EMPOWERING GLOBAL HEALTH SECURITY AND POLICY IN AFRICA

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MEETING REPORT
Table of contents

THURSDAY 14 NOVEMBER 2019

1 | OPENING STATEMENTS ................................................................. 4

2 | INTRODUCTION ............................................................................... 6
   JAY VARMA, AFRICA CDC ................................................................. 6

3 | ONE HEALTH: CHALLENGES OF ZOONOTIC DISEASES ...................... 8
   • ONE HEALTH CHALLENGES FROM THE HUMAN HEALTH PERSPECTIVE
     CALVIN SINDATO, SOUTHERN AFRICAN CENTRE FOR INFECTIOUS DISEASE SURVEILLANCE (SACIDS) ........ 8
   • ONE HEALTH CHALLENGES FROM THE ANIMAL HEALTH PERSPECTIVE
     IRENE NAIGAGA, ONE HEALTH CENTRAL AND EASTERN AFRICA (OHCEA) ............................................. 13
   • ONE HEALTH CHALLENGES FROM THE ECOHEALTH PERSPECTIVE
     JONATHAN EPSTEIN, VICE PRESIDENT FOR SCIENCE AND OUTREACH, ECOHEALTH ALLIANCE ............... 15

4 | PRIORITIZATION OF ZOONOTIC DISEASES .................................... 19
   • RESULTS OF ONE HEALTH ZOONOTIC DISEASE PRIORITIZATION WORKSHOPS ACROSS AFRICA
     CASEY BARTON BEHRAVESH, US CDC ............................................. 19
   • PRIORITY ZOONOTIC DISEASES: RABIES ELIMINATION IN AFRICA
     THUMBI MWANG, PAUL G ALLEN SCHOOL FOR GLOBAL ANIMAL HEALTH, WASHINGTON STATE UNIVERSITY &
     UNIVERSITY OF NAIROBI INSTITUTE OF TROPICAL AND INFECTIOUS DISEASES .................................. 22
   • PRIORITY ZOONOTIC DISEASES: POTENTIAL THREAT OF ZOONOTIC INFLUENZA IN AFRICA
     VINCENT MUNSTER, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASE, US .............................. 24

5 | ONE HEALTH AND GLOBAL HEALTH SECURITY ................................ 29
   • IMPLEMENTATION OF THE REGIONAL STRATEGY FOR HEALTH SECURITY AND EMERGENCIES IN AFRICA
     STÉPHANE DE LA ROCQUE, WHO HEALTH EMERGENCIES PROGRAMME TIEBLE TRAORE, WHE/WHO AFRO ...... 29
   • CONNECTING ONE HEALTH SCIENCE AND GLOBAL HEALTH SECURITY
     AB OSTERHAUS, ONE HEALTH PLATFORM .................................................................................. 31

6 | OTHER SPECIFIC PRIORITY DISEASES ........................................ 36
   • MONKEYPOX AS AN IMPORTANT EMERGING DISEASE IN AFRICA
     ADESOLA YINKA OGUNLEYE, NIGERIA CDC ........................................................................ 36
   • OVERVIEW OF VECTOR BORNE VIRUSES OF IMPORTANCE IN AFRICA
   • WITH PARTICULAR REFERENCE TO YELLOW FEVER
     MARIETJE VENTER, UNIVERSITY OF PRETORIA .............................................................................. 38
FRIDAY 15 NOVEMBER 2019

7 | RISK ASSESSMENT OF ZOONOTIC DISEASE EVENTS ................................................................. 43
   • CONCEPT OF RISK ASSESSMENT
     DILYS MORGAN, PUBLIC HEALTH ENGLAND .................................................................................. 43
   • RISK ASSESSMENT OF ZOONOTIC DISEASE: AN AFRICAN RESPECTIVE
     YILMA MAKONNEN, FAO .................................................................................................................. 45
   • RISK ASSESSMENT OF ZOONOTIC DISEASE FROM A HUMAN PERSPECTIVE
     CHINENYE OFOEGBUNAM, NIGERIA CENTRE FOR DISEASE CONTROL ........................................ 47
   • COUNTRY PERSPECTIVES
     • RIFT VALLEY FEVER
       MUSA SEKAMATTE, MINISTRY OF HEALTH, UGANDA ................................................................. 53
     • COUNTRY PERSPECTIVES BRUCELLOSIS
       ASEFA DERESSA, ETHIOPIAN PUBLIC HEALTH INSTITUTE ..................................................... 54
     • COUNTRY PERSPECTIVES HEALTH SAFETY AND SECURITY AND ZOONOSES IN AFRICA
       VEERLE MSIMANG, JANUSZ PAWESKA, NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES, SOUTH AFRICA... 57

8 | ABOUT ZOONOTIC DISEASE SURVEILLANCE SYSTEMS ............................................................. 61
   • THE TRIPARTITE VIEW ON ZOONOTIC DISEASE SURVEILLANCE
     JANE LWOYERO, OIE SUB-REGIONAL REPRESENTATION FOR EASTERN AFRICA ............................. 61
   • EVENT-BASED SURVEILLANCE AS A CONDITION FOR PUBLIC HEALTH EMERGENCY PREPAREDNESS AND RESPONSE
     ARUNMOZHI BALAJEE, US CDC ...................................................................................................... 63

9 | PANEL DISCUSSION: FRAMEWORK FOR ONE HEALTH PRACTICE IN NATIONAL PUBLIC HEALTH INSTITUTES: ZOONOTIC DISEASE PREVENTION AND CONTROL .............................................................. 66

10 | CONCLUSIONS AND NEXT STEPS ..................................................................................................... 73
    • CONCLUSION OF THE 1ST INTERNATIONAL ONE HEALTH FORUM
      AB OSTERHAUS, ONE HEALTH PLATFORM ..................................................................................... 73
    • NEXT STEPS
      AHMED OGWELL, DEPUTY DIRECTOR AFRICA CDC ...................................................................... 75
Ahmed Ogwell, Deputy Director Africa CDC

One Health is a key activity in which it is vital that Member States collaborate and go forward. Over the last few months progress has been made in getting One Health on the agenda of both the Africa CDC and the Africa Union as well as into the African continent as a whole. The Africa CDC is working with very active partners and Member States and is doing everything possible to meet all the expectations of Member States and partners and eventually the African people too.

For Africa CDC, One Health means interdisciplinary planning, action and approaches to all issues, with the aim of an Africa that is safer and healthier for the people as well as its flora and fauna.

One Health is very important in Africa because where globalization has spread, interconnectivity is now much easier than it was in the past. The Africa Union has already signed a free trade arrangement that will result in the easier movement of people and goods, which brings a lot of challenges in terms of public health. The One Health approach will be extremely important in securing Africa’s health in the light of this new arrangement.

The One Health approach also helps to address some shared health threats whether they be from humans, animals, plants or the environment, and to help mitigate potential disruptions. If this is not done together, then separately the various elements will suffer, so it is essential that all professionals in their varied capacities work together as one team to address issues using the One Health approach.

In the Africa Union’s Agenda 2063, one of the first aspirations is around people’s health, so the One Health approach fits well with this agenda. Africa CDC has endorsed this approach and has taken certain steps to ensure that it is secured in policy, planning and actions. For example, they have developed the framework for a One Health practice for National Public Health Institutes (NPHIs). This is important to strengthen these institutes to reduce reaction time and improve surveillance and protect people better. Moreover, guidance has been provided to the NPHIs in terms of protocols so they can implement the One Health approach in their activities. All this aligns very well with the Africa CDC strategic plan that runs until 2021, which means that the One Health approach is well secured in the current planning cycle.
The NPHIs are expected to conduct certain activities as outlined in that protocol, and Africa CDC will support them in those activities.

The Africa Union is also working with various specialized agencies to ensure that the One Health approach is well secured. Of special mention is the African Union InterAfrican Bureau for Animal Resources (AU-IBAR). Work has also been done to translate Africa CDC’s frameworks into Africa Union frameworks in order to better control antimicrobial resistance (AMR). Africa CDC is co-leading the Africa taskforce on AMR, in order to integrate all different activities into one place and move forward together.

Finally, Africa CDC is going to do all it can and within the policy organs of the Africa Union to ensure that the One Health approach is well understood and implemented and that it is adequately provided for in all activities, planning, budgeting and reporting.

Ab Osterhaus gave a quick overview of the One Health Platform, focusing on its mission to combat problems that emerge at the human-animal-environment interfaces and to provide that information to scientists and policymakers. This involves performing a series of actions. During the last Ebola outbreak and other pandemics it was realized that the tools are available today to make a good response to such outbreaks. Surveillance is a major element here, as is recognizing the drivers of the different diseases that are emerging. Biosecurity is a global issue, and it's vital to be prepared for these kinds of outbreaks, many of which originate from Africa.

John Mackenzie said that the One Health Platform was first approached by Africa CDC to help develop strategies for improved surveillance across Africa of zoonoses. Since then, Africa CDC has made enormous strides forward, well beyond what was originally anticipated, and has made enormous achievements over the last 18 months. He agreed that the importance of surveillance in terms of global health security is immense, because good global health security can only be undertaken in terms of infectious disease through good surveillance. The whole thrust of this meeting is therefore to improve surveillance across the whole of Africa.
Introduction of the Africa CDC Framework for One Health Practice in National Public Health Institutes: Zoonotic Disease Prevention and Control

Jay Varma, AFRICA CDC

Africa CDC is in the process of fully establishing five Regional Collaborating Centers around the continent. Ultimately, the Africa CDC HQ will set strategy, provide subject matter expertise, and mobilize and allocate resources. The Regional Collaborating Centers will seek to implement Africa CDC’s strategy within the economic and political context and priorities of their regions. The ultimate objective is to build strong NPHIs and connect them together. These NPHIs perform a variety of essential functions. Africa CDC has been looking to focus on and strengthen these specific functions.

The objective of the Framework for One Health Practice in NPHIs is to initiate and enhance One Health activities in NPHIs. From the human health side, there has been less commitment to do this than from the veterinary side. Another objective is to promote collaboration of NPHIs with animal and environmental sectors. The environmental side has often been missing in the past.

The document focuses on defining some priority One Health activities that fit within Africa CDC’s strategic framework related to surveillance, emergency preparedness and response, and building public health resources. It is necessary to stimulate these activities in NPHIs and enhance them where they are already being conducted.
An Africa CDC One Health Framework for NPHIs is necessary, because NPHIs are one of Africa CDC's primary customers. Africa CDC has already developed a detailed scorecard to measure NPHI progress and public health functions. This framework is intended to build on this and advance what NPHIs are already being asked to do with an additional focus on One Health and zoonoses. We see this as the first entry point for changing how public health is practiced on the continent relating to One Health and for collaborating with other African Union programs, such as AU-IBAR, to develop similar frameworks for animal, plant, and environment agencies.

The focus of this document is zoonoses. It’s the easiest entry point for NPHIs to start One Health collaboration, since a major focus of the NPHIs is disease control. Other high priority One Health areas include antimicrobial resistance and biosafety/security. Africa CDC initiatives already exist for these areas; hence there was no need to repeat them in this document. The framework can also be expanded to other areas in future revisions.

Rabies and influenza are prioritized in this document, because many African countries have selected these in prioritization workshops, and there is existing proven data on mortality and control measures (Rabies), and on economic and health risk (influenza).

The One Health framework was developed starting from early 2019 by an expert team and with assistance from Chatham House and the US CDC which provided a number of subject matter experts. An initial draft was completed at the end of July 2019 and was circulated to Member States in all regions of the continent as well as to subject matter experts. More input from Member States and experts will be gleaned during the current meeting. It is to be hoped that the document will be officially launched in March 2020.
One Health challenges from the human health perspective

Calvin Sindato, SOUTHERN AFRICAN CENTRE FOR INFECTIOUS DISEASE SURVEILLANCE (SACIDS)

The focus of the presentation was on surveillance and some of the challenges being faced, with some specific examples of the work being carried out.

With regard to infectious diseases, Africa has the biggest proportion globally, for a number of reasons. Infectious diseases are driven by the interactions between the pathogen-host, human activity and the environment. In terms of the pathogen-host, genetic variations or new pathogens have been seen, along with drug resistance and cross-species transfer. In regard to human activity, new trends are the local to globalized movement of people and commodities, land use changes and socio-ecological changes. And of course climate change is having a major effect on ecosystems and weather patterns.

About 75% of emerging human infectious diseases we are witnessing today have an animal origin, which is the major driving force for the collaboration between the human and animal health sectors, although here a collaborative strategy is needed, and a One Health approach would improve the effectiveness of disease surveillance.

When considering the locations where most infectious disease outbreaks have been witnessed (zoonotic diseases in particular), they mostly erupt at a community level. Community-based participatory disease surveillance can enhance early detection, timely reporting and prompt control. However, most vulnerable communities are located in hard to reach areas with poor infrastructure. So to address the global health security agenda from a community perspective, strategically designed fit-for-purpose solutions are required.

Zoonotic diseases are driven by the close interactions between humans and animals. To give one example, the occurrence of Rift Valley Fever in Tanzania between 1930-1978 was confined to one district only and affecting only the domestic ruminants in the northern parts of the country. However, the outbreak in 2006-2007 affected a much larger area of the country affecting both the domestic ruminants and humans. To address issues related to
infectious disease outbreaks and particularly of zoonotic diseases, it’s vital to address the point of origin, and it has become necessary to invest in early detection so that the disease outbreak can be contained at source. This will inhibit the spread of the disease into the regional context or global scale.

To address zoonotic diseases, it’s necessary to consider ecological health and how ecosystems are maintained and make strategies active rather than reactive. Unfortunately, reactive approach has largely been the case in Africa. When considering the animal health, ecological health and human health perspectives, efforts need to be focused on addressing ecological health to help maintain and control diseases more effectively.

Turning to One Health, it’s defined as a collaborative, multisectoral, and transdisciplinary approach looking at human, animal, and ecological health communities. But there are question marks about how all these three areas are being addressed.

In terms of the challenges faced when it comes to a One Health focus in Africa, there is a high infectious disease burden in the region. The uniquely high wildlife-livestock-human interaction in a shared ecosystem is also a major challenge. A collaborative strategy that encompasses key players from human, animal and environmental perspectives would be in line with the global health security agenda.

A further challenge is the siloed approach of public health and animal health systems. Scanning through the strategies and international health regulations for the African Member States, there is a poor linkage of surveillance systems with the community, which is where more efforts have to be placed. This will help to detect outbreaks faster as well as contain them at source. However, most health surveillance today begins from the primary health care facilities, e.g. dispensaries, or from the areas where most of the livestock surveillance systems exist, but not at the community level.

The One Health approach is not a new system, but it’s necessary to ask ourselves who the major drivers are, who is putting this perspective into the machinery and processes, and who owns One Health perspectives or One Health strategies within the countries? A lot of problems relate to the lack of coordination between different platforms, and when considering linking the issues from the Member States to the global scale, there are still no strong surveillance systems in place that can do this in a timely and efficient way.

To really address zoonotic diseases, an entire set of ecological systems needs to be acknowledged. The entire societal approach is the strategy that could enhance optimization of strategies in terms of addressing zoonotic diseases. The socioecological system ranges from the individual level (the way people live and behave), through interpersonal (families, friends, social networks), the community (relationships between organizations), organizational (including social institutions) to the policy enabling environment (global, national, provincial, regional, local laws/bylaws). Such a dynamic from community health perspectives on health security to the global health security perspective could be very effective.

It’s also necessary to strengthen the human and animal health sectors to fight disease epidemics. This could be by developing Information and Communication tools to support data capture, reporting and feedback at health facilities and within the community settings.
(feeding into the official national human and animal health information systems). Another issue is strengthening cross-border collaboration to fight epidemics in shared ecosystems. This is especially important when discussing the issue of the informal and free movement across borders that can increase the spread of infectious diseases.

The SACIDS Foundation for One Health approach has been on a collaborative strategy between human and animal health sectors that resulted in designing and developing AfyaData for One Health disease surveillance. AfyaData is an open source digital disease surveillance tool that enhances early detection, timely reporting and feedback loops in human and animal populations and their environment. It can be customized by different Member States to suit their specific needs.

It's multilingual and uses GPS to enhance tracing of health events. It includes the integration of different data sources and addresses the important issues relating to feedback. This is important, because why should someone report, if no feedback is received? Instead of having human-tailored feedback, the system uses artificial intelligence (One Health Knowledge Repository) that scans through clinical manifestations reported from different sources, and then provides feedback on most likely disease conditions and what should be done depending on the nature of the event.

This technology has been deployed at the community level in Tanzania, taking advantage of the penetration of mobile phones in the community. It's important to have a strategy in place that will enhance detection of events before they become outbreaks. But it's necessary to prioritize the community as that's where the disease events occur first.

A platform is however required to enhance efficiency in terms of verifying these events, and then linking with a network for confirmatory strategies and communicating within different platforms for feedback and response. In addition, it is high time to consider machine learning approaches to handle big data to provide appropriate guidance to policymakers and planners. This would help predict in the future not only when and where but the extent of expected outbreak of diseases.
QUESTIONS AND COMMENTS FROM DELEGATES

DELEGATE: The preparedness aspect is still neglected, and governments do not understand this aspect. The biggest problem is getting the necessary investment in the capacities. A step forward would be to have an African regional fund where calls can be made to young scientists to address the priorities that have been set. This would help to build the routine activities and strengthen surveillance, risk identification, mitigation and early detection. The aim should be that if an issue cannot be prevented, it should be contained at source.

DELEGATE: There is a balance between surveillance and response. There is a certain fatigue in the communities when surveillance is done without action or intervention. So there is no need to keep making surveillance if the capacity does not exist to respond. It’s therefore important to develop a framework of response if we are engaging in surveillance.

DELEGATE: I have observed that in the process of collaborating with experts from different sectors, this requires conducting meetings almost daily. Other countries, as they try to establish their NPHIs, are trying to include some aspects of the environmental sector and the animal sector into the NPHI. What is the recommendation of Africa CDC?

DELEGATE: As we are strengthening the One Health platform, it was indicated that we need One Health disease surveillance. But it’s essential to monitor not just diseases, but conditions too, especially when it comes to environmental aspects of surveillance. So, is it One Health disease surveillance or does it cover other conditions such as environmental issues too?

DELEGATE: Who did you target for training on use of digital technology in disease surveillance?
RESPONSE FROM CALVIN SINDATO, SACIDS:

When it comes to addressing infectious diseases of animal origin, most of the responses have been largely reactive and too late. What often triggers response is when we have a case being reported in a human being, and by then it’s too late to address a disease of animal origin. Strategically it’s important to respond to an animal infection before it spreads to humans. This is through a strong coordination mechanism. We have a number of One Health platforms but the coordination between human health and animal health experts is sometimes poor on the ground. The result can be confusion on the ground in the absence of efficient coordination.

