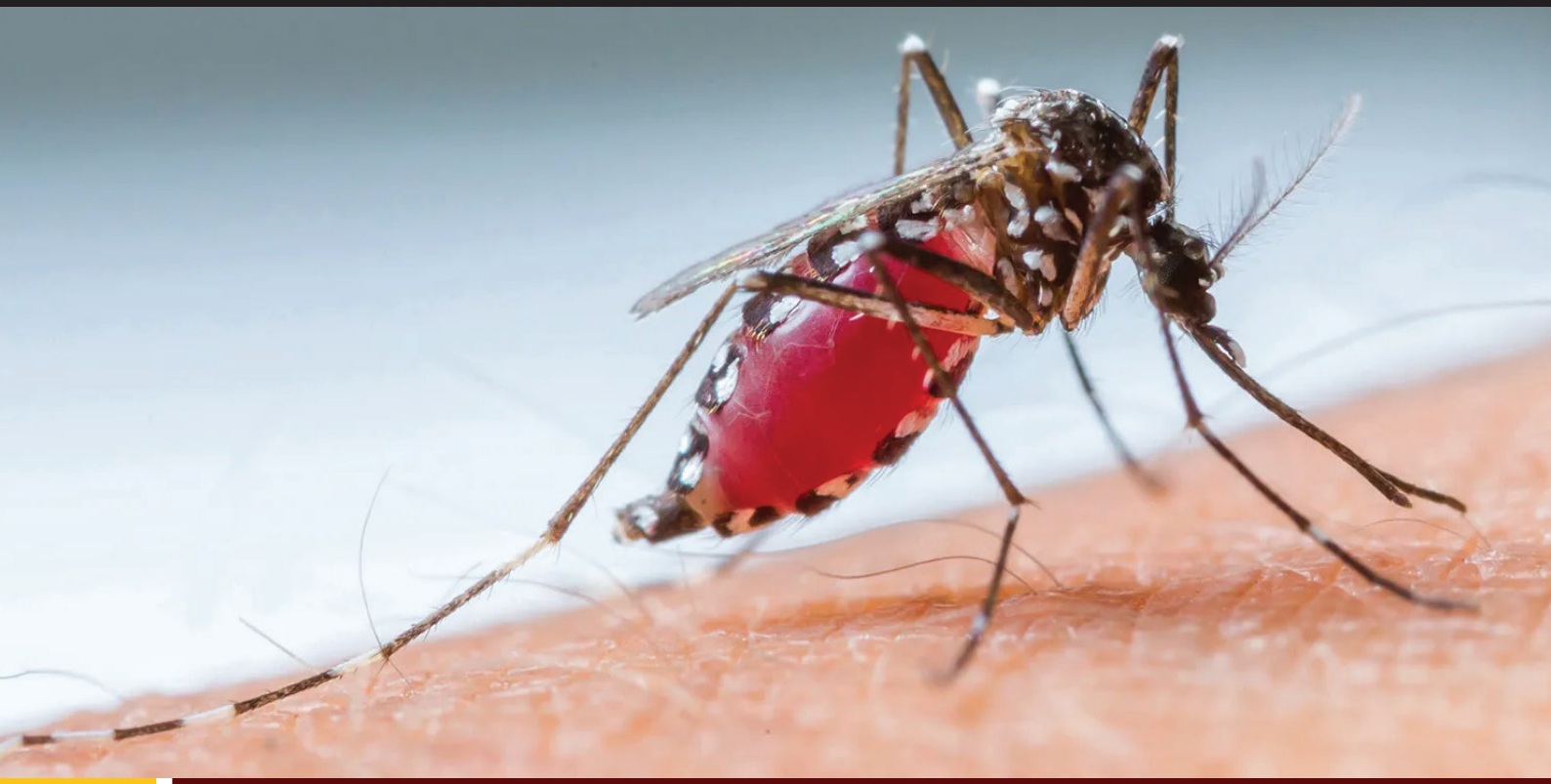
SCIENCE AFRICA

Africa's Leading Publication on Science, Innovation & Development

SPECIAL ISSUE VOL.1 ARBOVIRUSES, MARCH 2023



INSIDE:

- Arboviruses: Appropriate Scientific and Media Involvement Curbs Misinformation and Epidemics.
- Kenya: Combating Dengue Fever in Mombasa County
- Rwanda: Insurance Keeping Livestock Farmers Afloat after Rift Valley Fever
- Vaccination Boosts Efforts to Control Rift Valley Fever
- Uganda: One Health Approach, Surveillance Effective against Rift Valley Fever (RVF)
- Kenya: How Awareness Campaigns Helped Rabai Residents Overcome Chikungunya
- Mass Vaccination Protecting Ugandans against Yellow Fever
- Surveillance and Diagnosis Curbs Zika Virus Outbreak

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EDITORIAL

Arboviruses: Appropriate Scientific and Media Attention can Curb Rising Infections

Despite the rapidly emerging progress noted in the solutions-based articles in this issue, Africa still needs more science journalists who can effectively inform and educate the public on various methods of coping with the outbreak of infectious insect-borne viruses that are already endemic in the continent.

Indeed on 31st March 2022, the World Health Organization (WHO) launched the Global Arbovirus Initiative, an integrated strategic plan to tackle emerging and re-emerging arboviruses with epidemic and pandemic potential focusing on monitoring risk, pandemic prevention, preparedness, detection and response, and building a coalition of partners.

This was prompted by the fact that Arboviruses (Arthropod-Borne Viruses) such as Dengue, Yellow Fever, Chikungunya, and Zika viruses have become a global public health threat, especially in tropical and sub-tropical areas where a majority of the world's human population live, according to the WHO communique on the launch.

To contribute towards the efforts, and reduce the frequency and magnitude of outbreaks of these Arboviruses, Science Africa in partnership with the Solutions Journalism Network launched a media story fellowship to enable journalists in Kenya, Uganda, and Rwanda to produce in-depth stories on responses to mitigate the growing risk of epidemics resulting from these diseases.

The top science journalists from Rwanda, Kenya, and Uganda won competitive grants to produce and publish detailed stories on the diseases resulting from the transmission of infectious viruses during insect bites – mostly from various types of mosquitoes (including *Aedes*).

The stories reproduced in this collection focus on monitoring risk, pandemic prevention, preparedness, detection and response, and building a coalition of partners (public-private) to effectively prevent and or deal with outbreaks of Yellow Fever, Dengue Fever, Chikungunya, Zika, and Rift Valley Fever (RVF) affecting both livestock and humans in Kenya, Uganda, and Rwanda.

The stories, initially published by the media outlets of the fellows, include the one-health approaches necessary to effectively manage zoonotic diseases. In addition, they are written from a solutions journalism perspective which focuses on responses to a problem, evidence that responses are working, an insight so that audiences can emulate the response, and limitations.

The sudden emergence and reemergence of deadly viral diseases are posing enormous threats to global health. For instance, the sudden emergence of the COVID-19 pandemic has injected a sense of urgency with extra caution in the war against viral infections, especially for African countries that are almost wholly dependent on the importation of necessary vaccines, drugs, and equipment.

Still they have to deal with unlimited misinformation linked to the emergence of epidemics and pandemics. This means that African journalists need to focus their attention on various aspects of research and development activities including visiting research institutes, manufacturing or storage facilities, and interrogating related policies and laws governing the war against infectious Arboviruses. This is necessary to enable gathering requisite evidence to pile pressure on the authorities to deliver on their promises to make Africa self-reliant in the production, storage, and distribution of essential medicines and vaccines.

Finally, the publication of these stories should not be construed to mean that the fellows and other journalists across all four corners of the world should stop focusing global attention on the threats posed by Arboviruses. Instead, they should ensure that they update their stories or follow up and not just walk away after current publications both here and on their media platforms. Solutions Journalism at its best requires that important stories such as these are followed up, the progress of the WHO Arboviruses Initiative is tracked and stories about their successes and challenges are told. The team at Science Africa and Solutions Journalism Network are always available for consultations.

Combating Dengue in Mombasa County

By Ruth Keah

Ruth Keah

- The dengue outbreak was first reported in January 2021 and affecting two Coastal counties of Mombasa and Lamu. Mombasa County has six sub counties: Mvita (Island), Changamwe and Jomvu (mainland West), Kisauni and Nyali (mainland North) and Likoni (mainland South) with a total population of 1,208,333.

-According to the Mombasa County department of health in Mombasa, the first dengue cases were reported in early March 2021 with 24 cases testing positive out of 47. In April, another 305 cases tested positive out of 315.

Mombasa County has been experiencing an outbreak of diseases caused by mosquitoes among them dengue fever, chikungunya and malaria.

Cautioning residents to be alert of the outbreak, Pauline Oginga, Chief Officer of Public Health, Mombasa County, said that dengue fever disease has been on the rise especially during the rainy season.

Mohammed Musa, resident of Kisuani, Mombasa County, is among the people who suffered from dengue fever. "In the evening, I started feeling cold and having a running nose, which I thought might just be a normal cold. When I slept at night, I felt my whole body aching- my internal organs, hands, legs, knees, head. I couldn't sleep the whole night. My legs were on fire. I woke up severally going to the washroom to pour cold water on myself so that my body could feel some relief," he said.

"When morning came, I woke up early to go to the hospital. When I reached the hospital, I was tested and found to have dengue fever. I was injected and put on a drip and later given medication which I used until I got better."

However, this was not the end of it as Musa suffered from the disease again after a short while. "I have suffered from dengue fever twice. After the first incident, it took some time before I was infected again. My whole body just started aching including my head, my internal organs and I even had a severe cold. When I went back to the hospital, I was diagnosed with dengue fever," he said, adding that the disease can infect you in any place whether at home or at work if you're not using protection especially during the rainy season and if your environment is not clean.

Currently, Musa is taking precautions to ensure his family and him are protected. "I have put in place precautions to prevent mosquito bites by making sure I sleep under a mosquito net and there is no stagnant water around my home. If it rains and water stagnates, I make sure I drain the water so that there are no mosquitoes," he said.

According to Chimwaga Mwamuye, public health officer at Rabai sub-county, dengue fever is transmitted by the bite of an *Aedes aegypti* mosquito which carries the virus. The symptoms of the disease include headaches, fever, vomiting, stomach pains and aching muscles.

"Dengue fever is a disease that is caused by dengue fever virus. The virus lives in the human body and if a mosquito bites an infected person it can be transmitted to another person," Mwamuye said.

Dengue fever takes five to eight days for the symptoms to present while it takes seven days for someone suffering from the disease to get better with treatment.

"Everybody is at risk of being infected with dengue fever or chikungunya but research shows that children, people

aged above 65 years and immuno suppressed people suffering from diabetes, blood pressure and cardiovascular diseases are at more risk," he said.

To curb the risk of dengue fever outbreak, the Health department in Mombasa county, put up various measures to reduce the spread of the disease including unclogging sewer lines using the local youths who were employed by the county government and water treatment of boreholes across the county including in Likoni, Mvita, Kisauni, Jomvu, Nyali and Changmwe.

"We are seeing a rise in dengue fever cases. The numbers have doubled from 400 to 700 cases. We can't continue keeping quiet as a Department of health and that is why we are urging Mombasa residents to keep their environment clean ," said Oginga, adding that they are encouraging people to spray their surroundings, wear clothes that cover their legs and hands as well as use mosquito repellents.

According to her, when these measures were put in place in 2021, the cases of dengue fever decreased. Blood samples taken from patients suspected of having the disease between March and April, 2021 found that in Changamwe and Jomvu there were seven cases each, Kisauni had six while Likoni and Nyali had two and four cases respectively.

However, there have been fears of rise in cases due to heavy rains which have been experienced in the coastal region (long rains usually end in May). According to statistics from the Mombasa county department of Health, in June, 2022 the dengue fever cases rose from 400 to 700.

According to Oginga, among the measures they took to reduce these cases include the use of community health volunteers (CHVs) to sensitize the community on the importance of keeping their environment clean. The county also embarked on borehole treatment despite the challenge of not being able to reach all targeted areas due to inadequate finances.

The communities were urged not to leave water storage containers open so that they do not act as breeding ground for mosquitoes.

"We want to start fogging but we can't reach all parts of Mombasa and as such we are urging those living in areas with stagnant water to drain it so that when we spray the insecticides the mosquitoes don't have a breeding ground," Oginga said.

In Shimanzi area, Mvita constituency, Naima Omar Ali and Anastasia Okello are CHVs. They are among those who were involved in sensitizing the community to keep their environment clean with the aim of curbing mosquito-related disease outbreaks such as malaria, dengue fever and chikungunya.

"We CHVs have been put on the frontline to sensitize the community against any disasters. We carry out sensitization to reach patients and show how they can prevent infection," Okello said.

According to Naima Omar, Chairperson of Shimanzi community health, through collaboration with the Mombasa County department of health, every CHV has been given fifty households to sensitize in their area of residence.

According to Omar, they have been given a number of households which they visit and give reports on a monthly basis. In a day, she said, somebody can visit two to three households depending on their ability.

"In my area everybody knows that I work with the health department and whenever any disease emerges they consult me," Omar said, adding that from the community's reports of illnesses, she becomes aware of an outbreak if it occurs.

According to her, these sensitization aid in curbing disease spread. "There are plants that grow on their own including bushes, so we arrange with the community and do a cleanup. Then we sensitize them to clean even the bushes around their homes as well as urge women and children below five years to sleep under a net. Those storing water, we encourage them to make sure that they are covered because if they are opened, the mosquitoes breed. Even when the sewers are dirty, the mosquitoes give birth in high numbers and bring disease outbreaks," Omar added.

Apart from these interventions, they also emphasize the need for people to wear clothes that covers their entire body so as to minimize the chances of being bitten by mosquitoes who cause dengue fever.

"We used to put a lot of emphasis that if somebody is going to sit outside their house in the evening to relax, they should put on long clothes or cover their legs or hands. Even children would be encouraged

to wear long trousers and clothing," she said, adding that even treating boreholes has helped to prevent the spread of this disease. "Here, we have five boreholes and I was given five chlorine treatment which I distributed among the borehole owners to treat their water."

Though, Omar and her child are among the thirteen people who were infected with dengue fever in her area, she says, they were able to get treatment and return home to continue with their businesses.

According to Omar, since they started implementing these interventions, no cases have been reported from the area. "I am grateful that the cases have decreased. People suffering from diabetes, asthma and pressure, their health often changes with weather variations but with dengue fever, I am yet to hear of any new cases," she said, adding that if people will dispose off their garbage properly, it will help reduce the risk of diseases caused by mosquitoes in future.

"If there is a place designated for dumping garbage and then taking it away, then there won't be diseases," she said.

Despite these efforts bearing fruits, the biggest challenge facing these CHVs is following up to ensure that residents implement these interventions. Many a times, they lack funding to enable them to reach the residents from one point to another.

According to Okello, the CHVs will come and teach the residents how to store water, how to clean the verandah without leaving water stagnant, how to slash grass and how to sleep in a treated net but some people won't implement these interventions.

She added that it was a challenge taking a patient from his sick bed to the health facility because at times the family is poor and does not have a stable income. This forces the CHV to use their own money to hire a tuk tuk yet they are not being paid.

"Cleanliness is everybody's responsibility. There is nobody else who is going to come from anywhere to tell you what to do," Okello urged,

She called for the need to observe cleanliness of the person and his or her environment, noting that cleanliness is everybody's responsibility.

Additionally, Okello said proper disposal of garbage and setting up a handwashing station is important as well as passing this knowledge to children. "It is better to prevent than treat as treatment is costly than prevention," she said.

Mama Aisha is among those residents who have received these messages. "In creating awareness, they urged me to make my environment clean by slashing grass, draining stagnant water, and getting rid of empty cans in my compound which can collect water that can be a breeding ground for mosquitoes," she said.

"I implemented the advice and made sure that my compound is clean I was also lucky to get chlorine which I was trained to use to treat water in my borehole."

In just one week of implementation, she has observed that the number of mosquitoes in the area have decreased particularly, in the evening. "You can sleep without a net until it reaches around 2 am, then you start hearing a mosquito here n there going in circles. These sensitizations really helped me," Mama Aisha affirms.

Suleiman Elshadau, a resident of Mombasa also benefited from these sensitization campaigns. "They urged us to make sure that we sleep under a net and slash tall grass as they attract mosquitoes," he said, noting that he was among the beneficiaries of the nets which the CHVs were distributing to the residents.

Since then, Elshadau has been keenly implementing those interventions and they have helped to keep dengue fever at bay.

