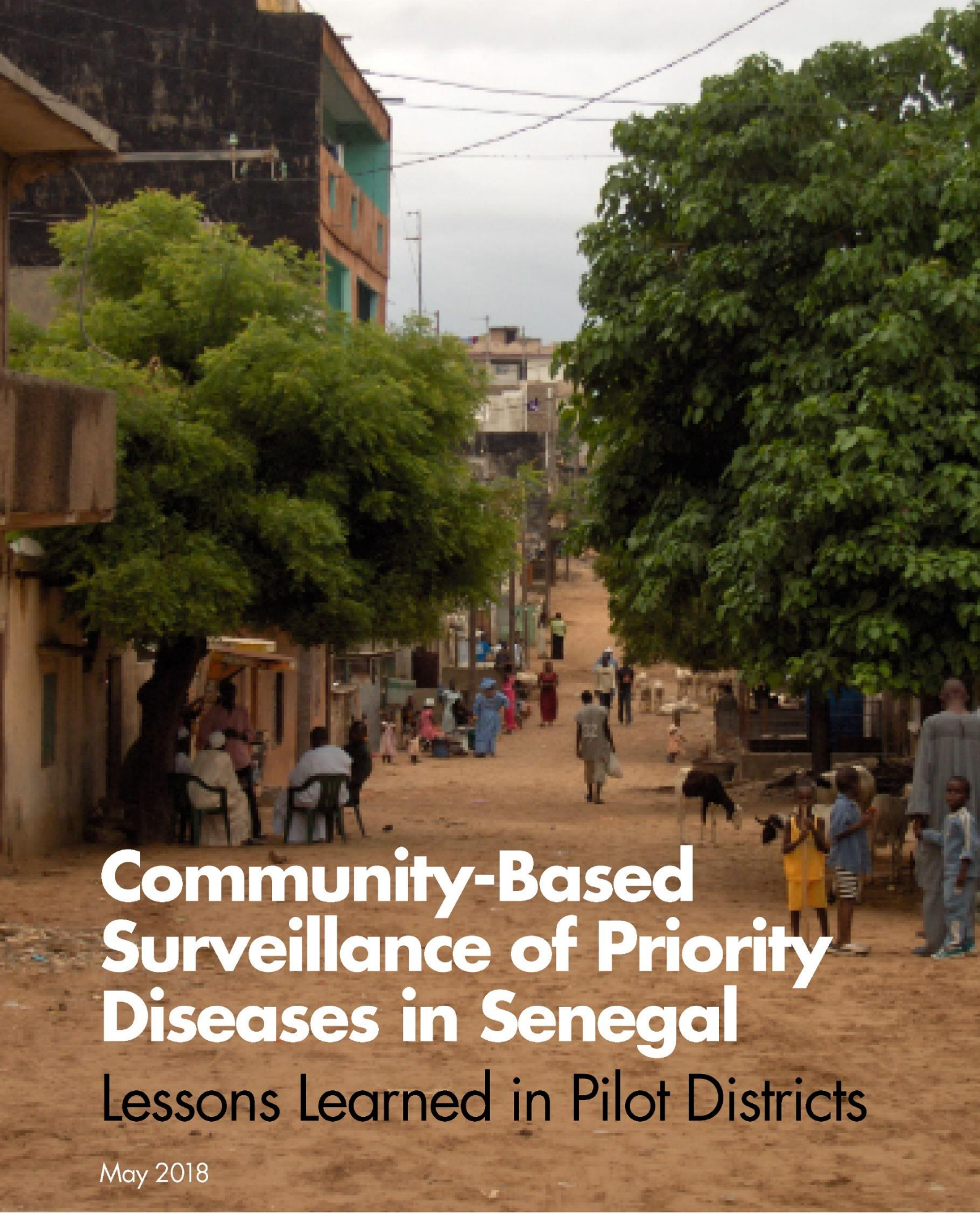

Community-Based Surveillance of Priority Diseases in Senegal

Lessons Learned in Pilot Districts

May 2018

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Lessons Learned in Pilot Districts

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May 2018

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Cover photo by Xavier Dammon