The other critical issue is not only the response from the higher levels but involves engaging the community. There are critical issues that could stop the outbreak from spreading if they could be implemented by the communities themselves. These are simple issues that the community could implement if they are well informed.

For instance, look at the spread of cholera in Tanzania. Sometimes there has been a mishandling of index cases that ended up spreading the disease to other people. Or people handling dead bodies for example; in one case a dead body was transported about 200 kilometers to another location and the cholera spread to another 13 villages, representing people who attended the funeral event.

In terms of training the community in the use of cell phones, our major entry was using community health workers, who are people working on a voluntary basis in the community, although in some areas they are paid. These are the people we trained before, and some of them we supported with mobile phones and for others we took advantage of existing mobile phones in the community. In Tanzania we have a 65% penetration rate of mobile phones in the community.

On One Health disease surveillance and collaboration, we should not focus solely on diseases. The other conditions in the environment or community, such as floods or taking care of mosquito swamps for example, or any other destructive issues to our health system, should be addressed at the community level. So instead of looking solely at diseases we should also look at putting our efforts into events through public surveillance.
One Health challenges from the animal health perspective

Irene Naigaga, ONE HEALTH CENTRAL AND EASTERN AFRICA (OHCEA)

In regard to One Health and Animal Health in Practice, the question was posed as to why animal health matters? The reasons are that communities and the world in general depend on livestock for their livelihood, their health and safety, for food security, and for the global economy.

African countries are more subject to animal health emergencies of which the majority are zoonoses. Examples of animal health issues include zoonotic diseases, transboundary diseases, insect-borne diseases, diseases of production and hygiene, veterinary public health, One Health, food safety, strengthening of veterinary systems, and antimicrobial resistance. The One Health approach is being widely applied to managing zoonotic diseases, and also now is being applied in the AMR discourse.

However, most public service positions in the animal health sector do not support a competency-based specialty. The One Health veterinary workforce (“One Health Champions”) are mostly absorbed in projects, universities and international agencies such as FAO, AFENET, Africa CDC, WHO, and OHCEA, so are not seen in the mainstream ministries of livestock and animal health. Some One Health veterinary champions can however be found supporting National One Health Platforms.

Looking at the challenges of One Health in animal health practice, these are many and varied. Gaps exist in surveillance systems, such as outdated case definitions, which in some cases are missing. There is an inability to capture original data, and insufficient numbers of staff on ground. Moreover, active animal disease surveillance is not conducted regularly due to inadequate budgets. Many Member States face budgetary issues for surveillance.

Another challenge is One Health competency capacity, which is especially limited among frontline veterinarians, while the mindset and attitude of animal health workers towards One Health needs addressing. Most One Health issues are being driven by veterinarians, and public health workers often shun these meetings.

There is also limited developed human resources, in terms of the number of veterinarians but also their distribution which is unequal. Some domains that are critical such as antimicrobial stewardship are understaffed. The quality of the human resource in terms of continuous professional skilling is inadequate, especially when it comes to specialization in some key domains.

Gaps also exist in institutional frameworks/policies, which hinders information sharing, reporting and decision-making processes. The public sector environment is not attractive to the new generation of the One Health workforce, for example university graduates. Infrastructure is often inadequate, with a lack of animal-based emergency operation centers. Gaps also exist at the laboratory level with poor access and services and limited diagnostic capacities for real-time confirmation of alerts (most labs are centrally located.
so it takes time to get results where they are needed.) There is often inadequate sample tracking and an inefficient sample chain of custody, delays in sample transportation, while the laboratory response can be hindered by logistics.

In terms of antimicrobial resistance, there is a lack of relevant legislation regarding importation, manufacture, distribution and use of veterinary products, including antimicrobials. There is a lack of public funds for implementation where the legislation exists, leading to unrestricted access of antimicrobials directly or indirectly on the market, the availability of adulterated antimicrobials, while farmers are not observing withdrawal periods for milk and meat.

In terms of recommendations, it would be good to strengthen the National One Health Platforms (NOHPs) where they exist. These are spaces where scientists will go and focus on the problem (the complex health challenge) and avoid traditional professional bias and rivalry. These "no discipline" spaces should be cascaded to sub-national and regional levels.

Ongoing best practices include developing a policy to operationalize One Health platforms at different levels, and developing strategic plans for NOHPs. It would be good to build leadership and the coordination capacity of NOHP leaders, and support joint outbreak investigations at all levels – national and sub-national. Finally, it would be of value to promote collaboration with academia in areas such as operational research.

Furthermore, a workforce capacity needs to be built in key areas. This extends to coordination and partnership; veterinary public health (preparedness and response, field epidemiology, surveillance); refresher trainings on One Health to build technical and cross-sectoral competences and meet international standards; and veterinary laboratory diagnosis. More needs to be done in all these areas.

Animal-based emergency operation centers need setting up for real-time disease alerts and to improve information coordination and data sharing. Another recommendation is to improve laboratory access and services, through capacity building of laboratory technical staff; electronic sample tracking; regional HUB coordination; regional health couriers; operational research; and mobile laboratories (at source). Animal samples need to be integrated into lab systems across sectors.

The promotion of the responsible and prudent use of antimicrobials is important, as is improving awareness and understanding of AMR issues, and strengthening knowledge through surveillance and research. It’s essential to support good governance and capacity building, and encourage implementation of international standards.
One Health challenges
from the ecohealth perspective

Jonathan Epstein, VICE PRESIDENT FOR
SCIENCE AND OUTREACH, ECOHEALTH ALLIANCE

Understanding the ecology of emerging zoonoses is an important aspect of the One Health Platform for controlling outbreaks and also for efficient preparedness and anticipation of where outbreaks may occur. Zoonotic outbreaks start with wildlife and wild animal reservoirs. Each animal species has its normal suite of viruses, bacteria, fungi etc. Some of them cause disease; others do not. Animals interact, leading to the opportunity to exchange microbes which can lead to disease. The same happens with human-animal interactions through agriculture, forestry, domesticated animals interacting with wildlife etc. The interface between animals and people gives pathogens the opportunity to jump from wildlife to people (like Ebola) or via domestic animals.

This can lead to an outbreak in the human population, and depending on the context, location, isolation or connectivity of the population, there may be a large scale or confined outbreak. Historically, Ebola outbreaks were confined to relatively isolated populations. Now, spillover occurs where there is high human mobility and connectivity across three countries.

The third stage is exacerbated by global travel, such as the SARS epidemic which quickly spread around the world. To mitigate outbreaks of pathogens, efforts need to be focused on understanding these animal-human interfaces better.

A lot of things have to line up for a pathogen to successfully emerge from wildlife into people. Is that virus able to infect multiple species, including people? There have to be susceptible hosts. Can people be infected? Is the population susceptible and mobile for it to spread? If any one of these is disrupted, the pathway to emergence can be knocked out. So, it’s important to understand the route and mechanisms of transmission of pathogens.

Surveillance challenges exist. It is difficult to catch and sample wildlife safely. It’s often unknown which species may be carrying a pathogen so it’s difficult to design studies with appropriate sample numbers. The routes of transmission are often unknown. Is the index case contact via wildlife, livestock or a vector? Or via indirect transmission (e.g. food)? There are diagnostic limitations, and a poor understanding of host-pathogen ecology and drivers of spillover hinders prevention.

Global challenges exist to implementing One Health surveillance and response strategies. There is no major intergovernmental organization focusing on wildlife disease surveillance. (In other words, no equivalent to WHO or FAO). Wildlife departments don’t have a mandate to look at disease surveillance in wildlife, nor the technical expertise to do so. Wildlife departments must be given an equal seat at the table with public health departments and veterinarian departments when discussing zoonotic pathogens.
Academic and professional One Health training (including wildlife) is weak or non-existent. There is insufficient laboratory capacity, and poor inter-departmental communication and coordination.

Should West Africa or DRC outbreaks have been a surprise? They shouldn’t have been. Had the resources been allocated to understanding the reservoirs of Ebola and its ecology it would have become known that Ebola is circulating in bats in West Africa.

One example of understanding pathogen ecology and risk is the SARS virus. It emerged in southern China in 2002 and was the first global pandemic of the 21st century that spread through human-human interactions and global travel. But its original appearance was in the wet and live animal markets in southern China where many species were in close contact, often in unhygienic conditions, creating the perfect conditions for spillover. Civets were implicated because the SARS virus was isolated from civets. However, civets in farms were not infected, suggesting it was a marketplace infection.

Bats were investigated through a One Health team comprising zoologists, virologists and veterinary epidemiologists in the USA, China and Australia.

They investigated the market and wild-caught bats (2003-2004) and it was discovered that Chinese horseshoe bats are carrying the SARS coronavirus. In Yunnan province, one population of bats that had a variety of SARS-like coronaviruses collectively had all of the genes that were part of the original prototypical SARS virus. The risk is still out there, so more surveillance is needed to target these populations and detect possible SARS cases.

Another example is the bat-borne Nipah virus which causes repeated outbreaks in Southeast Asia and causes encephalitis in people. More than 20 outbreaks have been reported since 2001. It’s carried by large fruit bats and gets into people through the contamination of food, specifically date palm sap. Bats contaminate the sap when they lick it as it flows down trees into collection pots.

Nipah virus is prioritized by WHO as one of the top 10 disease threats to investigate because it is a virus that is repeatedly spilling over from its wildlife reservoir into human populations with a high fatality rate. No vaccine is currently available. A recent outbreak occurred in Kerala, southern India.

In terms of a One Health approach to Nipah virus surveillance and control in Bangladesh, there is integrated human and animal surveillance and response and a Bangladesh One Health Secretariat. Ecological and anthropological studies are being carried out as are simple interventions, such as covering date palm collection streams. There is however potential for spillover not just in India and Bangladesh but also in Africa.

The challenges are being met, the gaps are being addressed in various ways. For example: USAID’s Emerging Pandemic Threats (EPT) program; OHW (AFROHUN); US CDC’s field epidemiology training programs; the WHO/FAO/OIE Tripartite; National One Health initiatives; the Global Health Security Agenda; and the World Bank One Health Framework. However, there is still much more to do.
Human activities are the main driver of emerging diseases. Deforestation, agricultural intensification, urbanization, bushmeat hunting ... all are activities where humans are altering the environment and changing the way we interact with wild and domestic animals. These are critical to understanding disease emergence. A One Health approach is effective in understanding the ecology of these diseases. It really does take a broad-spectrum effort. A critical need is training the workforce. It's going to take a cultural change to get veterinarians and public health practitioners to think about human and wildlife and animal health and its integration.

**QUESTIONS AND COMMENTS FROM DELEGATES**

**ONE HEALTH: CHALLENGES OF ZOONOTIC DISEASES**

**DELEGATE:** Not all countries have NPIHs. What can be done to help them?

**DELEGATE:** The environment is limited in the One Health approa. The key agencies and lead players in the environment need to be addressed.

**DELEGATE, NIGERIA:**

The main challenge of One Health and the human component is the availability of operational research to guide the preparedness and response to zoonoses, along with the correct and timely communication of information to people. There is a paucity of evidence-based facts to use in communication.

**RESPONSE FROM JAY VARMA, AFRICA CDC:**
It’s vital to help countries that currently do not have NPHIs, so they can implement One Health activities and other essential public health functions. In your government, a lot of these functions already exist, so it’s critical that we do not wait, and we need to find a way in the document that this is not only meant for those countries that have fully established NPHIs but is meant for all Member States. We focused on NPHIs in order to send a clear message that NPHIs need to be established.

**RESPONSE FROM JONATHAN EPSTEIN, ECOHEALTH ALLIANCE:**
Typically, ministries of environment have wildlife and forestry departments within them; they may have wildlife biologists in them too. However, they may have no training on health. Veterinary departments and livestock services have veterinarians that focus on livestock, but these people have little expertise with wildlife. So, the opportunity is to connect veterinarians with wildlife departments, and focus on wildlife, or train vets with a wildlife focus and make sure there are positions within wildlife departments for them.

**RESPONSE FROM IRENE NAIGAGA, OHCEA:**
Regarding operational research, academia need to come into these platforms. Important research is happening but it’s not reaching governmental departments. Most of this information is at universities, so a channel is needed. Also, more research is needed to give the local context of these diseases. Regarding the environment from the academic perspective, it is not at the same level of other disciplines but needs to be.

**RESPONSE FROM CALVIN SINDATO, SACIDS:**
The best approach for operational research could be the consideration of the socio-ecological system from a whole societal perspective as it considers other factors such as the exposure to animals while understanding the context in a community.
Results of One Health zoonotic disease prioritization workshops across Africa

Casey Barton Behravesh, US CDC

Zoonotic diseases are a threat to health security; 60% of existing human infectious diseases are zoonotic, and at least 70% of emerging infectious diseases of humans (including Ebola and influenza) have an animal origin. Three out of five new human diseases that appear every year are of animal origin, while 80% of agents with potential bioterrorist use are zoonotic pathogens.

The impacts of zoonotic diseases are numerous. They can be a threat to animal health, human health and local and national economic stability. To counter these threats, a One Health approach is needed, and a common definition of One Health is valuable. One Health means a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.

One Health has been increasing in attention globally thanks to the International Health Regulations (2005), Joint External Evaluations (JEE), OIE Standards and Guidance, Performance of Veterinary Services, Global Health Security, and other factors.

To help address the concerns of countries and regions around zoonotic diseases, the One Health Zoonotic Disease Prioritization Process was developed by CDC’s One Health Office. This is a collaborative process for prioritizing zoonotic diseases of greatest concern.

There are many reasons why such a prioritization list is needed. Funding is finite and personnel are limited. Such a list supports the creation or strengthening of multisectoral, One Health coordination mechanisms and networks, and improves the focus on surveillance, especially across sectors. Laboratory tests and equipment cannot cover all diseases. Moreover, the list can inform multisectoral, One Health coordination, assessments, planning efforts, or strategy development relevant to One Health. Finally, a thoughtful list of priority diseases is more likely to interest donors and collaborating partners.
A One Health method for zoonoses prioritization is needed because no single person, organization, or sector can address all health issues alone, and successful public health interventions require coordination of One Health teams. The process of collaborative prioritization provides a foundation for trust, while collaborative prioritization is fundamental to capacity building and advancing global health security. Action planning and strategy implementation are more likely to be successful if all One Health partners are equally involved in planning and prioritizing.

The goals of the One Health Zoonotic Disease Prioritization (OHZDP) Workshop are to use a multisectoral, One Health approach to prioritize zoonotic diseases of greatest concern for a country, region, or other area, and develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners.

What’s unique about the One Health Zoonotic Disease Prioritization process is that it’s transparent, with equal input from human, animal, and environmental health and other relevant sectors. It allows for local adaptation while being flexible and scalable with real-time outcomes. It also informs assessments, planning efforts, or strategy development relevant to One Health. Outcomes can focus limited financial and personnel resources to create or strengthen One Health coordination mechanisms and build laboratory capacity, conduct efficient and effective surveillance, develop joint outbreak response plans and preparedness plans, create prevention and control strategies, and build up a workforce.

Before a One Health Zoonotic Disease Prioritization workshop occurs, a core planning team begins collaborating, preparing, and planning two to three months in advance of the workshop to identify participants, allocate resources, generate an initial list of zoonotic diseases and conduct an extensive literature review of zoonotic diseases in the country and region.

The key to a successful workshop is ensuring the right people are in the room. There are three groups of participants in a One Health Zoonotic Disease Prioritization workshop. First, at least three trained and experienced facilitators representing human/animal/environmental health are nominated to facilitate the workshop. Second, up to 12 voting members including equal representation of government staff from One Health sectors actively involved in zoonotic disease prevention and control such as human health/public health, agriculture/livestock, wildlife (fisheries), environment (forestry, land management) and other government sectors active in zoonotic disease work are nominated. Lastly, up to 20 advisors or observers representing key technical and donor partners are invited to provide advice and expertise to voting members. These might include CDC, USAID, WHO, FAO, OIE, academic partners or others, but it is up to the host jurisdiction to decided who the advisors will be.

The One Health Zoonotic Disease Prioritization workshop process typically lasts 2 to 3 days, or longer if a regional level workshop, and involves developing criteria and questions, ranking the criteria, prioritizing zoonotic diseases and discussing next steps and action plans for enhancing One Health engagement. You can read more details on the process at www.cdc.gov/onehealth.
Outcomes of the One Health Zoonotic Disease Prioritization process include:

- List of priority zoonotic diseases of greatest concern agreed upon by all represented One Health sectors
- Recommendations for next steps and action plans for multisectoral, One Health engagement to address priority zoonotic diseases
- Understanding of roles and responsibilities of all represented One Health sectors
- Creation or strengthening of multisectoral, One Health coordination mechanisms and networks

A number of One Health Zoonotic Disease Prioritization workshops have been held (26 total in 25 locations since 2014). Several maps were shown to identify where workshops were conducted globally as well as across Africa. One country, Ethiopia, updated their priority zoonotic disease list after 4 years. In Africa, the most commonly prioritized zoonotic diseases are Rabies, zoonotic influenza, viral hemorrhagic fevers, anthrax and brucellosis. Viral hemorrhagic fevers include Ebola, Marburg, Rift Valley Fever, Crimean–Congo hemorrhagic fever and Lassa Fever, but vary depending on the country. Additionally, the Economic Community of West African States (ECOWAS) conducted a regional level prioritization which involved 15 countries in West Africa; about half of the countries had conducted a national level workshop. This process will allow the region to collaborate using a One Health approach to address transboundary zoonotic diseases threats of concern to the region. The ECOWAS priority zoonotic diseases included anthrax, Rabies, Ebola and other viral hemorrhagic fevers (ex. Lassa, Marburg, Rift Valley Fever, and Crimean Congo Hemorrhagic Fever), zoonotic influenza, zoonotic tuberculosis, trypanosomiasis, and Yellow Fever.

Common recommendations for next steps in Africa at the national and regional level were to create or strengthen the One Health coordinating mechanisms, improve outbreak response capacity, and improve surveillance capacity. It’s also necessary to improve data and information sharing across sectors and improve or develop laboratory capacity. Strengthening of the One Health workforce are frequently addressed. Lastly, developing response plans for priority zoonotic diseases, and supporting training activities for zoonotic diseases are frequently highlighted in the next steps and action planning discussions.

The document “Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries” is to be used at country level to address zoonoses and other health threats at the human-animal-environment interface. It provides guidance and operational tools to build national capacities in: planning and preparedness, joint risk assessment, mapping country conflict, risk communication, multisectoral One Health coordination, investigation and response, surveillance and information sharing, and workforce development. OHZDP Workshop Materials are now available in the 6 UN languages: English, Arabic, Chinese, French, Spanish, and Russian (available at https://extranet.who.int/sph/one-health-operations).