Dr. Salma Swaleh, Mombasa County Director of Public Health urged residents to ensure their environment is clean. The county government continues with routine spraying of insecticides to kill mosquitoes to curb spread of diseases particularly, during the long rains.

"Our community health volunteers are coming to your households to also explain some of these measures so that we are able to contain the situation," she said.

According to Mwamuye, residents should ensure that stagnant water has been drained and those that are storing water inside the house should cover them. "We have observed that some mosquitoes breed inside containers within the house if they are not covered," he said. "They should also sleep under a net and if they will be out for long hours, they should use repellents."

Insurance Keeping Livestock Farmers Afloat in Rwanda after Rift Valley Fever

By Francine Andrew

Rwandese Livestock farmers have resorted to taking insurance to cushion them against losses as a result of the death of animals due to the Rift Valley Fever (RVF).

Francine Andrew

Many farmers in the country, especially in Eastern Province, have suffered heavy losses of their livestock due to deadly attacks by the RVF. Rwanda, a country with extensive cattle production, reported RVF outbreak in Eastern Province in 2018.

RVF is a mosquito-borne viral disease that can be transmitted from animals to humans. It causes severe disease in animals that is characterized by fever, weakness, abortions (loss of pregnancy), and a high rate of severe illness and death, particularly among the young animals.

Isaac Mahoro, 37, a livestock farmer from Nyamata sector in Bugesera district, says that his diary cow died from RVF but because he had insured them against such risks, the insurance company compensated him for the loss.

Mahoro had just bought the cow that turned out to be infected from a livestock farmer's herd in neighboring Ntarama sector also in Bugesera district, Eastern Province.

He says that it was there for a very short time before it got sick. "At first we thought it was theileriosis so we started to give related medicine. The cow had high fever and later became too weak to move. We injected it with calcium and other medicine, thinking it was suffering from theileriosis.

"My cows were all vaccinated; I think it's the reason why they were able to resist RVF despite having it," he says, adding: "If we knew immediately that the cows, including the new one, had RVF and not Theileriosis as we had

Bugesera District Office

wrongly assumed, we would have used the recommended RVF case management regimen," Mahoro reflects.

Theileriosis is a disease caused by Theileria parva – a blood-born parasite; it only affects cattle and is primarily transmitted by ticks.

It was the autopsy carried out on the dead cow that revealed it had RVF. Later, the tests conducted for his other cows revealed that the two of them had RVF but were asymptomatic.

Mahoro is a business-oriented livestock farmer with 20 dairy cows that produce at least 300 liters of milk per day. He affirms that the cows are the lifeline for him and his family. "That's why I insured every one of them and I have spent over two million Rwandan francs to insure around 50 cows that passed in my farm since I started livestock farming," he intimates.

The process of compensation starts by a livestock farmer filling a form that specifies what the cow died of together with an autopsy report.

The form is signed by the veterinary doctor who treated the cow, and the veterinary doctor licensed by the insurance company.

The form goes to the insurance company after being signed by the area sector administration. The process takes not less than two months to be compensated.

For the cow that died from RVF, the insurance paid Mr. Mahoro 1,200,000 Rwandan francs (Rwf). The insurance is 5.5 percent of the value of one cow and it's paid once per year.

Laurent Karemera, 64, a business-oriented livestock farmer from Ntarama sector, Bugesera district, also has a similar experience.

Karemera does insemination for his cattle to produce an improved breed which he also sells to other livestock farmers.

"With symptoms similar to other diseases, RVF surprised us. At first, many cows aborted at the same time, but again some of them were asymptomatic. My two Friesians aborted in that period while another started to show similar symptoms.

I tried all sort of medication that we normally use for theileriosis and Anaplasmosis (an infectious vector-borne disease caused by a tick spreading bacteria and characterized by fever, decrease milk yield, progressive anemia and constipation among others), which are common. The fever sometimes was high and down but never left, finally the cow died," said Karemera.

"We treated cows with all available medicine, such as Bitalex until it ran out of stock. When by chance you got it, it was very expensive, with one bottle cost around Rwf 50,000. We opted to use generic medicine which are not original and cows finally died."

Karemera says that it was the first time in his whole career to see cows getting sick and die at that extent. In a farm of 14 cows, two aborted, two died while four recovered after treatment. He had to sell the other four that were not pregnant to avoid losing them also.

"First two cows aborted, while I was still recovering, two others died and four others were already sick. When they came to vaccinate them, they said pregnant cows could not be vaccinated because the vaccine itself could make the cow to abort. Besides, the vaccine reached my area late," he said.

The work of livestock insurance

Karemera says that between the two cows that died, one of them was compensated by livestock insurance while the other was not. This was because when it died Karemera was not around and they did not perform autopsy, which is the key element in the insurance compensation file. The initial value of his cow was about Rwf 1,500,000, he paid around Rwf 82,500 (5.5 percent) with the 40 percent of the Government support, and the insurance compensated him with Rwf 1,200,000.

How does the livestock insurance work?

The Government of Rwanda initiated the livestock insurance program for livestock farmers where they pay 60 percent of the insurance cost and the government pays the rest 40 percent in social support. However, not all animals were selected for this kind of insurance. The priority was given only to dairy cows and productive pork and chicken.

Dr. Fabrice Ndayisenga, the Director of animal resources development unit, Rwanda Agriculture and Animal Resource Development Board (RAB), affirms that this program is not found anywhere else in this world except Rwanda, which offers such brilliant support to farmers.

Even so, the program is greatly challenged by low uptake because some say the cost of the insurance is too high and is beyond their means. To some farmers the problem was lack of awareness. For example, James Nyaburinga, a livestock farmer from Nyagatare district whose livestock died from RVF complications, says that the thing he regretted the most is that he did not insure his cows beforehand because the idea never crossed his mind and the insurance campaign were not that frequent at that time.

James Nyaburinga, a livestock farmer from Nyagatare distric.

Nyaburinga lost three cows and four calves. "I wish I had thought about the insurance before the disease.

Compensation takes time

According to Hyacenthus Uwitonze, Bugesera district animal resources Officer, the insurance companies take time to compensate, at least two months, which discourages new clients.

In addition, some livestock farmers neglect their cattle because they are insured which leads to companies not compensating them, this leaves a bad image to the insurance program thus making other livestock farmers hesitate to participate.

Uwitonze says that they plan to keep campaigning and following up for complaints by livestock farmers against insurance companies.

, some selected insurance companies signed contract with the Ministry of Agriculture and Animal resources development to cover livestock insurance and when a livestock farmer loses one of his insured livestock the local government intervenes so that they are compensated.

The mobilization for insurance is carried out by veterinaries since they are the ones dealing with livestock farmers in daily life. Every veterinary officer has an area to cover and follow up the life of animals in that area; the program kicked off in 2019.

So far 6,680 cows have been insured since the beginning of the program in Bugesera district, said Uwitonze.

Shortage of veterinary doctors

According to Mahoro, when the cow is insured, you are requested to care for and feed it properly and healthily, notify the veterinary anytime it gets sick to be treated, and when it dies, you are requested to perform autopsy to be sure the cause of death is known.

However, he says that the number of private licensed veterinary doctors is still not enough. When your cow gets sick, it is not always possible to get a veterinary doctor on time, this may lead to the lack of treatment, which is counted as a breach to the insurance contract, and therefore you may end up not being compensated.

Karemera says that because he was not around when his cow died, the autopsy was not performed; therefore, he did not get any compensation despite being insured.

Cost of feed

Another issue according to him is the high prices of the feed, which is also part of the contract to feed cows properly and healthily. One kilogram of recommended feed costs about RWF 400, but one milked cow can eat at least 10 kilograms every day.

Despite the challenges, the livestock insurance program is cushioning many farmers from total economic ruin through adequate compensation for animals lost to the dreaded Rift Valley Fever.

Uganda: One Health Approach and Surveillance Curbs Rift Valley Fever Epidemic

By Olivia Namaloba

Frank Kachetero, 63, from Kabale District in South Western Uganda still has memories of his battle with Rift Valley Fever (RVF) disease.

''I started feeling pain and some flu then I started bleeding. This is the time I thought it is a serious disease. Then I decided to go to hospital, we spent three days there. I was bleeding all the time,'' he said.

Kachetero, a survivor of the disease, was saved by health workers at the Kabale Regional Referral Hospital.

''I was the only one sick in my family, not even my wife nor children were sick. Yet the meat we ate was tested. In hospital in Mbarara, I had to pay UGX 200,000 after selling a cow. If I didn't have that money to pay, I would be dead. Things were just too bad,'' he added.

The mosquito borne virus disease was first reported in Uganda in 2016 in Kabale district, but available statistics indicate that the country has had over 10 outbreaks in different parts of the country since then.

Rift Valley fever is an Arbovirus disease that is transmitted by *Aedes* mosquitoes to animals like cattle through mosquito bites. The Ebola like hemorrhagic disease spreads to humans through contact with blood from infected humans or animals.

The experts in Uganda say ten outbreaks have been contained through a surveillance by trained team which ensures monitoring and reporting of suspected cases.

"I lost another patient here, just around the time of election, so when I saw another patient coming, with bleeding tendency, I knew Rift Valley fever must be the problem. He was bleeding from the nose with yellow eyes," said Dr.Ana Namtevi,

Olivia Namaloba

a consultant physician and a member of the surveillance team at Kabale Regional Hospital, with expertise in handling haemorrhagic fevers like Marburg by using one health approach.

" This hospital is unique in the fact that we have handled three or four diseases. So in terms of success, we have worked together using the one health approach. In terms of surveillance, we have a system that is very efficient and we get feedback," Dr Namtevi said.

Even when immediate neighbors in Rwanda are currently reporting the Rift Valley virus, Dr. Namutebi is confident that with the preparedness the team has, it is ready in case of any outbreak.

According to Dr. Namutebi there is an ongoing surveillance for the fever. "When patients come to the hospital they always have the malaria symptoms, fever, and headache. We run all the test and see what the diagnosis is. And we normally send the tests to Uganda Virus Research Institute (UVRI). We are prepared than before. We have dealt with emergency, we have dealt with outbreaks and it is successful," she said.

Dr Alfred Visigenzi, the district health officer Kabale said the one health approach where the health of people, animals, plants and their shared environment are interconnected has greatly helped in fighting the outbreak of the Rift Valley Fever.

''Of course the main aim was to alert the public so that they can understand the virus, its signs and symptoms, be able to identify any case and report for quick response. And because we knew this virus was able to move from animals to human beings we had to use one health platform where we included the district veterinary doctors to be part of the response because we also wanted animal surveillance,'' Dr. Visigenzi said.

The Kavale district officer added that veterinary doctors have been put on alert to always look out for symptoms in animals so as to quickly isolate sick animals before they get into contact with humans.

''I have been working closely with the district veterinary department to discuss on how to make a follow up and surveillance also on the animal side. Because we normally get most cases from animals to humans and through that we have been engaging village health teams so that if they receive any case of rift valley fever then they can report to us,'' he said.

An entomologist studying insects, Dr. Julius Lutwama, who also heads Aborvirus department at Uganda Virus Research Institute says the team has also created awareness reporting of any suspected cases.

''All we need to do is to be more vigilant, we have more programs which are running in south western Uganda. There have been cases in Mbarara and Kabale. These programs are making sure that they are looking at the humans and animals to pick any case, so all these are being monitored,'' Dr. Lutwama said.

The Government of Uganda through the Ministry of Health has been implementing vigorous surveillance together with a team from World Health Organization.

'' One arm is in the animal sector, and another arm is in the human sector. The symptoms that are presented by the Rift valley fever are similar to those like viral hemorrhagic fevers like Ebola. So what we have done is support the country to build the capacity to detect the viral hemorrhagic fever so that they identify those cases early, take the sample to UVRI where the testing is done,'' said Dr Solme Okware, surveillance officer, World Health Organization.

Dr. Kavagambe, veterinary doctor for the district says their surveillance efforts have yielded results.

''Since 2016 to date we haven't registered any other cases meaning our efforts to sensitize and prepare for the best is actually yielding results,'' he said.

Citing the inadequate capacity of the health workers to identify and treat cases of rift valley fever, the surveillance efforts are also facing encumbrances of limited funding for research, and logistical requirements.

Dr.Visigenzi said resources are usually allocated during outbreaks making it difficult fighting hemorrhagic fevers.

'' When we had that Rift Valley Fever, there are some debts we have never paid because the Centre allocated money to the district and when it got finished, there was emergency shortage and other expenses that we incurred after wards were not paid,'' he said.

"Secondly, the capacity of some of those health workers to quickly identify the disease and they are able to notify the district is still inadequate because we never oriented all the health workers in the district.''

Additionally, experts decry that the circulation of the disease remains uncovered and that poses a big challenge in treatment.

''We have not established well on the ecological patterns

on how the rift valley virus circulates among animals, mosquitoes and humans. Sometimes people trying are tempted to slaughter these animals that have died instantly. So we have been encouraging our communities to avoid such practices to minimize transmission," Visigenzi said.

Dr. Kavagambe attributes the disease outbreaks to climate conditions that have resulted into natural disasters like, flooding especially in grazing areas creating favorable breeding conditions for vectors such as Aedes mosquitos which transmit the Rift valley fevers.

''When rains came and was too much, flooding was actually a lot in the valleys of chiriruma that's along Katono valley, and so climatic conditions triggered it. Because when you look at the life cycle of the virus itself flooding is one of the contributing factors. It helps in hatching of those effective agents and they end up causing chaos," he said.

Rift Valley Fever presents symptoms like abortions in animals and 100% deaths in neonate animals. In humans, symptoms include fever, malaise, blood, diarrhea and loss of appetite. The symptoms appear two to six days after infection and can be mild or severe. The mild cases can get even when not treated but severe ones are usually submitted to general supportive therapy.

Dr. Okoth Oboo, has a Centre of treating patients at Liantonde Hospital where an outbreak was reported in 2018.

'' This is an emergency which we are trying to handle in our small way, we've created an isolation room where patients who come in are isolated and treated. Unlike most viruses, we don't have definitive treatment so we have to do what we call supportive treatment. Because if somebody has high fever we give the antidiuretics, if dehydrated we hydrate and so on," Oboo said.

For the animals, the districts are doing prevention through vaccination. One percent of the people infected usually die from the disease. The viral hemorrhagic fever was confirmed in 23 districts of Uganda between 2017 and 2022 with 63 people infected mostly among cattle keeping communities. World Health Organization is optimistic that using one health approach, Uganda has the capacity to identify the hamorrhagic fevers like Rift valley and all other Arboviruses.

Mass Vaccination Protecting Ugandans against Yellow Fever

By Namiganda Jael

Namiganda Jael

In August 2020, Mr. Mark Oguma Oguti, and his daughter Claudia, were thrilled when they received news about the launch of the Yellow Fever Vaccination campaign in their area targeting 1.6 million people including children.

When the mass vaccination was rolled out in West Nile region, Oguti and Claudia were among the first people to be vaccinated. They were followed by hundreds of others who gathered at Moyo Town Council headquarters.

According to Dr. Nsubuga Fred, the Uganda National Expanded Program on Immunization (UNEPI) senior medical officer, division of vaccines and immunization, and the Yellow Fever focal person, "the campaign was a success with no new infections." It recorded a 92 percent success rate, Dr Nsubuga added.

According to the *Quarterly Epidemiological Bulletin, July to September 2020 Volume 5 Issue 3* the Ministry of Health received an alert on 10 December 2019, from the Uganda Virus Research Institute (UVRI) of a confirmed case of Yellow Fever from Buliisa District, Mid-Eastern Uganda

During January and February 2020, UVRI confirmed more Yellow ever cases in Moyo and Maracha Districts, both located in West Nile. "We investigated to determine the scope of the outbreak, identify exposures for transmission and recommend evidence-based control and prevention measures. We line listed 13 case-patients- seven confirmed and six probable," Dr. Nsubuga said.

The median age of case-patients was 32 years, with a range of three to 59 years. Moyo District had the highest attack rate of 5.7(9/158,600), followed by Buliisa, 2(3/149,300), and Maracha, 0.48 (1/208,300). The overall case fatality rate was 54%. Men had the highest attack rate of 3.9/100,000 compared to women 1.2/100,000. Common symptoms reported were fever (100%), headache (77%), unexplained bleeding (54%), and jaundice, vomiting, joint pain, chest pain each at 31%.

Reports show that majority (92%) lived or worked within 500 meters of a forested area with monkeys and standing water. There was very close interaction of humans with sylvatic monkeys in 54% of the case-patients who lived within 10 meters of monkey inhabited forested areas and hunted them for food.

