2019 | Facilitator Guide

# INFECTIOUS DISEASE MANAGEMENT


USAID FROM THE AMERICAN PEOPLE
One Health WORKFORCE
OHCEA Championing One Health
University of Minnesota
Tufts University

This is a product of the One Health Central and Eastern Africa (OHCEA) for health professionals' training with support from the United States Agency for International Development (USAID).

Published by OHCEA
Unit 16A, Elizabeth Avenue Kololo, P.O Box 35270, Kampala - Uganda
www.ochea.co.org

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First Edition

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**OHCEA**

**8 Countries**
**16 Universities**
**24 Institutions**

# Contents

# Preface

This module is One of the 16 One Health Training Modules developed by the One Health Central and Eastern Africa Network (OHCEA). OHCEA is an international network, currently of 24 institutions of higher education in public health, veterinary sciences, pathobiology, global health and environmental sciences. These are located in 16 universities in 8 countries in Eastern, Central and Western Africa regions. The universities currently forming OHCEA are: Universite des Montagnes and University of Buea (Cameroon), University of Lubumbashi and University of Kinshasa (DRC), Jimma University, Addis Ababa University and Mekelle University (Ethiopia), Moi University and University of Nairobi (Kenya), Université Cheikh Anta Diop (Senegal), Muhimbili University of Health and Allied Sciences and Sokoine University of Agriculture (Tanzania), University of Rwanda and University of Global Health Equity (Rwanda), Makerere University and Mbarara University of Science and Technology (Uganda).

The OHCEA network's vision is to be a global leader in One Health, promoting sustainable health for prosperous communities, productive animals and balanced ecosystems. OHCEA seeks to build capacity and expand the human resource base needed to prevent, detect and respond to potential pandemic disease outbreaks, and increase integration of animal, wildlife and human disease surveillance and outbreak response systems. The overall goal of this collaboration is to enhance One Health policy formation and implementation, in order to contribute to improved capacity of public health in the region. OHCEA is identifying opportunities for faculty and student development as well as in-service public health workforce that meet the network's goals of strengthening One Health capacity in OHCEA countries.

The 16 modules were developed based on One Health Core Competencies that were identified by OHCEA as key elements in building a skilled One Health workforce. This network is supported by two United States University partners: Tufts University and the University of Minnesota through the USAID funded One Health Workforce Project.

# Acknowledgements

This module was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the One Health Central and Eastern Africa (OHCEA) university network under the Emerging Pandemic Threats 2 One Health Workforce Project and do not necessarily reflect the views of USAID or the United States Government. USAID reserves a royalty-free nonexclusive and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use the work for Government purposes.

OHCEA extends her gratitude to those who participated in earlier works that informed the development of this module as well as reviewers and editors of the module.

Sections/parts of the materials for this course were adopted from RESPOND SEAOHUN One Health Course Modules: https://seaohunonehealth.wordpress.com/ecosystem-health/

# Introduction to the One Health Central and Eastern Africa (OHCEA) One Health Course Modules

## Training the Current and Future Public Health Workforce Using a One Health Approach

There is abundant evidence that no single sector or department can sufficiently manage the challenges of public health in any country, region or continent. Experiences from the fight against Ebola and the highly pathogenic avian influenza in the past few years demonstrated the effectiveness of multi-sectoral, multi-agency approaches and the need for specific training targeting multi-sectoral and multi-disciplinary public health professionals not limited by national or regional borders in dealing with public health threats. In response to this challenge, the One Health approach has been advocated as the global framework for strengthening collaboration and capacities of the sectors and actors involved in health service delivery.

One Health Central and Eastern Africa (OHCEA) is a network of universities in Central and Eastern Africa which are collaborating to build One Health capacity and academic partnerships between the member institutions in the region and with governments. The overall goal of this collaboration is to enhance One Health policy formation and implementation, to contribute to improved capacity of countries to respond to any emerging pandemics in the region. OHCEA seeks to expand the human resource base needed to prevent, detect and respond to potential pandemic disease outbreaks, and increase integration of domestic animal, wildlife and human disease surveillance and outbreak response systems.

OHCEA has identified One Health core competencies and developed modules based on the identified competencies that are key to delivering knowledge and skills to a multidisciplinary workforce and building a framework on which One Health curricula can be designed and implemented. They combine human health, animal health, infectious disease management with principles of ecology, social and environmental sciences. A total of 16 modules have been developed including One Health soft skills such as communication, culture, leadership, gender and core technical skills such as ecosystem health, infectious disease epidemiology, One Health concepts and outbreak response.

The modules are intended to:

- create a framework for One Health curriculum.
- improve workforce capacity to prevent, detect and respond to threats posed by infectious diseases and zoonosis.


One Health is defined as the collaborative effort of multiple disciplines working together locally, nationally, and globally to attain optimal health for people, animals and the environment.

www.AVMA.org

The One Health paradigm emerged from the recognition that the well-being of humans, animals and the ecosystem are interrelated and interdependent and there is a need for more systematic and cross sectoral approaches to identifying and responding to global public health emergencies and other public health threats arising at the human animal ecosystem interface.

- generate a shift in countries workforce culture and training structure.
- enable working across sectors and disciplines for a stronger and more effective public health sector.
- allow universities to be key drivers of the future workforce as they forge partnerships and drive change.
- combine human health, animal health, infectious disease with principles of ecology and environmental sciences.

The modules can be used at both pre-service and in-service levels as full courses, workshops or integrated into course materials for professionals who impact disease detection, prevention and response, allowing them to successfully function as an integral part of a larger, multi-disciplinary, team of professionals. This is key to creating a stronger sustainable Public Health workforce.

Each module contains a Facilitator Guide, Student Guide, PowerPoint slides and a folder of resources/ references for users. These modules are iterative and are continuously being revised. For any inquiries, please email: OneHealthModules@ohcea.org or wbikaako@ohcea.org

These 16 modules were developed by collaborative efforts of multiple disciplines and teams of people from seven different OHCEA partner countries with the support of two US university partners namely Tufts University and University of Minnesota. A team of sixty (60) people were engaged in the development of these modules. All the materials represent contribution by the faculty and leadership of the OHCEA network institutions and the technical and managerial support of the OHCEA Secretariat. The modules were built off previous One Health modules developed by SEAOHUN- network: https://seaohunonehealth.wordpress.com/ecosystem-health/ with addition of more Africa- specific materials, examples and case studies relevant and applicable to the region. Each module was reviewed by OHCEA network faculty including US university partners with technical expertise as well as partners with field experience that allows for OH application and appreciation of the local African context.

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# *Overview of Infectious Disease Management Module*

Today, many of the emerging diseases are of zoonotic and epidemic nature. A recent example is the Ebola virus. Majority of the newly recognized infectious agents responsible for emerging infectious diseases (EIDs) originate in animals, including wildlife (e.g. severe acute respiratory syndrome [SARS], highly pathogenic avian influenza H5N1, the pandemic influenza A/H1N1 2009 virus, and Nipah, West Nile virus Rift Valley fever, and Ebola viruses. They involve complex interactions between human, animal and the environment as well as socio-economic circumstances intertwined with ignorance and poverty. Infectious disease management requires collaboration across sectors to achieve more rapid, mutually beneficial and effective responses. This collaboration requires a comprehensive and strategic way of thinking about the problem of infectious diseases in order to minimize the impact.

This Infectious Disease Management Module will help participants to get a better understanding of infectious disease management from One Health perspective, at both the individual, organizational and community levels. The module will provide participants with insights into: definition of key concepts, infectious diseases risk factors, development, implementation of infectious disease management plans and evaluation of infectious disease management activities.

One Health is defined as the collaborative effort of multiple disciplines working locally, nationally and globally to attain optimal health for people, animals and the environment. The One Health paradigm emerged from the recognition that the wellbeing of humans, animals and ecosystems are interrelated and interdependent, and there is need for more systematic and cross-sectoral approaches to identifying and responding to global public health emergencies and other health threats arising at the human-animal-ecosystem interface. One Health concept is, therefore, a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of human and animal lives in present and future generations.

This Infectious Disease Management Module is one of the sixteen modules developed by One Health Central and East Africa (OHCEA), a network of 21 schools of public health and veterinary medicine in East and Central Africa for the purposes of building capacity in these institutions to prevent, detect and respond to any emerging pandemics using One Health approach. This module aims at introducing participants to the basic principles of preventing, detecting, and responding to infectious disease outbreaks in the context of One Health. The module uses One Health approach to examine various important infectious diseases of humans and animals and to help participants understand the fundamentals of infectious disease ecology and their impacts on humans, animals and the environment.

Key outcomes of the module are the ability to:

i) illustrate One Health concept as it relates to infectious disease management.
ii) explain the relationship between humans, animals, and the environment in infectious disease transmission.
iii) understand the role of surveillance in infectious disease management.
iv) apply multi-disciplinary approaches to infectious disease investigation, response and management.

## Target Audience

This module can be used by undergraduate and post-graduate learners, middle cadre trainees and in-service personnel from multiple disciplines and sectors (private, public, non-governmental organizations, civil society). The module can also be adopted for continuous professional development by health professional organizations such as the medical, pharmacy and veterinary associations. Also nursing, public health, environmental scientists, biotechnologists/laboratorians, wildlife officers, biostatisticians, epidemiologists, logisticians, social scientists, anthropologists and probably the media can use the module.

## Goals of the Module

The module is designed to produce competent professionals able to identify and respond to infectious disease outbreaks utilizing One Health approach.

At the end of the module, participants should be able to:

i) use the One Health approach to manage emerging infectious diseases, including emerging zoonotic infectious agents and newly identified infectious agents capable of causing pandemic threats.

ii) have knowledge and skills to work in multi-disciplinary teams in disease outbreak investigation and management.

iii) acquire skills/knowledge on standard operating procedures (SOPs) and guidelines for responding to severe infectious diseases outbreak

iv) know the principles of infection control and personal protection for responders in infectious disease management (including donning and doffing coveralls used for instance in Ebola and Marburg).

v) be aware of gender dynamics and apply gender-sensitive approaches to emerging pandemic prevention, control, surveillance and response. Also be knowledgeable about cultural and religious issues in communities as these play a great role in infectious diseases management/ control and transmission.

vi) be knowledgeable about leadership principles for the detection and response towards infectious diseases.

vii) be able to communicate risks associated with infectious diseases.

viii) be knowledgeable about logistics management in infectious diseases outbreak investigation. This component is very important for an effective investigations and control of infectious diseases outbreak.

## Learning Objectives

By the end of this module, participants should be able to:

i) illustrate the One Health concept as it relates to infectious disease management.
   (a) Describe the One Health concept.
   (b) Apply One Health core competencies in multiple disciplines.

ii) identify emergence and re-emergence of infectious diseases.
   (a) Describe the interactions between humans, animals and the environment and their roles in disease occurrence and spread.
   (b) Outline patterns of occurrence and spread of infectious disease causing agents and their determinants.

(c) Describe the various disease surveillance strategies and indicators of emergence or re-emergence of infectious diseases.

iii) design One Health tailor-made response strategies to fit infectious disease outbreak situations.

(a) Explain the common principles in infectious disease outbreak response.

(b) Illustrate the roles and management approaches for multi-disciplinary response teams in disease outbreak investigation and management.

iv) apply gender-sensitive approaches to infectious disease management.

(a) Describe the basic principles and concepts in gender, culture, beliefs and ethics.

(b) Illustrate the role of gender, culture, beliefs and ethics in infectious disease management.

v) apply effective risk communication principles and approaches to infectious disease response management strategies.

(a) Describe the key concepts and strategies for effective risk communication in infectious disease management.

(b) Illustrate risk communication strategies for various target groups.

vi) Apply the principles of infection control and personal protection in infectious disease management.

(a) Describe the basic principles of infectious disease occurrence and transmission patterns.

(b) Evaluate infectious disease risk and the appropriate infection control.

(c) Design personal protection protocol for responders in infectious disease management.

## *Program/Agenda*

| Session 1 | Session 2 | Session 3 | Session 4 | Session 5 |
|---|---|---|---|---|
| Understanding the Basic Concepts of One Health and Infectious Disease Management | Global Burden of Disease and Outbreak Investigation | Gender and Infection Control in Infectious Disease Management | Leadership and Communication in Infectious Disease Management | Problem Based Learning, Simulation and Evaluation: Putting it all Together |
| Part 1: Introduction to One Health<br>Part 2: Introduction to Infectious Disease Management and Epidemiology | Detailed steps in outbreak investigation | | | |

# Session 1: Understanding The Basic Concepts Of One Health And Infectious Disease Management

## Session Overview

This opening session will provide participants with an overview of the course goals and learning objectives. The session will introduce to participants the basic concepts of One Health and infectious disease management.