CONTENTS

TABLES

ABBREVIATIONS

CBS	community-based surveillance
CDC	U.S. Centers for Disease Control and Prevention
CHW	community health worker
COUS	Health Emergencies Operations Center
CSC	community health unit
CVAC	community watch and alert committee
DP	Department of Medical Prevention
DSISS	Division of the Health and Social Information System
ECD	district medical team
FCFA	francs Communauté Financière d'Afrique
ICP	health-post head nurse
IDSR	integrated disease surveillance and response
IHR	International Health Regulations
MCD	chief district medical officer
MCH	maternal and child health
MCR	chief regional medical officer
MSAS	Ministry of Health and Social Action
SMS	Short Message Service
SNEIPS	National Education and Health Information Service
SOP	standard operating procedure
TWG	technical working group
UNC	University of North Carolina
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

The Health Emergencies Operations Center (COUS) of the Ministry of Health and Social Action (MSAS) of Senegal launched community-based surveillance (CBS) in 2016 with support from the United States Agency for International Development (USAID) and the World Health Organization (WHO).

The USAID-funded MEASURE Evaluation provided technical support to implement the pilot stage of CBS in four districts in the regions of Saint Louis and Tambacounda. The overall goal of this initiative was to reduce the time lapse between the onset of symptoms and the health system's response to prevent infectious disease epidemics.

Together, we created a CBS teaching manual, tailored the mHealth platform to send notifications via SMS (Short Message Service) and data management, and developed standard operating procedures (SOPs) for data analysis and checklists for supportive supervision. Overall, 16 district medical team (ECD) members, 106 nurses and health-post head nurses (ICPs), and 2,094 community health workers (CHWs) were trained to implement CBS.

As of 13 March 2018, 360 priority disease alerts were sent via SMS by community watch and alert committees (CVACs), including 72 percent that were investigated by ICPs. Of the investigated alerts, 112 were classified by ICPs as corresponding to the clinical symptoms of priority diseases under surveillance that should be reported to the district as suspected cases. In this report, we describe the pilot project to implement CBS, preliminary results, and recommendations for supporting a surveillance system for priority diseases at the community level.

INTRODUCTION

Faced with the threat of emerging and pandemic diseases, governments, agencies, and donors in resource-limited countries have prioritized CBS. During the recent Ebola virus disease epidemic in West Africa, Senegal had one case and was able to prevent others through a robust response from health officials. With increased mobile network coverage in Senegal, communities can become more involved in the surveillance system if they are trained to use mobile phones to send alerts to health professionals of potential cases of diseases.

Several factors favor CBS implementation in Senegal. An evaluation conducted in 2016 on Senegal's capacity to implement the International Health Regulations (IHR) recommended strengthening communities' ability to report alerts in real time and to monitor potential epidemics. The MSAS included this recommendation in the new National Strategic Plan for Integrated Disease Surveillance and Response, which made CBS a national priority (2017–2021). The COUS leadership gained experience in data management related to Ebola virus disease epidemics using an mHealth platform called mHealth Info, which was supported by UNICEF. In addition, the MSAS trained more than 2,000 CVACs to strengthen maternal and child health (MCH). These CVACs were well-positioned to implement an early warning initiative for diseases within communities.

Under the leadership of the COUS, MEASURE Evaluation provided technical support to roll out the pilot project to implement CBS in four districts in the regions of Saint Louis and Tambacounda. The overall goal of this initiative was to reduce the lag time between the onset of symptoms and the health system's response, to prevent infectious disease epidemics.

In this report, we describe the pilot project to implement CBS, preliminary results, and recommendations for supporting a surveillance system for priority diseases at the community level. Through CBS, CVACs will be able to detect the symptoms of priority diseases within the community, to ensure timely case management and enable district medical teams (ECDs) to conduct investigations that will support disease control and prevention.

IMPLEMENTATION

Development of the Community Surveillance Guide

The MSAS, under the direction of the COUS, began the process to develop a CBS system in 2016. The COUS—with support from the World Health Organization (WHO), the CDC, and USAID—partnered with the Department of Medical Prevention (DP); the community health unit (CSC) and the National Education and Health Information Service (SNEIPS) to adapt the integrated disease surveillance and response (IDSR) guide for community-level application. The technical working group (TWG) has developed a national CBS guide for the eight priority diseases and conditions (measles, bloody diarrhea, neonatal tetanus, meningitis, yellow fever, acute flaccid paralysis, cholera, and hemorrhagic fever). The guide explains the definitions for community cases and features pictures along with the necessary communication techniques for community actors.