To learn more about the One Health Zoonotic Disease Prioritization workshops and to find published reports, please visit www.cdc.gov/onehealth/global-activities/prioritization.html. We have a fact sheet on the One Health Zoonotic Disease Prioritization process available in English, Arabic, French, Portuguese, and Spanish. Contact onehealth@cdc.gov if you are interested in the One Health Zoonotic Disease Prioritization process.
In summary, One Health is the way forward to best protect health for all. The effective mitigation of the impact of shared health threats at the human-animal-environment interface requires strong One Health collaboration and partnerships. Again, no single person, organization, or sector can address all health issues alone, and successful public health interventions require coordination of One Health teams. Using a One Health approach allows us to have the biggest impact on improving health outcomes for both people and animals living in a shared environment.

I would like to acknowledge my colleagues and partners who have contributed to the success of the One Health Zoonotic Disease Prioritization process across Africa and around the world.

**PRIORITY ZOONOTIC DISEASES:**

**Rabies elimination in Africa**

*Thumbi Mwang, PAUL G ALLEN SCHOOL FOR GLOBAL ANIMAL HEALTH, WASHINGTON STATE UNIVERSITY & UNIVERSITY OF NAIROBI INSTITUTE OF TROPICAL AND INFECTIOUS DISEASES*

For more than 100 years, excellent Rabies vaccines that work in dogs and in humans have been available. Most human cases of Rabies in Africa come from domestic dogs - the main reservoir of Rabies virus in the continent. The epidemiology of Rabies virus is fairly straightforward, making elimination of the disease feasible. To achieve elimination, four main strategies should be employed: mass dog vaccination campaigns reaching 70% of the dog population to break dog-dog transmission cycles, prompt provision of human Rabies vaccines, Rabies public education and awareness, and enhanced surveillance for human and animal Rabies.

The global goal is zero human deaths from Rabies by 2030, but this is to be acted locally. In Africa an estimated 25,000 people die from Rabies every year. Are endemic countries aiming for the same elimination target? There are five priority areas to help endemic countries achieve the #ZeroBy30 target.

1. Country prioritization of One Health and Zoonotic Diseases. This involves establishing formal mechanisms (in government) to address zoonotic diseases and establishing a priority list of zoonotic diseases to focus on. Zoonoses prioritization exercises in many countries in sub-Saharan Africa reveal endemic diseases are the priority. Rabies features prominently among the priority diseases in these countries. Investments that build capacity on endemic zoonoses do not only improve detection and control of endemic diseases, but also enhance rapid detection and response to outbreaks of emerging zoonotic diseases.

2. Development of national and regional Rabies elimination plans. The main tenets for Rabies elimination programmes are: mass dog vaccinations that reach sufficient proportions of dogs (70%) to break dog-dog transmission, prompt provision of human Rabies vaccines, Rabies public education and awareness, and enhanced surveillance for
human and animal Rabies. Countries need to plan on how to roll out these interventions aimed at progressively reducing Rabies burden toward elimination (stepwise approach). The plans should include tools to measure progress in eliminating Rabies.

3. Local Rabies champions and domestic ownership are vital, along with local government funding for veterinary and health services. It’s key to align Rabies elimination activities with the budgetary cycles to take advantage of government funding for Rabies diseases elimination activities. Actors in Rabies elimination programmes should befriend the media as a tool for creating public awareness around elimination activities, as well as opportunities to reach local and national decision makers and leaders. The media is an excellent available tool for advocacy.

4. Innovations in the delivery of Rabies interventions are necessary to achieve target vaccination coverage and completeness in the geographical coverage. Mass dog vaccination is essential, but in many places there are data gaps on population of dogs, where the dogs are located, optimal strategies for achieving sufficient vaccination coverage and best methods for measuring vaccination coverage.

There is a need for planning tools to aid decision making at country and county level and resources are needed to achieve mass dog vaccinations. Countries need access to quality dog vaccines at low prices. The OIE vaccine bank can play a critical role for this but this requires a dog vaccine demand and forecasting system to work well. A potential bottleneck to the delivery of dog Rabies vaccines is the low staffing with veterinarians in endemic countries. Rabies programs in South America have overcome these challenges by using other professionals including uniformed forces, nurses to form part of the workforce vaccinating dogs. These approaches may be important to keep the cost of vaccinating dogs down.

Currently, access to life-saving Rabies vaccines following bites from suspect rabid dogs is poor. Data from studies in Kenya show nearly 90% of dogs responsible for bites in people do not have a Rabies vaccination history. Less than 40% of the people bitten received at least one PEP dose and less than 1% completed the dosage. There is a big opportunity to overcome this challenge with the recent commitment by GAVI – The Vaccine Alliance – to invest in post-exposure Rabies vaccines, similar to investments done for childhood vaccines in the expanded program of immunization.

5. There is a need for enhanced Rabies surveillance systems that go beyond recording bite cases at the health facilities (proxy measure of Rabies exposure) to include forms of community surveillance for Rabies, risk assessment to determine the status of biting dogs, sample collection and diagnosis, and building of genomic databases on circulating Rabies viruses (especially important as countries move from endemic to control, elimination, post-elimination phases). The provision of Rabies PEP also require establishment of integrated bite case management as a mechanism for risk assessment to enhance judicious use of human PEP following dog bites.
PRIORITY ZOONOTIC DISEASES:
Potential threat of zoonotic influenza in Africa

Vincent Munster, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASE, US

The natural reservoir of avian influenza is wild waterfowl and shore birds, which is where the genetic diversity occurs. From here the virus spillover is typically into domestic birds such as poultry and geese from where it could transmit to swine and humans. Research led to looking at the migratory flyways of wild bird populations, which indicated a continuous interconnectivity, with a lot of birds using West Africa as wintering sites before flying to Europe.

There are many different subtypes of avian influenza but the most problematic are the H5 and H7 subtypes. This is because on introduction of these into poultry, they start mutating and become more pathogenic. The tropism of this particular virus changes. Normally it’s an intestinal tract virus and sometimes a little bit respiratory. In poultry it can spread systematically throughout the chicken. Typically, it goes from a very low mortality rate to up to 90-100%.

Historically there has been an increase in these outbreaks, especially in areas with large poultry production such as the Americas, Mexico, the Netherlands, and Italy. In Africa there have been just two major outbreaks, in South Africa in 2004. Regarding avian influenza in humans, the first big paradigm change was in 1999 with the emergence of a strain in Hong Kong that spread across Southeast Asia. Typically, these outbreaks were quite local, but then H5N1 spread to more countries around the world, including Africa. Moreover, the virus spilled back into the natural reservoir and wild birds started spreading the virus too.

From the human side, the virus has the propensity to replicate in the lower respiratory tract, as opposed to seasonal influenza like H3N2 which replicates in the upper respiratory tract. In the lower respiratory tract and lungs this can lead to bronchopneumonia with a higher fatality rate. A further concern is the potential to start an epidemic, although it’s not going to be poultry to human but human to human, as is the case with H1N1 and swine influenza.

H5N2 and H5N8 virus detections were recorded in poultry and wild birds in 2014. The almost simultaneous detection of closely related viruses in Asia, Europe, and North America suggests linkage with wild bird migration via a large region in Russia.

In terms of African outbreaks of H5N1, these occurred in 2006 and 2016 in Egypt, Sudan and West Africa. Typically, poultry production in Africa is in small backyard farms, but there is a growth in large-scale industrialized enterprises, which is where these outbreaks are increasingly happening, particularly in South Africa and Nigeria.
Egypt has the most confirmed human cases for avian influenza, which begs the question as to whether active surveillance is occurring in the other African countries, because chickens are everywhere.

Poultry is one of the main protein sources in Africa and first choice of meat. With the very big increase in middle class development, this is creating more demand for poultry products. The majority of poultry products are imported (from US, Brazil and the Netherlands). However, the short production cycle of poultry makes it a big target for investment in animal production. Consequently, animal production is growing at an annual rate of ~10% in Africa. At the same time, populations are increasing (double to 2.5 billion by 2050). With a fast rate of urbanization and a continuous GDP growth rate (especially Nigeria, South Africa and Angola), poultry production is increasing.

These kinds of changes can drive avian influenza but also other diseases such as Ebola. At the same time there is increased spatial connectivity via expanded road networks, opening up economic development but also spreading disease. For example, livestock is sometimes transported from southern Sudan and Chad to northern parts of Congo.

To conclude, there is an increase in frequency of avian influenza outbreaks in poultry and humans. Spatial connectivity will increase the size and duration of these outbreaks. To combat these we need better preparation. There is thus an urgent need for integration of veterinary and human health, and investments are necessary in long-term public and veterinary health and prevention infrastructure. There is also a need for increased training and support of African scientists, while outbreak funding should shift from a reactive to a preemptive strategy.
QUESTIONs AND COMMENTS FROM DELEGATES

PRIORITIZATION OF ZOONOTIC DISEASES

DELEGATE: Why were all the hemorrhagic fevers lumped together rather than treated as separate priority pathogens, when they are different in terms of their ecology, epidemiology and transmission routes?

RESPONSE FROM CASEY BARTON BEHRAVESH, US CDC: Viral hemorrhagic fevers were not always grouped together. Some countries chose to group Ebola and Marburg for example, while other chose to group different hemorrhagic fevers. We typically recommend that a country or other jurisdiction select five priority zoonotic diseases. In many cases, some of the viral hemorrhagic fevers, such as Ebola and Marburg, were grouped under a “Viral Hemorrhagic Fever” category because of some of their similarities in terms of the laboratory, surveillance, response and prevention. Ultimately, it is up to the country to decide how they want to present their final list of priority zoonotic diseases.

DELEGATE: How can the next steps be implemented, as the challenge is a lack of funding and resources for zoonotic diseases?

RESPONSE FROM CASEY BARTON BEHRAVESH, US CDC: It’s important to get the attention of leadership within all relevant ministries as well as government to increase awareness around the needs for the newly prioritized zoonotic diseases and associated action plans. This is one reason why illustrated reports are produced so the outcomes can be shared with all stakeholders including policymakers. It’s also important that after countries prioritize zoonotic diseases, that there is formal coordination of the action plans such as through a One Health coordination mechanism or platform. Additionally, when collaborating with other partners on One Health issues and when using other One Health tools, it is important that the country link outcomes from each One Health tool or activity together in order to build upon each step to build capacity and maximize their impact to advance One Health while addressing zoonotic diseases. For example, incorporating their action plans and activities around the priority zoonotic diseases into national action plans for health security can be helpful.

DELEGATE: Are you working in all countries in Africa?

RESPONSE FROM CASEY BARTON BEHRAVESH, US CDC: We work in countries where we are invited to work. Not all countries have asked to use this process. The maps I shared show the countries and regions that have invited us to collaborate to conduct a One Health Zoonotic Disease Prioritization workshop.
DELEGATE, UGANDA:
We have been conducting One Health influenza surveillance and are progressively seeing an endemic status of some of the H9 and H6 subtypes in poultry. This is a serious potential threat. We need to prioritize active surveillance to ensure we are able to intervene in real time. Also in wildlife, H6N2 is being increasingly identified.

RESPONSE FROM VINCENT MUNSTER, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASE:
There is indeed a continuous introduction of different strains of avian influenza and this needs to be better understood. Some of these are more of a concern for animal welfare and animal production than human health, but more comprehensive identification of what’s circulating in poultry in Africa is essential.

DELEGATE, UGANDA:
There are many different control strategies for Rabies. What is your view on the global action plan for the control of Rabies? And how are the policy issues treated in the (One Health) document being discussed?

RESPONSE FROM THUMBI MWANGI, UNIVERSITY OF NAIROBI:
We need a way of working with national governments to better appreciate this document or else there is a risk that the strategies will not be implemented. Africa CDC has a big opportunity to work with the Africa Union which in turn has a big opportunity to speak to governments, the veterinary sector and the ministry of health.

DELEGATE, BURKINA FASO:
What can countries do to get Rabies vaccines subsided?

RESPONSE FROM THUMBI MWANGI, UNIVERSITY OF NAIROBI:
In Kenya this was possible as we have a national plan for Rabies vaccination which was funded. Minimizing the cost of vaccines is very important. The vaccines are available to any country in Africa to use. The biggest challenge is a very poor forecasting mechanism because the companies that make vaccines need a certain lead time for them to use their resources to produce enough vaccines. And the more they produce, the greater the likelihood that costs will fall.

MARIETJIE VENTER, UNIVERSITY OF NAIROBI:
Did you also try and control Rabies in wildlife?

RESPONSE FROM THUMBI MWANGI, UNIVERSITY OF NAIROBI:
Studies have been done in the Serengeti area where the initial efforts of mass dog vaccination were to conserve the wild dogs there. The results were quite clear. When the domestic dogs were vaccinated around the parks, this brought down the number of cases of Rabies in wildlife. So a focus on domestic dogs would help to control Rabies. The question of stray dogs is also critical. There is a difference between roaming dogs and stray dogs. Roaming dogs often return to a home. If we plan a campaign well in villages, even roaming dogs can still be brought in for vaccination.
DELEGATE: What do you think about managing dog populations through spaying and neutering to prevent multiplication of dogs? Also, there are two types of vaccine: adjuvanted for immunity for 3 years and non-adjuvanted for 1 year. Do you think that dogs should be vaccinated every year or every three years?

RESPONSE FROM THUMBI MWANGI, UNIVERSITY OF NAIROBI:
It’s necessary to look at the lifespan of dogs. In most places it’s quite low. In western Kenya, female dogs have a lifespan of 1.8 years; for male dogs it’s about 2.5 years. This means that in two years you can have a completely new population of dogs, so it makes sense to vaccinate every year, even though you have vaccines that give immunity for up to three years. Spaying and neutering are expensive, time-consuming and resource-heavy procedures compared to vaccination which can take ten seconds. It doesn’t make sense to consider spaying and neutering as efficient methods to bring down dog populations. Responsible dog management and the efficient waste management of food from butchers and hotels could be more important.

DELEGATE: Given the Free Trade Agreements opening up in Africa and the fact that there are trade-offs in biosecurity between small backyard operations and larger scale farms that might have better biosecurity, is it possible to think more about having regional poultry development centers?

RESPONSE FROM VINCENT MUNSTER, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASE:
This is already happening in Africa. Poultry is generally not transported huge distances, so these regional production centers make sense.

DELEGATE: How can non-veterinarians be encouraged to vaccinate? And what vaccination coverage is necessary?

RESPONSE FROM THUMBI MWANGI, UNIVERSITY OF NAIROBI:
I think there are opportunities to train people at a community level to vaccinate dogs. Regarding vaccination coverage, it’s fairly low. Every rabid dog can infect about 1.2 to 1.4 new dogs. So, the population to vaccinate is probably not 100%. As low as 40% would probably be effective, or 70% as the dog population turnover is so high.
Implementation of the regional strategy for health security and emergencies in Africa

Stéphane de la Rocque, WHO Health Emergencies Programme
Tieble Traore, WHO/AFRO

Many global frameworks for One Health implementation are in existence, all of which contribute to promoting sustainable development. This reflects the fact that one single issue cannot be addressed without taking into consideration other issues and that one sector alone cannot address a problem that arises at the human-animal-environment interface. This is the case for the prevention and response to zoonotic diseases by national authorities. The Integrated Disease Surveillance and Response (IDSR) framework document was introduced in 1998 as a means to implement the International Health Regulation (IHR, 2005) in the African region, with the final aim to strengthen surveillance, laboratory and response capacities of the health system for public health events of potential international concern. In particular, for events linked to zoonotic diseases, the involvement of the animal health sector, the environment sector and other sectors in the implementation of IHR is obviously needed and this contribution should be ensured, using a One health Approach.

In the context of One Health, key technical reports and partnerships have been developed over the years. FAO, OIE and WHO joined forces and share responsibilities through the so-called Tripartite Agreement. A memorandum was signed to implement the establishment of Africa CDC. Recent developments offer opportunities to accelerate IHR implementation and improve the coordination of processes and interventions in order to make available the resources and enable better outcomes in the region. These include the Global Health Security Agenda, the establishment of the African Centre for Disease Control and Prevention (Africa CDC) and stronger partnership with the African Union Commission, regional economic communities and other stakeholders.

Supporting factors in the One Health area for the implementation of IHR (2005) in Africa include the adoption of the Regional Strategy for Health Security and Emergencies 2016-2020, establishment of the Regional Tripartite Secretariat and Partners; the Regional...
Disease Surveillance Systems Enhancement (REDISSE) Project; the USAID Predict project; Country Scoping Missions; the establishment and operationalization of One Health platforms or committees. Other important factors include the adoption of the Regional Strategy for Integrated Disease Surveillance and Response 2020-2030 to target and prioritize interventions to guide all Member States.

In recent years, Member States have made substantial progress to establish and operationalize national platforms in order to improve collaboration between human, animal and environmental health sectors. Despite the progress made, the operationalization of national One Health platforms in the African Region faces several challenges including social, economic, political and environmental drivers.

Many Member States are still at the level of basic groundwork i.e. implementing the multisectoral One Health coordination mechanism that requires sustainable financing, political will and endorsement, and effective communication to be fully operational for purpose.

Many tools are available to operationalize the One Health approach and strengthen IHR capacities. What is important is to see how these can be organized so that countries can use them for the implementation of IHR. For this purpose, WHO developed the IHR Monitoring and Evaluation Framework (MEF), which includes several tools to support countries in the review and strengthening of their capacities required by the regulation. These tools include self-assessment and reporting, external evaluation, after-action review and simulation exercises. As an example of implementation, a cross-border field simulation exercise was recently conducted between Tanzania and Kenya, and a video is available at https://youtu.be/p8F9iqNa0fk. The joint external evaluation (JEE) is another of these MEF tools which has been conducted in all African countries, and supported the development of National Action Plans for Health Securities (NAPHS).

The contribution of the veterinary sector in this dynamic has been promoted. While respecting the mandates of each sector and each organisation, WHO and OIE jointly developed the national bridging workshop program, where ministries of health, agriculture, environment (etc.) are given the opportunity to work on the result of the JEE and of the OIE PVS Pathway. Through an interactive approach using user-friendly material, case studies and facilitation tools participants are guided in the identification of gaps in their multisectoral coordination and in the development of a joint operational roadmaps, which inform the NAPHS.
Connecting One Health Science and Global Health Security

Ab Osterhaus, ONE HEALTH PLATFORM

In past decades, major infectious human disease outbreaks have had their origin in zoonoses. In contrast, infectious disease outbreaks originating from bio-terrorism or biological warfare have been more sporadic, although documented cases go back as long as 1346 AD when during the attack of the Tartars on the city of Caffa, bodies of plague victims were catapulted into the city so as to cause plague to spread amongst their opponents and break their resistance.

Other examples from history include horses and other domestic animals infected with B. anthracis and B. mallei during World War One; the Bhagwan Shri-Rajneesh-Sect Salmonella enterica serotype typhimurium, in salad bars of restaurants in Oregon; and the use of Sarin in underground trains in Tokyo, when 12 people died and over 1000 were injured.