## Session Learning Objectives

By the end of this session, participants should be able to:

i) explain the basic infectious diseases management concepts including: infectious diseases, One Health, epidemic, pandemic, biological agent, reservoir, host, emerging infections, surveillance, triage, and screening

ii) form a response team with different roles in infectious diseases management, identify outbreaks using surveillance data at health units, district levels, reporting and information flow.

iii) explain the relationship between humans, animals and the environment in infectious diseases transmission.

iv) identify types of infectious agents including viruses, bacteria, fungi, parasites, protozoa and prions.

v) explain the epidemiology of selected infectious agents.

vi) explain the risk factors for selected infectious agents.

| Schedule | Topic/Activity | Learning Activity | Materials |
|---|---|---|---|
| 8:00 - 9:00 | Registration | | Sign-in sheet |
| 9:00 - 10:00 | Introduction<br>• Goals and agenda<br>• Expectations<br>• Pre-Test | Presentations | PowerPoint<br>Sticky notes (2 colors)<br>Flip charts<br>Tape<br>Pre-Test |
| 10:00 - 10:15 | Tea Break | | |
| 10:15 - 1:00 | Introduction to One Health<br>core competencies | Group activity<br>Case studies<br>Video | Flip charts & Markers<br>Computer<br>Flipcharts<br>PowerPoint |
| 1:00 - 2:00 | Lunch | | |
| 2:00 - 2:30 | Basic concepts of infectious disease management and One Health<br>Types of infectious agents | Pre-work (review paper)<br>Small group activity<br>Small group activity | Flip charts & Markers |

| | | | |
|---|---|---|---|
| 2:30 - 3:30 | Epidemiology of selected diseases: plague, monkey pox and malaria | Presentations<br>Small group activity | PowerPoint<br>sticky notes (2 colors)<br>Flip charts<br>Markers |
| 3:30 - 3:45 | Tea Break | | |
| 3:45 - 4:30 | Risk factors for infectious diseases | Group paper review<br>Presentations | Review paper<br>Flip charts<br>Markers |
| 4:30 - 4:45 | Evaluation of the day | Plenary | Flip chart |

| Time | Activity/ Topic | Facilitator Instructions<br>(Facilitator notes available at end of session) Registration |
|---|---|---|
|  <br>15 min | **Registration**<br>  | i) Have participants sign the OHCEA attendance register.<br>ii) Explain logistics (e.g. breaks, meals, etc.).<br>iii) Issue per diem.<br>iv) If the short course is residential, check on housing accommodation. |
|  <br>15 min | **Welcome**<br>  | **Welcome Remarks**<br>Facilitator's welcome remarks and participants' introductions.<br>**Participant Introductions**<br>Randomly select five participants at a time. Request them to come to the front and tell others:<br>i) their name<br>ii) where they are from<br>iii) the type of work and position<br>iv) a story about an experience or understanding of infectious diseases and One Health<br>v) the reason why they need this training and how the knowledge gained will help them in future.<br>**Expectations and Concerns**<br>**Set up**<br>i) Have two flip charts in the front of the room: one titled "Expectations" and the other "Concerns".<br>ii) Give each participant two different colored sticky notes.<br>iii) Ask participants to write down their expectations for the short course on one of the sticky notes (specify color) and their concerns about the course on the second sticky notes (specify color).<br>iv) Let participants place their expectations sticky notes on a flip chart titled "Expectations" and their concerns sticky notes on another flip chart titled "Concerns". |

v) Organize the sticky notes according to common themes.

vi) Explain the agenda for the week and the goals of the short course, highlighting the expectations that will be met over the week and those that will not be met. Comment and address concerts.

vii) Set the ground rules for the training session that shall guide you and participants on time management for every activity.

viii) Select individuals who shall be responsible for such activities e.g. the timekeeper, welfare manager, spiritual leader and others.

**Expectations**

15 min

## Goals of the Short-Course

This module is aimed at enabling participants to:

i) have knowledge on and use the One Health approach to manage, emerging infectious diseases, including emerging zoonotic infectious agents and newly identified infectious agents capable of causing pandemic threats.

ii) have knowledge and skills to work in multi-disciplinary teams in disease outbreak investigation and management.

iii) know the principles of infection control and personal protection for responders in infectious disease management.

iv) be aware of gender dynamics and apply gender-sensitive approaches to emerging pandemic prevention, disease control, surveillance and response.

v) be knowledgeable about leadership principles for the detection and response towards infectious diseases.

vi) be able to communicate risk associated with infectious diseases.

vii) have knowledge on logistics management in emergency situations or in outbreak investigation.

Explain to participants that this course is sponsored by the One Health Central and Eastern Africa (OHCEA) network. The network is comprised 24 academic institutions from eight African countries consisting of schools of public health and veterinary schools with two US partner universities: Tufts University and the University of Minnesota. OHCEA is funded under a major USAID grant.

OHCEA's vision is to be a global leader in One Health, promoting sustainable health  prosperous communities, productive animals and balanced ecosystems. OHCEA seeks to expand the human resource base needed to detect and respond to potential pandemic disease outbreaks.

OHCEA has identified Infectious Diseases Management as a critical competency to achieving their vision, and for this reason, they are sponsoring this course.

30 min

**Guest Speaker and Pre-test**

In advance, be sure the speaker is prepared to address participants. Share with her/him the short course goals and desired outcomes and what you would like her/him to emphasize in her/his address.

Introduce the guest speaker to "officially open the course."

Give out copies of the pre-test. Tell participants they have 15 minutes to complete the pre-test. Explain to them that a pre-test is used to gauge how much they know about the program, and a post-test will be administered at the end of the course to gauge how much knowledge they have gained during the training session. The two tests will be compared. There is no grade associated with the pre-test. When participants finish, they can begin their break.

15 min

**Tea Break**

# Part 1: Introduction to One Health

| Time | Activity/ Topic | Facilitator Instructions |
|---|---|---|
| 30 min | **Pre- workshop Assignment**  | **Assignment**<br>**Reading Material: One Health: Interdependence of People, other Species and the Planet by Meredith A. Barret and Steven. A. Osofsky**<br>**(Participants should read this paper prior to beginning of class.**<br>i) Give each participant a blank piece of paper.<br>ii) Ask participants to draw on it a picture that they think represents One Health (that in their opinion can be understood by a community member).<br>iii) Have participants tape the paper against the wall.<br>iv) All participants should then review the drawings and grade them.<br>v) The grades are 1-5 with 5 being the highest or what is considered the best.<br>vi) Select 3 pictures and discuss why they are the best.<br>vii) Give a prize to the top three. |
| 15 min | **Introduction to One Health**  | |
| 20 min | **Discovery Activity: What is One Health?**  | Begin the session by having participants watch the following videos:<br>One Health: From Concept to Action by CDC.<br>https://www.youtube.com/watch?v=TG0pduAYESA<br>One Health: From Idea to Action:<br>https://www.youtube.com/watch?v=gJ9ybOumITg&t=4s<br>Briefly discuss the two videos with the participants.<br>Have each participant take 5-7 minutes to think about and write down on separate sticky notes the answers to the following questions:<br>1. Define One Health approach.<br>2. Identify two examples of One Health in practice.<br>3. Identify two to three advantages to multiple disciplines working together to promote One Health.<br>Let participants display the sticky notes on the wall in the three separate sections. Then in a plenary review the following:<br>1. What are the common things identified?<br>2. What are the differences?<br>3. Is there anything that surprised anyone?<br>Let participants come up with a single description of what One Health is. |

45 min

**Discovery Activity: Video: Fatal Infestations**


Show participants the video: Fatal Infestations.

The CDC, US army and a Bronx Zoo veterinarian join forces to identify the disease that is rapidly filling the city's emergency rooms a killing 17,000 crow and Zoo birds in NYC.

i) After viewing the video, divide participants into groups of mixed disciplines.
ii) Give each group flip chart paper and markers.
iii) Give each group a chart/paper which has one of the following:
- Disease transmission and ecology
- Stakeholders
- Human-animal-environmental interactions
- Regulation and policy issues
- Socio-political interactions

Each group should discuss the video based on the topic assigned higlighting key take away messages and what makes the video a One Health case study. . Each group will have 15 minutes to prepare their assignments and present it to the plenary. Encourage the groups to present their assignments in the most innovative ways, such as using role-plays, mimes, timelines, news interview etc.

**Activity 1: Themes**

i) Process and discuss the video:
- Start by focusing on the main themes of the video.
- Then focus on the disease, human-animal-environment ecosystem dynamics.
- Discuss the disciplines involved and, the relationships and how this affects the response.
- Discuss the socio-political interactions.
- Discuss the outcomes and policy implications.

ii) Next discuss how this is related to One Health.
iii) Debrief the activity by asking the groups:
- Areas of agreement/disagreement among team members as they worked on their assignment.
- Surprises.

The next activity involves identifying the roles of all the players in this emergency.

**Activity 2: Roles of Different Stakeholders**

Give each group pieces of paper. On each piece of paper is a task that should be carried out by a One Health Rapid Response Team (RRT) member. (See PowerPoint)

- Groups will then:
  - List the professionals usually constituting a RRT, using the video as an example.
  - Correctly associate each task to a RRT member using strips of paper on a table with 2 columns.

Groups should then display the information for all the participants to view. They should identify any professional members who have been left out of the RRT, the roles they play and the reasons why they should be part of the team. Most of the time non-traditional health professionals such as entomologists, gender specialists, media personnel are left out of the list. To effectively constitute a One Health team, they need to be included.

### Tasks for the Rapid Response Team Members

| Members/Functions | Tasks |
|---|---|
| RRT member (e.g. Clinician, Epidemiologist, Social Scientist) | |
| | |
| RRT member | |
| | |
| RRT member | |
| | |
| | |

20 min

### PowerPoint Presentation on One Health

This presentation (PPP No. 1) introduces One Health, the interdependence between humans, animals and the environment and why disciplines need to work together. It also answers the questions: Why One Health? Why now?

Debrief the session by asking participants to reflect on what One Health is and any questions they may have related to the PowerPoint presentation.

There are many similar definitions of One Health by different health organizations, but for the purposes of this course, we will adopt the American Veterinary Medical Association (AVMA) definition (www.avma.org). **AVMA defined One Health as the integrative (collaborative) effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment.** Together, the three make up the **One Health** triad, and the health of each one of them is inextricably connected.

10 min

### PowerPoint Presentation on One Health Core Competencies and Roles of Rapid Response Teams

This PowerPoint presentation (PPP No. 3) introduces One Health Core Competencies, what they are and how they have been developed from the global forums to the African region.

Provide the following introduction to participants: In the last activity, you identified the various disciplines that might be represented on a One Health team investigating a public health scenario. As we discussed, each person on the team brings expertise in their respective field, yet they must be able to work well with others and understand what other members of the team must offer.

A One Health team member must know their capabilities and limitations and be able to identify gaps in technical knowledge and skills that an expert from another field could fill.

To identify the broad competencies that each person on a One Health team needs to possess for the team to operate successfully, an international group of experts from a variety of disciplines was assembled. The broad competencies identified by this group have been termed the One Health Core Competency Domains or Categories. Within these domains, more specific skills, knowledge and behaviors were defined and then named the 'One Health Core Competencies.'

The PowerPoint presentation describing the composition of a RRT and the terms of reference of each RRT member is important. RRT formation depends on a particular disease being investigated at that particular time.

10 min

**PowerPoint Lecture on Systems Thinking**

One Health Systems Thinking as a Competency (PPP No. 4).

Systems Thinking from a One Health perspective allows us to solve "wicked problems" through a simplified process. It provides a means of analyzing the human-animal-environmental interactions and the different disciplines engaged and how they work together and as a system to solve complex health problems. It systematically covers the policies, processes, practices and people, the roles each play and how they interact to function effectively to solve public health threats.

Present an introductory PowerPoint lecture on Systems Thinking.

Why can't we 'solve' the health problems at the human, animal, ecosystems…… because they are….Wicked

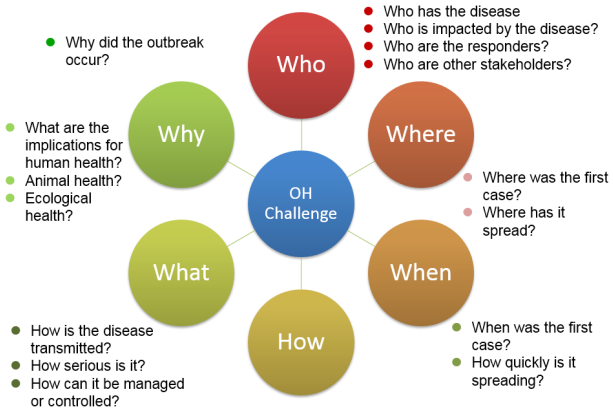
**Characteristics of Wicked Problems**

i) They are too complex to fully understand.
ii) There is no simple technical "solution".
iii) Actions precipitate unanticipated and unintended consequences.
iv) They are compelling and demand action.
v) They require innovative approaches.

30 min

**Group activity**

The One Health Systems Thinking uses the problem defining approach to identify and solve the problem. Introduce the following Systems Thinking map.




Let participants form three groups. Each group should use the above systems thinking approach to map out, identify and begin to address the following identified challenge:

**Activity: Challenges**

**Challenge 1.** There is an outbreak of Rift Valley Fever among people and animals in a small town in Northern Kenya.

**Challenge 2.** Three individuals come to the health station showing signs and symptoms of hemorrhagic fever in a small town in Uganda.

**Challenge 3:** Three children are dead in Jimma town, Ethiopia and several are hospitalized from a suspected aflatoxin poisoning.

**Questions:**

1. Can you identify the different stakeholders and their roles in addressing the problem?
2. Can you identify different policies that can be employed in addressing the problem?
3. What are the processes and practices that increase or mitigate the risk of the problem?
4. What do you need to know about systems thinking in order to use the approach in addressing One Health problems?
5. In what order should you research the items identified in the challengeabove?
6. What are the primary resources that you will use?
7. What will you do when you cannot find the information that you want?
8. What will you do when you have questions?
9. How will you know when you have enough information?

15 min

Groups should present their systems maps and briefly discuss the questions above. Summarize the session by stressing the need to simplify the problem and to solve it step by step.

# Part 2: Introduction to Infectious Disease Management and Epidemiology

**Discovery Activity: Infectious Disease Epidemiology**

20 min

## Discovery Activity: Infectious Disease Epidemiology

**Prior reading material:** Send out the article below for participants to read before they come to the training:

Based on the review of the paper: Barreto M., Teixeira M.G., Carmo E.H. 2006. Infectious Diseases Epidemiology. J Epidemiol Community Health 2006, 60: 192-195, ask participants to work in three small groups on the following:

### Group 1

1. What is an infectious agent?
2. What is an infectious disease?
3. What is an infection?

### Group 2

1. What is the difference between endemic, epidemic, pandemic and epizootic?
2. What is the difference between a definitive host, intermediate host and reservoir of infection**?**

### Group 3

1. What is an emerging infectious disease?
2. What is the difference between direct and indirect transmission of disease?