Institutionalization of CVACs

CVACs were trained in 2015 by the CSC to support MCH initiatives in the community. The CVAC is a group of people with decision-making power in the community—including the traditional healer, the imam, the priest, and the teacher—who are appointed by community members through a participatory process. In 2016, the MSAS decided to expand the CVACs' mandate to include community-level detection of priority diseases and alerting nurses and health-post head nurses (ICPs).

Selection of Intervention Districts

Several factors were taken into account when selecting districts to participate in the CBS pilot project. First, districts must be located in the regions supported by USAID: Saint Louis, Matam, Tambacounda, Kédougou, Kolda, Sédhiou, and Ziguinchor. Next, the number of functional CVACs, the completeness of weekly IDSR reports using the DHIS 2 software platform, and the epidemiology of the eight priority diseases were examined.

Tailoring Information Technology (IT) Solutions

The mHealth Info platform used to improve communication with health posts was identified as the best option for CBS. MEASURE Evaluation supported the collection of specifications and software configuration. Basic mobile phones entrusted to CVACs and smartphones entrusted to ICPs were purchased, and the cost of SMS between CVACs and ICPs was financed through a contract set up by UNICEF with the telecommunication networks. Smartphones allow users to view the CBS dashboards with an Internet connection.

Adapting Teaching Materials

Teaching materials were derived from the national CBS guide and included a facilitator's guide and adapted materials for participants. The materials were interactive and tailored to the audience. Figures were included to show the roles and responsibilities of the actors in the surveillance system. When available, pictures were included in the worksheets alongside the definitions of community cases of high-priority diseases. The COUS validated the teaching materials so they could be used in CBS training in the pilot districts. The training method for trainers requires that ICPs be trained first in all CBS topics so that they are able to reproduce the training. Key elements of the training for CVAC members covered case definitions for community alerts of priority diseases, communication techniques to use with community members, and SOPs for CBS. In addition, the CVAC was trained to use basic mobile phones to send SMS alerts to ICPs via the mHealth Info platform. (See Tables 1 and 2.)

Table 1. Learning objectives for CVACs

Understand the CVACs' role in CBS
Learn the manifestations of the 8 priority diseases
Understand what to do when visiting a patient
Be able to cite some best communication practices during a home visit
Send SMS messages using basic mobile phones
Interpret CBS indicators
Fill out the CVAC register

Table 2. Learning objectives for ICPs

Master how to use the tools needed for CBS
Access mHealth Info and DHIS 2 dashboards
Learn the community's, the health facility's, and the district's roles and responsibilities

ICPs received training to become fully proficient in the CVAC training content and other skills to ensure that they are able to manage CBS. These skills included how to fill out paper registers and how to access the online dashboards to view the CBS indicators. In addition, specific sessions dealt with CVAC roles and responsibilities vis-à-vis ICPs and ECDs.

Rolling Out Cascade Training

Cascade training began with a three-day national workshop, attended by the central level (MSAS) and the medical regions and health districts of Tambacounda, Koumpentoum, Pété, and Podor. Next, ECDs organized three-day workshops to train ICPs, with support from central- and regional-level trainers. Each district-level training session culminated in setting up a schedule to ensure that each ICP organizes a two-day training session for the CVACs associated with his or her health post, with ECD support. (See Table 3.)

Table 3. Cascade training

Region	District	ICPs	CVACs	CHWs
Saint Louis	Podor	33	64	632
Saint Louis	Pété	32	60	479
Tambacounda	Tambacounda	23	64	511
Tambacounda	Koumpentoum	18	59	472
Total		**106**	**247**	**2094**

Implementation of the mHealth Info System

After the first series of CVAC training in Tambacounda District, the community component of the mHealth Info system was launched and received its first alert (for meningitis) in Podor District on 31 October 2017. Additional alerts were sent while CVAC training was taking place in other districts. During the first month, six alerts were sent, but only two (33%) were investigated by ICPs. Data analysis meetings and supportive supervisions were organized to resolve these performance issues and clarify each actor's roles and responsibilities.