These outbreaks were possibly sylvatic, affecting unvaccinated individuals. Thus medics recommended mass vaccination campaigns in the affected districts and subsequent inclusion of Yellow Fever Vaccine in Uganda's routine vaccination schedule.

The medics also recommended controlled interaction of humans with wild animals and their habitats and removal of potential mosquito breeding sites.

Dr. Nsubuga, the immunization

expert and the Yellow Fever focal person, says the vaccination exercise was carried out at community centers, health centers, and regional referral hospitals.

Effective mass mobilization and sensitization of the people for the jab was mounted through local radio stations and through mobile public address announcements.

According to Dr. Alfred Driwale, the UNEPI program manager, the mass vaccination campaign was rolled out in West Nile in the affected districts. Dr. Driwale revealed that the outbreak followed the sudden death of two young males who dealt in timber in South Sudan.

This was confirmed by serological testing, to identify antibodies and antigens in a patient's blood sample to diagnose infections and to check if a person has immunity to certain diseases.

"The puzzled community, however, thought the disease was witch-craft or some sort of curse from the gods or their ancestors but when health workers swung into action and drew samples from their contacts to carried out further investigations with UVRI, it was ascertained that there was a Fellow fever outbreak in the region," Dr Driwale said.

Dr Driwale explained that Yellow Fever is an acute viral hemorrhagic disease caused by the yellow fever virus, a single-stranded RNA virus that belongs to the genus Flavivirus. It is transmitted from humans to humans or from animals to humans by Aedes mosquitos. During the same period, there was another outbreak in Buliisa where fishermen straddling between the Democratic Republic of Congo and Uganda also suffered unexplained deaths, Dr. Driwale said. .

He added that "according to Uganda's by-law, any unexplained deaths must be investigated with a postmortem; the postmortem in this case confirmed that it was a Yellow Fever outbreak."

As a result, the two regions were, therefore, prioritized for a mass Yellow Fever immunization campaign, targeting people aged between nine months 60 years.

Mark Oguma's whole family responded to the vaccination campaign including his elderly mother, who was already above the targeted top age bracket of 60 years. "My wife, my mother, my children and I always ensure that our family benefits from all government vaccination programs," he asserted.

The Yellow Fever vaccination campaign was launched by the Ministry of Health, supported by the World Health Organization (WHO), the Global Alliance on Vaccines Initiative (GAVI) and the United Nations Children Fund (UNICEF).

According to Dr. Driwale, Uganda is considered a high-risk country for Yellow Fever by a comprehensive global strategy to Eliminate Yellow fever Epidemics (EYE).

He says the disease became a global concern following the 2016 urban Yellow Fever outbreak in Angola, which spread to neighboring countries and generated local transmission, exhausted global emergency stockpiles of vaccine, and highlighted the risk of international spread, as 11 cases were exported to China.

The World Health Organization Yellow Fever fact sheet of the year 2019 indicates that worldwide, the number of Yellow Fever cases has increased over the past 20 years.

This might be attributable to multiple factors, including declining population immunity to infection, increased human activities such as deforestation, urbanization, population

movements and climate change. In 2013, the disease affected an estimated 130,000 people and caused about 78,000 deaths in Africa.

Dr. Driwale confirms that mosquitoes which transmit Yellow Fever are available and widespread in Uganda. "Because it is found in monkeys, the germs can be carried by the mosquitoes from these monkeys to humans and then from human to human. So, if someone came in to the country with it, transmission would be very rapid because the mosquitoes are here in plenty," he stresses.

He expresses concern that the risk is now even higher due to the increased travels and migrations of people across borders. "One can have lunch in Uganda and have dinner in London and breakfast the next morning in New York. So, you see there is an accelerated transmission of the diseases from people to people and that's why after the 2016 Angola global transmissions, Yellow fever elimination through vaccination became a global concern," Dr. Driwale says.

According to Dr. Nsubuga, there is no specific treatment for Yellow Fever; only supportive treatment to manage symptoms. However, without treatment, up to 50% of severely affected persons die.

Fortunately, he added, Yellow Fever has a single dose vaccination that lasts a life time.

"Previously it was a travel requirement for travelers and Ugandans had to pay about 25 dollars to get a shot but the Government of Uganda together with global partners have rolled out the first phase of a nationwide mass vaccination campaign to eliminate Yellow fever by 2025," Dr. Nsubuga explains.

The Ministry of Health applied to GAVI and WHO for the inclusion of Yellow Fever vaccination into routine immunization schedule. Having faced four outbreaks, Uganda qualified to introduce Yellow Fever vaccine as a long-term measure to prevent more outbreaks.

Before, only travelers would get the vaccine as a requirement which still stands. Travelers are encouraged to comply with this requirement to ensure that the risk of spreading Yellow Fever through international travel is minimized. The Government has also set up a toll free line forthe public 0800-203-033 to report any suspected cases to the nearest health facility

People responded positively by making constant phone calls whenever they encountered suspected cases or patients with similar symptoms to those outlined by the health ministry team during the mass sensitization exercise in the affected areas.

According to Dr. Driwale, Fellow fever vaccination will now be included in the routine immunization for babies at nine months while a mass immunization campaign is to be rolled out starting in October this year 2022.

"The Yellow Fever infections have not been that rampant in children but as a preventive measure to ensure that children are shielded and kept safe, we shall be immunizing all children as a mandatory measure effective October 2022." Dr. Driwale said.

Dr. Driwale stressed that they have prioritized the routine immunization for babies whose vaccines have already been secured along with that to cater for the first phase target populations. He is quick to add that "just like all the other vaccines administered during routine immunization for babies, the Yellow Fever vaccine is safe and effective."

The nationwide vaccination campaign is to

be covered in a phased manner presenting an opportunity to all Ugandans to receive the vaccine free of charge. Children of nine months will receive the vaccine in their routine immunization exercise while older Ugandans of up to 60 years will also receive it during the exercise expected to end by 2025.

Dr. Nsubuga reveals that the first phase is expected to be rolled out in October 2022 will cover six high risk regions including the districts of West Nile that were not reached during the 2020 campaign, Kabale, Kabalore, Hoima, Gulu, Lira and Arua. The second phase will start in October 2023 and the last one in October 2024.

The districts were chosen after a thorough risk assessment singled them out as those with high risk. "We started with a training exercise for all our health workers as well as mass media sensitizations to mobilize the public for the vaccination campaign", he added.

Uganda is affected mostly by diseases with epidemic potential thus the vigorous and constant monitoring and surveillance in communities to detect and eliminate , among others, Yellow Fever, malaria, meningitis, Ebola, Marburg Virus Cholera, Typhoid, Dysentry and others.

They all have a high potential of spreading rapidly and thus a swift response is always required to avoid an outbreak or contain one, Dr Nsubuga said.

For this, Dr. Driwale says, health workers are trained to flag certain symptoms through monitoring-where trained health workers doing community investigations and drawing blood samples for laboratory tests at the UVRI which helps in confirming an outbreak.

However, Sister Endreo Aurelia, a nurse in charge of immunization at Moyo Genospital, says that the COVID-19 vaccination campaign created mistrust towards government immunization programs among some members of the public. "People think that vaccines are the ones spreading the infection, others fear there is a hidden agenda in these mass immunization exercises but we continue to educate and inform them that vaccines are here to save their lives," she explained..

Oguti agrees with Sister Endreo, saying that as an elder in the society, he has always sensitized members of his community on the safety and benefits of vaccines. "I always tell them that these vaccines go through various tests before they are given to the public and as such should not be feared," he says.

Oguti also adds that when the Ministry of Health introduced the measles-rubella vaccine in 2019, he ensured that all his eligible children received the vaccine, as an example.

"There is no better protection for my family against diseases than vaccination", he says.

In his remarks at the launch of the Yellow Fever mass vaccination in Moyo District, the World Health Organization representative to Uganda, Dr Yonas Woldemariam, commended the leadership of the country for embracing vaccine programs.

Dr Yonas said that immunization remains the main strategic approach to prevent, contain and eliminate Yellow Fever outbreaks. "High vaccination coverage helps sustain immunity and is key to eliminating the risk of disease outbreaks," he emphasized.

The 2022-2025 Yellow Fever mass immunization campaign aims at eliminating the disease, Dr. Driwale notes that "the downside is that we

can only hope for reduction not eradication in humans and minimizing the harm through the vaccine protection because the virus is transmitted by mosquitoes from animals to humans and yet we cannot vaccinate animals, so the virus will always exist in animals."

According to Dr. Nsubuga, limited availability of vaccines has hindered a wider coverage and for now there is rationing what is available for babies' routine vaccination that will first cover six regions.

He disclosed that so far global partners, such as GAVI, have injected over US$ 9 million into the first phase of the vaccination exercise, translating into 13.5 million doses, while the Government of Uganda has also committed a million dollars for the exercise.

"This is a joint venture between the Government of Uganda and its global partners. The vaccines are already secured and the global partners have already provided the seed funds for training of health workers and the mass sensitization of communities," Dr. Nsubuga said,

He is optimistic that the targets of immunizing about 40 million Ugandans against Yellow Fever by 2025 will be met, given the experiences gained from the Moyo and Buliisa districts mass vaccination exercises in 2019-2020.

"We may be lacking a specific anti-viral drug for Yellow Fever right now but the good news is that it is prevented by an extremely effective vaccine which is also safe.A single dose lasts a lifetime and is currently administered free so I encourage all our people to grab this opportunity," he concluded.

Kenya: How Awareness Campaigns Helped Rabai Residents Overcome Chikungunya

By Ruth Keah

-Between December, 2017 and February 2018, the Ministry of health reported 453 cases of Chikungunya in Mombasa County. However, health authorities launched a major campaign in which 25,312 households were sensitized during the public awareness campaigns in Rabai sub-county.

Further, 175,269 people benefitted from 91,260 mosquito nets with each household receiving nets depending on how many members make up the household for instance, a household of 12 members would receive six nets, according to Chimwaga Mwamuye, public health expert Rabai Sub-County.

Ruth Keah

"However, it was a very big challenge even for the doctors. They weren't aware about chikungunya because it came as an outbreak affecting everybody. Adults were crawling. Personally, I was using the wall to crawl, because I couldn't walk," Naima Omar, a resident of Mombasa county, narrated.

Mosquitoes cause various diseases, among them malaria, chikungunya and dengue. Chikungunya and dengue fever are transmitted by *Aedes aegypti* mosquito. The symptoms of chikungunya being

severe cold, cough, headache, pains in the joints especially hands and legs, fatigue as well as nausea.

According to Dr. Jalab Ashraf, chikungunya takes three to five days for the disease to present symptoms while it takes seven days for someone suffering from the disease to recover when put on treatment.

The emergence of chikungunya outbreak in Mombasa county, one of the six counties in the coastal region brought a lot of concern among health officials while other counties put interventions to ensure that the disease does not spill over.

One of these is Kilifi County, which borders Mombasa County. One of these interventions included carrying out public awareness campaigns urging residents to drain stagnant pools of water which act as breeding ground for mosquitoes.

These campaigns were carried out across four different wards in Rabai sub-county including Kambe-Ribe, Mwawesa, Rabai/Kisirutini and Ruruma. This is because Rabai borders Mombasa very closely.

According to Chimwaga Mwamuye, a public health expert, Rabai in sub-county, the mode of transmission for chikungunya, dengue and malaria is the same. They are all transmitted by mosquitoes with the difference being that there are several varieties of mosquitoes that transmit these diseases.

"We've had the challenge of malaria but not dengue and chikungunya in this area. The good thing is that when we give people nets and they sleep inside the net, they prevent all mosquitoes," Mwamuye said.

"Thus we encourage people to use nets to protect them from malaria and by extension, they are protecting themselves from dengue and other diseases."

He noted that it is very important to sensitize people to sleep under a mosquito net every season and to make them aware that the chikungunya mosquito is different from the malaria one because it bites people early. When people are seated together in the evening, they should be careful or use mosquito repellents or clean their surroundings to ensure it is not mosquito-infested.

"We have really made effort to ensure that people are not bitten by mosquitoes by destroying their habitats, creating awareness and disbursing mosquito nets," Mwamuye said.

He added that they also increased surveillance by encouraging people to go for testing whenever they felt they had symptoms of Chikungunya. This was based on the fact that movement from one county to another put people at risk of acquiring the disease. Also, they wanted to keep records of any cases if it occurred.

According to Mwamuye, the possibility of Chikungunya spreading from one county to another is very high due to cross-county movements. This is what led them to use Community Health Volunteers(CHVs) to increase sensitization among the community members.

"We have sensitized our community through the CHVs who have been going to the field creating awareness. We have also had mass net distribution to ensure that people have nets," he said.

Mwamuye added that through collaboration with the government and the Kenya Medical Research Institute (KEMRI), they conducted research known as *malaria vector surveillance and larva source management*, to find out the kind of mosquitoes found in Rabai. This research was carried out in a few households to find out if there are mosquitoes causing Chikungunya.

"We lay a trap and captured mature mosquitoes and their larva to examine which kind of

mosquitoes they were but we are still waiting for the results," he said.

When I arrive at Maereni village in Kambe, Rabai subcounty, I meet with CHVs who have come to deliver their monthly reports to their supervisors based at Lenga health centre.

"Previously, before the awareness campaigns, residents would store water in containers without covering them, thus creating a breeding ground for mosquitoes. However, through the sensitization, the community members have understood that this is a mistake and a danger to them and the entire community," said Peter Penda, chairperson of the CHVs in the area, with 12 years' experience in the field, explaining some of the interventions they used to sensitize the community to protect themselves against mosquitoes causing chikungunya.

"We were trained and took part in the research including filling of surveys. Personally, I took part in visiting the areas with stagnant water and helping to capture mosquitoes. We conducted public awareness campaigns during communal meetings hosted by the chiefs as well as visiting schools talking to students and teachers. Most people have adhered to these measures," he added.

Christine Maajabu from Mbwaka village has been a CHV for 12 years. She is in charge of 40 households in her village. In a week, she can visit up to four households.

"My biggest objective was to sensitize my households on cleanliness- ensuring that the house is clean, there are no pools of stagnant water- and sleeping under a mosquito net. Previously, it was a challenge because when you told people about the nets, they would complain that they don't have money. But we are grateful cause the nets were brought and we helped with the distribution," she said.

Maajabu noted that though some were skeptical about the free nets, they changed their minds through sensitization. "The previous year, not many people took the free nets, but this year, we gave out so many of them until some people missed out," she added.

Jane Sada is also a CHV in Mbwaka with seven years' experience in the field. She is in charge of 37 households and she visits them twice a week. Her main objective is to sensitize the community on cleanliness to curb diseases caused by mosquitoes such as chikungunya.

"In my village, I have sensitized so many people to adhere to cleanliness of their environment, to slash grass and bushes outside the compound, remove containers that can store water from the compound and sleeping under a mosquito net. We insist that if they maintain cleanliness as we are advising them then the disease will be kept at bay completely," she said.

John Teko is a CHV from Jeuri village in-charge of 57 households. Some of his households took part in the research that was being conducted by the sub-county.

"We laid traps for the mosquitoes the whole night and caught them. We also visited some boreholes and got some egg samples which were taken to for research purposes," he said.

According to Penda, they face some challenges in their line of duty including lack of adherence to the measures despite sensitization. Others will implement the measures but when they see others not doing the same, they start complaining, he added.

He mentioned that conflict of interest was also another challenge, whereby personal interests such as earning a living hinders some CHVs from visiting households which are located very far away, as much time is lost visiting those distant places.

According to Umazi Mturi, a resident of Kavumuni pawa village, the CHVs often

sensitize them on the importance of cleanliness and disease prevention. They are very strict to ensure that we follow their advice and keep on reminding us if we fail to do so.

Additionally, she noted that her house is one of the places where the research took place but despite the traps being laid for mosquitoes in her house, they didn't catch any mosquito.

Mturi also affirmed that they were given enough nets to protect themselves from mosquitoes. "I have a net even if it is during the sunny season, I don't like sleeping without a net. If I sleep without one, it's like I am sleeping outside," she stated, noting that all her family members sleep under a mosquito net.

Illiminata Wakesho, another resident of Kavumuni, noted that the use of mosquito nets help in curbing the risk of them acquiring chikungunya. "They trained us not to sleep without nets and we are very grateful that whenever they are available at the dispensary, we are given," she said, noting that before they had to buy them from vendors, which at times posed a challenge in terms of expenses.

According to Salim Kahindi, a nurse, Lenga health centre, despite the sensitizations, you find some people have been given the nets but they are not using it while others are using the nets but because they have become worn out and not replaced, they are not really benefiting from it.