Ask participants to relate their findings from the paper to some of their experiences, generating examples along with the definitions for the terms above. Each of the groups should appoint a leader to present their work to the rest of the participants.

The expected answers to the group questions are as provided here:

### Group 1

1. Infectious agent was the name given to all micro-organisms or macro-organisms capable of producing an infection or an infectious disease (more recently it was found that even some proteins, known as prions, can be infectious).
2. Infectious disease (or communicable disease) is defined as an illness caused by a specific infectious agent or its toxic product that results from transmission of that agent or its products from an infected person, animal, or reservoir to a susceptible host, either directly or indirectly.
3. Infection is the term that defines the entrance and development of an infectious agent in a human or animal body, whether or not it develops into a disease.

## Group 2

1. Endemic is when there is a continuous occurrence of a disease at an expected frequency over a certain period of time and in a certain geographical location. Holoendemic is when a high level of infection is registered beginning at a young age and predominantly affecting the young population. Hyperendemic is when a disease equally affects all age groups. Epidemic is when the occurrence of a disease is definitely greater than that expected in a certain geographical region. Pandemic is when the epidemic is generalized and involves different countries and a large population. Epizootic is when an epidemic is restricted to a non-human population.
2. The simple or complex organism that is the target of an infecting action of a specific infectious agent is called a host. The host that harbors an agent in a mature stage or in a sexually active phase is called the definitive host and the host that harbors the agent in a larvae stage or asexual developmental stage is the intermediate host.

   Reservoir of infection, also called primary source of infection, is a location (person, animal, arthropod, plant, soil, or substance) in which the infectious agent finds conditions that permit it to survive and multiply and from where it can be transmitted to another susceptible host.

## Group 3

1. Emerging infectious disease is defined as a disease of infectious origin whose incidence in humans has increased within the past two decades or threatens to increase in the near future.
2. Direct transmission is defined as the transmission of an infection from one individual to another, while indirect transmission is the contagion between individuals that could be mediated by different means.

Discuss with participants some key terminologies in disease transmission such as:

**Incubation period:** This is the time from acquiring the infection to the first symptoms of illness.

**Infectious period:** This is the time during which someone with an infection can transmit infection to another person.

**Latent period:** This is the time from acquiring infection to the onset of infectiousness.

60 min

## Lunch Break

| Time | Activity/Topic | Facilitator Instruction |
|---|---|---|
| 30 min | **Discovery Activity: Identifying Infectious Agents**  | In this session, divide participants into small groups. Ask the small groups to identify the different types of infectious agents with examples of diseases in each category. Have them write the infective agents with examples of diseases on sticky notes. Have the different groups post their responses on the walls and look for the similarities/differences as the groups present to each other.<br>The expected responses on the wall should include: viruses, bacteria, fungi parasites and prions (proteins). The routes of entry include: direct contact, ingestion and inhalation. |
| 10 min | **Fundamental Concepts of Infectious Disease Transmission**  | Give a presentation that provides an overview of four common/priority infectious diseases in the region. Make sure the diseases have human, animal, and/or environmental elements in the transmission cycle. Additionally, the diseases selected should represent all major modes of transmission. Use the PowerPoint template to design the presentation prior to the course. Malaria, Ebola or Marburg or Rift Valley fever, influenza, and plague are included as examples. |
| 35 min | **Small Group Role Play: Disease Transmission**  | Divide participants into four groups, ensuring that all disciplines are in each group. Post each group an assignment. Each group will be assigned one of the diseases presented and will develop a role-play to demonstrate how the disease is transmitted and how the transmission cycle can be interrupted, and the disease prevented.<br>**Give participants the following instructions:**<br>"For the disease you have been assigned, design a short role-play (no more than 5 minutes) demonstrating how the disease is transmitted. Once you have demonstrated transmission, demonstrate how certain prevention measures can break the cycle of transmission." This can be demonstrated using life cycles for instance that of a mosquito or any other.<br>Give participants 15 minutes to plan and then have each group present their role-play over the next 20 minutes.<br>**During role-play presentations.** Participants not acting in the role play will observe the presentations and take notes to provide feedback, evaluate the role play, as well as identify gaps. An instructor checklist may be developed to aid in evaluation.<br>**After role-play presentations**<br>Let participants individually fill out an index card listing one thing they think would help prevent transmission of the disease they have presented. This aspect will allow the instructors to assess individual participant's knowledge of disease transmission. |

15 min

### Large Group Debrief: Disease Transmission Role-Play

Let participants discuss the activity, draw conclusions and identify key take-home messages. In particular, consider using the following questions as prompts:

1. What did you observe during the role-play presentations?
2. Describe different ways that diseases can be transmitted.
3. Based on transmission method, how can disease prevention vary?
4. Are there other professionals you may need to work with to understand transmission mechanisms or implement prevention measures?

Provide additional feedback and identify gaps, if necessary. If applicable, distribute disease notes after the discussion.

This activity will allow participants to practice systems thinking about disease etiology and transmission by working through a large group activity discussing additional diseases that were not covered as part of the role-play exercise.

15 min

### Understanding Disease Transmission: Matrix Activity

Before class, instructors should select 10 diseases that at least some of the participants in the group will be familiar with. Using the "Disease Matrix" template, fill in partial information for each disease selected. The matrix can be displayed on screen using PowerPoint, on a whiteboard or flip board, or distributed as copies for participants to view individually.

Facilitate a large group discussion by asking participants to fill in the blanks about disease etiology. Once each disease is complete, encourage participants to discuss the relationships between disease transmission and disease prevention. Consider using the following questions as prompts:

1. How does knowledge of the method of transmission for this disease facilitate disease prevention?
2. How many different types of transmission did you identify?
3. Similarly, name some common ways to prevent disease.
4. What professions will you need to aid in disease prevention?

Wrap up this exercise by summarizing participants' comments and bring the groups together on the importance of One Health in preventing disease.

25 min

### Presentation on Contact Tracing during Investigation of Severe Infectious Disease

Also give a presentation on contact tracing as one of the methods used to break transmission chain of most of the infectious diseases. It is an essential component of the overall strategy for controlling an outbreak of infectious diseases like Ebola, Marburg and others (WHO 2014). This will give participants an understanding of how diseases are transmitted and controlled, especially severe infectious diseases like Ebola. "Sample slides are provided"

15 min

## PowerPoint Presentation on Epidemiological Triad for 15 minutes

Do a PowerPoint presentation (PPP No. 6) for 15 minutes highlighting definitions and concepts related to epidemiological triad of disease, infectious disease management and One Health.

This should lead into a discussion of the epidemiology of infectious diseases.

Divide participants into 2 groups.

Give one group the following scenario on the 2017 plague outbreak in Madagascar.

## Case Studies on Surveillance


45 min

### Group 1: Plague Outbreak in Madagascar

In December 2016, the Ministry of Public Health (MoPH) of Madagascar, in line with the 2005 International Health Regulations (IHR), alerted WHO to an outbreak of plague in Befotaka district in south-eastern Madagascar. The IHR requires countries to report to WHO any situation that might constitute a public health event of international importance. The outbreak began in August, but Befotaka is so remote and lacking in basic services – such as telecommunications and health facilities – that health officials only learned about the outbreak in December.

Plague, though terrifying, is nothing new in Madagascar, where around 600 cases are reported annually. But there was something different about a suspected plague outbreak reported in December. The outbreak's location was this time far away and implied plague had spread to new parts of the island nation, but health officials couldn't explain it.

This group should review the plague outbreak in Madagascar, focusing on the causes, any relation to environmental factors, animal factors, etiological agent; transmission, clinical signs, transmission cycle, global and local distribution data, stakeholders involved and how Madagascar took control and managed the disease.

Excerpt from newspaper on plague in Madagascar: "Treatment centers bulked up their staff. Responders did extensive contact tracing to break the chain of person-to-person transmission. Health workers tracked down about 7,000 people who had interacted with confirmed and suspected plague patients. Ninety-five percent of them have taken preventative antibiotics. Fewer than a dozen of them came down with plague symptoms. In all, about 9,300 people received antibiotic treatment against the plague".

### Group 2: Outbreak of Monkey Pox in Nigeria

Give participants the following excerpt from a newspaper:

Nigerian authorities have called for calm after dozens of suspected cases of monkey pox were reported in seven states across the south of the country. Currently, the monkey pox virus outbreak has spread to 11 states with 74 suspected cases recorded, minister of Health Prof. Isaac Adewole of Nigeria has said.

In another meeting, speaking on the theme, "Perennial flooding in Nigeria: Communicable diseases and looming antimicrobial resistance", the WHO coordinator said floodwater was a major source of infectious communicable diseases because animals defecate in floodwater, which humans come in contact with. "Flooding is known to facilitate infectious disease transmission. It is no longer in doubt. Therefore, that will expose affected communities to the outbreak of epidemics, zootomic and other epizootic effects such as cholera, and of course we have had reported cases of cholera this year.

"Until proved otherwise, I think that flooding has a role in the sudden outbreak of monkey pox. This has been here before and it was never a problem but these things are now becoming dislodged from their normal habitat and moving towards us (humans).

This group should review the monkey pox outbreak in Nigeria, focusing on the causes, any relation to environmental factors, animal factors, etiological agent; transmission, clinical signs, transmission cycle, global and local distribution data, stakeholders involved, their roles and how Nigeria controlled the outbreak.

25 min

### Disease surveillance: Malaria Case study


Discuss in the plenary about these two cases, how both countries responded, what was done well or not and the response to both infections. Discuss the surveillance system in place in both countries. Is it adequate?

Present to the participants the malaria case study and request them to discuss it in groups. The case study discussion will help participants to get an understanding of surveillance of infectious diseases.

**Case Study: Malaria in Northern Uganda**

*Historically, the prevalence of malaria in northern Uganda has been high (prevalence = 15% +). Between 2012 and 2014, Indoor Residual Spraying (IRS) was introduced as an additive malaria prevention intervention in northern Uganda. A few months after IRS, the population of mosquitoes was drastically reduced and the communities no longer felt the need to use mosquito nets.*

10 min

*The number of malaria cases had indeed gone down. However, in June 2015, the Uganda National Medical Stores reported increased consumption of anti-malarial drugs in northern Uganda. This prompted the Ministry of Health to investigate the cause of this increased consumption of anti-malarial drugs. The Ministry discovered that there was an ongoing malaria epidemic that had gone undetected for 3 months.*

Each group should spend about 10 minutes brainstorming answers to each question posed by the scenario. They should then use the remaining 15 minutes to focus on responding to their assigned question or questions. You should walk around the room and listen in to the various group discussions and be available to answer questions or guide the groups if they have challenges.

Participants will come back together so that each group can report on their assigned questions. Ensure that each group takes no more than 5-6 minutes. For each question, make sure the groups address the following topics:

1. How could you tell that the burden of malaria was previously high?
    - *Reporting cases, summarizing cases, and monitoring the number of cases over time.*
2. What do you think prompted the communities to stop using mosquito nets?
    - *Lack of communication about the need to keep using the mosquito nets, perceived solution to a problem with the use of IRS.*
3. How would you be able to know that IRS worked?
    - *Using surveillance to monitor interventions.*
4. How could a multidisciplinary team have detected the outbreak earlier?
    - *Consider the role of others who may be able to evaluate:*
        - *i) Environmental factors such as rain, water logging, mosquito populations (engineers, environmental health, meteorologists)*
        - *ii) Reporting of more human cases (physicians, healthcare workers, teachers)*
        - *iii) Increased consumption of pharmaceuticals (pharmacists)*
        - *iv) Increased fevers in communities (community leaders, schools)*
        - *v) Similar diseases in animals (veterinarians, community animal health workers)*

5. Think of a model system that can integrate reporting of malaria cases in the community, at the health facility, and at the district and national levels.
    - *Who would be involved? How would information connect?*
6. If the community is reporting an increased number of fever cases, how could you/your team go about confirming whether it is an outbreak of malaria or not?
    - *Who would be involved? What samples would you need to collect? Who would be involved in testing the samples? How would results be communicated?*

After all groups have presented , ask the plenary for additional feedback, thoughts and ideas. Close the conversation by summarizing the exercise and reviewing surveillance strategies.

## Information flow in an outbreak

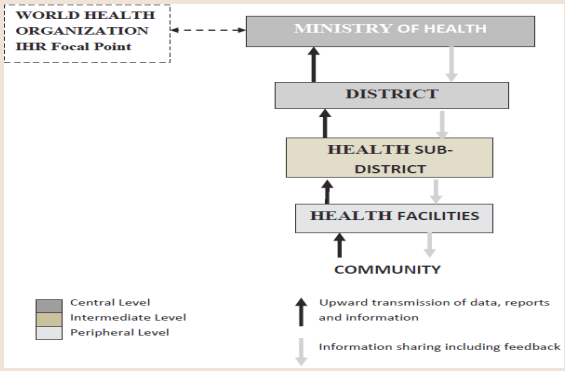
30 min

In their groups, ask participants to come up with a chart on how information flows when there is an outbreak. While doing this, they should ask questions like:

1. Where does the information start from and where does it end?
2. Does feedback flows in the same way?
3. Are other disciplines involved?
4. When do they get involved?
5. What are the limitations to their involvement?
6. How would you apply a One Health approach in communication to ensure that multiple disciplines are engaged right from the beginning and receive correct information to respond?

Present to participants the following Ministry of Health information flowchart. Let them identify points of entry for other relevant disciplines such as veterinarians, environmentalists and social scientists.

### Information flow and feedback



Ask them to draw a different chart that includes multiple disciplines and present these to the plenary for discussion. In summary, emphasize the need to have a multidisciplinary team of people doing surveillance, contact tracing and response together.