Organization of Data Analysis Meetings

After completing the training, the ECDs organized data analysis meetings to examine CBS data with ICPs. Surveillance focal points prepared the data analysis with support from MEASURE Evaluation. The performance of all actors was reviewed, by looking at the following data:

1. CVACs:
    a. Number of alerts sent to ICPs
    b. Percentage of suspected cases among the investigated alerts
2. ICPs:
    a. Percentage of alerts investigated
    b. Percentage of alerts investigated within 48 hours
3. Surveillance focal point for the district:
    a. Percentage of suspected cases for which a sample was taken
    b. Percentage of suspected cases that were confirmed

The CBS data taken from mHealth Info were cross-referenced with the ICPs' weekly IDSR reports collected by DHIS 2. Discussions focused on how CBS helps to decrease the time between the onset of symptoms and investigating alerts for epidemic-prone diseases. (See Table 4.)

Table 4. Data analysis meeting

Region	District	Dates	ECDs	ICPs
Saint Louis	Podor	2 February 2018	4	32
Saint Louis	Pété	3 February 2018	6	31
Tambacounda	Tambacounda	5 March 2018	4	23
Tambacounda	Koumpentoum	6 March 2018	3	14
Total			**17**	**100**

Organization of Supportive Supervision Visits

Supportive supervision visits were made by ECDs with support from the MEASURE Evaluation team. First, the ECDs supervised the ICPs; then, the ICPs and ECDs visited the CVAC member in possession of the phone. Supervision focused primarily on the ICPs, who had community alerts that were not investigated. The supervisors also worked with the CVACs to revise case definitions and helped clarify the ICPs' roles and responsibilities. (See Table 5.)

Table 5. Supportive supervision visits

Region	District	Start date	End date	ECDs	Supervised ICPs
Saint Louis	Podor	25 January 2018	19 March 2018	2	27
Saint Louis	Pété	20 February 2018	12 March 2018	4	25
Tambacounda	Tambacounda	28 January 2018	9 March 2018	1	23
Tambacounda	Koumpentoum	21 February 2018	2 March 2018	3	18
Total				**10**	**93**

RESULTS

Training for CVACs began on 25 September 2017 and was completed on 19 January 2018. As of 13 March 2018, 360 alerts were sent via SMS to ICPs through the mHealth Info platform. Of these, 259 (72%) were investigated by ICPs, which required a visit to the community to assess the patient's symptoms to determine if they corresponded to the definition of a clinical case. Overall, 206 investigations (57%) were conducted within the recommended 48 hours. The ICPs found that 112 (43%) of the investigated community alerts corresponded to the definition of a clinical case and were considered genuine suspected cases, justifying collecting a sample for the laboratory. (See Table 6.) Details of the alerts, investigations, and suspected cases, disaggregated by disease, are presented here in the appendix.

Table 6. CBS indicators (as of 13 March 2018)

	Podor	Pété	Tambacounda	Koumpentoum	Total
Alerts sent by CVACs	70	48	128	114	**360**
Investigation of alerts by ICPs	30	34	113	82	**259**
Investigation of alerts by ICPs within 48 hours	22	31	84	69	**206**
Suspected cases among the investigated alerts	13	7	49	43	**112**
Percentage of alerts investigated	43%	71%	88%	72%	**72%**
Percentage of alerts investigated within 48 hours	31%	65%	66%	61%	**57%**
Percentage of suspected cases among the investigated alerts	43%	21%	43%	52%	**43%**

CHALLENGES AND RECOMMENDATIONS

Community Watch and Alert Committees

The lists of CVACs designated by health post that were available at the central level were not the same as the available lists of CVACs at district level. Moreover, there was no clear distinction between the established CVACs and operational CVACs. Unfortunately, the SOPs for selecting CHWs as CVAC members were often not monitored, and community members were sometimes unclear about the CHW role. The community coordination meetings led be the CVAC president and CVAC supervision meetings led by the ICP were irregular. In addition to these operational challenges, the vertical nature of national-scale programs resulted in a fragmented management approach for CVACs.