The use of biological agents for non-peaceful aims has been banned since the Geneva Protocol of 1925, and since the Biological Weapons Convention (BWC) of 1972 also their manufacture, storage, acquisition or retention.

Recent examples of Dual Use Research of Concern (DURC) that constitute a threat include the development of a ‘killer’ mousepox virus (2001) as a vaccine vector; increasing the pathogenicity factor of the vaccinia virus (2002); mammalian transmissible H5N1 influenza virus (2003) and the identification of the minimal set of mutations needed; and reconstruction of the 1918 Spanish flu virus (2005) as a basis for pathogenicity and virulence factors. It should also be noted that full length sequences of poliovirus, smallpox virus, Yersinia pestis and many other pathogens are available today.

A coordinated, multidisciplinary and cross-sectoral approach should be used that addresses risks originating at animal-human-ecosystems interfaces. Various One Health vaccine initiatives are ongoing and are in various stages, such as: EU Horizon 2020; IMI ZAPI (Merial/BI); and the Zoonoses Anticipation and Preparedness Initiative (ZAPI). The latter is part of the Innovative Medicines Initiative (IMI), which is looking at MERS-CoV, RVFV and Schmallenberg virus.

CEPI (the Coalition for Epidemic Preparedness Innovations) is funding several vaccine initiatives for epidemic preparedness, including a Modified Vaccinia Ankara (MVA) based MERS-CoV vaccine development. Phase 1 is ongoing; Phase 1/2a is planned. CEPI is also working on a Rift Valley Fever vaccine (RVFV-4s): Phase 1/2a trials are planned.

Interestingly, work is being done to look at the vaccines available today for the animal world and to consider what should be done to be able to use them for human use too.

The One Health concept addresses risks originating at animal-human-ecosystems interfaces. This is not dissimilar from the concept of biosecurity, which refers to the systematic protection of humans, animals, plants and the environment from hazards that may arise in connection with biological agents.
There are many definitions of biosecurity. The National Academy USA defines biosecurity as security against the inadvertent, inappropriate, or intentional malicious or malevolent use of potentially dangerous biological agents or biotechnology, including their development, production, stockpiling and use of biological weapons but also agents causing outbreaks of newly emerging and epidemic diseases. This requires cooperation of scientists, technicians, policymakers and security experts. This needs a dedicated biosecurity program. Young scientist fellowships at One Health Platform’s One Health Congresses contribute to their education in this arena.

Returning to the examples of DURC, and particularly the Mammalian Transmissible H5N1 influenza virus (2003), researchers produced mutated H5N1 viruses that, in contrast to the wild type, could be transmitted between mammals (ferrets) through airborne transfer. Laboratory experiments were postulated to see what this virus might need to do to become transmissible from human to human. This led to discussions over the freedom of research vs biosafety and biosecurity, and the risk vs benefit. For example, is it possible that a virus such as H5N1 could through mutation or reassortment result in a transmissible virus? And how far are we away from such a virus? Usually H5N1 doesn’t infect humans but when it occurs, it proves fatal to half of the humans infected. But if this virus became transmissible, would it lose its pathogenicity? Could it become a pandemic virus? A series of experiments were carried out taking a molecular clone from H5N1 from Indonesia and then passaging this virus over the upper respiratory tract of ferrets and then looking to see if the virus would become transmissible from ferret to ferret. It would not. Then by reverse genetics the same virus was taken, and three mutations were applied which are hallmarks for transmissible respiratory viruses that transmit from human to human. This virus also did not transmit. Another round of ferret-to-ferret transmission was conducted, and a virus was found that transmitted from ferret to ferret. An enormous amount of work was carried out to show that only a handful of mutations were needed to make the virus transmissible from human to human.

This raises a number of issues. Should experiments to make a pathogen more dangerous (more transmissible: Gain of Function, GOF) be encouraged? Is it permissible to conduct such experiments? Should the findings be published? Is it appropriate to place limitations on them; if so, how and by whom? How can the unintentional release of pathogens be prevented (biosafety)? How can misuse, for example by bioterrorists, be prevented (biosecurity)?

On the other hand, the experiments were carried out since there are major benefits to such research. If H5N1 was to become aerosol transmissible, pandemic preparedness plans would need revision, risk communication would change, and early warning would be based on finding the relevant mutations in patients. Intervention would be tested and prepared using modified virus. It could be said that the benefits outweigh the risks provided that the right safeguards are implemented. For the research described, these involved five years of (inter)national planning and consultation; NIAID evaluation and funding (NIAID is part of Centers of Excellence for Influenza Research and Surveillance, CEIRS); EU evaluation and funding (part of EU project); and special permission from the Dutch Ministry after advice by COGEM. Furthermore, a new BSL-3+ lab was constructed for this purpose; specially trained personnel were involved; regular inspections by CDC were held (the last in 2011 detected no flaws); and independent experts stressed the importance of the research, public health
interest and safety. Other issues related to the dissemination of H5 transmissibility results. At an ESWI meeting in Malta in 2011, scientists and policy makers were informed for the first time. A paper was submitted to Science for an evaluation by the National Science Advisory Board for Biosecurity (NSABB). Their conclusion was that detailed information (on specific mutations) should only be shared under confidentiality with parties that “need to know.” Public discussions started on freedom of research and restrictions. WHO reached a position in favor of complete publication, which led to NSABB changing its original recommendation with minor revision. It took a year to get the paper published, and throughout the process the dilemma was whether to publish it or not.

Another example is morbilliviruses crossing species barriers and whether this could be a pandemic risk after measles eradication? A whole range of viruses have crossed the barriers between species, such as from dogs to seals; dolphins to seals; dogs to big cats. In China it was shown that there was disease and mortality in a colony of macaque monkeys, with an approximate 20% mortality from canine distemper virus (CDV). The question is what would happen if CDV got into humans after measles eradication: would it also be a danger and cause mortality? At present this is not a real risk because we are all immune to the measles virus which provides cross-protection to CDV, but this is largely due to vaccination. If we were to stop mass vaccination, then we would be at risk of infection by CDV or any of these animal morbilliviruses.

To better understand this dilemma, research was conducted looking at the virus receptors. There are two receptors to the virus: CD150 on the lymphoid cells, and PVRL4 which is an epithelial receptor. Morbilliviruses use the CD150 and then spreads into the PVRL4 in the epithelial layer. The latter is important for transmission of the virus. A CDV molecular clone could be created to see how many mutations would be needed to enable the virus to become transmissible. This is important research in regard to the eradication of measles but obviously there are GOF issues.

There is therefore a need for basic, advanced and continued education in the area of biosecurity. National and international guidelines and legislation need to be created, and codes of conduct put in place (Academies of Sciences). (Young) scientists need to be educated about these issues.

The One Health Platform and One Health Congresses have an important role to play in this respect. The One Health Platform educates young scientists worldwide and offers fellowships for conferences. It gives special sessions and lectures on One Health related biosecurity, and highlights contributions related to biosecurity.

An example of a code of conduct is the one developed by the Royal Netherlands Academy of Arts and Sciences (KNAW). It defines basic principles, identifies target groups and formulates rules of conduct in regard to raising awareness on questions of biosecurity. It covers research and publication policy; accountability and oversight; internal and external communication; accessibility; and shipment and transport.

Moreover, public research funding bodies in The Netherlands have agreed that all life science funding applications must take account of the KNAW code of conduct in research.

The most work in this area has been done in The Netherlands, UK and USA. According to the German Ethics Council (Deutscher Ethikrat), in all three countries, a process of
exchange between political bodies and scientific organizations has taken place with a view to establishing codes of conduct for DURC and linking these with the appraisal of biosecurity issues as part of research funding procedures. Aspects of self-regulation of research establishments as well as state regulation are both of relevance here. Despite these efforts, however, no specific biosecurity-related codes of conduct have been laid down at the university and research establishment levels. On the other hand, general codes of scientific or research ethics have been introduced in universities, especially in the Netherlands, but also in the United Kingdom and, sporadically, in the United States.

These issues will be further highlighted and discussed in 2020 at the One Health Congress in Edinburgh and the ESWI Influenza conference in Valencia. Young scientists’ fellowships are available for both events.

| QUESTIONS AND COMMENTS FROM DELEGATES |

**ONE HEALTH AND GLOBAL HEALTH SECURITY**

**DELEGATE, NIGERIA:**

Four points. First, we need good integration and coordination of animal, health and environment. Second, how can One Health be used to strengthen health systems in Africa? Third, we need a separate focus on research in order to generate evidence for One Health and come up with strategies to get this evidence into policy and practice. Fourth, how do we mainstream One Health into our schools of public health?

**DELEGATE:** How can African health systems be strengthened? We are all building national action plans for One Health, AMR etc., but who owns and finances these national action plans? How can we get governments to be part of these activities and routinely fund them? Otherwise we will end up with a lot of action plans but no actions.

**RESPONSE FORM AB OSTERHAUS, ONE HEALTH PLATFORM:**

Regarding integration and coordination of research: at these forums we try to not just make an inventory of what works and the various possibilities, but the data that is needed, which means surveillance and calculating the burden of disease and what needs to be prioritized. Regarding funding, there are a lot of mechanisms to tap into international funding by collaborating with other groups outside Africa as well as by combining forces within Africa. Regarding policy, it’s important to know what the problem is first. Regarding education, the One Health strategy is to look at schools of public health and focus on young scientists. The One Health Platform has more than 100 stipends for young people to come to our international meetings such as in Edinburgh in 2020; in the past, half of them have been from Africa. Here they are exposed to senior scientists and can start collaboration.
RESPONSE FROM DR TIEBLE TRAORE (WHE/WHO AFRO):
To strengthen health systems, partnership is key, with universities and other organizations and institutions. In addition, IHR implementation can help and should be integrated into the health system. These two elements should not be separated.

RESPONSE FROM STÉPHANE DE LA ROCQUE, WHO:
Thinking about the example given earlier about Ebola, most of the territory affected has no health facilities, which makes it very difficult to detect, control, respond etc. This must be part of the health system. WHO has a tool available called Resource Mapping Tool. It’s been used in Tanzania to put all the recommendations into one Excel sheet. It’s also necessary to cost these plans, and it was interesting that when we included domestic donors in this tool it became clearly visible who was paying for what in the plans. It was surprising to see that some activities were funded twice or three times, whereas other important activities were not funded at all. This tool is available on the WHO Strategic Partnership Portal on the WHO website.
6 | OTHER SPECIFIC PRIORITY DISEASES

CHAIR: David Harper, CENTRE ON GLOBAL HEALTH SECURITY, CHATHAM HOUSE

Monkeypox as an important emerging disease in Africa

Adesola Yinka Ogunleye, NIGERIA CDC

Monkeypox is a viral zoonotic disease. It was discovered in 1958 when two outbreaks of a pox-like disease occurred in colonies of monkeys kept for research. The first human case was recorded in 1970 in DRC during smallpox elimination in a region where smallpox was eliminated in 1968. A major outbreak occurred in 1996-97 in the DRC. Subsequently, sporadic cases occurred in central and western African countries. Monkeypox has since emerged as the most important orthopoxvirus since the eradication of smallpox in 1980.

Monkeypox is primarily seen in Central and West Africa, near tropical rainforests. Primary infection is from animals, with secondary human-human transmission. The reservoir for orthopoxviruses is however unclear. Primates and rodents may play a role in transmission. The disease is usually mild but can be fatal. No specific treatment or vaccine is available, although prior smallpox vaccination is known to be effective.

In terms of its clinical presentation, a vesiculopustular rash appears that is similar but less severe than smallpox. All parts of the body can be affected but especially the face, trunk, palms of the hands, soles of the feet, and genitals. Lymphadenopathy is common. Recovery may take 3-4 weeks and there is a 1-11% mortality rate. Common differential diagnosis is smallpox, cowpox, chickenpox and secondary syphilis.

There has been an increase in the global incidence of emerging infectious diseases and Monkeypox is no exception. There has been a recent increase in human Monkeypox cases across a wide geographic area and there is potential for further spread. In DRC, an 80-fold increase in incidence has been recorded between the 1980s and 2010. Since 2016, sporadic confirmed Monkeypox cases have been reported in Central African Republic, Cameroon, DRC, Liberia, Nigeria, Republic of the Congo, and Sierra Leone.

Looking at DRC in particular, since the beginning of 2019 a cumulative total of 3,015 Monkeypox cases, including 64 deaths (Case Fatality Rate 2.1%), were reported from 111 health zones in 16 provinces. In week 29 (week ending 21 July 2019), 112 cases and one death
were reported nationally. Sankuru province reported 63% of cases during the reporting week.

Presumed risk factors for its resurgence include a waning or loss of orthopoxvirus-related herd immunity from prior smallpox vaccination, and increased human-animal interaction, trade, deforestation, and animal husbandry.

In Nigeria, an outbreak was first reported in September 2017 in an 11-year-old male patient. Prior to this, three cases were reported in 1971 and 1978. Cases continue to be reported here.

As of September 2019, more than 400 suspected cases have been investigated, of which more than 180 are confirmed cases. Nine deaths occurred in confirmed cases (Case Fatality Rate 5.6%); 5 in known HIV patients. 18 states have reported at least one confirmed case. There have been four confirmed cases among health care workers, and one confirmed recurrent/re-infection. Regarding circulating virus strains and the mode of transmission, they are similar to the virus circulating in Nigeria in 1971.

Most cases in Nigeria occurred within known Monkeypox ecological niches, although some cases were identified outside them. Most cases were within urban and peri-urban settings in state capitals.

There is a risk of international spread. Four ex-Nigeria cases have been confirmed: two in the UK (September 2018), and one each in Israel (October 2018) and Singapore (May 2019).

The risk factors have yet to be fully understood but the available evidence suggests multiple zoonotic infection, although the animal reservoir is yet to be identified, and less than 10% had a known history of contact with animals, and no known contact with sick/dead animals.

Secondary human-to-human transmission has been identified via prison inmates, health care workers, and household contacts.

The known risk factors for Monkeypox include living in forested areas, male gender, age less than 15 years, and an absence of prior smallpox vaccination. During the 2017-2019 outbreak in Nigeria the risk factors have been identified as urban and peri-urban dwellers, males 20-40 years old.

The response in Nigeria includes activation of emergency operation centers; enhanced case-based surveillance; animal surveillance; and a One Health rapid response team. The Delphi process was instituted which recommended Monkeypox for immediate case-based reporting. Routine reporting was conducted on IDSR after the 2019 review, along with lab diagnosis at national reference laboratory by Real-Time PCR and the development of response guidelines. The One Health approach involves a multi-disciplinary response team; a One Health based incident action plan; laboratory capacity development; and animal surveillance.

There are many challenges facing Monkeypox affected countries. Monkeypox was/is not a priority disease for surveillance and response. There is a lack of surveillance in animals (especially in wild animals) and poor knowledge of the disease and its true burden. Inadequate resources are available for surveillance and diagnostics. Vaccination requires epidemiological data and accessibility and affordability.
There are serious implications with the resurgence of Monkeypox. The 2018 WHO Research and Development Blueprint identified Monkeypox as an emerging disease requiring rapid evaluation of available potential countermeasures. Monkeypox surveillance and diagnosis ensures continued surveillance for smallpox threat. The changes in sociodemographic distributions call for an evaluation of the possibility of sustained transmission in humans.

Recommendations include the development of standardized regional guidelines for Monkeypox control in Africa; incorporating Monkeypox into a routine surveillance system in all West and Central Africa countries; establishment of a regional and national Monkeypox research and control program; and a Monkeypox transmission study (human to human transmission, animal and environment surveillance).

Moreover, there needs to be adequate support for trainings of health care workers, while diagnostic capacity in affected areas needs to be built up. Also needed is adequate and urgent support for animal surveillance for emerging and re-emerging zoonosis in Africa, along with the provision of vaccines in the endemic population for health care workers.

To conclude, Monkeypox is no longer a rare disease but is enzootic/endemic in many countries. Investing in research will improve the current knowledge of Monkeypox and result in an effective control strategy. A concerted effort by national, regional and global health authorities is necessary to understand the emergence and institute a control strategy. A One Health approach is vital.

Overview of vector borne viruses of importance in Africa with particular reference to Yellow Fever

Marietjie Venter, UNIVERSITY OF PRETORIA

Arboviruses are a diverse group of viruses, from different families, which are transmitted by blood-sucking arthropods (mosquitoes, ticks, midges = the vectors). Various wild and domestic vertebrates are the source of infection for the vectors (= reservoir hosts). Spillover to humans and sensitive animals occurs, where it can cause severe disease. Some are zoonotic and can infect both animals and humans, but not all. Zoonotic arboviruses are Biological Safety Level 3 or 4 pathogens.

Typical zoonotic arbovirus symptoms in humans include fever, headache, myalgia, arthralgia, a morbilli-form rash and conjunctivitis. Complications such as encephalitis, paralysis, hemorrhagic fever and death can also occur. In animals the symptoms include febrile disease, abortion, encephalitis, paralysis, hemorrhagic manifestations and death. Transmission can be zoonotic but also via insect vectors.

Examples include Chikungunya virus, Sindbis virus, Zika virus, West Nile virus, Yellow Fever virus, Dengue virus, Rift Valley virus, and Crimean-Congo hemorrhagic fever virus.
Mosquitoborne arboviruses can be divided into two groups based on the transmission cycles. Yellow Fever, Chikungunya and Zika viruses utilize non-human primates as natural host in a sylvatic cycle with endemic \textit{Aedes} mosquitoes but may use humans as the only host in an urban cycle with competent vectors. The latter aspect makes these viruses epidemic prone with a risk of transmitting nationally through humans.

The second group of viruses need a reservoir host. Rift Valley Fever and Wesselsbronvirus (WSLBV) may utilize wildlife as reservoirs in an inter-epidemic maintenance cycle with several species of \textit{Aedes} mosquitoes. Humans may become infected through handling of infected animal tissue or sometimes mosquito bites. West Nile virus, Usutu and Sindbis viruses on the other hand are dependent on amplification by birds and \textit{Culex} mosquitoes with humans. Certain sensitive animals are dead-end hosts, which means they cannot transmit the virus back to mosquitos from humans; they need the in-between reservoir (birds) to maintain the cycle.

Chikungunya, Yellow Fever, Dengue and Zika viruses circulate between mosquitoes and non-human primates in forests but have the ability to utilize humans as the sole vertebrate host in urban outbreaks of the infection. The countries at risk are determined by the occurrence of the \textit{Aedes aegypti} mosquito.

WHO estimates that two thirds of the world’s population is at risk from Dengue virus infection and in the past 50 years it has increased its range thirty-fold due to the spread of \textit{Aedes aegypti}. Classical Dengue Fever leads to headache, fever, nausea, vomiting and severe myalgia and arthralgia. Dengue shock syndrome can lead to hypotension and vascular leakage. Dengue hemorrhagic fever adds a bleeding tendency.