15 min

## Tea Break

15 min

## Discovery Activity - Risk Factors for Ebola and Marburg

Based on the review of the paper: Brainard J., Hooper L., Pond K., Edmunds K. & Hunter P. (2015). Risk factors for transmission of Ebola or Marburg virus disease: a systematic review and meta-analysis. International Journal of Epidemiology, 2015, 1-15. doi: 10.1093/ije/dyv307, ask participants to use 15 minutes to work in three small groups on the following:

1. What are the risk factors for Ebola and Marburg?
2. Look at risk from human, animal and environmental components.

Have the groups present to each other through their representatives.

Debrief and summarize the day.

1 2 0 min

## Watch the Movie Contagion


Have participants watch the movie, Contagion, and read the following materials as an assignment for the next day.

1. Article, “Interventions for Avian Influenza: A (H5N1) Risk Management in Live Bird Market Networks” (Fournie et al 2013.)
2. Avian Influenza Fact Sheet (World Health Organization [WHO])

## Session 1: Facilitator Notes

## Definition of Different Terms

There are many similar definitions of One Health by different health organizations, but for the purpose of the course we will adopt the American Veterinary Medical Association (AVMA) definition of One Health (www.avma.org)

**AVMA: One Health is defined as the integrative (collaborative) effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment.** Together, the three make up the **One Health** triad, and the **health** of each is inextricably connected to the others in the triad.

The common theme of One Health is multiple disciplines working together to solve problems at the human, animal and environmental interface. Collaborating across sectors that have a direct or indirect impact on health involves thinking and working across silos and enhancing resources and efforts while valuing the role each sector plays. To improve the effectiveness of the One Health approach, there is a need to create a balance and a greater relationship among existing groups and networks, especially between veterinarians and physicians, and to amplify the role that environmental and wildlife health practitioners, as well as social scientists and other disciplines play to reduce public health threats.

In less than 10 years, One Health has gained significant momentum. It is now a fast growing movement. The approach has been formally endorsed by European Commission, US Department of State, US Department of Agriculture, US Centers for Disease Control and Prevention (CDC), World Bank, World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE), United Nations System Influenza Coordination (UNSIC), various universities, NGOs, and many others.

The One Health movement is an unexpected positive development that emerged following the unprecedented Global Response to the Highly Pathogenic Avian Influenza. Since the end of 2005, there has been increasing interest in new international, political and cross-sectoral collaborations on serious health risks. Numerous international meetings and symposia have been held, including major initiatives in Winnipeg (Manitoba, Canada, March 2009), Hanoi (Vietnam, April 2010), and Stone Mountain (Georgia, US, May 2010), as well as four international One Health scientific congresses, the last of which took place in Melbourne, Australia, in December 2016.

**Global health** is the health of populations in a global context and transcends the perspectives and concerns of individual nations. In global health, problems that transcend national borders or have a global political and economic impact are often emphasized. It has been defined as "the area of study, research and practice that places a priority on improving health and achieving equity in health for all people worldwide." Thus, global health is about worldwide improvement of health, reduction of disparities, and protection against global threats that disregard national borders. (www.who.org)

- **Environmental Health** is the branch of public health that is concerned with all aspects of the natural and built environment that may affect human health. Other phrases that are concerned with or refer to the discipline of environmental health include environmental public health and environmental protection. Environmental health, being closely related to environmental science and public health, is concerned with environmental factors affecting human health. Environmental health addresses all the physical, chemical and biological factors external to a person and all the related factors impacting behaviors. It encompasses the assessment and control of those environmental factors that can potentially affect health. It targets preventing disease and creating health-supportive environments. This definition excludes behavior not related to the environment, but to social and cultural environment and genetics.

- **Ecological Health (Eco-Health)**: The Eco-Health approach focuses mainly on the place of human beings within their environment. It recognizes that there are inextricable links between humans and their biophysical, social, and economic environments, and that these links are reflected in the state of health of a population (International Development Research Centre). The mission of Eco-Health is to strive for sustainable health of people, wildlife and ecosystems by promoting discovery, understanding and trans-disciplinarity. Eco-Health Alliance works at the intersection of ecosystem, animal and human health through local conservation programs, and it develops global health solutions to emerging diseases. It is an international organization of scientists dedicated to the conservation of biodiversity. Eco-Health Alliance focuses on innovative research, education and training, and accessibility to international conservation partners.
- **Ecosystem Health** is a metaphor used to describe the condition of an **ecosystem**. Ecosystem condition can vary as a result of fire, **flooding**, **drought**, **extinctions**, **invasive species**, **climate change**, **mining**, **overexploitation** in **fishing**, **farming** or **logging**, **chemical spills**, and a host of other reasons. There is no universally accepted benchmark for a healthy ecosystem, but the apparent health status of an ecosystem can vary depending on which health metrics are employed in judging it and which societal aspirations are driving the assessment.
- **Planetary Health**: Planetary health is the newest term, which is defined as the achievement of the highest attainable standard of health, wellbeing, and equity worldwide through judicious attention to the human systems – political, economic, and social – that shape the future of humanity and the earth's natural systems concerned with safe environmental limits within which humanity can flourish. – (Planetary Health Alliance).

## Organizations Operating in the One Health Sphere

i) World Health Organization (WHO)
ii) Food and Agriculture Organization (FAO)
iii) World Organization for Animal Health (OIE)
iv) One Health Initiative
v) United States Centers for Disease Control (CDC)
vi) Eco Health Alliance
vii) United States Agency for International Development (USAID)
viii) One Health Central and Eastern Africa (OHCEA)
ix) Southeast Asia One Health University Network (SEAOHUN)
x) Universities - Departments, Centers, etc.
xi) Ministries of Health, Agriculture, Environmental Resources, etc.
xii) Medical or Health Professional Associations

- The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of lives in our present and future generations. – One Health Initiative
- The One Health concept recognizes that the health of humans is connected to the health of animals and the environment. CDC uses a One Health approach by working with physicians, ecologists, and veterinarians to monitor and control public health threats. We do this by learning about how diseases spread among people, animals, and the environment. – United States Centers for Disease Control

## 1. Historical Context of One Health:

One Health is a well-grounded and thought out process that has grown in recognition over time, from Hippocrates to the Middle Ages. The recognition that environmental factors can impact human health can be traced as far back as to the **Greek** physician **Hippocrates** (c. 460 BCE – c. 370 BCE) in his text "**On Airs, Waters, and Places**". He promoted the concept that public health depended on a clean environment. In the 1940s, the first VPH service was established in USA. Initial concept forwarded Schwabe in 1960's – One medicine. WCS – One World One Health in early 2000s to involve wildlife and environment. 2005 HPAI pandemic lead to the recognition of the value of collaboration in health fields. Subsequent international meetings led to the adoption of One Health concept which has been further advanced into subsequent action plans by various organizations. WHO/OIE/FAO tripartite agreements.

One Health is a relatively new term, although the thinking behind it is not. Its global prominence has been growing in the past decade. For example in 2007, representatives of 111 countries and 29 international organizations met for the International Ministerial Conference on Avian and Pandemic Influenza. During this meeting, governments were encouraged to further develop the One Health concept by building linkages between human and animal health systems for pandemic preparedness and human security.

In 2009, a One Health office was established at The Centers for Disease Control (CDC). The CDC now uses a One Health approach by working with physicians, ecologists and veterinarians to monitor and control public health threats. Their focus is on learning about how diseases spread among people, animals and the environment.

In 2011, the first International One Health Congress was held in Australia. Delegates from 60 countries and a range of disciplines came together to discuss the benefits of working together to promote a One Health approach. In addition to understanding the interdependence of human, animal and environmental health, attendees agreed that it was important to include other disciplines such as economics, social behavior and food security and safety.

The **Italian** physician, **Giovanni Maria Lancisi** (1654–1720), was a pioneering epidemiologist, physician, and veterinarian with a fascination in the role the physical environment played in the spread of disease in humans and animals. Lancisi may have been the first to advocate the use of mosquito nets for prevention of malaria in humans but was also a pioneer in the control of rinderpest in cattle. The idea that human, animal and environmental health are linked was further revived during the French Revolution by Louis-René Villerme (1782–1863) and Alexandre Parent-Duchâtelet[fr] (1790–1835) who developed the specialty of public hygiene.

In the late 19th century, German physician and pathologist Rudolf Virchow (1821–1902) coined the term "zoonosis", and said "...between animal and human medicine there are no dividing lines – nor should there be". Canadian physician William Osler (1849–1919) traveled to Germany to study with Virchow. He returned to Canada and held joint faculty appointments at the McGill University Medical School and the Montreal Veterinary College.[6] Osler was active as a clinical pathologist and internist at the Montreal General Hospital, but was also active in the promotion of veterinary health, and helped investigate a swine typhoid outbreak near Quebec City in 1878;[7] he subsequently co-authored a monograph on parasites in Montreal's pork supply with A. W. Clement, a veterinary student at Montreal Veterinary College.

In 1947, veterinarian **James H. Steele** furthered the concept in the U.S. by establishing the field of **veterinary public health** at the **CDC**.[9] The phrase "One Medicine" was developed and promoted by Calvin W. Schwabe (1927–2006), a veterinary epidemiologist and parasitologist in his textbook Veterinary Medicine and Human Health. In 1996, Gary M. Tabor, Alonso Aguirre, Mary Pearl, David Sherman, Mark Pokras, Eric Chivian, Paul Epstein and Gretchen Kauffman launched the Conservation Medicine: Ecological Health in Practice effort (Consortium for Conservation Medicine) with the

Cummings School of Veterinary Medicine at Tufts University, Harvard Medical School's Center for Health and the Global Environment and Eco Health Alliance (formerly Wildlife Trust), with an institutional focus linking human, animal and ecological health.[11]

"One Health" was mentioned in a story about Ebola hemorrhagic fever on April 7, 2003 when Rick Weiss of the Washington Post quoted William Karesh as saying, "Human or livestock or wildlife health can't be discussed in isolation anymore. There is just One Health. And the solutions require everyone working together on all the different levels".

## *References*


Barreto M., Teixeira M.G., Carmo E.H. 2006. Infectious Diseases Epidemiology. J Epidemiol Community Health 2006, 60: 192-195

Betts R.F, Chapman, S. W. and Penn, R. L. (2002). Reese and Bett's A Practical Approach to Infectious Diseases, 5th ed. United States: Lippincott Williams & Wilkins.

Cleveland, S., Haydon, D.T., Taylor, L. (2007). Overviews of Pathogen Emergence: Which Pathogens Emerge, When and Why? Current Top Microbiology Immunology. 315(85-111). Summary (abstract) retrieved on December 1, 2013, from: http://link.springer.com/chapter/10.1007%2F978-3-540-70962-6_5#page-1.

Lederberg. J. (2000) Infectious History. Science Magazine: 288 (5464); 287-293.

National Institute of Health (US); Biological Sciences Curriculum Study. NIH Curriculum Supplement Series [Internet]. Bethesda (MD): National Institutes of Health (US); 2007-. Understanding Emerging and Re-Emerging Infectious Diseases. Retrieved from: http://www.ncbi.nlm.nih.gov/books/NBK20370/.

One Health Approaches to Ebola: https://www.youtube.com/watch?v=OSAJJcg1a1c

Root, K.R., Waldvolgel, F., and Corey, L. Clinical Infectious Diseases: A Practical Approach. 1991. New York: Oxford University Press. ISBN-0-19-508103-X.

Center for food security and Public Health (2008). Routes of disease transmission.

Brainard J., Hooper L., Pond K., Edmunds K., Hunter P (2015). Risk factors for transmission of Ebola or Marburg virus disease: a systematic review and meta-analysis. International Journal of Epidemiology, 2015, 1-15. doi: 10.1093/ije/dyv307

Factors that contributed to undetected spread of the Ebola virus and impeded rapid containment. WHO, 2015. http://www.who.int/csr/disease/ebola/one-year-report/factors/en/

# Session 2: Global Burden Of Disease And Outbreak Investigation

## Session Overview

On day two of the course, participants will undertake two sessions: one on global burden of highly infectious diseases and another on outbreak investigation with a focus on steps and stakeholders' involvement. The combined learning objectives for the two sessions are outlined below.

## Session Learning Objectives

By the end of this session, participants should be able to:

i) explain the recent highly infectious diseases outbreaks: epidemiology and burden (morbidity and mortality) and explain the risks faced by the countries in the Congo Basin region for severe infectious diseases outbreaks as an example.

ii) explain the health, social and economic impacts of recent highly infectious disease outbreaks in Africa.

iii) explain the steps involved in outbreak investigation.

iv) identify and analyze the roles and powers of different stakeholders to participate in outbreak investigation.

| Schedule | Topic/Activity | Learning Activity | Materials |
|---|---|---|---|
| 8:00 - 9:00 | Registration | | Sign-in Sheet |
| 9:00 - 9:30 | Morning Reflections | Plenary Session | 2 Flip charts<br>Sticky Notes |
| 9:30 - 10:00 | Global Burden of Highly Infectious diseases | Presentation | PowerPoint |
| 10:00 - 10:30 | Paper Review: Ebola and Marburg Burden | Small Group Activity | |
| 10:30 - 10:45 | Tea Break | | |
| 10:45 - 11:45 | Group Presentations | Plenary Session | |
| 11:45 - 12:45 | Socio-Economic Impact of Highly Infectious Diseases | Presentation<br>Small Group Activity | PowerPoint<br>Role Cards<br>Flip chart<br>Colored Markers |
| 12:45 - 1:45 | Lunch | | |
| 1:45 - 2:30 | Steps in Outbreak Investigation | Presentation | PowerPoint |
| 2:30 – 4.00 | Stakeholders in Outbreak Investigation and Systems Mapping | Small Group Activity | |
| 4.00 - 4:30 | Tea Break | | |
| 4.30 -5.00 | Group Presentations | Plenary Session | |
| 5.00- 5:15 | Evaluation of the Day | Plenary | Flipchart |

| Time | Activity/ Topic | Facilitator Notes |
|---|---|---|
| 15 min | **Attendance** | Have participants sign the OHCEA attendance register. |
| 20 min | **Morning Reflections** | i) Have two flip charts in front of the room: on one flip chart, write the question: "Do you feel that highly infectious diseases like Ebola have serious socio-economic impacts on communities? If yes, why? And if no, why not? On the other flip chart, write the question: "Do you feel that your country has capacity to investigate and manage infectious disease outbreaks? If yes, why? If no, why?<br>ii) Give each participant two sticky notes.<br>iii) Let participants write their responses on the sticky notes.<br>iv) Have participants put their sticky notes on the respective flip charts.<br><br>**Debrief:**<br>Review and discuss the comments |
| 45 min | **Infectious Disease Management Fundamentals** | Infectious Disease Management Fundamentals<br><br>Discussion of movie Contagion<br><br>To better understand the importance of the mode of disease transmission and possible risk factors, and to form a logical disease management plan, ask participants to consider the following questions based on the movie:<br><br>1. What type of infectious organism is involved in outbreak?<br>2. What host species are usually infected?<br>3. Are there known reservoir hosts that spread organisms, but do not develop disease?<br>4. How is the disease transmitted from host to host?<br>5. What interventions (treatment, prevention, vaccination) are available?<br>6. What are possible prevention strategies?<br>• Lower the risk of infection by implementing interventions that limit contact between susceptible hosts and infectious agent.<br>• Change high-risk behavior(s) through health education. |

- Quickly identify, properly treat and, where appropriate, isolate newly infected cases (i.e. persons or animals with the disease of interest).
- Also consider the slides on contact tracing mentioned earlier.