Recommendations:

- Strengthen CSC monitoring and evaluation capacities.
- Propose selection criteria for CVAC members.
- Propose the number of people needed for a functional CVAC.
- Propose minimum criteria for determining if CVACs are functional.
- Review SOPs for selecting CHWs, to ensure that they are applied at the community level.
- Strengthen ICPs' capacity to supervise CVACs and convene coordination meetings.

Community-Based Teaching Materials

Considerable investments were dedicated to designing suitable teaching materials for ICPs; however, teaching materials were not specifically tailored to the CVAC. Not all CHWs are fluent in French, and many have difficulties reading and might be unfamiliar with using mobile phones. Moreover, the distributed materials are not sturdy enough and quickly fall apart.

Recommendations:

- Organize a qualitative discussion group with the CVAC to identify areas for improvement.
- Simplify concepts and translate teaching materials into local languages.
- Create an aide-mémoire with illustrations or photos to improve understanding.
- Ensure that enough time is devoted to practicing how to use mobile phones.
- Improve teaching materials, so that they are sturdier and last longer.

Telephone and Internet Access

Despite ongoing expansion of commercial telephone networks in Senegal's rural areas, some challenges exist for an SMS-based alert system. CHWs have claimed they sent SMS messages to report a priority disease alert that was never received by the ICP. Such errors may be the result of network instability or incorrect use of the phone. Furthermore, there is no single network with national coverage. Consequently, different regions need different telephone service providers, which in turn involves numerous different contracts to ensure that the final users are not subject to SMS costs. Commercial phone service providers were reluctant to supply institutional SIM cards to CHWs, owing to the government regulation requiring that all telephone numbers be registered with an identity card. During the pilot project, MEASURE

Evaluation was unable to obtain the necessary number of SIM cards, and as a result, the CVACs agreed to register their personal phone numbers. If the CVAC member is away from their village, the community has no means for sending a disease alert. Internet access is not universally provided to all health posts or districts. Consequently, ICPs and district surveillance focal points found it difficult to access the mHealth Info website to view the CBS dashboards.

Recommendations:

- Verify whether basic mobile phones indicate that a message has been sent when the network is unstable.
- Clarify what the CVAC member should do when the network is unstable and it becomes impossible to send a message—ideally, this should occur through hands-on exercises during training.
- Analyze the costs associated with phone service providers, to determine the sustainability of communication through free SMS between the CVAC and ICPs.
- Consider providing continuous Internet access to districts and ICPs by means of smartphones.

Number of Telephones per CVAC

Initially, the CBS-implementation plan recommended that one basic mobile phone be allocated to the president of each CVAC. This strategy sought to ensure that alerts of diseases detected by the CVAC will be investigated by the president before being sent to the ICP. It was assumed that the CVAC president has a higher education level than the CHWs, which would help the president detect a higher percentage of cases believed to be suspect among the disease alerts. However, if CBS aims to decrease the time between the onset of symptoms and the health system's response, the CVAC should actively seek out disease cases during home visits. If we limit CHWs' ability to report alerts themselves, by requiring them to go through the CVAC president, we hinder a CVAC's capacity to issue alerts when a CHW member is geographically far from the phone. In addition, purchasing a basic mobile phone costing about 6,000 francs Communauté Financière d'Afrique (FCFA) for each trained CVAC member is not a significant additional cost beyond the current cost of 16,000 FCFA per person for CBS training.

Recommendations:

- Consider distributing one basic mobile phone per village.
- Consider distributing one basic mobile phone per CHW.
- Consider obtaining additional basic phones in case of theft, loss, or damage.

Following Up on Alerts

In some cases, when the ICP received an alert from the CVAC, the ICP hesitated to visit the village to assess the patient's symptoms, because the ICP considered this investigation to be an additional responsibility not falling within the usual scope of ICP duties. ICPs regularly request additional funding to compensate for transportation costs to conduct investigations in villages. Also, ICPs still have not routinely held monthly community-health meetings to review CVAC activities. These meetings should be used to address challenges, find solutions, and strengthen CVAC training. The content of these meetings should not be limited to CBS, but rather should include all topics related to community health.