Dengue Fever is present in 19 countries on the African continent. In a 1993 epidemic in the Comoros, an estimated 60,000 people were infected with Dengue. The hemorrhagic form of the disease has not been reported in Africa despite all four serotypes being present but is likely under-reported or missed.

In 2016 the first Dengue vaccine was registered. WHO recommends the vaccine is introduced for individuals 9-45 years old living in endemic countries where epidemiology indicates a high burden of disease. This is a problem in Africa where burden of disease does not exist; this needs to be addressed.

The Zika virus originated in the Zika forest in Uganda in 1947. It recently emerged in the Caribbean (2007) and spread across South America and Asia. There was a high incidence of microcephaly in newborns in Brazil in 2015 which raised awareness of the pathogenic potential of Zika virus.

It is transmitted primarily by \textit{Aedes} mosquitoes. Symptoms include mild fever, skin rash, conjunctivitis, muscle and joint pain, malaise or headache. These symptoms normally last for 2-7 days. It may cause microcephaly and Guillain-Barré syndrome and other neurological complications. Cases were previously considered mild in Africa; recently imported cases from Americas have been identified. The outbreak in Brazil was associated with the Asian genotype, which has not been described in Africa as part of local transmission.

Chikungunya was first detected in Tanzania in 1952 with periodic outbreaks in Africa but
is a major re-emerging disease of the last decade. In Africa it circulates between baboons and local *Aedes* mosquitoes. Symptoms in humans include fever, chills, nausea, vomiting, backache, headache, rash, and severe arthralgia. It may persist for months to years but is rarely fatal. In 2005-2006 more than 272,000 people were infected during an outbreak of Chikungunya in the Indian Ocean islands of Réunion and Mauritius where *Aedes albopictus* was the presumed vector. It led to over a million cases in India and spread to the Americas. No vaccine is available.

Yellow Fever is a flavivirus associated with acute viral hemorrhagic disease. It is transmitted by infected mosquitoes. Symptoms include fever, headache, jaundice, muscle pain, nausea, vomiting and fatigue. A small proportion of patients show severe symptoms, approximately half of those die within 7 to 10 days. It is biphasic. The first phase is non-specific leading to headache, fever, malaise etc. The second phase follows after a brief period of recovery leading to fever, vomiting, abdominal pain, jaundice and a bleeding tendency.

Large epidemics of Yellow Fever occur when infected people introduce the virus into heavily populated areas with high mosquito density and where most people have little or no immunity, due to lack of vaccination. In these conditions, infected *Aedes aegypti* mosquitoes transmit the virus from person to person.

Extensive, repeated epidemics in Africa, North American and European port cities occurred during the 18th and 19th centuries. 150,000 people died during epidemics in the United States, with the then capital of Philadelphia losing 10% of its population in 1793. In 1898 Dr. Walter Reed proved Yellow Fever is spread by the bite of the mosquito *Aedes aegypti*, and in 1927 the virus was isolated. This led to the development of two vaccines. The French neurotropic and live attenuated 17 D Vaccine by the Rockefeller team is still used today. Extensive vaccination campaigns eradicated urban Yellow Fever in most parts of the world.

The virus is endemic in tropical areas of Africa and Central and South America. In Africa, WHO state that 27 countries are at the highest risk for Yellow Fever epidemics. The burden in Africa is ~ 84,000–170,000 severe cases and 29,000–60,000 deaths annually.

In 2016 there were two linked urban Yellow Fever outbreaks, in Angola and DRC, leading to 965 confirmed cases and ~400 deaths. 11 cases were exported to China. 28 million doses of Yellow Fever vaccines were needed, exhausting the existing global vaccine supply.

There are risks for illness and for death due to Yellow Fever for unvaccinated travelers visiting an endemic area. In West Africa this is 50 per 100,000 and 10 per 100,000, respectively, In South America it is 5 per 100,000 and 1 per 100,000, respectively.

The 17 D live attenuated Yellow Fever vaccine is extremely effective, safe and affordable. A single dose gives life-long protection within 10 days of vaccination for 80-100% and within 30 days for more than 99% of people vaccinated. It is recommended for people aged ≥9 months traveling to or living in areas with risk for Yellow Fever virus transmission in South America and Africa. Proof of Yellow Fever vaccination is necessary for entry to some countries.

Adverse events are rare but include anaphylaxis, Yellow Fever vaccine-associated viscerotropic disease (YEL-AVD), of which there are 2.4 cases/100,000 doses, and Yellow Fever vaccine-associated neurologic disease (YEL-AND) of which there are 0.13 to 0.8/100,000 doses.
The strategy to Eliminate Yellow Fever Epidemics (EYE) by 2026 developed by a coalition of partners aims to face Yellow Fever’s changing epidemiology, the resurgence of mosquitoes, and the increased risk of urban outbreaks and international spread. This global, comprehensive long-term strategy (2017-2026) targets the most vulnerable countries, while addressing global risk, by building resilience in urban centers, developing preparedness in areas with potential for outbreaks and ensuring reliable vaccine supply. Its strategic objectives, built on lessons learned, are to protect at-risk populations; prevent international spread; and contain outbreaks rapidly.

Other zoonotic arboviruses that rely on an animal reservoir host are Rift Valley Fever, West Nile and CCHF.

Rift Valley Fever mainly affects cattle and sheep, causing massive outbreaks of abortion and death in young animals. It occurs at irregular intervals of many years when particularly heavy rains favor the breeding of the vectors. Humans acquire infection from contact with infected tissues of farm animals, abortions or from mosquito bites. Human cases are usually mild; a small percentage (8-10%) develop ocular (eye) disease (0.5-2% of patients), meningoencephalitis (less than 1%) or hemorrhagic fever (less than 1%). Fatality was previously estimated to be <1%.

A number of major outbreaks have occurred in recent years in Tanzania, Kenya and Somalia with a case fatality rate of 20-45%. The last major outbreak in South Africa in 1974 was controlled through large-scale vaccination of livestock, which is mandatory but has waned due to memory loss over the next 30 years. A major outbreak occurred in 2010-2011, in which 242 human cases were laboratory-confirmed, resulting in 200 human cases including 26 deaths and over 5000 animal cases. It was controlled through vaccination of cattle and sheep.

The West Nile virus is one of the most important emerging disease of the past two decades. There are two major lineages. Lineage 1 emerged in the Americas and also circulates in Europe. Lineage 2 is found in southern Africa and Madagascar but also emerged in central Europe in 2005. It has also spread to Italy and Greece; major outbreaks in Greece involved hundreds of cases among humans and horses, including deaths. Lineage 2 in South Africa has been shown to cause severe neurological disease in horses as well as in humans. West Nile has been reported in multiple African countries.

In humans, 20% of occurrences will be symptomatic with fever and rash, with <1% of cases leading to severe disease including meningoencephalitis, encephalitis, poliomyelitis, and death. In horses only 20% of cases are symptomatic, but up to 90% of these will be neurological and the fatality rate is 30-40%. Neurological disease outbreaks in horses have shown annual epidemics and the seasonality of West Nile disease across South Africa. Cases appear every year, with the severity of rainfall determining the severity of the outbreak. The distribution of neurological cases in horses has been shown to correlate with seroprevalence in veterinarians in South Africa. Lineage 1 cases have also been found in horses and in lions in the Kruger Park.

Crimean-Congo hemorrhagic fever (CCHF) virus maintains itself in a cycle involving ticks and vertebrates. Most animals do not show symptoms. 80-90% of humans are infected through tick bites or direct contact with blood of infected ticks, or with blood/tissues of infected wild animals and livestock. Secondary human-to-human transmission occurs
through direct contact with the blood, secretions, organs or other body fluids of infected persons. There is a high transmission risk when providing direct patient care or handling dead bodies, for example at funerals.

Incubation period is 1-9 days and symptoms include fever, severe headache, myalgia, lower back pain, nausea and vomiting, prostration, diarrhea, and hemorrhagic manifestations. Terminally ill patients develop hepatorenal failure, comatose, and death by day 5-14. 88% cases are subclinical; 1 in 8 develop severe disease. Fatality rate is 3-30% in hospitalized patients. There is a high risk of nosocomial infections, which means isolating patients and using barrier nursing. Treatment is supportive, with ribavirin early in disease. Three billion people are at risk from CCHF with an estimated 10,000-15,000 infections each year and 500 deaths per year. It is endemic in Africa, Balkans, Middle East and Asia.

To conclude, there are many important vectorborne diseases endemic to Africa. These tend to be neglected and under-reported, and data is lacking on burden of disease. It is important to raise awareness among clinicians and veterinarians, as well as the public. A One Health approach needs to be implemented for detection, prevention and control, vaccination of animals and humans, and integrated vector control strategies.
Concept of risk assessment

Dilys Morgan, PUBLIC HEALTH ENGLAND

Risk assessment is a component of risk analysis, which also includes hazard identification, risk management and risk communication. A hazard is anything with the potential to cause harm. The presence of a hazard does not automatically imply a threat. A threat is a potentially damaging event or incident. Risk is the combination of the consequences (impact) of an event or incident (hazard/threat) and the associated likelihood (probability) of a harmful effect to individuals or populations.

There are many reasons for conducting risk assessment, such as to inform risk managers; alert and inform those who need to know about events in a comparative and consistent way; preparedness and forward planning; to provide appropriate guidance and advice to a wide range of stakeholders; inform media; and advise policy and policy makers, particularly to provide reassurances that robust system are in place.

Since most emerging infections are zoonotic in origin, taking a One Health approach to infections/incidents emerging at the human-animal interface is crucial. This includes assessing the zoonotic potential of new animal conditions.

There are few examples of established One health risk assessment working outside research projects or disease-specific areas. In the UK, the Human-Animal Infections and Risk Surveillance Group (HAIRS) is a multiagency, multidisciplinary group which has met every month since 2004 and acts as a horizon scanning and risk assessment group across government and the constituent countries of the UK. It provides a forum to identify and discuss infections with potential for interspecies transfer (particularly zoonotic infections) – especially those that don’t fit in existing advisory committee structures. It has developed a close working relationship with professional contacts, collaborators and networks. It provides a useful model for multidisciplinary working between colleagues working in animal health and human health. The HAIRS group started looking at potential risks to the UK population and then expanded to include to UK interests overseas and now looks at potential risks globally.
Threats can come from a range of sources, but threats at the human-animal interface – particularly zoonoses or potential zoonoses pose a particular risk. Once an incident is verified as being of potential public/animal health concern, a rapid risk assessment is undertaken to evaluate the risk to human/animal health. The initial assessments can be complex and challenging. They are produced within a short time period when information is often limited and when circumstances can evolve rapidly. The risk assessment needs to be revised frequently and needs to be based on all available information/evidence, with a clear estimate of the scale of the health threat.

The outcome of this rapid risk assessment will determine the degree of escalation of communications; whether a response is indicated; the urgency and magnitude of any response; the design and selection of critical control measures; and will inform the wider implications and further management of the incident. The assessment should provide information to support risk management, prioritize resources and aid communication.

In terms of the risk parameters, Risk = probability x impact. The risk to a population from a communicable disease is dependent on the probability or likelihood of transmission in the specified population and the impact should infection occur. Risk may be influenced by context or the broad environment in which the threat occurs, including political, public, media interest and perception of risk. It is more useful to report probability and impact, but policy makers usually want an ‘overall risk’.

A quantitative assessment requires calculations of two components of risk: the probability and the impact, and it will produce a numerical risk score often of unknown accuracy. It is useful for known risks where data defining the probability and impact are available. A qualitative assessment is a more useful approach for a rapid risk assessment, as it is possible with limited information. It’s also easier to outline uncertainties and use consistent terms to describe risk parameters. A number of risk assessment methodologies are available including the WHO/OIE/FAO Tripartite Joint Risk Assessment.

The risk assessment of HAIRS group involves two detailed algorithms or “decision trees” which have been developed and agreed by the group, plus risk statements/narrative. It uses expert input as needed. It is qualitative, enabling the rapid communication of the probability and impact in a hierarchy of robust and consistent terms).

Even though it is rapid, it is important to ensure that the best evidence underpins the risk assessment. This should be assessed based on the source, design and quality of each study or piece of information. Uncertainties should be identified, clearly documented and communicated and the assessment updated in light of new evidence appearing over time.

Formal systems are available to grade evidence and recommendations, such as systematic methods in event-based medicine. However, in rapid risk assessment, observational data/case studies are often the only available source of information.

The quality of evidence can be classified as good (i.e. further research is unlikely to change confidence in information); satisfactory (i.e. further research is likely to have impact on confidence of information and may change assessment); or unsatisfactory (i.e. further research is very likely to have impact on confidence of information and is likely to change assessment). This approach improves confidence in risk assessment which should be made explicit.
In summary, risk assessments often have to be undertaken rapidly and based on poor evidence. This is often under intense professional, political and media attention. Good scientific evidence should underpin the risk assessment process and any resulting guidance. Gaps in knowledge and assumptions need to be clearly outlined in the risk assessment. ‘Confidence’ gives an overview of quality of evidence. Risk assessments ensure all decisions become easier to explain and justify and act as logs for decisions and actions. It’s essential to ensure complete documentation of the process with clear version control etc.

Risk assessments should be transparent, systematic and objective, as well as rapid and reproducible. They should identify the need to move to an expert formal risk assessment and are used to promote risk-informed decision-making. They should be communicated, and are best done in a multidisciplinary, cross-sectoral team who sign up to the risk assessment and risk statements.

Risk assessment of zoonotic disease: an African respective

Yilma Makonnen, FAO

The Tripartite Zoonoses Guide (TZG) was published in March 2019 with considerable technical input from the US CDC, and is supported by various US government agencies and projects. It is intended to be used at the country level to address zoonoses and other health threats at the human-animal-environment interface by taking a multisectoral approach. It provides guidance and Operational Tools (OTs) to build national capacities in various fields.

These OTs are technical documents and resources that countries can use to assist their implementation of the Topic Area technical guidance of the 2019 TZG. OTs include models and templates for standard operating procedures and processes; draft terms of reference or agreements; templates and tools for data collection, evaluation, and reporting; and workbooks and materials to guide intersectoral collaborative activities and working groups. OTs will be published and distributed as parts of the TZG in all six UN languages.

Workgroups involve FAO, WHO, OIE, CDC, experts from regional and country public health and animal health services, reference centers, NGOs and universities. Virtual meetings are held as well as in-person expert consultation workshops. Interim versions for piloting are based on results. Four pilots as part of DTRA-funded projects have been implemented. Additional pilots are also planned, to be funded by other sources, and interested countries can pilot using their own funding sources.

The objective of the Joint Risk Assessment (JRA) is to provide a standard Tripartite (FAO-OIE-WHO) Operational Tool for conducting national risk assessments. A JRA is implemented at the national level, involves all relevant sectors, and is qualitative. It applies to any zoonoses or other health issue at the human-animal-environment interface.
However, a JRA for zoonoses needs a different approach. The animal health and human health technical processes are in principle the same but are operationally different and have evolved to meet different needs and interests. They therefore do not directly align. This means that when sectors come together with separate uni-sectoral risk assessments, there can be confusion and misunderstanding. It’s therefore important to find common ground to harmonize the various sectors.

Consequently, animal, human and environmental health counterparts need to assess risks from zoonotic diseases jointly (qualitatively). This is necessary to ensure stakeholder involvement and commitment and should involve regular meetings and updates. These should systematically gather, assess and document information, focusing on the interface (each sector comes prepared with their own, unilateral assessment). Such an approach leads to informed decision-making (risk management), agreed by all participating sectors.

The JRA Steering Committee defines the specific hazard, the scope, and agrees key objectives. The JRA Technical Team formulates and documents risk assessment questions; identifies and diagrams the risk pathways; characterizes the risk; identifies risk management options and communication messages; and documents the assessment.

In terms of progress to date, a JRA Technical Workshop was held in Rome in October 2017, followed by a JRA workshop in Indonesia in March 2018 and a regional facilitator meeting in Rome in September 2018. Pilots are running in Tanzania, Pakistan and Georgia, and one is planned for 2020 in Thailand. Additional piloting depends on funding. Topics focus on priority diseases such as Rabies, CCHF, zoonotic influenza (various subtypes), Rift Valley Fever, leptospirosis, equine encephalitis and anthrax.

Regional Trainings of Trainers (ToTs) have been conducted for East, West and Central Africa in Senegal in May 2019, and are planned for North Africa in Tunis, Tunisia in January 2020. JRA implementation was conducted in nine African countries in 2019 and plans for 2020 include implementation in a further 14 countries.

Objectives are to use the JRA tool to assess current zoonotic disease threats; familiarize national experts with the use of the JRA tool; evaluate the JRA tool’s usefulness for national and/or subnational levels in the country; and evaluate the JRA tool and the pilot workshops through feedback (verbal and in writing through feedback forms).

Various lessons have been learned from JRA activities so far. All relevant sectors need to be included in all discussions from the beginning. It’s essential to follow the tool step by step and gain consensus at each step. Discussion (including justifications and dissent) should be captured in a comprehensive way. And JRA Reports (a template is provided in the tool) are essential to summarize, synthesize, and track agreements and decisions.

The next steps are for the continuation of the development of the JRA. One important step is a joint simulation exercise both at the national and cross-border regional level.

A Surveillance Evaluation Tool (SET) is increasingly gaining momentum in Africa. It was requested by African countries under the Global Health Security Agenda (GHSA). This was to meet the need for an assessment tool specific to animal disease surveillance. SET was developed by FAO with support from the US Agency for International Development (USAID).
The methodology involves a comprehensive assessment of animal/zoonotic disease surveillance capacities; 10-day missions in collaboration with local vet services; interviews with stakeholders centrally and in the field; and aspects of intersectoral (One Health) collaboration with ministries of health and environment.

Many tools are available to countries, from general to specific. Countries can select evaluations based on specific need/outputs. SET provides a deeper understanding of surveillance strengths and gaps seen in other broader evaluations (e.g. PVS). A comprehensive assessment of surveillance leads to more specific recommendations to improve surveillance systems.

SET is based on field interviews and gives scores (1-4) for all 90 indicators. It highlights strengths/weaknesses of a surveillance system and provides country-specific action plans for improvements as well as a baseline for future capacity-building activities. The final report gives an action plan for improvement that can be developed with veterinarian services along with country-specific recommendations. SET has been implemented in 14 countries in Africa and in two in Asia.

Risk assessment of zoonotic disease from a human perspective

Chinenye Ofoegbunam, NIGERIA CENTRE FOR DISEASE CONTROL

The word ‘Zoonosis’ was introduced by Rudolf Virchow in 1880 who described it as diseases collectively shared in nature by man and animals. Zoonoses include only those infections where there is proof of transmission between animals and man. According to the WHO, zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans. Animals thus play an essential role in maintaining zoonotic infections in nature. Zoonoses may be bacterial (anthrax, Brucellosis etc.), viral (Ebola, Dengue, Lassa Fever, Rift Valley, Rabies etc.), fungal (dermatomycoses, blastomycosis etc.) or parasitic (cryptosporidiosis, toxoplasmosis, leishmaniasis etc.).

