEASURE Evaluation cooperative agreement AID-OAA-L-14-00004. MEASURE Evaluation is implemented by the Carolina Population Center, University of North Carolina at Chapel Hill in partnership with ICF International; John Snow, Inc.; Management Sciences for Health; Palladium; and Tulane University. Views expressed are not necessarily those of USAID or the United States government. TR-18-255

ISBN: 978-1-64232-031-2

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