"People should continue sleeping inside a net, every time and every season. They should also take care of their environment and drain stagnant water while covering their stored water," he urged.

Uganda: Community Sensitization Keeping Yellow Fever at Bay

By Jael Namiganda

Jael Namiganda

Joyce Kabyanga is a vibrant young mother of two. I happened to bump in to her as she exited the immunization center at the Kasese Municipal Health Centre III, where her nine months old baby girl had just received her first dose of Yellow Fever vaccine for free.

"People have been paying a lot of money to receive this vaccine but my child is amongthe few lucky pioneers to be enrolled in this free vaccination program. I am so happy for this initiative," Kanyanga says.

She got to know about the introduction of the new vaccine for children not only through a community sensitization exercise but also through various talk shows that were hosted on many community radio stations. This is after the government of Uganda introduced Yellow Fever vaccine into the routine immunization program.

According to Dr. Fred Nsubuga, the senior medical officer at the Uganda National Expanded Programme on Immunization (UNEPI), a single dose of Yellow Fever vaccine lasts a life time. "Previously it was a requirement for travelers and Ugandans had to pay about USD 25 to get a shot but the

Government together with global partners are now rolling out the first phase of a nationwide mass vaccination campaign to eliminate YellowFfever by 2025," Dr bNsubuga said.

The Yellow Fever vaccination was included in the routine national immunization program by the ministry of health in October, 2022 following a recommendation by the Uganda National Immunization Technical Advisory Group. The vaccine is rolled out in high risk border areas and is administered to babies at nine to 12 months. Dr. Nsubuga reveals that this first phase is being carried out in six high risk regions but the free service for adults is yet to be rolled out.

On 6th March 2022, the Uganda Ministry of Health announced an outbreak and by April 25th t, a total of seven suspected cases tested positive for Yellow Fever. These cases were reported from Wakiso district, Masaka, Kasese and Moyo.

Due to the potential of the epidemic spreading in Uganda and neighboring countries, Kasese being at the border with Democratic Republic of Congo (DRC) and also being host to many refugees was put on high alert.

In March 2022 the Government through Ministry of Health. Ministry of Information, Communication and Technology (ICT) and National Guidance embarked on a nationwide sensitization campaign to spread information amongst the population due to the limited or lack of information available at the time.

According to the World Health Organization (WHO), Yellow Fever is an epidemic-prone mosquito-borne vaccine preventable disease caused and transmitted to humans by the bite of infected Aedes and Haemagogus mosquitoes. Once contracted, the yellow fever virus incubates in the body for three to six days.

The majority of infections are asymptomatic, but when symptoms occur, the most common are fever, muscle pain with prominent backache, headache, loss of appetite, and nausea or vomiting. In most cases, symptoms disappear after three to four days.

According to the Kasese District Health Officer, Dr. Baseka Yusuf, when a case was confirmed in the district, they immediately engaged the population in a mass sensitization exercise. This is because there was very limited information about the disease among the population.

"We targeted our health workers especially in the areas that we knew were first to be affected. Since we are at the border, our Village Health teams were equipped with enough information to spread at the outreach centers but also at the village levels in a door to door exercise," he explained.

Dr. Baseka said that they also sensitized them through the mass media, especially radio stations where health experts attended talk shows and engaged directly with the listeners through direct call-ins with various queries and inquiries that receive immediate responses.

He noted that "besides the radio sensitizations, we continue to engage the populations through community gatherings with drama performances which help us convey the messages and it is here that most people get sensitized about the available services for instance the newly enrolled yellow fever vaccine on the national routine immunization program for babies at nine months," he notes.

"The Uganda National Expanded Program on Immunization is already supplying us with the Yellow Fever vaccine. When this young generation starts school at three years, they will all be vaccinated, but also the general public is soon starting to get the free vaccination although what we administer now at border points is still paid for, at a subsidized fee," Dr. Baseka reveals.

He emphasized that it was very important to engage the community through community-based surveillance and through emphasis on the signs and symptoms and the mode of transmission. Through this the communities are able to report immediately any suspected cases to the authorities who then alert their stand-by laboratories to swiftly confirm if it is indeed a yellow fever case so that it is handled with utmost care to prevent further spread.

After the ministry of health declared a Yellow Fever outbreak earlier this year (2022), the ministry activated the Public Health Emergency Operation center. They also deployed rapid response teams to affected districts where all cases were reported to determine the extent of the outbreak, identify the at-risk population, conduct a risk assessment, initiate risk communication and community engagement activities and implement integrated vector control measures.

However, despite an earlier imminent plan to introduce the Yellow Fever vaccine in October, followed by Phased Mass Vaccination Campaigns (PMVCs), the vaccine is not yet rolled out for the masses due to funding gaps and a shift in priority areas arising from the current Ebola outbreak.

Kabyanga says it is a relief that children are now being protected from any possible out breaks. She is thankful that the Village Health Team was able to reach out to the community with information regarding the new inclusion in the routine immunization. Due to the risk of an epidemic spreading in crowded urban areas that are common hubs for travelling residentsthe authorities, in Kasese in collaboration with border towns like Bunagana, carried out sensitization campaigns because of the frequent population movements between Uganda and DRC.

Dr. Baseka said efforts to sensitize the populations have not been in vain because they were able to contain the 2022 outbreak with just a single confirmed case in his district and response from the communities who keep reporting suspicious cases and symptoms.

"When the vaccine was introduced at the beginning of October 2022, mothers started flocking health centers by the third week, we had reached 50 respondents and are looking at 150 babies with the numbers still growing," Dr. Baseka observed.

He said, populations in areas like Kasese are low income earners and suffer the wrath of having to treat illnesses, especially breakouts of such preventable diseases and, therefore, as the district leadership, they decided to take it upon themselves, to support communities and families to ensure healthy populations that would ultimately thrive in their various economic activities.

According to the Masaka District Health Officer, Dr. Nakiyimba Faith, vector control would be another crucial way of controlling any possible outbreaks and spread of yellow fever in the urban centers of Masaka. However, there are still limitations to this measure because spraying the mosquitoes which spreads yellow fever might actually end up doing more damage to the eco system and other species.

As a general precaution, WHO recommends prevention of mosquito bites including the use of repellents and insecticide treated mosquito nets. However, the highest risk for transmission of yellow fever virus is during the day and early evening to which Dr. Nakiyimba stresses that it has been a challenge.

She, however, notes that through their sensitization campaign, the populations most of whom spend their days in the gardens are being urged to put on long clothing when they go about with gardening.

The WHO African Regional Offices have been active in terms of surveillance and coordination with all stake holders as well as giving funds needed to facilitate all their focal persons at the various affected areas. However, health workers are fully equipped with information, logistics and protective gears to enable them go about their work when the general public reports and cases as well as continuing with the sensitization campaigns as they move door to door at grass root village level.

According to Dr. Nakiyimba, despite the Ebola outbreak in the country that seems to be taking all the resource, there was a program already in motion by the government to make people aware of yellow fever symptoms and signs and this is still ongoing as planned.

With these, the public is educated through dramas. However, according to Jalia Nakitto a resident of Nyendo Masaka, there has been some information about the disease in the market where she works at Nyendo town but she seems skeptical about the whole arrangement.

Dr. Nakiyimba notes that sadly, propaganda and fake news being disseminated on social media are among hallenges the government and other sface while educating the public. According to Dr. Sarah Zalwango, the Deputy Director Public health and Environment, Kampala, the government chorological data keeps being updated and thus enables them to get ready for any cases that may arise.

Dr. Zalwango says that as they spread out information about the yellow fever to the public through media campaigns, they are always on standby to respond to any out breaks that may arise, stressing that this mechanism has proven effective when the country had an outbreak at the beginning of this year 2022.

She noted that messages meant for urban populations like those of Kampala Metropolitan area are different from those of rural areas like Kasese and Masaka.

The time frame in all these regions for such campaigns also differs and depends on the availability of resources including volunteers who keep working even without proper facilitation from the districts. “These ones are sometimes supported by partners like the Red Cross and World Vision,” Dr. Baseka says.

Faith Nyakaisiki is a Village Health Team member attached to the Uganda Red Cross Society currently volunteering as a peer health educator in Kasese district. Nyakaisiki has been conduting out-reach activities at Kyanzuki Village, Nyakabingo Parish in Nyakabingo sub-County throughout this campaign.

She said on some days she rides a motorcycle with a loud speaker announcing the available services at the Nyakabingo Health Center II. “People always stop me with inquiries and I take that opportunity to educate them all about the yellow fever disease as well as other relevant issues at hand,” Nyakaisiki says.

She has been doing this for two years now and has noticed a big difference in how people positively take in such information. “They gladly makes inquiries, their curiosity and inquisitiveness gives me so much joy. I am always happy to help them and sometimes follow up their cases to the health center,” Nyakaisiki added.

“I would do this for the rest of my life because am passionate about saving lives and humanitarian work but the financial constraints, the bad weather, dusty and impassable roads and some few individuals who are still superstitious make my work hard,” Nyakaisiki explains.

She wishes for consideration of peer health educators at the district’s budget allocations because health matters must always be considered a priority area.

According to Dr. Mubunga Julius, a health worker

in charge of the border point between Uganda and DRC, the vaccination service is currently being managed by a private practitioner on authorization of the Ministry of Health under the stewardship of the District Health Officer. "The vaccine is picked from the District facility to the border point andand wWe now receive 40-50 people monthly and have held a vigorous sensitization exercise to educate people about the importance of the vaccine," Dr. Mubunga notes.

"The vaccination campaign has gone beyond the Kasese borders to places like Fort Portal so that people in neighboring areas can also access this vaccine," the health worker says.

However, Dr Mubunga says people are still being rigid about vaccination as they still believe the myths and propaganda surrounding it. But being at a border point, most people travel out to DRC and have now understood the benefit of vaccination through these constant sensitization campaigns.

Dr. Mubunga is optimistic that with all the information spread through these vigorous mass sensitization campaigns, when the mass vaccination exercise kicks off before the end of this year 2022, the drive will be nearly 100% a success.

Uganda's Swift Response to Yellow Fever Outbreaks Pays Off Despite Challenges

By Jael Namiganda

Jael Namiganda

Despite the Yellow Fever disease being endemic in Africa, in Uganda identifying a patient suffering from it takes several tests which usually follow failure to detect malaria and other common infections.

The Assistant Commissioner for Disease Surveillance in the Ugandan Ministry of Health, Dr. Michael Mwanga, says there is no specific treatment for Yellow Fever; only supportive treatment is available to manage symptoms. Without treatment, up to 50% of severely affected persons die but there is a vaccine which provides life-time protection against the disease.

He explains that yellow fever is an acute viral hemorrhagic disease transmitted by infected mosquitoes. The "yellow" refers to the jaundice that affects some patients. Other symptoms of the disease include fever, headache, muscle pain, nausea, vomiting and fatigue, Dr Mwanga explained.

He says the disease is transmitted from humans to humans or from animals to humans by Aedes mosquitos. Its treatment is generally supportive care as there is no antiviral drug available for it. In severe cases, hospitalization is required to administer fluids, manage blood pressure and to replace blood in case of blood loss.

The disease is endemic in tropical areas in Africa where Uganda lies and is considered to be a re-emerging disease due to increasing reports of its occurrence in different parts of

the world in the recent years.

To continue protecting its people, Uganda launched the third Edition of the National Guidelines for Integrated Diseases Surveillance and Response (IDSR) in Kampala in September 2021. It highlights new methods of disease detection, reporting and provision of real-time surveillance data using new technologies and platforms.

The platforms include event-based disease surveillance, community-based surveillance, one health approach, cross-border surveillance, and electronic IDSR to improve disease surveillance in Uganda at all levels.

The IDSR guidelines incorporates lessons learnt from previous epidemics, new frameworks like the Global Health Security Agenda (GHSA), One Health, Disaster Risk Management (DRM), the World Health organization (WHO) regional strategy for health security and emergencies, and the rising non-communicable diseases, and aims to strengthen implementation of IHR (2005) core surveillance and response capacities. These guidelines have been adapted to reflect national priorities, policies and public health structures.

Under the IDSR, investigation of an acute yellow fever outbreak is made as quickly as possible. It starts with case management by trained health officers, picking samples and following up on them, risk communication by health educators after orientation, community outreaches through village health teams (VHTs) who coordinate directly with the communities to do contact tracing and then the laboratory tests at Uganda Virus Research Institute (UVRI) subsequently identifying the cases which are then managed.

According to Dr. Mwanga, as of August 2022, the health ministry had enrolled 33 surveillance entomologists who study the vector-insects through conducting intensive active search in over 1000 health facilities.

The aim is to strengthen indicator-based surveillance, event-based surveillance, improving community-based disease surveillance, improving cross border surveillance and response, improving reporting and information sharing platforms, improved data sharing across sectors and tailoring IDSR to emergency or disaster contexts.

The IDSR tool is used by health workers at all levels of public and private settings, National Focal Points, health authorities at Points of Entry, Hospital managers, clinicians, infection prevention and control officers, national and regional reference laboratories, district health teams, health training institutions and community leaders.

According to Dr. Mathias Lugoloobi, the Wakiso District Health Officer, tracking victims can be a lengthy, complex exercise which requires a thorough check of history of patient's travel records, family and all other contacts. It is very key for family because since the virus is spread by a mosquito, they may also have been bitten by the same mosquito.

"Prioritizing family testing is very important if we are to trace all contacts of the victim. We always contact our VHTs who are always on standby to go down to the villages and trace all these contacts from whom we get samples which are then sent to the Uganda Virus Research institute to ascertain the numbers of those infected," he adds.

Dr. Lugoloobi says the IDSR strategy has been of great impact in Wakiso district during the 2021 yellow fever outbreak where five yellow fever cases were confirmed out of which one was a contact to one of the original victims.

The cases were all found to have recently travelled and, therefore, imported the virus in to the district however the swift response of the district's health team was able to mitigate a wide

spread and none of the victims lost their lives, thanks to the IDSR strategy which enabled quick detection, surveillance and response.

The Wakiso district health team has a surveillance team of 25 clusters. Each cluster has members and each village is covered by at least five VHTs. The VHTs and health teams coordinate with other neighboring district teams and the central disease surveillance team since Wakiso districts forms part of the Kampala metropolitan regional public health emergency centre, which is now regularly active.

One of the cases in Wakiso only identified as Margaret says she at first thought she was suffering from ulcers." When I went to see the doctor at Masuulita Health Centre IV, the doctor said he was drawing a blood sample, I didn't understand because I knew I had ulcers but to my shock days later when the results came in, I was informed that I had yellow fever. I was enrolled on treatment and got better with time" she said.

Margaret says she doesn't visit health facilities that regularly due to transportation costs given the remote area she lives in but is very glad that she took the decision to visit a health center this time round. "Who knows? I could have died. I thank the health workers for their timely response and ensuring that my entire family was safe," she narrates.

The largest yellow fever outbreak in Uganda affected 181 people and resulted in 45 deaths in northern Uganda in 2010.

Since 2000, surveillance for yellow fever in Uganda has been conducted through the IDSR strategy. This strategy enables timely detection of and response to outbreaks to prevent further spread.

Over the years, there has been improved completeness and timeliness of reporting, case detection and data analysis and better response to disease outbreaks as key achievements following the implementation of the new strategy.

To address persistent inconsistencies and inadequacies in the core and support functions of IDSR, Uganda initiated an IDSR revitalization programme in 2012. The objective of this evaluation was to assess IDSR core and support functions after implementation of the revitalised IDSR programme.

On 26 March 2016, the IDSR focal person in Masaka District, southern Uganda, alerted the Public Health Emergence Operations Center (PHEOC) of the Ministry of Health (MoH) that within a one-month period, three men from the same extended family had died of a "strange disease" with bleeding symptoms.

Fearing an outbreak of a viral hemorrhagic fever (VHF), the MoH immediately activated the VHF response plan, established an isolation unit at the Masaka Regional Referral Hospital, and initiated active case-finding.

Six blood samples were collected from patients at the isolation unit and tested for Ebola Virus, Marburg Virus, Crimean-Congo Hemorrhagic Fever, and Rift Valley Fever in the Viral Special Pathogen Laboratory at the Uganda Virus Research Institute (UVRI).

However, the samples tested negative for all the tested VHFs. Based on the clinical presentation of the patient and the initial laboratory results, the reserved samples were then sent to the Arbovirus laboratory for further testing including yellow fever testing.

On 8 April 2016, three samples from Masaka District tested positive for Yellow Fever by both PCR and IgM antibody tests. On 9 April 2016, MoH declared a yellow fever outbreak and launched an outbreak response. After the declaration, another cluster of cases was reported in Rukungiri District, southwestern Uganda.