Globally, zoonoses accounts for an estimated 2.5 billion cases of morbidity and 2.7 million cases of mortality in humans yearly. Major zoonotic diseases prevent the efficient production of food that are of animal origin and create obstacles to international trade in animal products. Emerging zoonoses are responsible for some of the highest profile and devastating epidemics. Endemic zoonoses may pose a more insidious and chronic threat to both human and animal health. For example, the recent Ebola epidemic caused 11,316 deaths and $2.2 billion in economic losses whereas Rabies accounts for ≈59,000 human deaths and roughly $8.6 billion in economic losses worldwide annually. Routes of transmission can be aerosol, oral, direct contact, vectors or fomites (inanimate objects).

Risk assessment is a process undertaken to deal with matters which pose a potential danger, it is managed according to certain standard procedures and involves four
components: hazard identification, risk assessment, risk management and risk communication.

Hazard identification is the process of identifying the pathogens (something potentially harmful) in the given context and can be directly included in the risk assessment. Risk assessment is a systematic process for gathering, assessing and documenting information to assign a level of risk. It provides the basis for taking action to manage and reduce the negative consequences of acute public health risks. Risk communication involves the information exchange between risk assessors, risk managers and those affected by the risk. It is a multidimensional and iterative process and begins at the start of the risk analysis process and continues throughout. It has two components: operational communication between the risk assessment team and relevant stakeholders; and communication with the public for desired behavioural changes.

Assembling the risk assessment team using a One Health approach involves human health, animal health, environment health, food safety, laboratorians and others.

A key step is to formulate risk questions in humans. Questions to ask include: What is the public health risk of the event and consequence? Who is likely to be affected? What is the likely exposure to a hazard? The risk questions may be influenced by the population at risk; the level at which the risk assessment is taking place (e.g. cross-border); the level of risk accepted by decision-makers; and the level of risk perceived externally (e.g. international community).

The risk assessment process involves hazard assessment (identifying, characterizing and ranking the potential of the hazard); exposure assessment (modes of transmission, dose–response relationship, duration of exposure and occupational risk groups); and the context assessment (evaluation of the environment and other factors such as social, technical and scientific, economic, environmental, ethical, and policy and political).

Defining the level of confidence in the risk assessment involves describing it as either a high, moderate or low level of confidence based on factors such as reliability, completeness and quality of the information used, and the underlying assumptions made with respect to the hazard, exposure and context. A risk matrix is often used to assign a level of risk. It is not based on numerical values but on broad descriptive definitions of likelihood and consequences. Definitions of likelihood and consequence are based on the country’s rating as well as on the expert opinion of the team.

Regarding risk factors for zoonosis in humans, these include global travel linked to the increase in global movement of people, animals and animal products due to global expansion of capitalism and the free market system. Urbanization, the animal-human interface (deforestation, animal husbandry, agricultural intensification) and cultural practices (the use of animal products such as blood for rituals) also play roles. Also important are ecological/evolution dynamics (vector/reservoir domestication), poor zoonotic disease surveillance, and host–pathogen dynamics. The latter includes transmission amplification and genetic mutation such as seen with influenza viruses.

Several zoonotic diseases exist. However, many countries and organizations have prioritized zoonotic diseases for effective control and management using various standardized criteria. These include but are not limited to epidemic potential; severity of the zoonotic disease;
socio-economic impact; burden of the zoonotic disease; and the ability to prevent and control.

In 2017, Nigeria conducted a prioritization of zoonotic diseases. 36 zoonotic diseases were shortlisted for prioritization among which were Rabies, avian influenza, Ebola, anthrax etc. Shortly afterwards, in September 2017, there was a re-emergence of Monkeypox after almost 39 years of no cases. Risk assessment of zoonotic diseases are done at national level, whereas for individual diseases, further risk assessment is conducted (such as Lassa Fever, Yellow Fever, Monkeypox) pre, during and post outbreak seasons.

Various risk assessments in humans have been done at different times by several countries. All these help countries to prioritize resources although varying criteria were used. For example, the risk of Ebola was assessed as high in DRC and Uganda, but moderate in Nigeria. The risk of Zika virus infection is assessed to be moderate because of the presence of the vectors (Aedes mosquitoes) and the frequent movement of people in and out of Zika endemic countries. Lassa Fever is endemic in Nigeria and the risk is assessed to be high. The risk of Yellow Fever is considered high because of the abundance of vectors (Aedes), the presence of the reservoir host, and in some parts unimmunized population.

Some common zoonotic diseases in Nigeria include Lassa Fever, which peaks during the first few weeks of each year; a fact that helps in preparedness. There is currently an outbreak of Yellow Fever in the country. It peaks towards the last quarter of each year.

There are many benefits of risk assessment. As a tool for defensible decision-making of the most appropriate set of control measures, it helps in deciding on the level of acceptable risk, reduces or prevents disease in affected populations, and reduces negative social and economic consequences. It helps with the implementation of appropriate and timely control measures, and with effective operational and risk communication. It improves preparedness and acts as an important source of data for research.

Recommendations include assessment of ecosystem vulnerability and introducing resilience as a component of risk assessment. There is a need for an integrated risk assessment framework. And risk assessments should be done periodically and as the need arises.

In conclusion, risk assessment is an effective science-based tool for informing decision-making. The global impacts of emerging and endemic zoonoses on both human and animal populations demonstrate the important of fostering collaboration between human, animal and environment health sectors using a multisectoral approach. A One Health approach is a critical step towards improving animal and human health.
QUESTIONS AND COMMENTS FROM DELEGATES

RISK ASSESSMENT OF ZOONOTIC DISEASE EVENTS

DELEGATE: How can Africa CDC help countries to collect the necessary data to enable risk assessment?

DELEGATE, CÔTE D’IVOIRE: What can be done to better integrate the environmental aspect into risk assessment?

DELEGATE: How were the priority diseases selected for the JRA in Africa?

DELEGATE: How can behavioral aspects be better integrated into risk assessments? Also, the social science contribution tends to be forgotten.

DELEGATE, TUNISIA: In Tunisia, each sector works on its own for its own risk assessment, especially in regard to the West Nile virus. How can collaboration between the sectors be improved?

DELEGATE, DRC: Is there a tool for risk assessment that could be applied in all countries?

DELEGATE: Can rapid risk assessment really be considered as qualitative? And how can you come up with precise follow-up actions that aim to mitigate the risks, considering that they involve a lot of resources?

DELEGATE: Regarding Lassa Fever appearing in the first quarter of the year, what are the risk factors and the preparedness actions?

RESPONSE FROM DILYS MORGAN, PUBLIC HEALTH ENGLAND:

Regarding the environmental components of risk assessment, I was focusing on the concept. The risk assessment group described includes officials from human health, animal health and wildlife. This is enough to deal with the practical risk assessments that need to be done. For wider issues we bring experts in to contribute to the group. Chemicals and environmental are not covered, as we are clear as to what risks we look at.

Regarding social science, this is crucial and any relevant publications or information produced by social science groups that might affect our risk assessment are included in the evidence.

Regarding rapid risk assessments, it’s a matter of using whatever evidence is available to consistently and robustly inform our risk managers as to the risk.

Regarding mitigation, if the risk is quite low and it can be mitigated by approaching appropriate groups, then it’s possible to go to those groups, give them the relevant information and work with them. If it’s a wider mitigation, then risk managers are used. Sometimes it’s necessary to sort out risk assessors from risk managers.
RESPONSE FROM YILMA MAKONNEN, FAO:

Regarding the implementation of the SET tool, the veterinary service is underfunded so the surveillance system is not fully functioning. It’s therefore necessary to enhance the capacity of veterinary surveillance systems. SET is a specifically developed FAO tool to help the veterinary services. But it’s also good to evaluate how the veterinary service would like to take the One Health component and work on it. SET is not a Tripartite initiative but is intended to support veterinary services.

Regarding the priority diseases mentioned, the prioritization exercise was done with the help of the CDC prioritization tool. These priority diseases can be reevaluated at a later stage.

Regarding the situation in Tunisia, it would be good to share the example from Egypt where avian influenza is a major problem and has a huge economic impact. This includes establishing the four-way linking involving animal health and public health. It was challenging but provides the necessary input.

RESPONSE FROM CHINENYE OFOEGBUNAM, NIGERIA CDC:

Regarding integrating environmental and social science aspects in risk assessment, these are often not included but are critical. Behavioral and cultural practices are especially important in regard to Lassa Fever in Nigeria.

Regarding how to build integration between the different sectors, the first thing to do is to establish a One Health platform at the national level with a One Health steering committee that involves leads from the different sectors.

Regarding possible risk factors and preparedness for the seasonal appearance of Lassa Fever in Nigeria, prior to the outbreak we work on surveillance systems and capacity building. We improve the index of suspicion and help to detect cases timely and promptly for action. There is an upscale of activities with social mobilization including leverage on social media platforms to send messages on cultural practices, keeping the environment clean, removing sites for rodents, covering food in airtight containers etc. When the outbreak occurs, One Health rapid response teams go to affected areas and conduct active searches and contact tracing to follow up on contacts and curtail the outbreak. Possible risk factors include bush burning, which moves rodents into houses, and cultural practices such as eating rodents as delicacies. We are also working with CEPI on a Lassa vaccine.
DELEGATE: How do we handle ethical issues around One Health?

DELEGATE: Is the strategic tool for the elimination of brucellosis adapted from a generic tool or your own initiative? And how will the tool lead to elimination of brucellosis?

DELEGATE: What will the initial control of brucellosis look like, given that the vaccines are host specific, and it is found in small ruminants?

DELEGATE: What is the reason behind the sudden emergence of RVF in Uganda?

DELEGATE: What do you think of a proposal to support the establishment of an African health threat prevention fund or an emergency fund that would support the Africa CDC to make calls to young African scientists to address the health issues and the One Health approach?

DELEGATE: What is your recommendation for minimum capabilities for the various countries for rapid response to outbreaks anywhere in the continent?

DELEGATE: What barriers can be erected between wild and domestic poultry and livestock to prevent the transmission of zoonoses?

RESPONSE FROM MUSA SEKAMATTE, MINISTRY OF HEALTH, UGANDA:
In the past we did not have capacity to detect RVF but it’s been present in some areas of Uganda since the 1960s. Now we can detect its presence better than before.

RESPONSE FROM ASEFA DERESSA, ETHIOPIAN PUBLIC HEALTH INSTITUTE:
The tool has a very detailed activity and goes through surveillance, lab capacity, investigation, assessments etc. We are working on it as a technical working group and implementation is through local workgroups.

Regarding the control of brucellosis, it’s a grey area where technical experts have to sit together for a national control strategy. We are promoting the strengthening national surveillance in animals, wildlife and humans. This is key. We don’t have vaccination in our national program, but it is under discussion.

VEERLE MSIMANG, NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES, SOUTH AFRICA:
Ethics review is still a new field although essential, for example how to deal with people or ask for their consent. These and many other issues are not part of their current training.

In regard to outbreak prevention, it’s important to have some core people that are prepared and trained for an outbreak in a broad range of fields as well as in biosafety and biosecurity and outbreak response. Countries like DRC have a lot of experience in managing the Ebola outbreak that they could share with other countries.
COUNTRY PERSPECTIVES

Rift Valley Fever

Musa Sekamatte, MINISTRY OF HEALTH, UGANDA

Uganda is situated in a rich and complex ecological system with high biodiversity. This puts it at risk of high hazard diseases like Rift Valley Fever (RVF). Periodic isolation of the virus from animals, humans and vectors occurs. Until 2016, Uganda had not experienced epizootics and large epidemics, unlike neighboring Kenya, Tanzania and Sudan. RVF is now a prioritized zoonotic disease in Uganda.

RVF is caused by a single-stranded RNA virus. It primarily affects animals but can also infect humans. Human infections mainly result from contact with blood or organs of infected animals although have also resulted from bites of infected mosquitoes. To date, no human-to-human transmission of RVF virus has been documented. The incubation period for RVF varies from 2 to 6 days. Outbreaks of RVF in animals can be prevented by a sustained program of animal vaccination.

In animals, symptoms include fever, loss of appetite, weakness, low milk production, nasal discharge, vomiting, diarrhea, abortions, and infant and adult mortality. In humans, symptoms include fever, jaundice, rhinitis, encephalitis, hemorrhagic manifestations, and retinal degeneration.

The first human outbreak of RVF in Uganda was on March 10th, 2016 in Kabale District. The index case was a 48-year-old male butcher who had been working in a local abattoir. He presented with a history of fever, vomiting, diarrhea, headaches and hemorrhagic symptoms. The next day, a second case, a 16-year-old male student from Katuna on the Uganda-Rwanda border confirmed positive at UVRI. On June 7, a 35-year-old male mason from another village was confirmed with acute RVF.

Anecdotal reports of increased numbers of sick animals and abortions in these areas were reported. Blood samples from domestic livestock in the same locations were collected. In total, 83 livestock samples were obtained from cattle, goats and sheep; 8 of these were seropositive for RVFV by IgG ELISA. One goat was confirmed by RT-PCR.

Entomological investigations collected 298 pools, representing 9,950 mosquitoes, from the five locations in Kabale. Pooled species sorted for RT-PCR testing were Aedes gribbinsi (24.2%), Coquillettidia fuscopennata (13.4%) and Aedes tricholabis (11.4%). Six genera and 33 species of mosquitoes were identified. Only 3 (1%) mosquito pools (A. gribbinsi, C. fuscopennata, unspecified Aedes spp) were found positive for RVFV by RT-PCR.

Risk factors associated with human RVF in Kabale district included meat handling, and in animals, cows were at risk, especially the adult animals (females more than males probably because they are sold less frequently and stay in the fields). Further cases have been confirmed in the south-west of Uganda where there is significant trading in cattle.

This leads to questions for One Health research. What is the current/known geographic distribution and incidence of RVF beyond clinical cases? If RVF is present in neighboring countries, where are the nearest outbreaks to shared borders? What can be learned from
them? What other animals are likely to be the target for RVF in the country? Are they of susceptible or non-susceptible genotypes? Are any other potential mosquito vector species for RVF present in the country? What is known of their distribution, ecology and population biology? What is the relationship between environmental conditions and the occurrence of RVF in different areas in the country?

Also worth researching are how large are the susceptible livestock populations in the country? Are they in areas ecologically favorable for the generation of huge populations of RVF mosquito vectors? Will it be difficult to recognize the disease quickly in different parts of the country? And how difficult will it be to mount an effective disease control program in different parts of the country? How costly will these programs be?

COUNTRY PERSPECTIVES

Brucellosis

Asefa Deressa, ETHIOPIAN PUBLIC HEALTH INSTITUTE

Ethiopia has a human population of around 92 million and an animal population of 49 million cattle, 47 million sheep and goats, and 760,000 camels. The agriculture system is divided into three distinct production systems: pastoralists, mixed crop-livestock, and agro-pastoralists. The small-scale livestock production system is responsible for 97% of the total milk production and 75% of the commercial milk production (mostly sold through informal markets).

In terms of zoonotic disease that affects humans, domestic animals and wildlife, B. abortus, B. suis, B. melitensis and B. canis are the four Brucella species commonly known to cause human infections. Human brucellosis is commonly known as undulant fever and is often misdiagnosed due to the non-specific symptoms (it’s a flu-like illness). In livestock, brucellosis is considered a production limiting disease as it causes abortions, stillbirths and decreases milk production. It was first reported in cattle in Ethiopia in 1970.

During technical working groups at the One Health zoonotic disease prioritization workshops (September 2015 and September 2019), brucellosis was identified as one of the top five zoonotic diseases.

The Brucellosis Technical Working Group is multisectoral and provides feedback and expert advice to help guide future policy decisions related to their particular area. It is supported by the Ethiopian government (animal and human health sectors), environment, Ethiopian universities, international universities, and international partners such as USAID, FAO and CDC.

An assessment of the burden of disease was carried out in 2016, including a seroprevalence survey in humans and animals of selected areas in Ethiopia representing the rural livestock...
production system. The objectives were to estimate the burden of brucellosis in humans, cattle and small ruminants in selected regions in Ethiopia, and identify risk factors for Brucella infections in humans and animals. The major findings indicated that 71% (n=761) of interviewed householders were reported as milk producing areas of which Amhara produces 43%, Central Oromia (80%) and South Ethiopia (91%). 68% of people interviewed consume raw milk products regularly: Amhara (59%), Central Oromia (56%) and South Ethiopia (95%). Amhara and Central Oromia consume only cattle milk; South Ethiopia consume cattle, sheep, goat and camel milk. South Ethiopia has a particularly high (72%) percentage of households with at least one human with detectable Brucella antibodies.

To summarize findings, there is a variable brucellosis prevalence in both humans and animals. Disease prevalence and livestock systems are quite different, so there is no "one size fits all" disease control strategy that can be used throughout the country. As a result, each livestock system should be considered and addressed separately during the development and implementation of the National Brucellosis Control Program. A One Health approach to address the brucellosis situation in Ethiopia should be used to ensure the sustainability and success of the interventions.

Following these findings, a Staged Tool for the Elimination of Brucellosis (STEB) was developed. STEB is a methodological tool that assists countries in launching, updating and pursuing brucellosis control programs (incorporating animal and human assessments). It aims at progressive control and ultimately elimination of brucellosis. A STEB workshop was held in February 2019. It is currently finalizing Ethiopia’s first National Brucellosis Control Program using a One Health approach.
In terms of governance, brucellosis units have been established within human and animal health sectors to oversee brucellosis control. A formalized agreement between human and animal health ministries to jointly address brucellosis has been established, as has an intersectoral brucellosis committee. In terms of laboratory capacity, human and animal brucellosis can be diagnosed at the national level.

In terms of surveillance, research documents exist that provide seroprevalence estimates of brucellosis in humans and livestock. It is necessary to ensure animal health officers are reporting and investigating abortion storms and/or retained placenta events. And also, to ensure there is a feedback mechanism that facilitates livestock surveillance data sharing between local/municipal and national governments.

Next steps have been recommended in these four areas. In terms of governance, steps are to finalize the draft of the National Brucellosis Control Plan, evaluate its economic feasibility, obtain dedicated funding for it and implement it. In terms of laboratory capacity, it is essential to ensure confirmatory diagnostic testing is performed at an established National Reference Laboratory. In terms of prevention, control and elimination, there is a strong need to know the livestock and Brucella species associated with human infection. This involves identifying the species and location of herds associated with the majority of livestock brucellosis cases. Government-sponsored Brucella vaccination programs are occurring where needed. In terms of education and communication, this will involve consulting and informing the local/municipal and national partners about drafting the national control plan.
COUNTRY PERSPECTIVES

Health safety and security and zoonoses in Africa

Veerle Msimang, Janusz Paweska,
NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES, SOUTH AFRICA

Biosecurity and biosafety policies, practices and procedures safeguard against exposure to, or the deliberate or inadvertent development or release of, living organisms or biological material that may harm humans or the environment.