Recommendations:

- Encourage ICPs to visit villages within 48 hours when the CVAC has issued an alert about a high-priority disease.
- Encourage ICPs to organize monthly integrated coordination meetings with the CVAC
- Consider training ICPs' assistants, who are primarily midwives, to provide follow-up if the ICP is absent or unavailable.

District Medical Teams

The district's successful implementation of CBS could be attributed to a high integration of CBS activities under the responsibility of the ECD. Leadership, coordination, and technical advice were necessary during the training; data analysis meetings and supportive supervision visits were needed for follow-up. However, in some cases, these activities experienced significant delays, because of competing priorities and budget negotiations.

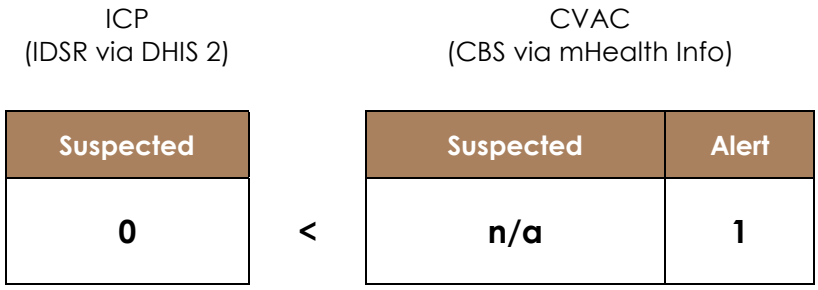
Recommendations:

- Encourage ECDs to supervise ICPs who do not conduct visits to investigate alerts within 48 hours.
- Encourage ECDs to incorporate CBS in routine supervision visits of ICPs.
- Encourage ECDs to include CBS on the agenda of monthly coordination meetings with ICPs.

Data Analysis and Use

For CBS to work, it is essential that ECDs regularly interact with this new source of surveillance data. It is advisable to cross-reference CBS data on mHealth Info with the weekly IDSR reports from DHIS 2. During the pilot stage, we encountered three challenges related to surveillance data.

1. *Alerts that were not investigated and that were not reported by the health post*: ICPs did not go to the village to evaluate the patient's symptoms. This presents a potential problem for treating the patient: the patient may die in the community without ever having been seen in a health facility or could infect other people, because appropriate control measures were not implemented.



2. *The alerts that were investigated were not reported by the health post*: ICPs went to the village, evaluated the patient's symptoms, and classified the patient as a suspected case. However, this suspected case was not cited in the health post's weekly IDSR report in DHIS 2.

ICP (IDSR via DHIS 2)		CVAC (CBS via mHealth Info)	
Suspected		**Suspected**	**Alert**
0	**<**	**1**	**2**

3. *Suspected cases are not detected by the community*: A potential case presenting symptoms of priority diseases went unnoticed by the CHW. This is a potential problem, because suspected cases may go directly to a health facility. The time between the onset of symptoms and case management by the ICP can lead to death or exposing additional people to the infectious disease.

ICP (IDSR via DHIS 2)		CVAC (CBS via mHealth Info)	
Suspected		**Suspected**	**Alert**
1	**>**	**n/a**	**0**

Once CBS is fully functional, most suspected cases cited in weekly IDSR reports in DHIS 2 can first be sent as CBS alerts (via mHealth Info). Similarly, all CBS alerts (via mHealth Info) classified as suspected cases should be cited in DHIS 2 weekly IDSR reports. As a result, the number of CBS alerts should be equal to or greater than the number of CBS suspected cases, and the number of CBS suspected cases should be equal to the number of IDSR suspected cases.

ICP (IDSR via DHIS 2)		CVAC (CBS via mHealth Info)	
Suspected		**Suspected**	**Alert**
1	**=**	**1**	**2**

Recommendations:

- Encourage ECDs to regularly consult mHealth Info dashboards to ensure that priority diseases alerts are quickly investigated.
- Encourage ECDs to cross reference CBS alerts in mHealth Info with DHIS 2 weekly IDSR reports.
- Encourage the ECDs to include CBS data analysis in the monthly surveillance meetings with ICPs.