Subsequently, four years after the Masaka

outbreak, another outbreak occurred in Uganda from 4th November, 2019 through 14th February 2020, eight laboratory confirmed cases of Yellow Fever in Buliisa (3), Maracha (1) and Moyo (4); including four deaths (50% case fatality rate), were detected through the national surveillance system.

The very first case this time was reported on 10th December 2019 when the Ministry of Health (MoH) was notified by the UVRI Regional Reference Laboratory of a case of Yellow Fever confirmed by reverse-transcriptase polymerase chain reaction (RT-PCR).

The case was a 37-year-old male with suspected VHF. His occupation was cattle farming with a history of travel to sell milk between Kizikya cell, Buliisa \District in Uganda and the Democratic Republic of Congo (DRC).

On 30th October 2019, he visited hospital with symptoms of fever and headache of a five-day duration.

His symptoms worsened with vomiting, abdominal pain and nose bleeding and he died on 4th November 2019. During an in-depth investigation in December, eight samples were collected from close contacts, including family members and neighbours, and tested for yellow fever.

On 22 January 2020, UVRI notified the MoH of a second case of Yellow Fever confirmed by serological testing in Buliisa with connection to the index case and with similar occupation. The other samples collected during investigation were negative for yellow Fver.

Two other confirmed cases of Yellow Fever were identified in Moyo Ddistrict in West Nile region which shares a border with South Sudan. The cases were aged 18 and 21 years, traded timber between Uganda and South Sudan and spent time in both countries. Onset of illness for both cases was 3 January 2020 and they were admitted at a Health Center in Moyo District.

They were later referred to a General Hospital with symptoms of fever, vomiting, diarrhoea, fatigue, headache, abdominal and joint pains, confusion and unexplained bleeding.

The patients' conditions worsened and died in the hospital on 5th and 6th January 2020. Results from UVRI confirmed Yellow Fever infection.

Subsequently, Moyo district notified a second cluster of suspected and confirmed yellow fever infection in a different village. The confirmed case in the suspected cluster was a 59-year-old patient who presented symptoms including unexplained bleeding and fever on 22nd January and died on 23rd January 2020. A blood sample collected tested positive for yellow fever by RT-PCR at UVRI. His death was preceded by the death of two of his family members in early January with similar symptoms.

The Minister of Health, Dr. Jane Ruth Aceng, declared an outbreak of yellow fever on 23rd January 2020. It was then that the National rapid response teams swung in to action with massive deployments in Moyo and Buliisa districts to conduct further investigations and initiate outbreak response.

Other response activities included enhancing surveillance and active case finding in all districts in the north-west region and entomological surveys in the affected districts of Buliisa and Moyo. Cross-border notification with South Sudan in reference to the cases in Moyo district was done, she says.

A reactive campaign was then launched, approved by the International Coordinating Group on Vaccine Provision for Yellow Fever Control targeting approximately 1.7 million people to stop transmission and prevent imminent risk of the outbreak spreading in the north-west part of country particularly in Buliisa,

Mass Immunization against Yellow Fever in Uganda

Koboko, Maracha, Moyo and Yumbe districts.

To achieve sustained protection across the country, the MoH took on preparations for introducing yellow fever vaccination into the routine immunization programme in 2021 as well as the implementation of preventive mass vaccination campaigns nationally.

The State Minister of Health in Charge of General Duties, Hon. Anifa Bangirana Kawooya, noted during the launch of the IDSR third edition that, "We are working in tricky times when a disease in one country can easily cross to another, therefore with these IDSR guidelines in place, we should equip our systems to detect and respond to diseases effectively."

The WHO Representative to Uganda, Dr. Yonas Tegegn Woldemariam, noted that IDSR is a cost-effective public health method.

"Africa is challenged by recurrent disease outbreaks. These guidelines provide an opportunity to build resilient systems and contribute to attaining the SDGs. COVID-19 has taught us enough about building resilience and preparation for disease outbreaks and we ought to do that," he said.

Although the revitalized IDSR program in Uganda has been associated with improvements in performance; Dr. Mwanga says that the program still faces significant challenges and some performance indicators are still below the target. "It is important that the documented gains are consolidated and challenges are continuously identified and addressed as they emerge" he stresses.

Dr. Mwanga says the limited financial support also still cripples the strategy implementation that has over these years proven a great potential. He says they are very optimistic about the strategy which has a targeted goal of 2030 to wipe out neglected diseases such as Yellow Fever.

Dr. Mwanga notes that IDSR strategy is quite broad and deals with all outbreaks, especially VHF with epidemic potential such as Yellow Fever, but operate on meager resources as well as unclear policy specifications which guide how they respond which sometimes delays response in affected areas.

"The ministry of health leverages on support and interventions by support partners such as USAID and CDC. However, the government has of late stepped up, injecting in a lot of funding, looking at prevention and managing yellow fever in hospitals," he adds.

The ministry now targets all 14 regions in the country first looking at Bunyoro region, Ssezibwa, Masaka, Karamoja, Lango, West Nile, and Kampala metropolitan area, among others, where they hope to start a mass vaccination as a prevention strategy. "The strategy is to detect disease outbreak early for early response and minimize spread, from community to regional, national and cross-border levels. Actually the whole of Africa is integrating as a means of mitigating effects of out breaks," he said.

Dr. Mwanga notes that the strategy skills health workers at community level, support supervision and mentorship from community to district and regional level equipping them on how to prevent, detect and respond.

IDSR strategy looks at outbreaks, tracks them and provides adequate response; they also follow the trend to see whether numbers are increasing or decreasing and advise response teams on how to mitigate.

The WHO intends to roll out vaccination in Kampala metropolitan areas together with the Government of Uganda at the end of this year or beginning of 2023 as a preventive measure. This follows intensive social mobilization in communities with the WHO as a key partner on yellow fever mitigation.

Mr. Mawejje Edward Titus, the surveillance focal person for Masuulita Sub county, Namayumba health sub district in Wakiso District, where one of the cases was detected, says they were enabled as front line workers after they tracked the victim for a while. A test was carried out at UVRI and it was confirmed that she had yellow fever and she was subsequently enrolled on treatment. All her contacts turned out negative, he says.

Dr. Mwanga says there are many success stories especially at boarder districts where IDSR impact has been very visible citing refugees crossing to Uganda with the virus but they are mitigated early enough before they spread it amongst their host communities.

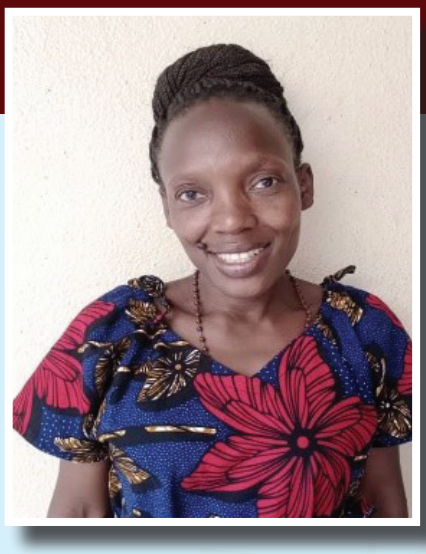
Mawejje points out that the challenge of the dynamic population that they work with is that "these people often live in one district but work in another making surveillance and tracking hard." He adds that the other challenges include the inadequate number of trained staff, funding, irregular supervision, and lack of key logistics.

The delayed results from tests taken at the UVRI is a huge challenge, too, because the time factor is important in health service delivery. Also problematic are some private clinics which intentionally give wrong diagnosis in order to keep patients for long to earn more from the hapless victims, also hinders the IDSR strategy goal of early detection, Mawejje says.

Dr. Mwanga concludes that improving IDSR efficiency and effectiveness will require intensified pre-service and community training including private clinic owners, mentorship, regular supervision or inspection and improving funding at the district level.

Impact of Yellow Fever Vaccination and Surveillance in Uganda

By Olivia Namaloba



Olivia Namaloba

Yellow fever, an acute viral haemorrhagic disease transmitted through the bite of *Aedes* mosquitoes, has become a global challenge and endemic in many African countries. Uganda has had a history of Yellow Fever outbreaks with the largest reported in 2010 in a number of districts in northern Uganda where over 180 people were affected, 45 of whom succumbed to the disease.

The country was declared Yellow Fever free after the 2016 outbreak. But in March 2022, seven new outbreak was confirmed in the districts of Kasese in Rwenzori region, Wakiso and Masaka in the central region.

Margret Nachintu from Masulita village, Wakiso district, survived the recent yellow fever outbreak but still has fresh memories of the disease impacts.

"I was in my garden digging then I started feeling something in my chest and I went to the hospital. I went to tell the doctors that I am disturbed by ulcers but when they took my blood sample, I waited and waited. After like one month, the doctor whom I had told about my ulcers condition at Chishbaye health Centre called me on phone asking if I was home and I told him I was. "

Then he told me that some medics were coming to my home to check on me. I got so scared and asked the doctor what was wrong with me and he told me it was the medics to communicate my ailment," she said.

"When the medics arrived, I was so scared and asked them what I was suffering from and told them that I was very scared. In fact, if I had high blood pressure, I would have collapsed and died. Then they told me to relax everything was going to be okay. I gave them a seat and slowly they told me after a while that I had yellow fever. I got scared and asked how I had gotten yellow fever yet I had gone to treat ulcers. I asked why I had not been told about it when I went for the ulcers checkup and had to wait for over one month. But the medics told me that my blood samples had been taken to bigger laboratories for further tests. After that, they kept on monitoring me for some time."

Nachintu who says she now feels much better explains that all she got from the medics was preventive treatment as the medics explained that the disease has no medication.

"After the medics diagnosed the disease, I felt a big change. They gave me some tablets but the medics assured me that it has no defined medication. They told me that what they give is a preventive medication to fight the virus that causes the disease. So the medics said they only treat the symptoms

you report to them and as such they gave me the medication for the ulcers which I had reported. I feel a big improvement right now. The pain has generally reduced," she said.

Dr. Mathias Lugoloobi, Wakiso District Health Officer explained the symptoms and diagnosis of Yellow Fever, "They usually present with different symptoms. You may think it is malaria, or typhoid. It is not a disease which comes once. You may have fever and by the time you get yellow eyes or something, it is really at an advanced stage."

He added that "we take all the samples to the Uganda Virus Research Institute(UVRI) so they do the serology. Usually, these results come a bit late maybe after one month or so because of the complexity of the testing."

UVRI is undertaking a number of research projects on viral diseases caused by arboviruses. Dr. Julius Lutwama, an entomologist at UVRI says it is through this research that Uganda has managed to reduce on yellow fever outbreaks four years.

"We continue doing survey and we pick samples from people who are sick and that is how we actually identify that there are cases there. That is why we never got to the worst case scenario because we identify cases very early." Dr. Lutwama said.

In an effort to strengthen the surveillance, Ministry of Health is incorporating yellow fever vaccination into their routine immunization. The vaccination has been taken mainly to those intending to travel out of the country.

Sister Betty Nabuganda, assistant district health officer in-charge of maternal and child health at Wakiso district explains that this is a new vaccine that has been received without resistance and is effectively administered to nine-months old babies as a protection against the deadly yellow fever virus.

"Normally a vaccine is administered at a younger age to protect the young population such that by the time they become adults there will be herd immunity. Most of them would have been vaccinated and if infection or a disease is to occur, it will find when most of the population is immune. All that needs to be done is we help educate these parents to know that now we have added yellow fever which is as good as the other vaccines," Sister Nabuganda said.
Currently, over 700 health workers are undergoing training in preparation for the roll out of national mass vaccination campaign against yellow fever.

Ziporah Namoviru is one of the nurses at Kajas Health Center Four in Wakiso district who was recently trained by the ministry of health after Yellow Fever was integrated into routine immunization including vaccination of nine-month babies. "My first role is to vaccinate after training. I am only giving the vaccine to children of nine months due to the shortage of the vaccine for now. My second role is to advice mothers to bring their children for vaccination. The mothers are highly receptive they are even asking for it to be there because they have been hearing of it and they are responding very well. They are bringing their children and in the community where I have been operating for now, above 50 of them yesterday were vaccinated," Namoviru explained.

Dr. Fred Nsubuga, senior medical officer

United Nations Expanded Program on Immunization(UNEPI) says vaccination will be carried out in six other districts at the regional referral hospitals.

"We did the risk assessment in 2020 to identify districts at high risk. Because of the demand of yellow fever vaccines globally, we are not able to get all the vaccines for the seven regions.
Thereforein 2022 phase one we focused on six regions including Kabale, Kabarole, Hoima, Gulu, Lira, and Arua.

We shall go to a second phase in 2023 around October and the last phase in 2024. We are aware that Wakiso is a risk area so are planning to include Wakiso in the initial phase," Dr. Nsubuga noted.

Although part of the vaccines has been procured by the government, Dr. Nsubuga reveal the much of the vaccines have been donations under the global fund through World Health Organization (WHO) initiative.

"We are going to use around 9.3 million dollars that is the donation money and the Ugandan money is around one million dollars for phase one. We shall have 13.5 million doses," he added.

WHO is focusing on the EYE (Eliminate Yellow Fever Epidemic) strategy which is a comprehensive long-term solution aimed at ending yellow fever epidemic.

Dr. Salome Okware, World Health Organization surveillance officer says that the strategy is being implemented in all Yellow Fever endemic countries and it has worked well for Uganda in reducing the outbreaks.

The EYE strategy focuses on supporting countries to eliminate yellow fever and Uganda has been classified as a high risk and endemic thus surveillance systems are robust enough to respond to outbreaks," Dr. Okware said.
According to Dr. Okware, unlike malaria which has specific treatment, there is no particular treatment for yellow fever and this makes it a challenging to treat.

Even with all the interventions, Dr. Alfred Driwale, Program Manager UNEPI, explains that the favorable climatic conditions for breeding of Aedes mosquitoes as well as encroachment on forests are still a major hindrance to elimination of the Yellow Fever.
"We have destroyed the environment. We have taken ourselves to the forest thus being closer to getting bitten by mosquitoes which had bitten monkeys. And once we go to the forest we also come back to the community. So it means the risk of being infected and accelerated transmission amongst moneys is made worse by the fact that now people also move," he added.
According to the WHO new guidelines, an effective dose of yellow fever vaccine provides lifetime protection against the disease but without treatment, up to 50% of the severely affected persons die of Yellow Fever.
Global statistics indicate that about 40 countries are at risk of yellow fever outbreaks and Uganda is among the 27 endemic countries. Yellow Fever is among the diseases highlighted for elimination by 2026.

Uganda: Surveillance and Diagnosis Curbs Zika Virus Outbreak

By Olivia Namaloba

Olivia Namaloba

Named after Zika forest in central Uganda, the Zika virus was first isolated in Uganda about five decades ago among the monkeys in the forest. However, since 2007 the Zika virus disease has become one of the emerging health threats caused by the aborviruses with sporadic outbreaks reported in parts of Africa, the Americas and on the Asian continent.

The latest outbreak of the disease was reported in Brazil in 2015.

Zika virus disease is caused by Zika virus, which is transmitted by *Aedes* mosquitoes. Uganda has not reported any outbreak of the disease among humans but researchers say they have traced antibodies of the disease among humans whose samples have been taken at St Francis hospital in Kokonjeru, some 68km away from the Zika forest.

Dr Angelina Kakoza is the pediatric neurologist with Makerere University College of health sciences and part of those researching about Zika virus in Uganda. Dr Kakoza says the disease might be affecting people in Uganda but passing as malaria since they have similar symptoms.

''We find that if this similar mosquito goes and bites a monkey and it is infected with Zika virus, that mosquito can also come and bite us and then we get sick with that. So the Zika virus once it comes and infects us, usually it has an incubation period of about 10-14 days or can be less," she explains.

"But in 80% of the cases, a person is symptomatic in a way that you are not able to show the signs. You might be having the virus but you are not showing any symptom. "

The symptoms include muscle aches, red eyes, joint pains, headache, diarrhea, vomiting. But all these are nonspecific symptoms which mostly are found with malaria. So you may find that people will be thinking they have malaria, they get over it. And you find that someone who has Zika virus even without treatment, they can get better.''

According to Dr Kakoza, the Zika virus disease has clinical similarities with malaria, and can be prevented in similar ways especially by raiding the homesteads of mosquitoes and preventing mosquito bites. While the disease is said to have mild symptoms that can even disappear with treatment, Kakoza says it has adverse effect on pregnant mothers including birth defects that can also cause paralysis in adults.