Participants will spend the next 45 minutes discussing questions related to the movie as indicated below. Begin by identifying the main themes in the movie:

1. What are the different themes that you think are evident in the movie?
2. Interspecies transmission and spread of the virus: how does that happen?
3. What are some One Health competencies recognized in the movie?
4. Mitch was immune: how real is that? Can you explain that concept?
5. Did the symptoms seem plausible?
6. Can you identify multiple stakeholders in the movie and their roles?
7. What are other social and economic effects/impacts that can be seen?
1. Having talked about communication – what is the role and impact of miscommunication?

20 min

### Contagion Fundamentals

Present the PowerPoint on Contagion Fundamentals (PPP No. 7) that:

- explain the progression of a disease within an individual.
- describe how infections are transmitted from individual to individual.
- describe the transmission of a disease within a population.

30 min

### Global Burden of Disease

Do a PowerPoint presentation (PPP No. 8) on global burden of disease.

This presentation will reveal the burden (morbidity and mortality) due to highly infectious disease outbreaks. The presentation will reveal how the recent outbreaks started, who was affected, where and when.

This discussion will lead to small group activity that will be guided by the paper titled: Social economic impact of Ebola virus disease in West African countries. A call for national and regional containment, recovery and prevention. UNDG West – Central Africa (2015). http://reliefweb.int/sites/reliefweb.int/files/resources/ebola-west-africa.pdf

30 min

**Discovery Activity:**

Based on the review of the above paper, ask participants to work in 2 groups on the following:

Group 1

1. What is the history of Ebola in Africa?
2. What is the origin of Ebola?
3. How many countries were affected by the recent (2014-2015) Ebola outbreak in West Africa?
4. Which country was affected most?

Group 2

1. How were children and women affected?
2. When was the first case identified and how was the trend after?
3. What was the morbidity and mortality due to Ebola in the affected countries for the general population and health workers?

15 min

**Tea Break**

60 min

**Discovery Activity: Article Review**

Still based on the review of the paper on Ebola above, divide participants into 2 groups and ask them to work on the following:

Group 1

1. What was the impact of Ebola on poverty?
2. What was the impact of Ebola on trade?
3. What was the impact of Ebola on GDP growth?

Group 2

1. What was the impact of Ebola on education?
2. What was the impact of Ebola on access to health services?
3. When was the impact of Ebola on food security?

**Group Presentations**

1. In a plenary, ask the different groups to present their findings.
2. Regroup and analyze the findings of each group.

60 min

## First-hand Account of an Outbreak Investigation

Obtain a video interview or invite a local partner to describe an outbreak investigation that they were involved in. Ask them to not only address the steps involved in the investigation, but also the outcomes and the individuals/disciplines involved. This activity can be tailored to the region by addressing specific diseases and partners that may be unique to the area.

After the speaker or video, allow participants time for questions if they have any.

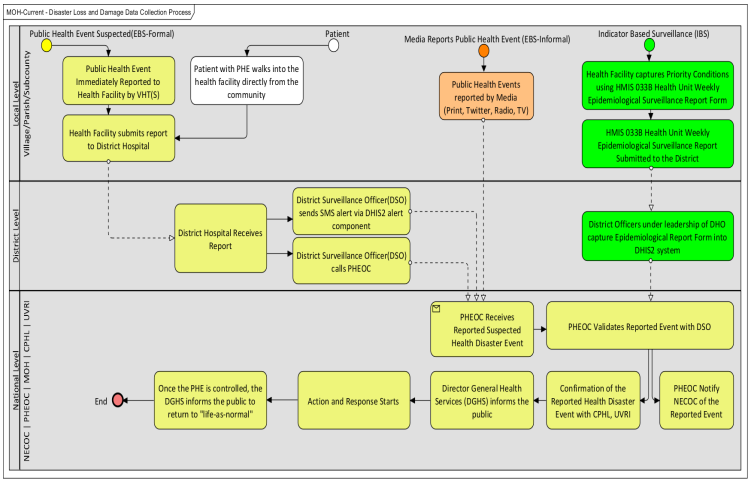
Follow the presentation with a discussion. First, how information leading to an investigation in communities comes about. This should include sources of the information, e.g. rumors, community alerts, social media, media and others.

Second, briefly discuss the role of public health emergency operation center (PHEOC) in outbreak investigation. Discuss further how outbreaks are detected (routes), the role of the National Task Force (NTF) or District Task Force (DTF), and who should be part of this team. Also explain what is involved in outbreak investigation e.g. line listing of cases, daily situation report (Sitrep), and outbreak investigation report at the end of an outbreak.

The following flowchart may be used to summarize the sources and flow of information resulting in an investigation of a disease. (Almost all countries have the public health emergency operation center in an outbreak investigation.

As you review the PHOEC, consider the other disciplines that need to be included.

### The PHOEC information sources and flow



20 min

### Steps in Outbreak Investigation

Prior to class, prepare the game activity by writing the steps involved in an outbreak investigation on separate sheets of paper. The steps include the following:

i) Prepare for fieldwork
ii) Establish the existence of an outbreak
iii) Verify the diagnosis
iv) Define and identify cases
v) Describe and orient the data in terms of time, place and subject
vi) Develop hypotheses
vii) Evaluate hypotheses
viii) Refine hypotheses and carry out additional studies
ix) Implement control and prevention measures
x) Communicate findings

Ask the participants to volunteer/shout out steps that they identified in the outbreak investigation discussion. When a step is correctly identified, hang the piece of paper with the corresponding step on the wall/whiteboard. As additional steps are identified, ask participants to put them in order so that by the end of the exercise, all the steps in the outbreak will have been identified.

Note that the steps listed above are in a logical order, so the final list produced by participants should be similar.

For in-service trainees, it is important to feed them with the additional information found in the facilitator notes. It gives important information for each of the steps described in outbreak investigations. This could be given to participants in soft copy for those who need to understand the details of outbreak investigation.

### Decide whether/how to respond to outbreak

i) Scope of outbreak (number of cases reported)
ii) Severity of disease (hospitalizations, deaths)
iii) Potential to spread to other areas
iv) Potential involvement of commercial products
v) New/resurgent disease
vi) Disease targeted for elimination
vii) Availability of control measures
viii) Press/media/political/international interest
ix) Request by local public health agency

(Find detailed information on outbreak investigation included in facilitator notes at the end of the session).

25 min

## Case Studies in Outbreak Investigation and Stakeholder Involvement

Divide participants into four groups and provide them with the following scenario.

22 people are rumoured to be admitted in Kagamba main hospital in Kibaale district after eating a dead cow.

1. What happens next?
2. Who informs who?
3. Who does what, and when?
4. Who should liaise/collaborate with whom?

Distribute the questions as follows: Group 1 question one; Group 2 question two; Group 3 question three and Group 4 question four. After discussion, each group chooses a representative to present their answers in a plenary on a flip chart for two minutes.

Debrief and wrap-up of the session.

30 min

## Case Study


Divide participants into two groups.

Give each group a different case study.

- Panic in Rwanda
- Bovine Tuberculosis

- Have the groups read their case study, answer the questions at the end of the case and prepare a ten-minute report, summarizing the case and conclusions.

**Note:** Case studies include facilitator notes in italics to ensure that participants' responses are accurate and complete.

### Case Study: Panic in Rwanda

#### Analytical questions for Panic in Rwanda

1. Discuss human-wildlife conflict in Rwanda and in the other East African countries.
2. What are the effects of the pesticides on the animals, humans and the environment?
3. Considering the information provided by the tourists and how it affected Rwanda. How would you communicate or control flow of information in this scenario?
4. What kind of team should be mobilized to respond to this emergency and to work with the community?
5. With an international crisis of Avian Influenza, how should the Rwanda team manage this situation?
6. How does the extinction of the lion affect the ecosystem?
7. What interventions would be used in this situation?
8. What is the role of the community and how should they be involved?

**Case Study: Bovine Tuberculosis (TB)**

**Analytical questions for Bovine Tuberculosis:**

1. Who and what are the different elements and stakeholders involved in the case of TB?
2. What disciplines should work together to control this re-emerging pandemic?
3. What are the benefits of cross-sectoral cooperation and the sharing of resources and information between countries?
4. What gender issues do you see in this scenario and how would you deal with them?

45 min

## One Health Stakeholder Analysis

Give the participants the following instructions:

i) You have been provided with a set of sticky notes. On a sticky note, write the name of a stakeholder or player in your case study scenario. One name per note. Write as many stakeholders as you can think of. Identify them by their roles. Consider their gender as well especially at the community level.

ii) Line the sticky notes on the plain piece of paper according to whether they are international, national, regional or local.

iii) Using a red marker, draw a circle around those stakeholders with lots of power and authority.

iv) Draw a square around those players with the most interest in the activity or who are impacted the most.

v) Using a red marker, draw arrows that show the flow of decision-making (power and authority) from one stakeholder to another.

vi) Using a green marker, draw arrows that show flow of resources (funding) from one stakeholder to another.

vii) Using a blue marker, draw arrows that show communication flow from one stakeholder to another.

Have the groups discuss the map and the following questions.

1. Who has power and authority?
2. Who do you think should have power and yet does not?
3. Who is being left out of the different arrows and yet considered important, and how do you include them?
4. Can you identify any gender differences in power, communication and resource flow?

## One Health Systems Mapping

45 min

### This tool /activity was adopted from the OH-SMART toolkit developed by the University of Minnesota in collaboration with the United States department of Agriculture

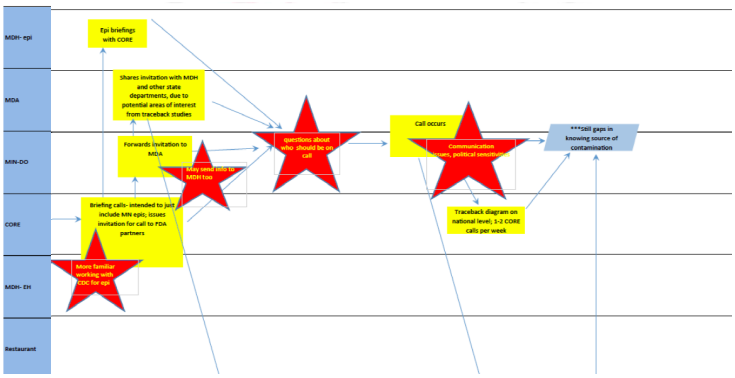
https://www.vetmed.umn.edu/centers-programs/global-one-health-initiative/one-health-systems-mapping-and-analysis-resource-toolkit

**Instructions:** Using the two case studies above, draw a table consisting of many rows and two columns. The first column shows the stakeholders involved in the event. The second column shows the timeline of their involvement. The mapping will be done from the left to the right.

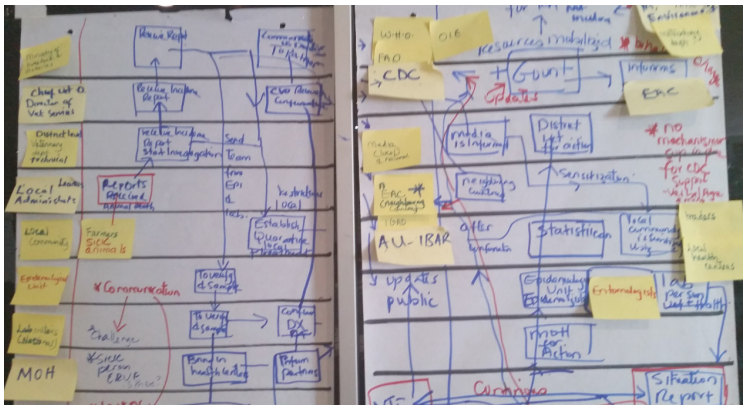
| | Over Time |
|---|---|
| Agency | |
| Agency | |
| Agency | |
| Agency | |

Beginning at the center of the table on the left, insert the first stakeholder and the genesis of the public health event i.e. an animal suspected of having rabies bites a child. Draw a square around this activity. In the left column enter community member as your stakeholder. Using an arrow, link up this activity to what happens next and the stakeholder involved in that next activity. For example, child goes to a local health center and receives first aid, enter the second stakeholder in the next row - that would be the local health center. Keep adding activities as they happen and all the stakeholders in a chronological order, until you have a map linking up the stakeholders to each other and the activities happening. If you think there is any missing information, put a question and star it for discussion.