Africa needs to improve and strengthen biosecurity and biosafety measures to reduce biorisks. These cover prevention, early detection, diagnosis and treatment; disease surveillance and outbreak response; International Health Regulations; a biorisk management framework for responsible life sciences research; and laboratory biosafety and biosecurity.

Looking at the natural occurrence of infectious diseases, of 1415 known pathogens of humans, 62% have an animal origin. Over the past 40 years, on average almost one new emerging infectious disease (EID) is recorded each year, and approximately 75% of these diseases are zoonotic. Several zoonotic EIDs cause epidemics of regional and global concern. Locally in South Africa most recent examples include Lujo virus (2008), Rift Valley Fever (2008-2011), and the (re)-emergence of Rabies.


There are also lab accidents and laboratory-acquired infections (LAIs). In 2012, the CDC estimated approximately 80% of LAIs are caused by aerosols of pathogenic microorganisms. Aerosols are solid or liquid particles suspended in the air (1-100 µm). Safe practices are necessary to minimize the creation of and exposure to aerosols (centrifuge and procedure).

The International Health Regulations (IHR) (2005) provide a very important guide to strengthen health security and biosecurity. These regulations help build the capacity of countries to prevent, protect against, control, and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade.

They are not limited to specific diseases but apply to new and ever-changing public health risks. They are intended to have long-lasting relevance in the international response to
the emergence and spread of disease. The IHR also provides the legal basis for important health documents applicable to international travel and transport, as well as for sanitary protection for the users of international airports, ports, and ground crossings.

South Africa has been implementing IHR since their adoption on 15 June 2007. It has also developed its National Action Plan for Health Security (NAPHS) for South Africa 2019-2021. Infectious disease threats and events challenge the health security in South Africa and destabilizes the already overstrained health system and the under-resourced public health sector in South Africa.

WHO has a Monitoring and Evaluation Framework for the implementation of the IHR. It involves self-assessment annual reporting, Joint External Evaluations (JEEs), simulation exercises, and after-action reviews. The WHO JEE reviewed capacity in technical areas regarding the promulgation and regulation and implementation of IHR (2005) on biosafety, biosecurity and legal systems. South Africa scored 2 and 3 respectively (1 = no capacity, 2= limited capacity, 3=developed capacity, 4= demonstrated capacity, 5 = sustained capacity).

The Academy of Science of South Africa (ASSAF) reported that the legal framework related to human and animal health and agriculture biosafety and biosecurity is comprehensive and robust. South Africa has enacted a number of statutes and regulations that relate to human, animal and environmental issues regarding infectious diseases. These involve the Departments of Health and Agriculture, Fisheries and Forestry, and Trade and Industry. Poor coordination of legal and regulatory frameworks however poses challenges including a lack of cohesion and clarity, and duplication of content due to not cross-referencing. The IHR Bill (2013) adds to the legal provisions for health security but there is no reference to already existing statutes from the existing legal framework.

Regarding prevention, detection, early diagnosis and treatment, while the African continent suffers from one of the highest burdens of infectious diseases of humans and animals in the world, it has the least capacity for their detection, identification and monitoring. There are fewer Biosafety Level 3 and 4 laboratories in developing countries than in developed countries. Accordingly, it is necessary to establish more laboratories in developing countries or increase the number of regional laboratories.

To date, there are only two BSL-4 laboratories in Africa compared to 13 operational BSL-4 laboratories in the United States. Only three African countries have standard BSL-3 laboratories.

In terms of diagnosis and treatment, there is inadequate biocontainment infrastructure. Limitation to their access and availability not only limits African capacity to respond to threats caused by highly dangerous pathogens but also hampers development of new and improved diagnostic assays, vaccines and antivirals. There is a lack of strategic biobanks for long-term and secure storage of reference clinical materials and strains. This is essential to preserve African pathogen biodiversity for the future development of diagnostic assays, vaccines and therapeutics. The greater availability of personnel trained to work in high containment laboratories or to manage biobanks is crucial for fully functioning biosafety and biosecurity. Funding and training is pertinent to increase capacity to increase biosafety and biosecurity and mitigate health risks.
WHO has produced a blueprint prioritization tool: the Methodology for Prioritizing Severe Emerging Diseases for Research and Development. Its second annual review in February 2018 included a list of priority diseases. These are Crimean-Congo Hemorrhagic Fever, Ebola, Marburg, Lassa Fever, Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Severe Acute Respiratory Syndrome (SARS), Nipah and henipavirus diseases, Rift Valley Fever, and Zika.

Regarding capacity and monitoring, the transportation, storage and handling of diagnostic pathogens and the prevention of accidental and intentional release is crucial.

In South Africa, the capacities to detect infectious disease event threats specifically for high risk pathogens are mostly concentrated at the National Institute for Communicable Diseases of the National Health Laboratory Service (NICD/NHLS) and the Onderstepoort Veterinary Research Institute of the Agriculture Research Council. Maintenance and further development of these national capacities requires robust policies and standard operating procedures as well as adequate numbers of technically qualified human resources – and naturally more funding.

In regard to the systematic monitoring and mandatory reporting of breeches and malpractices, there needs to be more and continuous training opportunities for scientists and clinicians related to biosafety and biosecurity in developing countries.

The African Biosafety Association (AFBSA) is a non-governmental, apolitical, non-sectarian and non-profit organization, through which its members collaborate with other associations, scientific or health organizations, institutions and individuals throughout Africa and around the world in order to engage, educate, empower and promote implementation of required biosafety and biosecurity practices. It represents professionals working in the field of biosafety and endeavors to make biosafety a recognized profession with well-defined tasks and qualifications.

The 15793 Lab Biorisk Management Framework agreement sets out the requirements necessary to control risks associated with the handling or storage and disposal of biological agents and toxins in laboratories and facilities.

Emergency Operation Centers (EOCs) have to be established in each country. They need to possess all the necessary training and clear guidelines for tackling emergencies, enabling them to timely operationalize response measures as soon as an outbreak is recognized. Response to disease threats and other events should be simultaneously activated and implemented, employing well established and fully operational emergency response strategies when necessary.

Training health care personnel is very important to upscale human resources, especially as they are vulnerable to nosocomial infection. Examples include isolation techniques, nursing-barrier techniques, etc. Training for emergency response should be proactive and continuous as opposed to reactive, in order for the country to be prepared for an infectious – zoonotic – disease event.

In South Africa, the department of health has a national health operation center (NATHOC), to respond to public health emergencies. In 2015, a national emergency operation center (EOC) was launched during the West African Ebola outbreak (2014-16) in order to manage public health emergencies. A national disaster management center also exists. Smooth and
fast coordination between multiple sectors and centers is imperative.

The need for a National Public Health Institute of South Africa (NAPHISA) to act as central authority to oversee and manage public health events of concern is urgent, especially considering that preparedness and emergency response are technical areas where adequate capacity is lacking.

A One Health approach that integrates research and response to zoonotic pathogens and their biology, ecology and epidemiology is vital. Key findings of the ASSAF report include poor training on research ethics and low awareness of national and international conventions, laws and regulations related to research.

Recommendations include an ethics review; education and awareness training; improving capacity to detect and respond to infectious disease outbreaks; and scientific openness and transparency. Engaging the community is also vital. It is necessary to improve the basic understanding of zoonotic diseases among the general public as well as to suggest approaches to stop the spread of infections. Basic hygiene and protective behavioral measures should be maintained in normal conditions and, especially, during emergencies. Most infections spread owing to lack of proper hygiene and protective measures (e.g., hand washing, disinfection, and safe burial practices, vaccination).

Moreover, healthcare workers need adequate training in managing zoonotic infections to decrease bio risks. An example is adequate post-exposure-prophylaxis for victims of dog bites to prevent Rabies.

To conclude, Africa has one of the highest burden of infectious diseases in the world. Epidemics continuously catch Africa off-guard and cause health and socio-economic devastation to the continent. Studies on the risk of spread of EIDs point to Africa and Asia as likely to harbor the endemic settings for both conventional and emerging epidemic diseases, especially in the human-livestock-wildlife interface areas.

In a world with increasing globalization, international travel, urban crowding and global climate change, we constantly have to rethink our strategies for health safety and security. It is necessary to resource and strengthen public health infrastructure and capacity and increase integrated surveillance systems and workforce development strategies. Sustainable dynamic preparedness and coordination of health safety and security against re- and emerging zoonotic outbreaks are needed. It is vital to increase and enhance research capacity for health safety and security, and to grow public health awareness and engagement in zoonotic infectious diseases.

Finally, there is a need for more and stronger partnerships across national and international sectors (human health, animal health, environment) and disciplines (natural and social sciences) involving public, academic and private organizations and institutions.
The Tripartite view on zoonotic disease surveillance

Jane Lwoyero, OIE SUB-REGIONAL REPRESENTATION FOR EASTERN AFRICA

The Tripartite is a strong collaboration between WHO, FAO and OIE (other stakeholders are invited to participate as appropriate). It aims at sharing responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces.

FAO, WHO and OIE have conducted joint work since the 1940s on risks at the human-animal-ecosystems interface. Since 2003, joint expert meetings have been held to assess the human health risks associated with the use of antimicrobials in food producing animals. In 2010, formal cooperation was established between the three organizations on AMR, and 2012 marked the establishment of the Tripartite Secretariat.

This strong collaboration is based on shared principles that recognize the prevention and control of emerging infectious diseases as public goods. Support for national services and building on existing structures and shifting the focus towards strengthening good governance and national health systems, instead of short-to-medium-term ad hoc interventions; with reference to internationally adopted standards and references.

There have been a number of achievements since 2010. In the area of zoonotic influenza, the two systems are the OFFLU network where data in influenza in animals is compiled and shared with colleges in human health, and the GISRS which is a WHO database that records the incidences of influenza.

In 2015 the three organizations came up with a global elimination strategy for Rabies which was presented at a Rabies conference in Geneva, with a roadmap to eliminate Rabies by 2030. A Global Action Plan for antimicrobial resistance was developed and launched in Geneva in 2015 and at a UN high-level meeting in New York in 2016.

Other collaborations include the IHR-2005 Monitoring Framework (JEE); IHR-PVS capacity-building; bovine tuberculosis control and tuberculin standards; and MERS-COV. These are all initiatives taken jointly so that these problems can be handled together.
In 2017 a renewed commitment was made reaffirming their commitment to provide multi-sectoral, collaborative leadership in addressing health challenges. Focusing on strengthening and modernization of early warning and surveillance/monitoring systems; the foresight, preparedness and response to emerging, re-emerging and neglected infectious diseases; the encouragement and the promotion of coordinated research and development to achieve a common understanding of the highest priority zoonotic diseases. Also that year the Joint Secretariat of an AMR Inter-Agency Coordination Group was formed. A Tripartite Guide to Addressing Zoonotic Diseases in Countries was published in 2019. It advocates for effective multisectoral, multidisciplinary, and transnational collaboration to effectively prepare for, detect, assess, and respond to emerging and endemic zoonotic diseases. It provides countries with operational guidance and tools and is applicable to all zoonotic disease events and emergencies. It covers other shared health threats at the human-animal-environment interface (AMR, food safety, and food security).

Regarding the surveillance for zoonotic diseases and information sharing, the objective is to establish a coordinated national surveillance system for early detection of zoonotic disease events, and timely, routine data sharing among all relevant sectors with responsibility for zoonotic disease. It also supports coordinated response, prevention, and mitigation measures.

Coordinated surveillance helps to understand the burden of disease, monitor trends of zoonotic diseases, provide an early warning system, and provide support for outbreak investigation and response.

Examples of systems that have been put in place include GLEWS, the Global Early Warning System for major animal diseases including zoonoses, and GOARN, the Global Outbreak Alert and Response Network, which is a WHO network of 200+ technical institutions.

Establishing/enhancing a surveillance system for zoonotic diseases involves much work. Planning for coordinated surveillance includes infrastructure and resource mapping; identifying priority zoonotic diseases; identifying stakeholders related to the zoonotic diseases being investigated; developing surveillance plans for the specific objectives; and targeting surveillance to the specific population which could be stationary or mobile.

Building the surveillance system is essential and involves looking at all the stakeholders. It involves describing the organization of the surveillance system; establishing networks and partnerships; and identifying resources before surveillance begins.

A core group is then established to undertake the functions of the surveillance system, these include standardization; laboratory diagnostics; and specimen collection, transportation, storage and management. All these measures ensure that whatever is collected and taken to the lab meet all the conditions to enable results to be achieved without interfering with the quality of the sample or the results. It also involves data collecting and managing; data sharing; official reporting to international organizations through the various reporting systems that are in place; joint analysis and interpretation; and providing feedback.

To conclude, multi-sectoral collaboration is essential in controlling and managing health risks. This requires well-structured and resilient health systems that prioritize prevention. Best practice seeks to improve and adapt existing national structures, mechanisms and plans rather than build new ones.
Event-based surveillance as a condition for public health emergency preparedness and response

Arunmozhi Balajee, US CDC

A health threat anywhere is a health threat everywhere in this increasingly interconnected world, so there is no room for complacency. In 2005 the IHR required countries to shift from looking for and reporting on infectious diseases to detecting and reporting any public health risk. Also, looking at all sources of information to detect these public health risks and strengthen core capacities. The core capacities for surveillance include timely detection of all events with potential public health risk, and immediate reporting and response. This laid the foundation for what we call event-based surveillance.

Traditional (indicator based) surveillance (IBS) is the systematic (regular) collection, monitoring, analysis and interpretation of structured data, i.e. of indicators produced by a number of well-identified, mostly health-based, formal sources.

Event-based surveillance (EBS) is the organized collection, monitoring, assessment and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human health.

To recap: IBS is organized data, limited, predetermined, formal, trusted and reliable, mainly healthcare based. EMS is not organized, multiple and variable, not predefined, informal and formal, reliability not established, all hazards. Data from EBS has to go through triage and monitoring before confirmation of the data.

IBS and EBS are two arms of surveillance; they are systems that feed into early warning and response systems in a country. When data is used from IBS and EBS, that will add to a country’s early warning and response systems. The difference between IBS and EBS is the early detection and rapid reporting.

EBS is the reporting of any episode that may represent an immediate threat to public health and requires prompt action. It includes single cases of some diseases or syndromes, especially those targeted for elimination; clusters of syndromes that may represent disease spreading in a group of people or animals; and patterns of illness that might represent other exposures (contaminated food, chemical leakage...). EBS can detect diverse events, from natural disasters, complications after vaccinations, illnesses, birth defects etc. It’s an early warning system because it helps to detect such events at an early stage, even before they appear at the health facilities. It can be used at the community health level to strengthen the One Health approach.

Information for EBS can come from anywhere: health providers, public/private, traditional healers, routine surveillance, pharmacy sales, points of entry, educational establishments, industry/factories, veterinary services, police, customs, factories, atomic/radiation safety authority, community, media, internet.
A signal can therefore come from anywhere but can look very differently depending on the source. An occurrence may represent acute risk to human health. The signal goes through triage verification and the regular risk assessment in a country before an action can be taken. A typical signal for animal health could be severe illness in veterinarian, wildlife staff or community members after contact with (e.g. through culling, feeding, treating, vaccinating) a sick or dead animal. It could be large unexpected, sudden increases in disease or death of animals, or a sudden increase in abortions in animals. Countries need to be encouraged to share data. Cross notification of signal events is vital and needs to be shared between all sectors. An epidemic intelligence hub is essential where cross-notification is possible in a routine manner, not just during an emergency.

Earlier in 2019 the WHO, to support building the capacities, released a new benchmark tool for surveillance, for all the core capacities, with one of them being to strengthen event-based surveillance. In order to get to capacity level 2 (which is fairly limited) it’s necessary to: develop guidelines and standard operating procedures for event-based surveillance; establish a designated unit at all needed levels, with operational plan and procedures; and develop and put in place case definitions and the process of detection, assessment and reporting of the event (clusters or outbreaks). Very few countries in Africa have these activities in place so a lot more has to be done to get to capacity level 2. Moreover, there are three more levels to achieve after this before it can be said that a country has functional event-based surveillance.

At the country level, US CDC is working in six countries to strengthen EBS capacity. To date, over 24,000 health workers have been trained in EBS in 165 districts covering over 23 million people. Over 7,000 events have been detected. Currently, work is ongoing to systematically strengthen the EBS workforce. Mentors selected from various countries are being trained on event-based surveillance and provided resources on how to train and mentor others. Transfer of knowledge and advocacy for policy makers, national-level stakeholders is essential, as is further knowledge transfer and mentorship for public health workers in-country.

In summary, event-based surveillance is an all hazards approach which includes One Health. The need is to find ways to work together, train together and complement implementation.
QUESTIONS AND COMMENTS FROM DELEGATES

ABOUT ZOONOTIC DISEASES SURVEILLANCE SYSTEMS

DELEGATE: Should a signal be introduced at the local level, or should we wait until the signal is verified before introducing it as an event. Are there any tools to help setting up such an electronic platform?

RESPONSE FROM ARUNMOZHI BALAJEE, US CDC:
Signals can be considered as “background noise”, all of which does not need to be reported. Signals should be kept local until they are triaged and verified and known to be an event. Electronic tools do not yet exist for event-based reporting. It’s good to build on the tools available. Once it becomes an event in Africa, we want to feed it into the existing network, not build new tools that the countries can’t sustain.

DELEGATE: How is event-based surveillance linked to ongoing Digital Disease Detection surveillance techniques and systems, or the electronic Integrated Disease Surveillance and Response system (eIDSR)?

RESPONSE FROM ARUNMOZHI BALAJEE, US CDC:
It is important to connect to different existing systems. I am meeting people in regard to connecting with the eIDSR but I don’t know the Digital Disease Detection system. We work with Africa CDC and publish event-based surveillance as a framework in collaboration with them. We will continue to connect with other surveillance systems in countries and regions through the world.

AB OSTERHAUS, ONE HEALTH PLATFORM:
The follow-up of surveillance is crucial to avoid gaps appearing between initial notification and an action, which in the case of a recent influenza outbreak was three months. A lot of focus also needs to be put on the professionals in the field who are often the first to notice something.
9 | PANEL DISCUSSION:
FRAMEWORK FOR ONE HEALTH PRACTICE
IN NATIONAL PUBLIC HEALTH INSTITUTES:
ZOONOTIC DISEASE PREVENTION AND
CONTROL

MODERATED BY: Yewande Alimi, AFRICA CDC

PANEL COMPOSED OF

- Jay Varma, AFRICA CDC
- Stephanie Salyer, AFRICA CDC
- Athman Mwatondo, AFRICA CDC
- Feyesa Regassa, ETHIOPIA EPHI
- Chinenye Ofoegbunam, NIGERIA CDC
- Sofia Viegas, MOZAMBIQUE NPHI

The session focused on the framework document on One Health practice in NHPIs. Its aim is
to serve as a guideline for NHPIs on minimum One Health activities for zoonotic diseases and
pulls together resources from a number of organizations.