''When you are pregnant, it can affect the growth of the baby, the baby is born with a small head, others can get miscarriages. That is why it's dangerous. In adults it can cause muscle paralysis and they are not able to move because the power in muscles has gone. So the virus has been associated with those complication," she says.

Uganda in relying on its laboratory based aborviruses surveillance and continuous research on Zika virus trends to rapidly diagnose the disease and curb the potential outbreaks.

Professor Caleb Pusiano, the Executive director of the Uganda Virus Research Institute (UVRI), says Uganda has continued with research and surveillance on Zika virus since the first report of the disease in the country.

''We have a department of emerging and re-emerging aborvirology, that is looking at all this viruses including Zika virus and some of the studies they have done. interestingly they have not found so far any individuals who has these antibodies. And now that there is more interest, we are going to observe more to see, whether

the strains that are causing this microcephaly in America and other countries, are the same with what we have here," Prof. Pusiano says.

Dr Solem Okware, the World Health Organization surveillance officer says Uganda is among the countries being supported to strengthen their surveillance systems to prevent future outbreaks of Zika virus disease.

''Arbovirus initiative targets four viruses, Yellow fever, Dengue, Chikungunya, and Zika. In the recent years, we have been seeing increasing cases of these four. You are aware of what happened in South America with Zika spreading quite widely and even the cases of Dengue, have also been going up. For all of them they have that same risk, we have the mosquitoes encroaching in forested areas. So this initiative, aims to see how we can improve access to vaccine for these diseases, access to medicine, and access to better health care workers who are just trained to manage them,'' Dr. Okware says.

Dr John Kayua, laboratory manager, at UVRI explains that Zika virus is screened and tested using either PCR or serology test.

''at UVRI we don't use urine, we mainly use serum or blood but we can also use Cerebrospinal fluid (CSF) I would not like to give recommendation on urine unless if you are using Polymerase chain reaction (PCR) because urine might have some other deterrents on the laser. All arboviruses have a short viremic phase. This means the virus stays in an individual or someone for a very short time, and that is between less than 7 days. So when we pick the blood sample, that is less than seven days from symptoms onset, we do the PCR because it will be able to detect if the person has got the viral RNA of the Zika virus," Dr. Kakuya says.

"However, when the sample is more than seven days, after the symptom onset, the viral RNA is decreasing or might be completely out. That means the patient is recovering and producing antibodies and now you expect the level of antibodies to go up. So the other screening tests will be now the serology because that one detects antibodies."

He adds that patients are usually subjected to another confirmatory test to ensure it is Zika disease and not other aborvirus diseases.

''If the PCR is positive, that confirms an infection of Zika. However, the negative PCR does not rule out an infection because the viremia phase might be down, and antibodies might not be active and that's why we do the serologic tests. And if IgM is positive, then we call that presumptive positive sample for Zika. The reason why we call presumptive is because in this flavivirus family where there is Zika, Yellow fever, Dengue, there is a lot of cross reaction in antibodies," he explains.

"This is where we do the Pluck Reduction Neutralization Test (PRNT).We test the patients antibodies or serum with yellow fever, Zika and all Dengi viruses. We react the antibodies with these viruses and find out which gives the greater one four-fold neutralization which is tighter compared to the other one. And that's how we confirm an IgM presumptive positive Zika."

Dr Kayua says, while some tests results come within hours, others can take up to two weeks.

''The duration for PCR is a couple of hours, maybe I can say less than 6hours for processing the sample to analyzing. Serology if it is negative that is also six hours. However, when it is positive, that is now where we need to do the PRNT and it takes one and half weeks or almost in total two weeks," he adds.

Dr Julius Lutwama, a virologist at UVRI attributes the emerging Zika virus outbreaks to changing climate patterns across the globe, which he says has created a conducive breeding environment for mosquitoes that transmit the Zika virus.

''The dry seasons have become very dry, and in some places the rainy seasons have become very rainy. And both of these are not good both for the human and animals but also for the environment. And when it is too rainy of course we have the multiplication of mosquitoes, bacteria moving up and down anywhere where there is a lot of water, there is floods and many diseases move during the rainy periods. The changes in climate are affecting very much, both human health and animal health leading to more diseases," he says.

Dr Lutwama explains that health teams in Uganda have been trained to screen and collect samples from suspected cases of Zika virus disease, of which samples are then delivered to UVRI for confirmatory tests.

"All we are doing is trying as best to be able to identify it as quickly as possible, if it comes into the human population. We have hospitals and clinics, health facilities where we have people who pick samples for us. So when they identify any people are sick and have got signs and symptoms of the disease, they collect blood sample from these people, and they send the blood sample to UVRI so that we do the diagnosis. So that is how we do the surveillance," he said.

Dr. Lutwama says there are centers spread across the country for the surveillance and collection of samples.

''We know the virus is mostly in areas where we have monkeys, or the forested areas. And the forested areas are mostly around the central part of the country, but also in some areas in western Uganda. So we have sites in central Uganda, western Uganda, and west Nile region of Uganda and also in Tororo which is the eastern part of the country. Unfortunately, we don't have in the central north and north east because they are not forested so you wouldn't expect Zika virus to be circulating there," he adds.

Dr. Lutwama however notes that the diagnosis of Zika virus disease is hampered by the late or non-reporting to the hospitals by people who have symptoms of the disease.

''We know it is there, in the animal population, in monkeys, in certain forests, but a few cases we have identified over time, who show antibodies against the disease, which indicate that they have been infected, not very long ago but we have not been able to isolate the virus because we get these cases a bit late. The period for the virus is very short so unless you are lucky to pick a person who has just been infected. But given our poor health searching behavior, many people will come to the facilities, hospitals, clinics, a bit late, when the amount of virus in the blood has gone down," he notes.

The research on Zika virus is also facing a challenge of rapid urbanization that has led to massive encroachment on Zika forest where most of the mosquitoes used in research are bred.

''You can go to Zika forest now, and find that it has been encroached as most people are building and so there is no demarcation between animals and where the humans are staying. You find that infected monkeys were first discovered in Zika forest. So if we have this problem where the urban area is close to the forest where these mosquitoes reside we find that it's very quick for this mosquitoes to come to us and also infect us," Dr. Lutwama adds.

In 2016, the World Health Organization (WHO) declared Zika virus disease a public health emergency of international concern following its global distribution and the birth defects it was causing especially in the Americans.

Zika virus is transmitted to people through the bite of an infected aedes mosquito, the same mosquito that transmits Dengue and yellow fever. There are also reports that the disease is spread through blood transfusion, sexual contact or from mother to foetus during pregnancy.

The disease presents symptoms such as fever, rashes, muscle or joint pains, headache among others. The symptoms normally last two to seven days. There is no specific treatment for Zika virus disease but patients are given general supportive medicine to relieve the pain and symptoms.

Multiple Interventions Helping to Curb Chikungunya in Mombasa County

By Ruth Keah

Chikungunya virus is primarily transmitted to people through the bite of an infected mosquito, mainly Aedes aegypti and Aedes albopictus.

It's on a Saturday morning at 9.00 a.m when I meet Mwatime Halfan, 80, a resident of Likoni, Mombasa County. Despite her age, she still strives to make it to the market every morning to sell a variety of vegetables- work which she has been doing for more than 30 years.

However, Halfan says, presently her health is making her efforts to earn a living dwindle. According to her, since she suffered from Chikungunya, her health has not been the same.

According Halfan, it was just a normal day for her at the market but when as she was leaving for home together with her colleague, she started experiencing difficulty lifting her legs. As her home is on the other side of town, where she has to cross using a ferry, she dragged herself slowly to board the ferry. She managed to cross over and board a tuk tuk taxi to take her home. But things worsened when she alighted from the tuk tuk as she couldn't walk completely. It was at this point that she was put on a motorcycle and taken to the hospital.

Both Halfan and her neighbour at the market were diagnosed with Chikungunya. The disease, she says, left her in pain to the extent she almost lost hope of living. " I was so sick and yet I didn't know what was ailing me," she narrated.

Ruth Keah

On arriving at the hospital, she got two injections and her blood sample was taken for testing. When the results came out, it was found to be chikungunya.

Mohammed Kombo, 38, Likoni resident and his child also suffered from chikungunya. "My body felt like it was not a body. My joints were not working. I felt as if I was going to be with the Lord. Things were not easy," he said.

According to Kombo, when he reached the hospital, he was first put on a drip because his body was very weak. It took two bottles of water at a go for him to regain consciousness. He hospitalized for a week before he was discharged. Until now, Kombo doesn't know how and where he acquired the disease but he has taken precautions to protect him and his family.

"The precaution I have taken is to sleep under a mosquito net. Because I am living in a rented house, I can't say I will fumigate the surrounding," he said, adding that it is important to take heed of government advisory because they have experts who conduct research and are well informed.

According to Dr. Jalab Ashraf, chikungunya resembles malaria and dengue fever. The symptoms include severe cold, pain in the joints and muscles, headache, nausea and fatigue. From the time one is bitten by the mosquito carrying the chikungunya virus to the presentation of the symptoms, it takes about three to five days, he

said, but it takes about seven days for the person to recover if treated.

He noted that everyone is at risk of acquiring chikungunya and there is need for people to take caution to reduce the risk of infection.

"The chikungunya virus is transmitted by mosquitoes, so where there are a lot of mosquitoes, there is a high risk of acquiring chikungunya. Mosquitoes are present in a dirty place, where there is no enough light or the circulation of air is limited," Dr. Ashraf said.

During the period between December, 2017 and February, 2018, the Ministry of health reported 453 cases of chikungunya in Mombasa County.

Population pressure in the county has put pressure on the available infrastructure leading to poor waste disposal as well as poor drainage and sewer system, resulting in breeding grounds for mosquitoes. This has in turn led to a rise in diseases caused by mosquitoes such as chikungunya.

It is in this regard, that the Mombasa County government put interventions to curb the outbreak of chikungunya among them vector control where five vehicles were dispatched to spray mosquitoes in the most affected areas. These include Mvita and Changamwe where the spraying was done daily for a period of one month.

"Ordinarily, we would have had one vehicle to do vector control, but as it is, the situation demands we do more than the ordinary. We have flagged of these five vehicles to cover the six sub-counties starting with Changamwe and Mvita because they were the most affected," Hassan Joho, the former Governor of Mombasa County, said during the launch of the vehicles.

Other areas that were mostly affected during the chikungunya outbreak include Kizingo, Nyali, Shimanzi and Moroto.

Other interventions used to curb the spread of the disease in Mombasa include draining of places with stagnant water which act as breeding ground for mosquitoes, public sensitization by community health volunteers (CHVs) on the importance of keeping the environment clean and conducting surveillance to know which areas are at risk of chikungunya.

Among the challenges faced by the county in conducting these interventions include not reaching the targeted areas due to poor infrastructure, diverting resources meant for other diseases to manage the chikungunya outbreak and inadequate human resource especially volunteers in the affected areas.

In the informal settlements of Moroto, Mvita constituency, I meet with community health volunteers, among them is Alice Owino. The poor infrastructure in the area has made the residents at risk of acquiring and transmitting Chikungunya from one person to another.

"At first, we did not know the disease, everyone was crying of pains in the knees, muscles and the entire body aching. When we noticed the outbreak, we reported it to the hospital. We found donors who came from Kilifi to help with research," Alicesaid, noting that she also suffered from the disease.

After the research was conducted, the CHVs started door to door campaigns on awareness. They were moving around the community urging residents to cover their stored water to prevent mosquitoes from breeding.

Every CHV is obligated to sensitize about 100 households in their area of residence. Alice reported more than 20 cases of chikungunya including among children. "I used to visit them daily to give them a health talk, without reminding them, some people forget," she said, noting that even during the day, she would remind people

to put their children to sleep inside a treated mosquito net.

According to Owino, it is important for the community to keep their environment clean by dumping waste properly, and slashing the grass to destroy mosquito breeding grounds. Also, they should make sure they cover stored water properly.

"When the outbreak began, nobody knew what the cause of the disease was. But when the CHVs were sensitized about it, we were able to sensitize other community members," Asia Nduta, a CHV in Moroto, said.

"Every household we visited, somebody would be crying about fever and joint pains. When we inquired about the condition, we were sensitized on what it was and understood that if an infected mosquito bites you, then you can transmit the disease to other people," said Nduta

According to Nduta, the community believed that witchcraft was a major cause of the disease. But through sensitization, many myths and misconceptions about the disease were dispelled.

"When we realized that the disease had a lot to do with mosquitoes, we embarked on sensitization campaigns around the community and advocated for keeping the environment clean. We would teach them on how to properly cover their stored water and how to use mosquito repellent during the day to keep off mosquitoes. We would emphasize that when sleeping at night, they should sleep under a mosquito net. Also, we would tell them to slash grasses and bushes outside their compounds and burn garbage," she highlighted.

Nduta acknowledged that vector control which was implemented by the County government in Moroto also helped in curbing spread of the disease. In her own area, she recorded thirty cases of chikungunya.

Among the challenges, Nduta noted is that some people despite being sensitized, do not follow the instructions while others claim that the government wants to embezzle funds in the name of diseases.

Mama Ali, a resident of Mombasa County, noted that they were living in fear when the chikungunya outbreak emerged because they thought it was an infectious disease. But when they were taught that it is mosquitoes that are responsible, they changed their attitude and started co-existing with those infected.

She attested that since the vector control vehicles sprayed her area, she has not witnessed any case of chikungunya. "My aunt suffered from chikungunya and she was admitted for a week in the hospital. Since that time, I have not seen any case of chikungunya," she said.

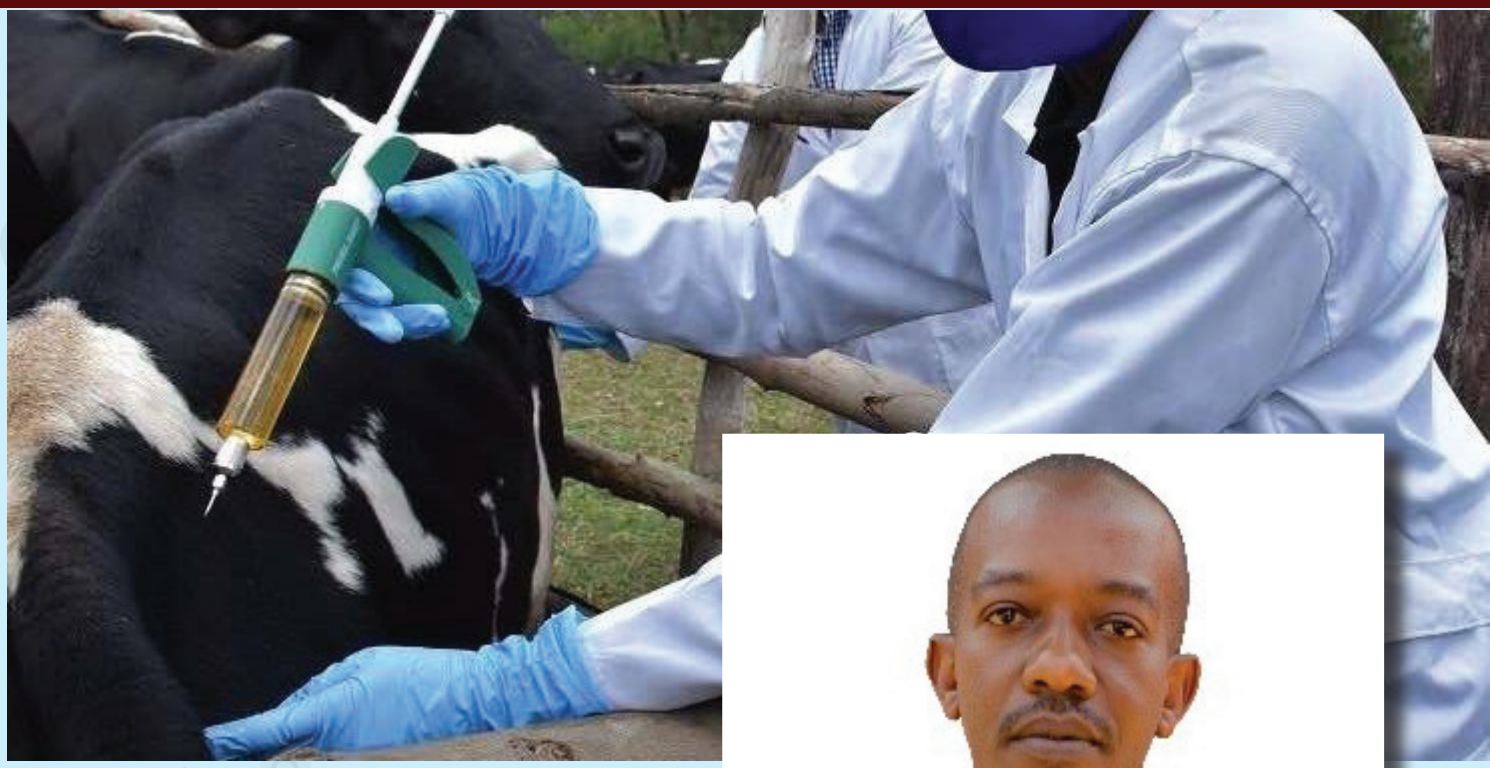
Maria Atieno, a resident of Moroto, says that she benefitted from the sensitization campaigns carried out by the CHVs. Because the area is an informal settlement, to keep it clean is very challenging, thus it was easy for the disease to spread.