Example of map:



Sample systems map for Rift Valley Fever (RVF) outbreak in Uganda




After mapping:

i) identify the process steps that may not be clearly understood or accepted. Show discrepancies or differences in responses noted by stakeholders or duplication of functions.

ii) note any significant stakeholders not included in the map. For example, in the RVF case, the Environment Department and entomologists were not included in the mapping showing a clear gap since these two groups play a major role in the surveillance for RVF.

iii) mark interactions that are working well and how they might be made more effective.

iv) present the maps to the rest of the class.

15 min

## Tea Break

20 min

## Group Presentations

Give each group 15 minutes to present and 15 minutes for discussion on their case study.

## Concluding Comments

The case studies demonstrated how infectious diseases start and spread as well as the need for a multi-disciplinary approach in managing them. Key concepts include:

i) Infectious disease outbreaks are not limited to one sector.

ii) Outbreak investigation and response requires a multi-disciplinary approach.

iii) Involvement of several stakeholders is critical—need to understand the roles, influence and powers of each stakeholders.

15 min

## End of Day Two Evaluation

**15 min**

i) Create the flip chart shown below.

ii) Ask participants: “How did it go today?”

| **How did today go?** |
| --- |
| ☺ 😐 ☹ |
| Comments: |

## Session 2: Facilitator Notes

### Case Study 1: Panic in Rwanda

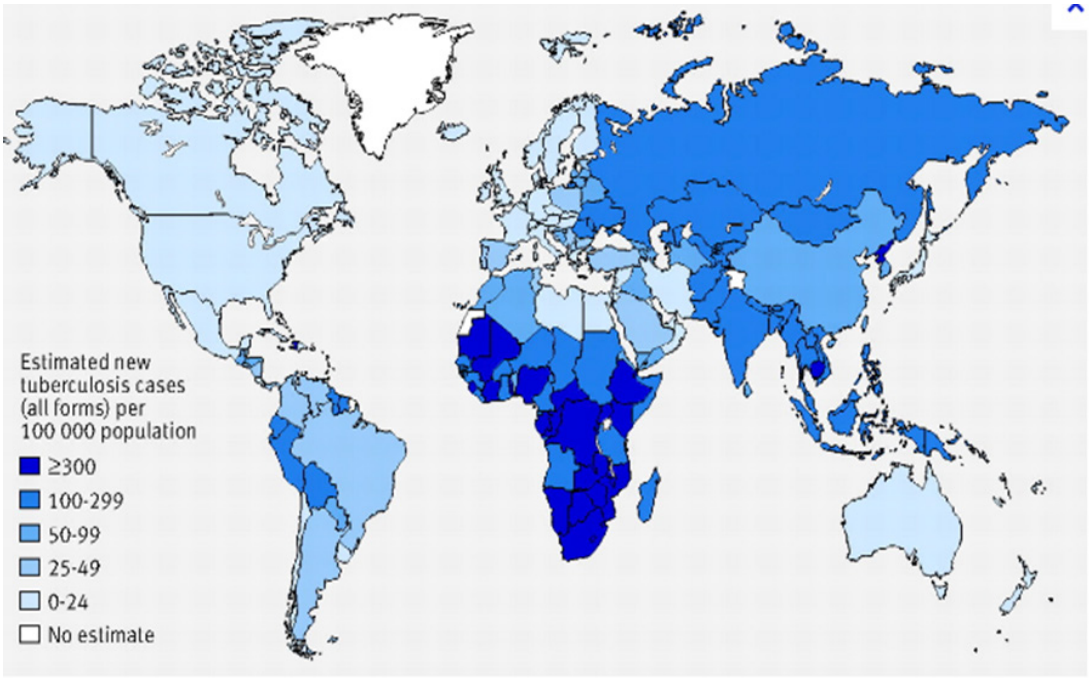
In Rwanda, herdsmen frequently graze their animals in the Akagera National Park. As a result, their cows are attacked by wildlife specifically lions. This constantly causes conflict between the communities and the national park management. In many incidents when domestic animals are killed, the farmers respond by using furadone, a pesticide to poison the wild animals. In one such incident, when a farmer's cow was killed, he layered the dead animal with furadone. The following day, there were dead carcasses of lions, and hyenas. A few days later, many scavenger birds like vultures were found dead.

Tourists going through the park found very many dead vultures and immediately panicked and reported it to the game warden as possible cases of Avian Influenza. Since it coincided with a worldwide outbreak of Avian Influenza, newspapers magnified the story. Rwanda depends very heavily on the tourism industry and any mention of influenza was immediately going to stall the country economically. Politicians and high level government officials mobilized a team and sent them to investigate and to work with the community. This incident led to the extinction of the lion in Rwanda.

### Analytical questions

1. Discuss the human-wildlife conflict in Rwanda and in the other East African countries.
2. What are the effects of the pesticides on the animals, humans and environment?
3. Considering the information provided by the tourists and how it affected Rwanda. How would you communicate or control the flow of information in this scenario?
4. What kind of team should be mobilized to respond to this emergency and to work with the community?
5. What process would the team use to investigate the outbreak?
6. With an international crisis of Avian Influenza, how should the Rwanda team manage this situation?
7. How does the extinction of the lion affect the ecosystem?
8. What interventions would be used in this situation?
9. What is the role of the community and how should they be involved?

## Case Study 2: Bovine Tuberculosis




Every year, there are 8–10 million new cases of TB reported, and 2–3 million deaths attributed to TB. In many countries in Africa, HIV and AIDS is widespread. The biggest killer of people with HIV and AIDS is TB. However, the impact of Bovine TB on humans is poorly documented.

Bovine TB is a major problem for livestock in developing countries and wildlife play a major role in the failure of TB eradication programs. In many cases, consumption of raw meat and milk and the development of bush meat consumption as a cheap source of protein are the principal routes of human contamination with Bovine TB.

Human TB of animal origin (zoonotic TB) is an important public health concern in developing countries. African nations face a particular challenge in TB control, deficiencies in public health control measures for cattle and animal products. Once detected, tuberculosis is curable in 90 percent of cases for as little as $15 per treatment.

HIV and AIDS is fueling the TB epidemic, and coordination between TB and HIV communities is lacking. The spread of extensively drug-resistant TB (XDR-TB) is a major threat and there is a significant lack of infrastructure and capacity, including laboratory facilities and health workers. This is made worse by the fact that smaller, less-regulated farmers sell unpasteurized milk directly to consumers and most consumers in the village do not boil their milk to the required standards.

Mycobacterium bovis has a broad host range as the principal cause of TB in free-living wildlife, captive wildlife, domestic livestock, and non-human primates. Wild ruminants and carnivores, such as African buffalo, lion, cheetah, greater kudu, leopard, warthog, and eland, can be infected and in turn infect both humans and domestic animals. Scavengers (hyenas, genet) and chacma baboons in Kenya became infected through the ingestion of abattoir wastes. Furthermore, recent development of wildlife activities, such as game tourism, farming, and hunting to develop the peripheral zones of protected areas has increased human contact with wild animals.

Due to international travel and migration, TB is now considered a rapidly re-emerging pandemic. Many cases diagnosed are Multi- drug resistant (MDR) or XDR.

### Analytical Questions

1. Who and what are the different elements involved and stakeholders in the case of TB?
    i) Wild animals, domestic animals, humans, birds
    ii) Multiple governments, veterinarians, medical doctors, wildlife specialists
    iii) Consumers of milk and meat products, handlers of these products, business people, hunters, women selling milk and handling food, caring for the sick
    iv) International travel organizations and their governments, WHO, OIE, FAO
    v) NGOs involved and engaged in disease control
2. How do you carry out an investigation and what disciplines should work together to control this re-emerging pandemic?

    *All medical disciplines, veterinary, wildlife, anthropology, local and national leaders, businesses, consumers, multi-lateral organizations: WHO, OIE*

3. What are the benefits of cross-sectoral cooperation and the sharing of resources and information between countries?

    Needed for the effective control of highly contagious disease emergencies.

    *Participants should be able to brainstorm here and come up with multiple ideas.*

4. What gender issues do you see in this scenario and how would you deal with them?
    i) Women are responsible for milking, and cooking food.
    ii) They are caregivers.
    iii) If women are not targeted for intervention, then you will not be able to control TB.
    iv) Men are hunters bringing bush meat home.
    v) Traders in illegal bush meat (sometime women are go-betweens or intermediaries).
    vi) Women have less accessibility to medical care and training than men in most communities.
    vii) Drug resistance (MDR ad XDR) make control difficult.

## Detailed Steps in Outbreak Investigation

Give in-service trainees this additional information found in the facilitator notes as it gives important details for each of the steps described in outbreak investigations. This could be given out in soft copy for those who need to understand the details of outbreak investigation.

**1. What to consider whether/how to respond**

i) Scope of outbreak (number of cases reported )
ii) Severity of disease (hospitalizations, deaths)
iii) Potential to spread to other areas
iv) Potential involvement of commercial products
v) New/resurgent disease
vi) Disease targeted for elimination
vii) Availability of control measures
viii) Press/media/political/international interest
ix) Request by local public health agency
x) Availability of resources
xi) Training opportunity to improve competency

**2. Prepare for fieldwork**

Scientific issues to think about

i) Discuss with lab staff on types of specimens needed, specimen collection, storage and transport
ii) Contact chief physician as soon as possible to collect clinical specimens before antimicrobial use!
iii) Consult with disease experts on clinical issues
iv) Develop objectives for investigation
v) Review literature and collect reference materials

**3. Logistical/administrative issues to consider**

i) Seek permission to investigate
ii) Engage intra-agency and inter-agency partners
iii) Assemble investigation team as necessary, and clarify team member's roles and responsibilities
iv) Consult with agency communication officer
v) Anticipate and prepare for early logistical needs
vi) Prepare for daily consultation with supervisors

**4. Establish existence of outbreak**

i) Are there higher rates than expected?
ii) Same disease or related diseases?
iii) Change in case definition/lab method/report staff?
iv) Increased awareness?
v) Misdiagnosis, lab error in diagnosis?
vi) Batched reporting?
vii) Population change**?**

**5. Verify diagnosis**

i) Review clinical findings
ii) Compare percent distribution of clinical features with what is expected for the disease
iii) Evaluate lab findings and methods
iv) Visit and talk with case-patients

**6. Construct a working case definition**

i) Never include exposure of interest in case definition
ii) Use objective, easily available clinical features
iii) Specify time, place, person
iv) Have multiple levels of certainty (suspected, probable, confirmed cases) as necessary
v) Leave no ambiguity: one person should only be classified into one category
vi) Use sensitive case-definition for case-finding; more specific one for analytic epidemiology

**7. Find cases systematically**

i) Contact healthcare practitioners and facilities
ii) Solicit public reporting
iii) Conduct population survey

iv) Ask case-patients about other ill patients

v) Create case form/line listing to include: identifying and contact info; demographic info; clinical features; reporter info

**8. Perform descriptive epidemiology**

i) Time: Epidemic curve

Use equal time intervals, each bar ≤1/2 incubation or generation periods

Show ≥2 generations before and after outbreak

Mark key exposures on epi curve

Recognize and interpret common epi curves

Construct stratified epi curves as necessary

ii) Place: Map (spot map, area map…)

Show potentially related factors (roads, wind direction…) on map

Indicate scale, longitude/latitude, orientation

iii) Person: Evaluate host characteristics (age, sex, education, occupation, medical status…)

Assess possible exposures (occupation, leisure activities, use of medications/tobacco/drugs…)
Use rates whenever possible. Avoid use of proportions of total cases

**9. Develop a working hypothesis**

i) Consider known facts about the disease (biology, nature, mode of transmission…)

ii) Use descriptive epi (time, place, person)

iii) Conduct hypothesis-generating interviews of patients, clinicians, public health experts

iv) Consider analogy, e.g. mode of transmission of similar diseases

v) Pay special attention to outliers and persons with unexpected observations

vi) Limit number of viable hypotheses to 1-2

**10. Evaluate hypotheses epidemiologically**

i) Select appropriate study design: case-control, retrospective cohort and others

ii) Choose appropriate comparison group

iii) Enroll as many cases as feasible

iv) Evaluate hypotheses against causal criteria

**11. Strength of association**

i) Consistency with other studies

ii) Time sequence (exposure precedes disease)

iii) Biological plausibility

iv) Dose-response relationship

v) Consider both relative and attributable risk

**12. Reconsider/refine hypotheses**

i) Re-evaluate hypotheses against causal criteria

ii) Ensure most cases can be explained by exposure

iii) Ensure all significant findings are explained

iv) Achieve greater specificity (e.g. specific brand/batch/lot of drug)

v) Address unanswered research questions when possible

**13. Compare/reconcile with lab/environmental studies**

i) Collaborate with lab/environmental experts

ii) Value, but do not over-rely on lab findings

iii) Use environmental studies to pin-point when/where/how exposure occurred

**14. Implement control and prevention measures**

i) Implement generic measures early; modify as new info becomes available

ii) Target segments in transmission chain (i.e. agent, source, mode of transmission, port of entry, host) susceptible to intervention

iii) Conduct trace-back/trace-forward studies

iv) Protect patients' confidentiality

**15. Initiate/maintain surveillance**

i) Evaluate effectiveness of prevention and control measures

ii) Monitor potential spread of outbreak

**16. Communicate findings**

i) Be first! Be right! Be credible!

ii) Aim at improving public health practices

iii) Know your audience

iv) Select appropriate format:

- Oral briefing
- Press release
- Investigation report
- Conference presentation
- Bulletin article
- Peer-reviewed journal article

## *References*


Social economic impact of Ebola virus disease in West African countries. A call for national and regional containment, recovery and prevention. UNDG West – Central Africa (2015). http://reliefweb.int/sites/reliefweb.int/files/resources/ebola-west-africa.pdf

Brainard J., Hooper L., Pond K., Edmunds K., Hunter P (2015). Risk factors for transmission of Ebola or Marburg virus disease: a systematic review and meta-analysis. International Journal of Epidemiology, 2015, 1-15. doi: 10.1093/ije/dyv307

Factors that contributed to undetected spread of the Ebola virus and impeded rapid containment. WHO, 2015. http://www.who.int/csr/disease/ebola/one-year-report/factors/en/

Seagle, HM, Morrow CB, Cibula D, et al. Appraising outbreak investigation skills in a public health emergency: an examination based on an actual event. J Public Health Manag Pract. 2007 Sep-Oct: 13(5):506-509.