Athman Mwatondo, AFRICA CDC introduced the goals of the framework. The first is to
strengthen multisectoral coordination and collaboration to support the development of
One Health Platforms, improve existing platforms whenever possible, and advocate for One
Health nationally and regionally. The document contains a set of activities that describe how
NPHIs can work to do this. In countries where the One Health Platform already exists, NPHIs
can collaborate with those platforms. Where they do not exist, the NPHI can take a lead role
and collaborate with other agencies to develop these platforms. In some countries the NPHIs
are actually One Health Platforms and this document provides guidance as to how they can
be strengthened.
A further objective is for NPHIs to support priority zoonotic disease prevention and control programs and come up with strategies and information sharing tools between the sectors. This would be through the support of zoonotic disease prioritization workshops – both regionally and nationally, national One Health strategic plans or disease specific action plans; and multisectoral information sharing protocols.

The second goal is to develop and strengthen surveillance systems and data sharing mechanisms with relevant stakeholders. This would involve establishing surveillance for Rabies, zoonotic influenza, and at least three additional high priority zoonotic diseases. Rabies and zoonotic influenza were chosen as they come high up the priority list. It’s also important to provide minimum guidance to countries for other diseases. This can be indicator-based (e.g. IDSR) or event-based (e.g. media scanning and community-based surveillance). A further objective is to support new and strengthen existing mechanisms for information and data sharing for priority zoonotic diseases. Information sharing between countries is a major challenge so multisectoral technical working groups could help in this respect, as could developing minimal data elements and data standards, and coordinated surveillance.

Stephanie Salyer, AFRICA CDC introduced goal three which is to strengthen laboratory systems and networks to ensure early detection, surveillance and response. This involves strengthening facilities, personnel, and systems for Rabies, zoonotic influenza, and at least three additional priority zoonotic diseases, through laboratory assessments, evaluating diagnostics capacity (e.g. equipment and reagents), and standard protocols. The second objective focuses on supporting coordination between human, animal and environmental health laboratory networks through multisectoral lab working groups to share results and protocols etc.; laboratory data sharing mechanisms between sectors; and proposed specimen referral mechanisms between sectors.

The fourth goal is to ensure effective and coordinated public health emergency preparedness and response using a One Health approach. This highlights the need to conduct a joint risk assessment (JRA) for at least one priority zoonotic disease event in collaboration with relevant One Health sectors; to develop and implement joint preparedness and response plans for Rabies, zoonotic influenza, and at least three additional priority zoonotic diseases in collaboration with animal and environmental officials; and to include simulation exercises, risk communications, and after action reviews. Further objectives are to include animal and environmental health experts in staffing of Public Health Emergency Operations Centers, and to liaise with country and regional stockpiles to ensure adequate and just-in-time procurement and distribution of supplies for outbreaks of priority zoonotic diseases.

Goal five is to strengthen and support workforce development to prevent and control priority zoonotic diseases. The first objective here is to support workforce development to prevent and control Rabies, zoonotic influenza, and at least three additional high priority zoonotic diseases through clinical staff, surveillance officers and epidemiologists, and laboratorians. Its second objective is to advocate for multisectoral, One Health training opportunities for Rabies, zoonotic influenza, and at least three additional high priority zoonotic diseases. This would be through in-service training programs that support One Health (e.g. FETP and ISAVET), multisectoral lab programs (e.g. GLLP), multisectoral event-based surveillance training, and biosafety and biosecurity training.
Sofia Viegas, MOZAMBIQUE NPHI described what Mozambique has done in recent years and to share a key success of their multisectoral platform and one major challenge that the institution has experienced. In 2016 the ministries and key departments sat together to discuss the implementation of the global health security agenda. Based on that, a national action plan for health security was developed (although not yet approved) and a multisectoral technical working group was created. It meets every two months and coordination is rotated between the ministries involved. International collaboration was also established with the institutions with expertise in One Health including the Public Health Agency of Sweden, and the Zoonotic Diseases Unit in Kenya. A training package was developed based on the One Health approach. Using that they have done a training of trainers (ToT) at provincial level in all provinces in the country and have also included this module in a postgraduate specialty in public health. Discussions are ongoing with the Academy to also include this at the undergraduate level.

In April 2018 a workshop was held to prioritize the zoonotic diseases, and seven priority diseases were identified. The National Plan for AMR was developed and approved. This year the National Plan for Rabies Control was approved. Still under development is the One Health strategic plan and a zoonotic diseases manual for surveillance that should be approved in 2020.

The main challenge – besides the funding to implement all these plans – is that Mozambique is highly vulnerable to climate change which can bring added challenges in terms of reactions to outbreaks. During 2019 two cyclones affected the central and north regions of the country and evaluations of their impact are still ongoing. It is important to include the One Health approach on climate change.

Feyesa Regassa, ETHIOPIA EPHI described Ethiopia’s commitment to One Health and their major successes and challenges. One of the major concerns is global health security and the increasing number of epidemics in Ethiopia including but not limited to Dengue Fever, Yellow Fever, MERS coronavirus, Rift Valley Fever, cholera, Ebola, Rabies and anthrax. All this requires multisectoral coordination with the One Health approach as well as a trans-disciplinary approach along with preparedness and response. For this purpose the Ethiopian government established a national One Health steering committee in 2016 and signed a memorandum of understanding between the ministries of agriculture, health, environment and forestry, the climate change commission and a life conservation authority. The main purpose of the national steering committee is to ensure the most sustainable One Health coordination mechanism at all levels.

The One Health approach supports the establishment of the regional One Health Platform and technical working groups covering anthrax, brucellosis, and emerging pandemics. Capacity building has been conducted.

An important strategy document has been developed in the last year along with the operational plan for this year plus the national Rabies prevention and control strategy 2018-2030 and the national anthrax prevention and control strategy plan 2018-2030. Also developed is a preparedness and response plan for Rift Valley Fever and highly pathogenic influenza.

Many challenges for the One Health approach exist such as a lack of formal structure and no domestic funding, leading to challenges as to how to coordinate in the most sustainable way. Also there is poor linkage and lack of interoperability between the different sectors, particularly with the siloed approach that is common in the country.
Chinenye Ofoegbunam, NIGERIA CDC said that major achievements in Nigeria have been the establishment of a One Health field epidemiology training program which became operational in February 2016 and has 11 cohorts running concurrently. A One Health strategic plan has just been developed and is to be launched soon. One Health contingency plans have been developed for anthrax and brucellosis, work on AMR surveillance has been carried out, and Nigeria is also a partner with the African One Health network guiding policies. Inadequate funding is a challenge especially for animal health surveillance. There is an absence of environmental surveillance, and no system for animal disease surveillance in wildlife. Laboratory diagnosis is weak, coordination is poor, and information sharing is also lacking between the animal and health sectors.

QUESTIONS AND COMMENTS FROM DELEGATES

DELEGATE: How do we get the justification for sharing information? It might be there from the scientific point of view but from the point of policy, who is going to share their data? How is the development of the framework at country-specific level going to go forward? How can Africa CDC and Africa Union be helped to push for policy? Who accommodates whom: does the NHPI accommodate the national health platform, or vice versa?

DELEGATE, SIERRA LEONE: Regarding information sharing during the Ebola outbreak, an ad hoc information sharing system was put in place by the government, the National Ebola Response System, which was a One Health approach. Plans were developed, orientation occurred, and two years later people easily accepted the One Health approach. Since 2017 a 5-year strategic plan was developed for the country, part of which is in the process of being rolled out. The animal health people were mentored by the human health people in terms of leveraging resources to ensure that the surveillance tools being used were adapted appropriately. Now it’s time to move from the policy level to actual activities in the countries on the ground. For example, the surveillance people are busy with event-based surveillance. Recently a suspected outbreak of African swine fever led to the death of 1000 pigs within one week. That event was monitored and jointly investigated by the ministries of health and agriculture, and even the environment. The One Health Rapid Response Teams conducted joint investigations. However, to test in-country a Monkeypox specimen for example, it has to be flown to the US where a confirmatory test can be conducted.

DELEGATE, SOUTH AFRICA: The unique challenges to South Africa and the national One Health forum that we formed, and which can be extrapolated to the southern region, include too many siloed networks. For example, integrating the academic networks in the universities, with laboratory networks and research networks is a problem. And incorporating environmental colleagues is another challenge. It is recognized that the issue of AMR is also very important. A program was devised to go into activities where environmental sampling is performed (water sewage etc.) to
detect antibiotics and other residues. That gained interest from environmental colleagues who became part of One Health. But what really brought everyone together was an outbreak of listeriosis. So long as there is no common event linking everyone together, they go back to their own siloes. The inter-epidemic periods between two events is critical to address. So a program of training and capacity building was developed with four training courses held in the southern region on avian influenza which involved simulations in the field. This is key for the continent and is one of the driving forces behind the formation of the Africa One Health network, and this needs to be replicated.

DELEGATE: It’s important to address the roots of zoonosis problems; the animal. Most countries have Rabies. Can something be initiated through Africa CDC to vaccinate domestic dogs? How can this be supported? Can this be added to the framework?

DELEGATE, MALAWI: The document is not clear on the support from Africa CDC through other regional coordinating centers and NPHIs. Second, what about the role of the rural communities which are mainly affected by these diseases? Strengthening community structures is important. One approach found to be useful in Malawi is the implementation of a training program to detect “strange diseases” which ultimately ended up being identified as typhoid.

RESPONSE FROM YEWANDE ALIMI, AFRICA CDC: In terms of country-specific frameworks, all of the available One Health frameworks were reviewed before this document was produced. The information in this document was guided by the publications that have come out of countries, based on informal and formal engagement. So Member States were consulted in the development of this document.

In terms of what Africa CDC will do to drive policy, in collaboration with the Africa Union institutions, this current framework will feed into an overall Africa Union One Health strategy. This will touch on animal health, environmental health and plant health. Africa Union’s strength is to be able to convene ministers of health, agriculture, environment and other institutions.

Regarding the question on regional laboratory networks, the document mentions the Africa CDC Regional Integrated Surveillance and Laboratory Networks (RISLNET). It’s necessary to drive the sharing of resources between countries. Regional collaboration centers exist in five countries: Egypt, Nigeria, Zambia, Kenya and Gabon. The essence of these centers is to give coordination to NPHIs across each region and to provide sharing of information and resources and joint response. Perhaps these need to be highlighted in the document so that Member States have a reference to go through.

RESPONSE FROM FEYESA REGASSA, ETHIOPIA EPHI: A multi-hazard approach is very important as a framework for the African countries. We should include other aspects of One Health such as AMR to make it comprehensive.
RESPONSE FROM YEWANDE ALIMI, AFRICA CDC:

The Africa CDC framework for AMR exists, as do documents such as the Africa Union event-based framework. Also, the Africa Union framework for antimicrobial control which utilizes the One Health approach and was produced by Africa CDC and other African institutions that work on environment health, animal health and plant health. We are trying to address known gaps, not reinvent the wheel. All these documents are available on the Africa CDC website.

DELEGATE: We need to think clearly on how the tools are to be implemented on the ground; case studies for example on Rabies would be useful. The document has to go beyond zoonotic diseases when talking about One Health; this is very important. Also, the entry point with the NPHIs may conflict with the existing One Health platforms because it will bring a leadership problem. If Africa CDC wants to use the One Health framework to address the diseases, it’s very important to look at the relationship between what is going to be done with the existing platform.

DELEGATE: From the academia point of view, coordination is a problem. It is not clear in the document how coordination is to be operationalized. There are three key departments: Ministry of Health, Ministry of Agriculture and Ministry of Environment. Who takes the lead? This needs to be clarified, with an organogram, to avoid management and organizational problems. Secondly, the document says you will develop mechanisms for operational research: it’s better to omit “operational”; leave it open so that it includes clinical research, implementational research etc.

DELEGATE: Templates for common diseases could be uploaded on the Africa CDC website to provide information to member countries that can then be download and adapted. This would save time and money.

DELEGATE, KENYA:

The title of the document currently alludes to it being an NPHI document, which could dissuade people working in government from reading it. Kenya has the technical capacity but needs Africa CDC to help them with the policy level push to fight against malaria, HIV, Rabies, anthrax etc.

DELEGATE: A recommendation is for the Africa Union to carry out strong advocacy to the various governments and Member States because not all Member States have NPHIs.

DELEGATE, MALAWI:

It is to be hoped that the Africa CDC has been created to ensure that the nations can establish NPHIs in order to strengthen the One Health approach. This document should look into the implementation of a One Health forum covering all diseases and all public health events and not several forums looking at different diseases, nor looking only at zoonotic diseases. Secondly, it would be good to integrate animal health into public health institutes.
RESPONSE FROM STEPHANIE SALYER, AFRICA CDC:
This framework is really meant to be a minimum of activities that NPHIs or ministries of health could take and use to start building up the One Health capacity within those institutions. It would be good to identify the gaps across the Member States and potentially build training modules to fill in the gaps.

RESPONSE FROM YEWNDE ALIMI, AFRICA CDC: This document is driven by Member States, for Member States, and will be adapted according to the comments received from Member States and will then be adopted according to Member States’ contexts. One of the things Africa CDC is advocating is for more countries to have NPHIs and is therefore supporting countries to work where there is no NPHI, to strengthen them where they do, and to support countries to develop one where they don’t exist.
Conclusion of the 1st International One Health Forum

Ab Osterhaus, ONE HEALTH PLATFORM

The focus of the meeting was on the prevention and control of zoonotic diseases in Africa in a One Health perspective. Many initiatives were presented and discussed; coordination between them is essential. This is probably the most important thing for Africa CDC now: that this coordinating role is picked up. This means establishing collaboration between all the different groups.

One of the major challenges is how to prioritize. Obviously, differences exist between national, regional and international priorities, but what came back repeatedly was Rabies virus, avian flu, Hemorrhagic Fever, Lassa Fever, Rift Valley Fever, anthrax and brucella. Monkeypox is still a major problem, as are vector-borne disease. After diagnostics and surveillance, tackling the problem comes next, which is important, especially in the context of regional and global health security.

It was good that representatives from WHO were present and active in discussions, and it was good to air the problems regarding the coordination of the Tripartite issues, but progress has been made, particularly regarding the coupling of influenza databases before the end of the year.

A list of crucial “peace time” zoonosis preparedness elements includes:

- Syndrome and lab-based surveillance in humans & animals. Lab capacity was frequently mentioned, and collaboration between labs is key.
- Pathogen discovery / identification platforms for humans & animals: being quick is key to combat problems at source. With all the technologies available, rapid identification is possible, but the issue still remains as to how to channel this to the WHO, IHR, Ministry of Health, the veterinary system etc.
- Diagnostics development and distribution platforms
- Mathematical modeling and risk assessment capacity
• Animal models capacity (BSL3/4)
• Pathogenesis study platforms for new infections (transmission...)
• Preventive intervention platforms (societal, vaccination, antiviral)
• Therapeutics discovery platforms (antivirals, antibiotics, BRM’s...)
• Communication strategies

These are items that are being addressed in a One Health approach, and most of them are being seriously addressed by Africa CDC.

Another key issue to address is international collaboration, education and coordination using all available technology (classical and novel).

Regarding prediction, the more modeling and the more data that is received from the studies on the virus or bacteria, the better. Surveillance is crucial and so is its communication. A Biothreat Scanning Group has been created to safeguard the connection between One Health Science and Global Health Security, consisting of top experts from different One Health Science disciplines. They identify new agents as they emerge, and work on how to deal with them at the level of WHO and the other organizations. Coordination, collaboration and financing are also key elements.

This Forum was a great success in bringing so many different people together to discuss a broad range of topics. Considerable progress has been made. Follow up is now essential to take these discussions to the next steps to make a fully functioning organization.
Next steps

Ahmed Ogwell, DEPUTY DIRECTOR AFRICA CDC

Firstly, all the ideas that delegates have presented or will come up with in the future need to be sent to Africa CDC to enable them to review the framework document and include all appropriate comments. The document cannot be a good source of knowledge unless thoughts, comments and proposals are shared.

Secondly, Africa CDC and Africa Union is a vehicle and a platform that can and will carry forward the issues discussed on One Health. This is only possible if Member States and partners are able to play their role, facilitating knowledge around the group so that Africa CDC can play its roles of convening and bringing together different levels of government and various partners, to make solid discussions and make appropriate resources available.

Thirdly, One Health remains a key program in the Africa CDC vision because coming together in diversity of knowledge, expertise, experience and skills is essential to tackle the issues being faced.

Finally, across the African continent, successful initiatives have already been set up, engaging public health practitioners, scientists, policy makers and workforce. Yet, these initiatives are often suboptimally connected and integrated. This 1st International One Health Forum brought together the One Health Community in Africa: different Member States and organizations discussed the importance of surveillance and the importance of prioritization of zoonotic disease. The next step is to bridge the outcome of this 1st Forum to the broader international One Health community.

The One Health Platform commits itself to discuss this meeting report extensively at the upcoming 6th World One Health Congress, 14-18 June 2020, Edinburgh, Scotland in order to discuss further what needs to be done to connect One Health Science issues to Global Health Security Policy. The 2nd International One Health Forum, June 2012 will focus on Biosafety and Biosecurity using this meeting report and its conclusions as a starting point for discussions.
The following partners have provided support to the organization of the 1st International One Health Forum:

Established in January 2017, the Africa Centres for Disease Control and Prevention (Africa CDC) is a new public health agency of the African Union. Africa CDC strengthens the capacity and capability of Africa’s public health institutions as well as partnerships to detect and respond quickly and effectively to disease threats and outbreaks, based on data-driven interventions and programmes.

www.africacdc.org

The One Health Platform is a strategic forum of stakeholders and a One Health reference network that aims to enhance our understanding of zoonoses, emerging infectious diseases and antimicrobial resistance, including the ecological and environmental factors which impact on these diseases. The One Health Platform engages in collaborative partnerships with existing international governmental and non-governmental organizations and institutions to set up a framework for information-sharing, cooperation and awareness raising activities.

www.onehealthplatform.org
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- fosters the exchange of new scientific insights and policy developments regarding all aspects of One Health
- advances science and improves health security by connecting One Health science with global health security policy
- offers keynote lectures by renowned experts, a series of special plenary sessions and 35 different parallel sessions to choose from
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- Extra sessions on the 2019 novel coronavirus SARS-CoV-2 / COVID-19

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