"They would go around telling us that mosquitoes like laying eggs in clean water. They also told us to wear long clothes, which protect us from mosquito bites. Now we even have reduced cases of malaria," Atieno said.

The biggest challenge being some people ignoring the advice given to them by the CHVs. Thus, they have to follow up with their neighbours to see if they are doing the correct thing like covering their stored water containers. Since 2018, no cases of Chikungunya have been reported in Mombasa County.

Vaccination Boosts Efforts to Control Rift Valley Fever in Rwanda

By John Mugisha



John Mugisha

Jean Marie Kalisa, a livestock farmer from Nyabisindu Cell, Kiramuruzi sector Gatsibo, one of the seven districts in Eastern province of Rwanda recently got immunization certificates after his cattle were vaccinated against Rift Valley Fever (RVF), a viral zoonotic disease that affects mostly cattle and sheep.

"In 2018 I didn't have enough information prior to RVF outbreak and just as much I wanted to know what the main cause of death for my cattle," the 58-year-old livestock farmer, father of six said in an interview.

In a span of two weeks, Kalisa lost 16 cows out of the 47 heads of cattle while two of his children and the herdsman developed fever with severe headaches due to the virus.

"I was relieved when all my cattle were vaccinated. I kept on thinking that the deaths would have been avoided had they received the vaccine earlier. I would have increased milk production," Kalisa said.

"Initially, I would get about 84 liters of milk per day that would earn me 16,800 Rwandan francs per day, that would enable me to take care of my family but nevertheless after the outbreak things changed as I earned about 7000 Rwfs which was

Annonciate Vuguziga at her home in Ngoma district

less and also the reduced animal productivity, trade bans on livestock and livestock products affected me severely."

In 2020, Annonciate Vuguziga, 53, a livestock farmer from Ntaga cell, Mugesera sector, Ngoma district in the Eastern province was informed about the fever outbreak in the region through an SMS, it urged all farmers to take appropriate measures to prevent transmission, including vaccination.

"When I received an SMS to take my 32 cattle for vaccination, I responded quickly, it took me two days to have all my animals vaccinated," says the 53 year-old widow.

Rwanda, with extensive cattle production, reported RVF outbreak in Eastern Province in 2018. The province is made up of seven districts including Gatsibo, Bugesera, Kayonza, Ngoma, Kirehe, Nyagatare and Rwamagana.

Official reports indicate that throughout 2020, Rwanda experienced 32 new outbreaks of RVF, with 689 total cases recorded in livestock.

RVF is caused by a virus transmitted by mosquitoes. In domestic ruminants, it results in abortion and high rates of mortality, especially among young animals. In humans, the disease ranges from a mild flu-like illness to severe hemorrhagic fever that can be lethal, meaning it is typically a self-limiting febrile illness. Severe disease, such as hemorrhagic fever and encephalitis, occurs in a small percentage of the cases.

Estimates by the Rwanda Agriculture and Animal Resources Development Board (RAB) indicate that most parts across Eastern Rwanda were among the hotspots of RVF during the 2018 outbreak which led to a lot of animal deaths.

Official reports show that at least 102 cows in Eastern Province died from the fatal disease, while 103 others have aborted since the disease was first reported in the province in 2018.

To respond to the outbreak, RAB embarked on awareness campaigns using various outreach approaches such TV, Radio also short message service (sms) and during community works

commonly known as "Umuganda".

Umuganda can be translated as "coming together to achieve an outcome" and in so doing members of the community gather to complete different tasks like building and maintaining different infrastructures every last Saturday of the month. Different information pertaining to the wellbeing of the community is also shared.

Community members after working around their cell hold an informative meeting led by the cell leader or a representative from the sector where health information among others is passed on.

According to Annonciate, besides receiving the sms, more emphasis for cattle vaccination was carried out by the sector leader during one of the Umugandas carried out at Ntaga cell communal playground.

During the awareness campaign, advertising spots have been running for several months on different platforms including National and community radio stations, television and other online magazine in order to broaden their reach to the general public.

Since 2018, the public awareness campaigns run for three months annually resulted in 237,386 cattle, 22,727 goats, and 17,872 sheep getting vaccinated against RVF.

According to Amos Ntaganda, a veterinary doctor from Gatisibo, the vaccination program in the district has been carried out fairly well with most farmers in year 2022 responding positively to the vaccination campaigns.

"The messages aired or sent as sms calls for the locals to avoid direct or indirect contact with the blood or tissues of infected animals, bites of infected mosquitoes (most commonly Aedes), and avoid consuming raw (unpasteurised or unboiled) milk from infected animals as well as bringing their cattle to designated centres for vaccination," he said.

"Unlike in 2018 when I was caught off-guard not knowing about the RVF virus and lost cattle and revenue, this time around I listened to the awareness campaign announcements over the radio and even sms," Kalisa said

mass cattle vaccination

"I responded quickly, none of my 68 cattle died because I had taken them for vaccination at our village designated Centre that was announced on umuganda day. My income is stable and the family members are now enlightened about the RVF virus," he added.

But Simparinka Theogene, in his late 50s from Karama village, Rurenge sector in Ngoma district did not take heed towards the call for vaccination which resulted in nine of his cattle dying.

"I didn't heed the call for vaccination when my animals got infected even when I heard the announcement on radio. All I did was to purchase tetracycline from nearby pharmacy and treat my animals with the antibiotic personally, but the solution was not appropriate," he recalled.

Jean Leonald Sekanyange, Vice-Mayor in Charge of Economic Development from Gatsibo district in Eastern Rwanda, explained that the government embarked on vaccination of cattle in all affected areas. "Vaccination has been one of the most effective methods for controlling this disease, and farmers are strongly encouraged to present all their cattle for vaccination," he said.

According to Sekanyange, "the budget allocation for 2021/2022 vaccination campaign in the district of Gatsibo was 11,710,000frws which was properly accounted for and it has been successful with 87% of cattle being vaccinated in the district."

Jean Leonald Sekanyange, Vice-Mayor in Charge of Economic Development, Gatsibo district in Eastern Rwanda

He noted that the campaign will continue until 2024 as it has been beneficial for the farmers and the district at large from the revenues collected from farmers upon selling their cattle and dairy products.

Raban Iradukunda, a veterinary doctor in Eastern Rwanda, explained that most cows have been properly vaccinated with only one dose. "In the initial campaign we realized that one dose was sufficient, but boosters are sometimes required in high-risk areas for efficient response to the outbreaks," he said.

Officials at Rwanda Agriculture and Animal Resources Board are convinced that a regular booster is deemed necessary for maintaining maximum protection after a series of primary immunization.

Most cattle vaccines are injected, although some have been given by other routes, such as nose and mouth. These modified live vaccines, according to veterinary experts, contains a small amount of virus or bacteria that has been altered so that it does not cause other side effects when used according to product label directions.

Solange Uwituze, the Deputy Director General in Charge of Animal Resources Development Board

In addition, animals given the official vaccination are marked in the right ear with an official orange ear tag and a special tattoo, to separate them from non-vaccinated cattle.

According to Iradukunda, the one single dose of cattle vaccine against RVF has proven to stimulate more rapid, stronger, and longer-lasting immunity among cattle in the affected region.

"But for a vaccine to work, the animal's immune system must be able to respond to it, and for an immune system to respond, an animal must receive proper nutrition," the veterinary expert said.

According to him, vaccinations and nutrition are related in terms of maintaining healthy immune functions in cattle.

Cows' daily energy requirements according to veterinary experts depend on their specific requirements for maintenance, reproduction, milk production and body reserves.

Solange Uwituze, the Deputy Director General in Charge of Animal Resources Development Board, said improving information dissemination about vaccination campaigns has been key to a record high countrywide vaccination penetration of about 68% for year 2022 compared to 47% in 2018.

"The government of Rwanda has been able to carry out spraying of all ruminants, vaccinating all non-pregnant ruminants and calves that are less than three months old, testing suspected cases and also treating the sick," said Uwituze.

According to Uwituze, the government also implemented vector control, ante- and post-mortem inspections, and public awareness education campaigns on when to contact the Veterinary Services Authorities for information on vaccinating their animals against RVF.

As part of the awareness campaign, Jean Bosco Kagame who is the information officer for Mugesera sector said that on some market days in the sector, he rides his motorcycle fitted with loud speaker playing the recorded awareness campaign messages.

"The messages call upon livestock farmers to take their cattle for vaccination against RVF and restrict animal movement to limit the spread of RVF," he said, adding that it urges people in contact with ruminants to practice hand hygiene, wear gloves and other appropriate individual protective equipment when handling sick animals or their tissues or when slaughtering animals."

He also warned that people should avoid consuming fresh blood, raw milk or animal tissue and products without thoroughly roasting

them while informing them about other relevant issues.

However, Kagame explained, "The limited resources like getting fuel on time, rainy season slows one's abilities to pass on the information on some days and sometimes farmers asking me veterinary questions that I normally have no answers too,"

According to Simparinka, some of the challenges faced during the vaccination exercise is the shortage of veterinary doctors to cater for the cows thus they waste the whole day at the vaccination centre and even missing to graze their cattle.

Additionally, he said, some vaccination points are very far and sometimes the farmers miss out on the sector information officer reminding them of points for vaccination.

Annonciate further added that a few of her fellow farmers display passive attitudes about the whole program of vaccination because of ignorance and concerns about vaccine side-effects.

"I know of two farmers who have refused to adhere to vaccinating their cattle due to ignorance or negative attitude., reason being that they don't believe in western made vaccines because of fears of adverse livestock reaction to the vaccine and negative mentality towards some veterinary doctors who practice privately charging exorbitantly for other services despite the nationwide vaccination exercise being free," she said.

"Understanding these barriers can help veterinary workers design more effective community livestock vaccination programs to benefit the farmers and the nation at large," she said.

The use of vaccines is still one of the most effective tools to control infectious diseases, but budgetary constraint remains one of the major obstacles to the effective vaccination rollout, said Sekanyange.

"The allocated district budget is not sufficient to cover the vaccination rollout because there is a need to address the demands of multiple stakeholders in line with the established planning," he noted.

Zawadi Kayitesi Ingabire, the director of Health in Ngoma District, Eastern Rwanda also points out that budgets are still a lingering constraint to some approaches.

"This vaccination rollout against RVF has been

conducted under a constrained budget to cater for infrastructure of health facilities, lack of enough capacity and support systems for field logistic, communication and insufficient information on the epidemiological and reservoir status of the RVF virus," she said.

Ntaganda however called for recommendations to be made to improve participation and effectiveness of vaccination programmes.

"Programmes should be planned to integrate with annual cycles of disease risk, agricultural activity, seasonal climate, social calendar of villages and maximise efficiency for vaccinators with dates being well publicized, as some respondents frequently reported missing the vaccinators," he said.

"Relevant farmer education should precede vaccination programmes to mitigate against poor knowledge or negative attitudes," Ntaganda advised.

Farmer-to-Farmer Awareness Campaign Reduces RVF Burden in Rwamagana

By Francine Andrew

Though Rwamagana was among the districts in Rwanda's eastern province affected by the Rift Valley Fever (RVF) outbreak, farmer-to-farmer awareness campaigns reduced losses and helped them cope.

Through the Livestock Farmers Field School (LFFS) the local government trained the most influential livestock farmers for them to also train and mobilize others.

RVF is a viral disease that mostly affects domesticated animals such as cattle, buffalo, sheep, goats, and camels. People can get RVF through contact with blood, body fluids, tissues of infected animals and bites from infected mosquitoes.

Although RVF often causes severe illness in animals, most people with RVF have either no symptoms or a mild illness with fever, weakness, back pain and dizziness. However, a small percentage (8-10%) of people with RVF develop much more severe symptoms including eye disease, hemorrhage (excessive bleeding), and encephalitis (swelling of the brain).

With Rwamagana neighboring Kigali, Rwanda's capital city, most of the local people are engaged in commercial activities rather than agriculture and livestock breeding. Besides, unlike other areas of the Eastern province, those that practice farming and breeding are small-scale.

During the RVF outbreak, local authorities urged farmers to prevent and control the disease by vaccinating their animals, feeding them well including a balanced diet, the right feed and in the right amounts plus adequate water at all times so that the animal can take as much as it needs in order to build immunity, and spraying them regularly with appropriate chemicals which are insecticide, the most used is Permapy plus.

Through the Livestock Farmers Field School (LFFS) – a countrywide program that began in 2017- the local government trained the most influential livestock farmers for them to also train and mobilize others. The program is based on cell level basic administrative unit composed of several villages. One advisor is in charge of a certain number of people, which varies from one cell to another.

Every cell has at least an advisor selected by other livestock farmers, who is trained and whose role is to advise and work closely with others.

The advisor is nominated by other livestock farmers during a local community meeting in their villages. They are selected based on influence, skills, knowledge, dedication and willingness to help peers; a livestock advisor trains them on how to take care of their animals. Training is provided by the government free of charge by professionals from the Ministry of Agriculture and animal resources.

Rwanda: Free Livestock Vaccination Helping Control of Rift Valley Fever in Nyagatare

By Francine Andrew

Rwanda: free livestock vaccination aids control of rift valley fever in Nyagatare

In 2018, the Government of Rwanda reported an outbreak of Rift Valley Fever (RVF) in the Eastern Province. Eight sectors across five districts: Ngoma, Kirehe, Rwamagana, Kayonza and Gatsibo were affected. Hundreds of cattle aborted and cases were confirmed via ELISA tests in the national veterinary laboratory of Rubirizi.

According to World Health Organization (WHO) RVF is a viral zoonosis that primarily affects animals but also has the capacity to infect humans. Infection can cause severe disease in both animals and humans. The disease also results in significant economic losses due to death and abortion among RVF-infected livestock.

RVF is able to infect many species of animals causing severe disease in domesticated animals including cattle, sheep, camels and goats. Sheep and goats appear to be more susceptible than cattle or camels.

Research published by PLos confirmed that age has also been shown to be a significant factor in the animal's susceptibility to the severe form of the disease: over 90% of lambs infected with RVF die, whereas mortality among adult sheep can be as low as 10%.

The rate of abortion among pregnant infected ewes is almost 100%. An outbreak of RVF in animals frequently manifests itself as a wave of unexplained abortions among livestock and may signal the start of an epidemic.

The disease has been a major problem in Rwanda. According to the PLos report in 2020, for example, Rwanda experienced 32 outbreaks of RVF across the country with 689 cases recorded in ruminant livestock. In the same year, Nyagatare District experienced three outbreaks

in January and one in March, with 213 total cases.

To control and prevent this terrible fever from ravaging the livestock sector in the country, the Rwanda Agriculture Board responded by vaccinating 237,386 cattle, 22,727 goats, and 17,872 sheep against RVF. Animal movements were banned from mid-June to the end of July to mitigate the outbreak. The government implemented vector control, ante and post-mortem inspections, and public awareness campaigns.

The public awareness campaigns done through the media, farmer field schools, market days and public meetings with farmers were conducted in collaboration with local livestock farmers' advisors- this includes livestock farmers among others who are more informed and respected by their colleagues.

"In 2022 only, in Nyagatare district 178,467 cows, 140,668 goats and 23,373 sheep were vaccinated in line with the RVF prevention," said Gonzague Matsiko, the district vice mayor for economic development.

Matsiko says that in order to master the prevention strategy of RVF they hired private veterinaries to help in vaccination and disinfecting livestock, which cost the government around 19 million Rwandan francs to conduct.

Matsiko affirms that with the force they put in vaccinating livestock and educational campaigns for livestock farmers, now the RVF is under control; but the advocacy is continuing, he reiterates.

The free vaccination of livestock and educational campaigns targeting livestock farmers to beware of RVF disease bore fruits, especially in the Eastern province.