Sistrom MG and Hale PJ. Outbreak Investigations: Community participation and role of community and public health nurses. Public Health Nurs. 2006 May-Jun; 23(3):256-263.

# Session 3: Gender and Infection Control in Infectious Disease Management

## Session Overview

The morning session will focus on gender in infectious disease management. It will help participants to appreciate gender concepts and relate gender to infectious disease outbreaks and management. It will also help them to appreciate the relationships between gender and infectious diseases.

The afternoon session will focus on infection control and personal protection equipment (PPE) in infectious disease management. The session will provide participants with insights into: infection control procedures and practices; personal protection programs as well as standards/guidelines for infection control.

## Session Learning Objectives

By the end of this session, participants should be able to explain:

i) the linkages between gender and emerging pandemics.
ii) how gender and infectious diseases affect each other.
iii) the different types of infection control precautions.
iv) the different types of respiratory and PPE available for use by health care workers.
v) the principles for selection of PPE.

| Schedule | Topic/Activity | Learning Activity | Materials |
|---|---|---|---|
| 8:00 - 9:15 | Registration | | Sign-in sheet |
| 9:15 - 10:15 | Gender Concepts and Role in Management of Infectious Diseases | Presentation/Group Activity | PowerPoint<br>Group Activity 1 |
| 10:15 - 10:30 | Tea Break | Plenary Session | |
| 10:30 - 11:00 | Gender Mapping | Group Activity Using a Case Study | Case Study: Water System<br>Flip charts and Markers<br>Group Activity 2 |
| 11:00 - 11:30 | Group Presentation | Plenary Session | |
| 11:30 – 12:30 | Infection Control and PPE | Presentation/Group Activity<br>Practical Session | PowerPoint<br>Group Activity 3<br>PPEs |
| 12:30 – 1:00 | Group Presentation | Plenary Session | |
| 1:00 - 2:00 | Lunch | | |
| 2:00 - 3:00 | Infection Control Preparedness for Managing Highly Infectious Diseases like Ebola. | Group Activity (Paper Review) | Activity 4 |
| 3:00 – 3:45 | Group Presentation | Plenary Session | |
| 3:45 - 4:00 | Tea Break | | |
| 4:00 - 4:20 | Summary of the Day | Plenary Session | |
| 4:20 - 4:30 | Evaluation of the day | Plenary Session | Evaluation Chart |

| Time | Activity/ Topic | Facilitator Instructions |
|---|---|---|
| 10 min | **Attendance** | **Attendance and Introduction to Day 3**<br>i) Have participants sign the OHCEA attendance register.<br>ii) Introduction to day 3. |
| 15 min | **Discovery Activity: What does it mean to be gender sensitive?**<br>**Group Activity** | Divide participants into four groups. Provide each group with a separate activity. Allow each group 5 minutes to review the activity provided and then have them discuss it and present their findings to the rest.<br>Participants should be able to respond to the following questions:<br>1. Can you identify any gender related actions in these activities?<br>2. What should be done to address the gender issues?<br>**Group 1:** In this community, there is a conflict between the people and the national parks because the community is collecting medicinal plants and firewood from the national parks – an area that is protected. Wildlife has also been destroying the villagers' crops and killing their domestic animals. The national park management decides to create awareness about the role of wildlife by delivering a training and awareness program primarily through night classes.<br>**Group 2:** For several years, a community organization has announced its meetings and events through the use of a local grocery store and daycare bulletin boards, and has held its meetings in the local Women's Institute Hall.<br>**Group 3:** The government in the country you work in wants to target farmers for training in poultry production and management on Avian Influenza prevention and control. They ask the animal health workers in the communities to identify people for training. Since men are the heads of households, they are selected to attend the training.<br>**Group 4:** There is an outbreak of Avian Influenza in this community. The government decides that in order to completely eradicate this disease, they will slaughter all the poultry be they ducks or chicken. They decide to compensate all farmers owning more than 50 birds. Backyard poultry farmers are not compensated because they are not considered important enough. |

60 min

## Presentation on Gender and Infectious Diseases

Give a brief PowerPoint presentation (PPP No.9) on gender concepts, social issues and culture in infectious disease management. As part of this presentation, discuss:

What is the difference between sex and gender?

**Sex:** refers to the biological and physiological factors that define men and women.

**Gender:** refers to the socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women.

**Gender differences**: refers to both socio-cultural factors and male-female differences in access and control over resources.

**Examples of biological differences:** Women become pregnant, men do not. Physiological changes in the immune system during pregnancy predispose women to disease.

- Examples of gender differences
- Common gender stereotypes
- Gender analysis tools, community resource mapping and infectious disease outbreaks
- WHO framework for sex and gender in infectious diseases

**Instructions:** During the course of the presentation, ask participants the following questions:

1. What are gender roles in your community that can make:
2. individuals vulnerable to infectious disease?
3. expose individuals to infectious disease?
4. What are the practices in your community that prevent people from accessing health services?
5. What are the practices in your community that prevent health interventions from being effective

Have the participants discuss the questions in a plenary session.

15 min

## Tea Break

30 min

## Case Study on Gender Mapping

Divide participants into two groups.

- Have the 2 groups work on the case study on **installing a water system in Teso, Uganda.**
- Have the groups read the case study, answer the questions at the end of the case and prepare a 10-minute report summarizing the case and conclusions.

### Case Study: Installing a water system in Teso, Uganda.

### Questions

1. Draw a daily activity chart for the men and women in the village.
2. What would be the best time to meet the women and where would the meeting be?
3. What would be the best time to meet the men and where would that meeting be?
4. Is it possible to have a combined meeting for both men and women? Where would it be and when?
5. Plot a resource map indicating issues of access, ownership and control.
6. Why did the women shun the tap built by the NGOs?

45 min

## Group Presentations

Each group has 10 minutes to present and 5 minutes for discussion on the case study.

### Concluding Comments

The case studies demonstrated how access, ownership and control of community resources vary with sex and gender. This variation in access, ownership and control has implications on infectious diseases.

20 min

## Presentation on Infection Control and PPE in Infectious Diseases Management

Give a brief PowerPoint presentation (PPP No. 10) on infection control and PPE in infectious diseases management. As part of this presentation, discuss:

1. types of infection control precautions and practices.
2. criteria for use of infection control precautions and practices.
3. the need for personal protection programs in infectious diseases management.
4. types of PPE for health care workers in infectious diseases response.

**Note**: Perform a practical session on donning and Doffing and orientation of participants on the red and green zones in case of severe infectious diseases like Ebola, Marburg etc. Call some two participants to volunteer in this session: one will act as a hygienist and another as a clinician as you demonstrate the process. (**Use WHO 2014-15 Guide)**

**Instructions:** During the course of the presentation, ask participants the following questions:

1. What are some of the recommended infection control practices?
2. What PPE is recommended for health care workers?

Also call some other participants to demonstrate basic infection control practices such as hand washing following standard procedures. The hand washing can be done as per the following steps: (*www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf)*


Have participants discuss the questions in a plenary session.

60 min

## Lunch

60 min

## Paper Review (Discovery Activity)

Based on the review of the paper: Preparedness of institutions around the world for managing patients with Ebola virus disease: an infection control readiness checklist. Tartari et al. (2015), ask participants to read the paper and in 2 small groups and respond to the following questions:

1. What is the paper about?
2. Which infection control precautions and practices are mentioned in the paper?
3. What infection control challenges were experienced in the hospitals?

4. Did hospitals have isolation rooms available for use at all times (for suspect or probable cases)?
5. Did hospitals have trained contact tracing teams in place?
6. Did hospitals have policies for safe management of the dead?
7. Were respirators available for use during aerosol generating activities?
8. Were medical/surgical masks provided for suspected or confirmed Ebola cases during transportation?
9. Were health care workers trained on using PPE?
10. Was One Health approach mentioned or used in the paper?
11. If not, how would you add it?

45 min

**Group Presentations**

**Group Presentations**

1. In a plenary, ask the different groups to present their findings.
2. Each group should present for 15 minutes and 15 minutes for discussion.

15 min

**Tea Break**

20 min

**Summary of the Day**

i) Review gender analysis tools and relationship to infectious diseases.

ii) Review infection control practices and PPE.

iii) Ask participants:

- What stood out as key learnings?
- What surprised you?

10 min

**End of Day Three Evaluation**

**End of Day Three Evaluation**

i) Create the flip chart shown below.

ii) Ask participants: "How did it go today?"

| **How did it go today?** |
| --- |
| ☺ 😐 ☹ |
| Comments: |

## Case study: Installing water system in Teso District – Very tricky

A village in eastern Uganda consists of a farming community that keeps both livestock and grows crops. The children go to school during the mornings then help their parents with chores in the evening. The men's activities generally consist of taking cattle for grazing in the communal fields at around 9-10am. This would be after the women have milked the cows and fed the calves. The young boys take the goats and sheep that are tethered around the home to graze and browse in the nearby fields upon returning home from school.

Cultivating the crop garden during the rainy season starts in the cool hours of the morning, just before dawn and ending by around 10:00am. Both men and women participate and oxen may be used to draw the ploughs. Sometimes children help especially in the planting just before they go to school which starts at 8:30am.

The women use the remainder of the day to do their household activates. Notably, the afternoons up to 4:00pm are set aside to collect water from the village stream.

Market day is usually held twice a month on Saturdays, and it is an activity where the whole family participates. The men would be selling livestock, farm implements, farming pesticides and acaricides as well as crops like rice and maize. The women, on the other hand, sell vegetables, fruit, dried fish and oil seed crops like groundnuts and sim-sim. It is during this period that villagers have entertainment or hold bazaars. It is interesting that due to strong religious and cultural beliefs, the men and women do not intermingle

Recently, an NGO visited the village and upon the suggestion from the men, built and installed a water tap in the center of the village. This was hoped to help the women by decreasing the amount of time spent to collect water from the stream. However, to their disappointment, the women neglected to use the tap and insisted on going in their groups to collect water from the stream. Only in cases when one had to attend to a sick patient at home did they use the nearby tap.

### Case Study Questions

1. Draw a daily activity chart for the men and women in the village.
2. What would be the best time to meet the women and where would the meeting be?
3. What would be the best time to meet the men and where would that meeting be?
4. Is it possible to have a combined meeting for the men and women? Where would it be and when?
5. Plot a resource map indicating issues of access, ownership and control.

# *References*

Farmer P. Social inequalities and emerging infectious diseases. Perspectives, 2, 259 – 269.

Infectious Disease Simulation Training Centre (2013). Infection control tool kit on emerging infectious disease outbreaks.

WHO (2009). How to hand wash www.who.int/gpsc/5may/How_To_HandWash_Poster.pdf.

WHO (2011). Taking sex and gender into account in emerging infectious disease programmes: an analytical framework.

# Session 4: Leadership and Communication in Infectious Disease Management

## Session Overview

The morning of Session 4 will focus on leadership in infectious diseases management. It highlights the qualities of a good leader, development of a vision/strategy for infectious diseases management as well as stakeholder identification and analysis for effective response. The afternoon of Session 4 focuses on communication in infectious diseases management.

This session seeks to equip participants with knowledge and skills of communication in infectious diseases management. It will focus on the basic communication concepts, **risk communication types and principles** as well as **communication best practices**. The communication types applied in different circumstances, and the communication best practices, ideally would be the principles of risk communication.

## Session Learning Objectives

By the end of this session, participants should be able to:

i) explain the qualities of a good leader.
ii) identify and assess stakeholders to be involved in infectious diseases management.
iii) develop a vision and strategy for infectious disease management.
iv) explain the basic concepts of communication including, risk communication, hazard communication and outrage management.
v) explain why risk communication is important in infectious disease management.
vi) explain the risk communication best practices.

| Schedule | Topic/Activity | Learning Activity | Materials |
|---|---|---|---|
| 8:00 - 9:00 | Registration | | Sign-in sheet |
| 9:00 - 9:15 | Introduction to Day Four | | |
| 9:15 - 10:15 | Basic Leadership Concepts & Principles | Presentation/Group Activity | PowerPoint |
| **10:15 - 10:30** | **Tea Break** | | |
| 10:30 - 11:30 | Stakeholder Involvement: Identification and Analysis | Presentation/Group Activity | PowerPoint |
| 11:30 - 1:00 | Planning (Vision/strategy setting): Case Study on Ebola Outbreak in Luwero | Group Activity | |
| **1:00 - 2:00** | **Lunch** | | |
| 2:00 - 3:00 | Basic Communication Concepts and Principles | Presentation/Group Activity | Internet Access |
| **3:00 - 3:15** | **Tea Break** | | |
| 3:15 - 4:00 | Case Study: Northern Uganda | Group Activity | |
| 4:00 - 4:45 | Message Development | Plenary Session | |
| 4:45 - 5:00 | Evaluation of the Day | Plenary Session | Evaluation Chart |

| Time | Activity/Topic | Facilitator Instructions |
|---|---|---|
| 15 min | **Attendance** | Have participants sign the OHCEA attendance register. |
| 15 min | **Introduction to Day Four** | This morning focuses on leadership and management in infectious diseases management. In this session, participants will be equipped with knowledge and skills on: definition of leadership, leadership basic concepts for infectious disease management, stakeholder identification and analysis as well as planning and vision/strategy setting. |
| 30 min | **Group Activity**<br>15 min | Before the presentation, ask the participants to come up with leadership definitions and write them on flipcharts. Categorize the definitions based on themes and then have participants move to view the flipcharts to appreciate the thematic definitions of leadership.<br>After the definitions, ask participants in a plenary session to discuss five qualities of a good One Health leader. In a plenary session, ask participants to choose an animal that they think has a character that best describes a good leadership style. |
| 20 min | **Presentation on Leadership and Infectious Diseases**<br>45 min | Make a PowerPoint presentation (PPP No. 11) on leadership and management in infectious disease management, highlighting concepts, importance, teamwork and stakeholder involvement. Discuss leadership from a One Health perspective—how do you lead different disciplines that operate in their own systems?<br>As part of this presentation, discuss:<br>1. What is leadership?<br>2. What is management?<br>3. Leadership styles: democratic, authoritative, charismatic, bureaucratic, Laissez-Faire etc.<br>4. The role of leadership in infectious disease management. |
| 20 min | **Teamwork** | Have participants watch a video on competency building, leadership and teamwork by Candy Mauricio: https://www.youtube.com/watch?v=nD6tUEp1lws<br>After watching this video, put the participants in groups and:<br>• Give each group 10 minutes to generate an idea and develop a role-play/skit on teamwork. The teams will then present their role-plays to the rest of the group. The role-plays should only last utmost 3 minutes. Discuss the role-plays and key themes identified that make a good team. |

- Summarize the section by talking about teamwork and the qualities expected of an efficient One Health team. Discuss the concept of teams.