Sustainability of the System

In order to ensure that CBS is sustainable, MSAS IT specialists must be encouraged to perform upkeep on the mHealth Info software so they are prepared to respond to any users' queries, fix "bugs," and apply updates. In addition to IT expertise, a sustainable funding source must be found to support the cost of SMS and to guarantee Internet access at district level.

Recommendations:

- Encourage the MSAS to strengthen IT specialists' capacities to facilitate the use and maintenance of mHealth Info.
- Encourage the MSAS to establish contracts with telecommunications network operators to provide communication by SMS for CVACs/ICPs and by the Internet for ECDs.
- Consider negotiating with telecommunication network operators to establish a public-private partnership to reduce the cost of SMSs.

CONCLUSION

Interpretation of the Results

During the CBS pilot stage in four districts in Senegal, 360 priority disease alerts were sent by CVACs. Each of the 260 investigated alerts gave the ICP an opportunity to work with CHWs to help them better understand the symptoms of priority diseases and the procedures to follow when faced with a potential infectious disease. As of 13 March 2018, 55 measles alerts were investigated in Tambacounda region, which found 11 suspected cases according to the clinical definition (see the table in the appendix). We anticipate that case management of these priority diseases will improve along with the ECDs' capacity to expedite investigations and implement prevention measures. Enthusiasm for CBS in Senegal will increase when public health officials have seen how community-level detection of priority diseases reported in real time improves epidemic prevention and control.

Questions for Reflection

This pilot stage aimed to implement an early warning system at the community level and revealed some weaknesses in the current surveillance system, through which ICPs send weekly IDSR reports to the district. The ICPs play a critical role at the heart of surveillance: we rely on ICPs to actively engage with the CVAC to improve the completeness and timeliness of their weekly IDSR reports on suspected cases. Despite considerable efforts to strengthen the IDSR system, more work is needed to motivate "silent" health posts that have effectively stopped reporting suspected cases. The ICPs from these same posts also neglect to conduct investigations on community alerts. Clearly, following up on community alerts poses a "new" responsibility for ICPs, and ECDs must determine what resources are needed to help ICPs improve their overall performance regarding surveillance.

Further Research Needed

Despite the potential of CBS for early detection and possible prevention of infectious disease epidemics in Africa, international protocols are insufficient thus far. Additional studies are needed on how to select community priority diseases, adapting the definitions of clinical cases for detection by community actors, and the terminology for classifying cases alerted by the community. Those CHWs with no medical training cannot be held to the same standards as ICPs. Therefore, each aspect of the surveillance system must be adapted to its context. Currently, the principles of basic surveillance of events are poorly understood, and routine basic surveillance of indicators, which ICPs report on regularly, is not a model that can be easily applied at the community level. As a result, performance indicators that measure how much community actors contribute to the overall surveillance systems should be validated and included in the MSAS normative documents before scale-up.

Going Forward

This pilot initiative to implement CBS in four districts in Senegal has encountered and overcome significant challenges, and the impact of CBS on the overall surveillance system is only beginning to be felt. It is hoped that lessons learned can be applied to future MSAS initiatives, to broaden the scope of CBS so that it includes both the detection of unusual events and zoonoses in animal populations.

APPENDIX

Appendix Table: Priority disease alerts by CVACs (as of 13 March 2018)

	Tamba			Koumpentoum			Podor			Pété		
	Alert	Invest.	Susp.	Alert	Invest.	Susp.	Alert	Invest.	Susp.	Alert	Invest.	Susp.
Bloody diarrhea	51	46	32	59	45	38	43	15	11	26	17	7
Meningitis	0	0	0	4	2	1	2	1	0	2	2	0
Measles	64	55	11	40	26	0	9	4	2	9	7	0
Yellow fever	8	7	6	9	7	4	5	2	0	6	4	0
Neonatal tetanus	0	0	0	0	0	0	3	1	0	4	3	0
Flaccid paralysis	3	3	0	0	0	0	3	3	0	0	0	0
Cholera	1	1	0	2	2	0	4	3	0	1	1	0
Ebola	1	1	0	0	0	0	1	1	0	0	0	0
Total	**128**	**113**	**49**	**114**	**82**	**43**	**70**	**30**	**13**	**48**	**34**	**7**

Invest. = investigated

Susp. = suspected

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