Many farmers agree. Livestock farmers in Rwimiyaga sector, Nyagatare district, interviewed for this article, attributed their success in controlling or even preventing the dreaded fever from ravaging their stock to the government campaigns, the instructions they received, the mass vaccination and disinfection strategies implemented by the government and farmers who diligently followed the advisories.

"We heard from our neighbors in Gatsibo district about that disease, that when a cow is attacked by the disease, it bleeds from mouth and nose, and remains motionless until death," says Theoneste Rukemurampaka, a livestock farmer from Rwimiyaga Sector.

"As soon as the administration found out about the outbreak, they approached us and launched a massive awareness campaign and prevention through free mass vaccination. They also gave us animal disinfectants to prevent infection, for free."

Rukemurampaka affirms that the government's contribution was commendable in the fight against RVF.

Besides, the government's warnings and sensitizations efforts, the fear of losing all their livestock made many farmers to faithfully follow the instructions to save their animals from being attacked by the viral disease.

Francis Kamanzi, a livestock farmer and a manager of Kirebe Dairy Farm, said that for a livestock farmer, staying 'cow-less' is more terrifying than the even death. "The feeling of living without cows for a livestock farmer is more dreadful than other forms of poverty," he intimates. Most livestock farmers in the district keep their inherited animals as matter of culture, prestige and tradition, he adds.

Kamanzi says that with the RVF outbreak, "what was left for them was selling milk, which was far from being enough to cover for their daily living costs. Therefore, they had to follow to the letter what the government was telling them in order to prevent the disease."

They adopted the good practice of disinfecting their cattle at least twice a week, and vaccinated all of them at once, as instructed by the veterinary officers that led the campaign to eradicate RVF from the district.

The fight against mosquitoes among other measures

To control the spread of the fever, which is spread by mosquitoes, the government and farmers embarked on a massive drive to kill mosquitoes and destroy their breeding grounds.

For example, according to Suweto Mugabowishema, a veterinary officer based in Rwimiyaga Sector, they cut down the bushes and drained the ponds to stop mosquitoes from breeding in the area. In addition, they made it a habit to wash the livestock at least twice a week using the medicine/disinfectants they had been given.

Mugabowishema, who works with a local livestock farm, is one among the people who saw the infected cows: "it was scary to see because the animals were bleeding from their noses and eyes which made them weak and very sore. They had high fever and sweating."

He says that his eyewitness account and experience was used to create awareness and to sensitize farmers on dangers of the disease. This, he says, motivated the farmers to take decisive measures to prevent the disease and even to insure their animals.

In addition, the government implemented other control measures including closer of livestock markets commonly known as 'Ibikomera', stoppage of sale and slaughter of cows. Although farmers' livelihoods were severely affected by these measures, they helped to save lives of both humans and animals and drastically reduced the impact of the disease.

Still the effects were huge and insurance too costly

Despite the stringent measures including vaccination and disinfection campaigns, to prevent this disease from reaching their farms, the disease still managed to attack some farms or animals. The protection was not 100 percent effective, says Mugabowishema.

What is more? The high cost of insurance prevented smallholder farmers from insuring their animals. Thus, this solution was mostly accessible only to the well-to-do ranchers and farmers.

"This unpredictable disease can take the lives of animals and people, but those who are able to take insurance for their livestock are still few, mainly due to the low level of awareness and the price of insurance that they find expensive for them," Kamanzi notes with concern.

Mugabowishema confirms that except for those with big farms and focused in business related livestock farming; buying insurance is beyond the reach of poor farmers. The cost of insurance is 4.5 percent of the value of the cow every year, the farmer pays 60 percent and the government pays the rest 40 percent.

"You think about the money to insure like 50 cows all together and you can see that the cost is very high, that money can buy more cows," he says.

The livestock advisors are trained for five years and the training is carried out in stages based on the topic, some will last for two months while some will last for two weeks. They are trained on how to treat and prevent diseases, feeding the animals appropriately to help raise their immunity.

Jean Paul Habumuremyi, a beneficiary of LFFS from Kigarama cell, Nzige sector, says that after training they are expected to go down to their villages to help their fellows with the skills they get from

training.

According to Habumuremyi they form groups of livestock farmers in the villages where they work. They teach the farmers what they have learnt, and raise awareness about government programs in livestock sector such as immunization of animals to deal with various diseases and putting them on insurance. The teachings are delivered during cells' weekly gatherings and some other occasional times based on the current messages.

The whole Rwamagana district has 67 trained livestock advisors who operate in 82 cells with 17,920 livestock farmers. They are not on paycheck; they just work as volunteers and get some little motivation once in a while such as bicycles and allowance when they attend training; though not regularly.

In addition to being mentors to their colleagues, the trainees make use of the knowledge they have gained from the training, for example, Habumuremyi now grows and multiplies reeds for livestock professionally, earning his own income and doing it as a job and business.

The RVF intensity eased

Elie Ugiraneza is a livestock farmer but also an advisor in this program from Karenge sector in Rwamagana district, he coordinates around 25 fellow livestock farmers. He had two cows both got RVF but were treated on time and recovered. He was well prepared. "When the disease attacked my cows, I knew that I shouldn't touch their blood so that I don't get myself infected, and that I had to call in the veterinary as

soon as I see RVF symptoms," said Ugiraneza.

He says that he was aware of some RVF symptoms like fever, nose bleeding and lack of energy among others. Therefore, he quickly contacted the veterinary to treat the cows and both survived the RVF.

Some of the advice given to livestock farmers in order to prevent and ease the intensity of RVF is to feed their livestock well with a nutritious diet to boost their immunity, spraying insecticide at least twice a week and getting their livestock vaccinated.

In addition, if they see signs of the disease, avoid contact with the blood of a sick animal and call a veterinarian instead.

Ugiraneza confirms that in his group, those who followed the advice did not lose their cattle.

With livestock farmers being aware of the effects of RVF, they did everything possible to prevent the disease including cutting down bushes to remove mosquito hideouts and draining water bodies so they cannot breed.

Goreth Murekerisoni, a livestock farmer in Nsinda cell, Muhazi sector says that since they knew how to prevent RVF. Among her nine cows, one was infected but was treated on time and cured thanks to the advice she got from their advisors.

"I used to hear on radio about the RVF, and our local leaders used to remind us to be on guard, so I cut all bushes around my home, and I was always vigilant in case one of my cows would show the RVF symptoms," said Murekerisoni.

She says that she feeds her cattle with the reeds and gives them enough water; their barn is also clean enough and they are sprayed severally a week.

According to Rwanda agriculture and Animal resource development Board, Rwamagana had 60 RVF cases 26 were treated and 34 died in 2022; many livestock farmers were not affected.

According to Rwamagana district animal resources officer, Dr. Jean De Dieu Niyitanga, since April to July 2022, 285, 005 cows were vaccinated. So far, there is no more RVF in the region. Moreover, in just three months, the anti-RVF operations cost around 15 million Rwandan francs.

Wilson Sekabera from Muhazi sector lost his one and only cow to RVF. He did not have prior knowledge before the advisors taught him.

However, he says the advisors are the ones who taught them how to deal with epidemics like RVF, and how to feed their livestock properly.

Murekerisoni says that livestock advisors trained them on how to fight mosquitoes that are said to be spreading RVF, how to grow grass and how to feed cows properly; they also encouraged them to take livestock insurance.

Despite being able to handle the last RVF outbreak, livestock farmers in Rwamagana are still afraid that the next outbreak might not go easy on their cattle yet getting insurance is still a big challenge.

The insurance is 5.5 percent of the value of one cow and it is paid once per year, this is still expensive for the low-income livestock farmer, Murekerisoni says.

"Not all variety of cattle is allowed in insurance scheme, the priority was given only to dairy cows and productive pork and chicken; and when they are sick you will have to get them treated on your account, insurance will step in only if they are dead," she said.

Ugiraneza notes that though he keeps mobilizing, it is not easy to convince his fellows to insure their livestock as the insurance costs are high for those with one or two cows.

In addition, areas near lakes and swamps such as Rwamagana, and near the rivers of Akagera and Akanyaru are breeding grounds for mosquitoes; hence, it is easy for animals to be infected with RVF.

Rwanda combating Rift Valley Fever Using Mobile Phones

By John Mugisha

John Mugisha

Francis Kazoba, a farmer from Rwagitima village in Gatisibo district, bought eight cows as an investment and source of milk for his family, but as time went by, he realized there was a problem with his cattle.

The cows repeatedly suffered from unknown diseases, and he was not getting milk from the cows, which his family relied on for nutrition and income.

"I was confused because the cows repeatedly suffered from stillbirths," Kazoba says, not knowing that it was Rift Valley Fever (RVF).

Thanks to a mobile phone-based system, Kazoba was able to report the detected symptoms on a timely basis and got rapid help to save his cows and his family from economic ruin.

The introduction of rapid reporting systems, using mobile phones to provide real-time data and the detection of high-infection areas, has Rwandese health workers and veterinary services excited about containing the spread of RVF, a viral hemorrhagic fever.

Rwanda, a country with extensive cattle keeping, reported a RVF outbreak in Eastern Province in 2018. When it was first detected, Rwanda veterinary services confirmed that at least 100 cows from different districts across the province died from RVF.

As RVF cases continue to be detected, livestock farmers are encouraged to use the new mobile system as a platform to report suspected cases in order to contain the outbreak.

The disease is spread to livestock through the bite of infected mosquitoes. The disease symptoms include fever, failure to eat, weakness, diarrhea, and increased chances of concurrent infections.

To help contain the spread, a new mobile-based solution was introduced in the rural

areas for reporting disease symptoms through the phone system for fast health and veterinary interventions, thanks to the extensive mobile phone penetration in Rwanda currently hovering around 80 percent connectivity.

In 2016, the Rwandan Government developed a strategy for Information and Communication Technology for Rwandan Agriculture (ICT4RAG). The strategy was developed with an aim to implement ICT in agriculture to achieve an "information-rich and knowledge-based economy". For instance, in 2021, the government adopted the iCow Mobile Phone App to help in combating RVF.

Additionally, there is the Smart Nkunganire(I tell you) System (SNS) is a supply chain system where farmers receive various information about their livestock, Elias Nzabagereza, a veterinary doctor in Gatsibo district said.

This is how it works. Questions written in Kinyarwanda developed by the Rwanda Agriculture and Animal Resources Development Board (RAB) are uploaded using the KoboToolbox server which directs them to the iCow App. The livestock farmers' responses are directly entered by the Community Animal Health Workers (CAHWs) and information disseminated on a two way- communication basis.

"Predictions and early detection for RVF and their spread are dependent on obtaining disease data history through the iCow App which is normally reported by the farmer who transmits initial report to CAHWs, who have been trained to understand transmission parameters such as infectious periods," Nzabagereza said.

The training of these CAHWs, who are called upon on a volunteer basis, are supervised under the district veterinary doctors through the initiative of RAB and takes one week. They are introduced to feeding data on the demographics, livestock ownership, risk perceptions about zoonotic diseases and livestock, RVF knowledge, preferred communication sources and information sharing, as well as protective strategies.

The volunteers are given smartphones to facilitate their work and for personal use as long as they perform their duties. The iCow is designed such that farmers can access it through all types of mobile phones: entry level, middle level and high-end phones.

"The iCow, a mobile-phone application, is helping farmers send alerts about outbreaks of diseases, such as RVF and foot-and-mouth disease, in the country. for the cost of sending a short message service (SMS) to CAHWs is only 10 rwfs, which is far more cost effective compared to the transport journey the farmer would have taken to report the case to the veterinary doctor," Ngabagereza added.

In Mutenderi, a remote village from Ngoma district in Eastern Rwanda, Jean Bosco Muhame uses his smart mobile phone to monitor new RVF cases.

His 5-inch smartphone with 3 GB RAM and 64GB ROM has supported the busy activities of this livestock owner, who is also a community-based animal health worker to report newly detected cases of RVF.

"The system has been supporting most of the local livestock farmers to perform timely diagnosis of infection and give prompt advice on case management," Muhame said.

Using smartphone, farmers download the application available in the Google Play Store and sign in using the credentials assigned to them by local veterinary service providers.

"After signing in, I usually fill the provided form with all symptoms observed from the cattle before submitting it online," said Muhame,

who complained about the challenges related to poor network faced by livestock farmers in the remote rural village.

"With my mobile phone, I can get updates from farmers who are out in the field instead of waiting hours, sometimes days, for them to make it back here to the veterinary clinic with their reports," Ngabagereza says.

Mukandoli Alice, 52, a farmer with 16 cows and eight goats in Ngoma village, says she uses the App and WhatsApp to send photographs of livestock with disease symptoms to CAHWs. She does this because she believes that it is easier for the vets to diagnose a disease by examining pictures of the infected animal compared to just reading messages that may be inaccurate.

"I receive information from the application and WhatsApp group with other members that also have smartphones. We are 60 people in the WhatsApp group. In the group there are several vets, local leaders and some local farmers. The WhatsApp group is used to give information on pests and diseases. I can either send the group a picture or just a question, and I will receive an answer less than one hour later," the farmer explained.

"The mobile phone reduces the costs and time for receiving or demanding information due to its ability to connect with farmers and CAHWs regardless of the time and place."

These phone-based surveillance systems, according to Nzabagerageza, captures higher numbers of detected cases compared to traditional veterinary office-based surveillance system.

Apart from using human healthcare and veterinary workers to collect and submit surveillance data in these remote rural areas, crowdsourcing data from local communities, including cattle herders, are also being used to detect outbreaks using mobile phone surveillance systems.

According to him, the most important fact is to educate people on how to use the system and avoid reporting bias and providing inaccurate data.

With most of the pastoralists' lack of access to timely veterinary care, and limitations in diagnostic laboratory capacity in remote rural areas, the new mobile App and veterinary volunteers systems are rekindling farmers' hopes of access to regular and timely veterinary interventions to save their prized animals from deadly diseases like RVF.

Amani Jean Marie, one of the veterinary officers from Ngoma, says, "We have been able to recruit 30 CAHWs, who are using the App with interview questions, focusing on specific RVF transmission knowledge, which CAHWs fill then forward to RAB for review and action."

Reporting on vital livestock information

Thanks to the iCow application, several cases of RVF were detected in districts of Ngoma and Gatsibo in Eastern Rwanda. Muhame, as an end user and a community vet volunteer, has been able to report hundreds of abortion cases among cattle in the region to the national veterinary laboratory, triggering a massive vaccination campaign.

In response to the outbreaks, Rwandan veterinary authorities were able to vaccinate 237,386 heads of cattle, including 22,727 goats, and 17,872 sheep against RVF.

In 2020 Rwanda confirmed outbreaks of RVF in its key cattle producing provinces, including 689 cases detected in ruminant livestock. A total of 354,380 animals were vaccinated for RVF following the outbreak in the region.

Data from records submitted via mobile phone after analysis showed that the animals were suffering from RVF which is known to reduce fertility and cause stillbirth. The data provided

by farmers, including Kazoba and Muhame really helped us, the veterinary officers based in the affected districts acknowledged.

The disease can also infect people through contact with blood, body fluids, or tissues of infected animals, or through bites from infected mosquitoes. In humans, the disease ranges from a mild flu-like illness to severe haemorrhagic fever that can be deadly, the World Health Organization (WHO) notes.

Currently, the integrated surveillance activities for zoonoses involve the systematic collection, analysis, and evaluation of health-related data from animal and human populations. These data, in turn, are used to enhance disease preparedness, improve resource allocation, and guide disease intervention strategies.

Aphonse Kirizi, working at the Agricultural Information and Communication Program (AICP) under MINAGRI, which runs the national extension service, said that use of mobile phones is cost-effective to the ministry.

"The technocrats don't have to make those trips to access information about the livestock since we have CAHWs and Sector and district veterinary doctors near them and most importantly the effective use of mobile phones among all parties," he said.

"The implementation of mobile phones in combating RVF under the extension and advisory service (EAS) unit is seen as a solution for creating a more efficient service where the ministry has been able to provide timely information about animal health and care tips while also cutting unnecessary transport facilitation costs from the ministry's' budget."

Limited network coverage and intermittent electricity supply

Although mobile technologies are considered as a promising solution for transmitting timely information on common zoonotic diseases, there is need for mainstreaming the capacity of end users at different levels.

From veterinarians' perspective, in most cases farmers are not responsive in providing answers in real time because of the problem associated with both network coverage and electricity.

When the phones are out of reach or switched off, it is challenging for the veterinary service provider to get the right directions to the farmer's home sometimes leading to cancellation of the visit, they intimated.

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