**Points for discussion:**

1. What happened? What did you notice about how teams prepared?
2. What were the leadership dynamics? (e.g. Were there discussions about who would lead? Did different people assume leadership at different times?)
3. What did the leader(s) do that was effective? Not as effective?
4. As a team member, how did you communicate to leadership your personal needs and opinions?
5. Did you feel you were competing with the other teams to be the first? Or did the teams collaborate?
6. What will you do differently next time . . . as a leader? As a follower?

10 min

Show the following video on eradicating Rinderpest.

- YouTube – Eradicating Rinderpest http://www.youtube.com/watch?v=tuG5_wdO050

## Case Study on Rinderpest Eradication


20 min

Divide participants into groups of 3 or 4 and have them consider the following questions. Groups should prepare a short overview of their discussions and conclusions to share with the entire class.

1. Who were the partners involved in the eradication of Rinderpest?
2. Why did they make an effective partnership?
3. What was the vision or goal, if any? Was it "shared"?
4. What leadership styles and/or decisions may have contributed to the eradication of the Rinderpest?
5. In your opinion, what leadership barriers slowed down the eradication of Rinderpest?

Give each group a maximum of 5 minutes to share their reports. Compare and contrast participants' perspectives and conclusions.

Conclude this session by emphasizing the importance of the "collective leadership model" that is needed for success in addressing One Health challenges.

15 min

## Tea Break

30 min

## Stakeholder Engagement in Infectious Diseases

30 min

Give a presentation (PPP No. 11) on stakeholder engagement in infectious diseases. Make a PowerPoint presentation on leadership and management in infectious disease management, highlighting concepts, importance, teamwork and stakeholder involvement.

As part of this presentation,

1. Discuss why engage stakeholders in infectious disease management.
2. Discuss the steps of stakeholder involvement process.
3. Discuss the process of problem definition.
4. Identify stakeholders.
5. Conduct stakeholder's analysis.
6. Develop a vision, goals, objectives, solutions and a plan.
7. Decide on implementation roles and responsibilities.
8. Implement with adjustments where necessary.

Include examples on partner mapping to avoid duplication of activities and conflict in the field. Also orient participants on the role of international organizations such as WHO, UNICEF, MSF, CDC and others, in emergencies.

30 min

## Group Activity - Karatu Case Study


### Karatu Case Study

Using the Karatu case study, ask participants to divide into 2 groups. The group members will be required to read the case study and answer the following questions in their respective groups:

### Group 1

1. Brainstorm issues identified in this case study.
2. What are the underlying issues impacting this community?

3. What key One Health issues can be identified?
4. What sectors are involved?
5. What measures can be done to protect the health of humans, animals and the environment?

**Group 2:**

1. identify the individuals who will attend the meeting (work on a flipchart).
2. Justify why each member is critical to the response. (i.e. role, expertise, responsibilities, etc.)
3. Discuss who should chair the stakeholders' meeting and why.
4. Relate the above case study to policy and governance.
5. Develop an intervention strategy.

In a plenary session, each of the groups will be given 5 minutes to present and 5 minutes for discussions.

75 min

**Group Activity on Planning for Emergency Response**

Planning for Emergency Response – Case study: Ebola Outbreak in Luwero.

Using the case study on Ebola outbreak in Luwero, ask participants to break into 3 groups and have each group discuss the following questions:

You have just been informed that there is a suspected Ebola outbreak in Luwero village, in western Uganda bordering Rwanda. A total of 14 people have died and 26 others are reportedly sick. There is only one health center in the area manned by one local doctor and two nurses. The Government is putting you in charge of the emergency response. You have been given a budget of 20,000 dollars to mobilize a team to prepare and respond to this emergency

- In 3 groups respond to the scenario in the following manner:

**Step 1**

i) Create a budget for this emergency response.
ii) Identify and price the key resources that you will need.
iii) Identify key personnel and logistics required to respond to this emergency.
iv) Develop a timeline of your activities to respond to the emergency.
v) In a plenary session, have each group present for 5 minutes and discuss for 5 minutes.

**Step 2:**

i) You receive information from the Ministry of Health informing you that you only have 8,000 dollars because the 12,000 dollars was a commitment from one of the international organizations but the funds have not come through. You still need to respond to the emergency.

ii) Re-budget and identify priority resources that you will need and what you will eliminate to work with the 8,000 dollars that you now have.

iii) In a plenary session, have each group present for 5 minutes and discuss for 5 minutes.

**Step 3**

Just as you finish budgeting and are getting ready to leave for the field, you are informed that your contact health personnel on the ground, the local doctor and the two nurses at the local hospital have died of Ebola.

- Present a plan on how you are going to go ahead and respond to this emergency without the local team.

**Step 4**

When you are in the village, you hear the local politician telling the community members that they should burn down the houses of all the Ebola victims to ensure that there is no more spread of the disease.

1. What do you do in this situation?
2. Who can you reach out to help you solve the problem?

**Pointers:** Ask participants: "What should be included in an emergency communication plan?" Possible answers include:

i) Assigned roles and responsibilities including primary decision-maker/emergency coordinator and back-up

ii) Emergency contacts (e.g. police, fire department, doctors

iii) Contact list of all personnel

iv) Phone/e-mail trees

v) Employee evacuation plan

vi) Website and/or phone/voice mail emergency messaging plan

vii) System to account for all personnel

viii) Stakeholder communication plan including clients, regulatory agencies, etc.

ix) Media communication plan

x) Training and summary booklets/brochures/cards

This scenario is very good because it puts participants into real severe infectious disease outbreak situation.

20 min

**Debrief**

**Why?** – Why are we doing this initiative?

**What?** – What is the work that needs to be performed to successfully complete the initiative? What are the major products/deliverables?

**Who?** – Who will be involved and what will be their responsibilities within the initiative? How will they be organized?

**When?** – What is the timeline and when will milestones be completed?

**Where?** – Where is the One Health initiative taking place (e.g. the location)?

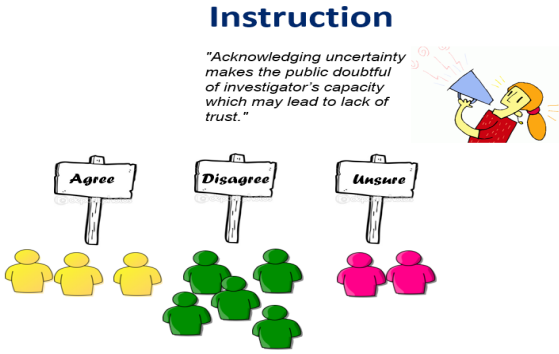
These questions are critical in defining the constraints on an initiative, or the scope, resources and schedules available in an emergency. The combination of these elements is referred to as the Project Management Triangle and understanding the relationships between the elements helps managers make better choices and tradeoffs. These elements are often competing and termed the 'triple constraints' of a project. Changes in any part of the triangle impacts the other parts. For example, increasing the scope typically means increased time and increased cost, or a tight schedule could mean increased costs and reduced scope, or a tight budget could mean increased time and reduced scope.

60 min

**Lunch Break**

| Time | Activity/ Topic | Facilitator Instructions |
|---|---|---|
| 30 min | **Introduction to Risk Communication** | Start by challenging participants to find out if they have any idea about risk communication.<br>i) Get three flipcharts and write "Agree", "Disagree" and "Unsure" on each.<br>ii) Stick the flip charts on the wall at different point in the room. The facilitator reads out the following statements projected on the screen to the participant one at a time.<br>1. Acknowledging uncertainty makes the public doubtful of investigator's capacity which may lead to lack of trust.<br>2. One should not inform the public unless the information is complete. |

3. Communicating to the public is the domain of leaders. Technical staff have no roles in communicating to the public.
4. Public concerns that are unfounded should not be addressed.




Give one minute for participants to choose a side of either agree, disagree or unsure. Two participants from each category are picked randomly to express their opinions. This guides participants to appreciate when to communicate and who should be involved in communication during an emergency situation.

Risk communication is an open, two-way exchange of information and opinion about risk. It leads to better understanding and better risk management decisions by all involved. It is critical to have a plan in place to deal with a crisis before it happens. Communicating information about possible life threatening issues can be difficult, but if it is not done well, the communicator can put the public at greater risk by creating misunderstanding or possibly inciting panic.

Professional communicators owe it to the people and agencies they represent, as well as to the public, to be prepared to deal with a crisis—natural or manmade. Establishing trust and credibility are two of the cornerstones of effective risk communication. When an issue is of high concern, such as the 2001 anthrax incidents in the US or the threat of a smallpox outbreak, trust and credibility on the part of communicators is essential. Without them, your message will not be heard, people will not make informed decisions, and problems can escalate.

Risk communication is important because:

i) every action or inaction involves risk.
ii) health professionals communicate across a wide range of risks and audiences.
iii) health professionals are often trusted sources of information in the community.

30 min

## Risk Communication Presentation

The PowerPoint presentation covers the following topics:

i) Brief overview of communication theory and practice: The differences between myths and truth and how beliefs in some common myths interfere with risk communication.

ii) Basic risk communication rules: Who defines the issues involving the public as partners including their specific concerns; planning and evaluating the effort and meeting the needs of the media?

iii) Factors that influence risk perception: An individual's perceptions of the magnitude of risk are influenced by more than numerical data. For example, more people die each year in automobile accidents than in airplane crashes, yet more people are afraid to fly than they are to drive.

iv) Avoiding pitfalls in communication: Presentations and interviews and presentation aids.

v) Managing hostile situations: Issues of health and environment can arouse strong anger and hostility. Consider some things you can do to diffuse anger and re-direct hostile energy.

**Should also cover:**

i) A description on characteristics of information during an emergency.

ii) Application of WHO outbreak communication principles, would work better.

iii) Identification of effective tips for communication with the media in emergencies.

Establishing trust and credibility are two of the cornerstones of effective risk communication. When an issue is of high concern, such as the most recent Ebola outbreak in West Africa, trust and credibility on the part of communicators is essential. Without them, your message will not be heard, people will not make informed decisions and problems can escalate. Using risk communication best practices can help manage risks better.

**Note**: Risk communication PowerPoint has three embedded exercises.

i) The first two exercises are individual-based. Give participants 2 minutes to prepare and then ask for a few examples.

ii) The third exercise is a small group-based. Divide participants into 5 groups. Give the groups 5 minutes to prepare and then 2 minutes to share their responses with the entire group.

30 min

### Developing Risk Communication Plans

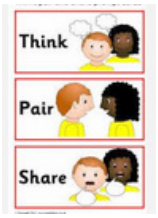
i) Divide participants into five groups.

ii) Each group will develop an interim plan for risk communication and information dissemination to educate the public regarding exposure, risks and effective public response on an emergency of your choice.

iii) Include a list of communication channels, merits and demerits for the selected ones by each group. The following are some of the expected answers: radio, TV, newspapers, social media, the Internet and others.

15 min

### Think, Pair, Share




Present the following scenarios to participants and have them find solutions through think, pair and share technique. They should think of an answer, pair with a neighbor, share with each other and then have one of them share with the rest of the group the solutions they came up with.

#### Scenario 1

i) You are the spokesperson for the National Emergency Taskforce leading government response to an outbreak of anthrax in wildlife in a national park. The outbreak has spilled over to domestic animals and humans. Over 500 hippos have so far died.

ii) Following the initial press release about the outbreak, you are misquoted in the international media - misinformation which may cause undue concern or alarm, and massively affect the tourism industry (outrage!).

iii) As the spokesperson, how should you address inconsistent messages about the outbreak?

#### Scenario 2

i) You receive information that there seems to be a "strange disease"/ hemorrhagic fever outbreak in a remote town.

ii) As a One Health leader, how can you communicate appropriate risk messages and ensure that you are communicating to the right audience (take gender roles into consideration; who has access to what communication channels?).

iii) Identify one audience, one to two communication vehicles and develop 3 key points (messages).

#### Scenario 3

i) There is an outbreak of Marburg in Kween district, eastern Uganda. Marburg is known to be a hemorrhagic fever with high fatality rates. The index cases died three days ago.

ii) A traditional burial was done. He was a renowned businessman trading between Uganda and Kenya. He had more than ten wives and three of them are presented with signs and symptoms of Marburg. His caretaker who was his closest sister has developed signs and symptoms too.

iii) The health worker requests that they isolate anyone who meets the case definition. However, the general community thinks that this could be witchcraft because the disease is congregated in one family. They have hidden the suspected cases and promise to strangle any health worker who comes around asking for the case.

iv) As a One Health champion, how best would you communicate this incidence to the media and the community so that they are able to understand the consequences of not reporting suspected cases.

20 min

## Group Presentations

**Note**: When evaluating the group presentations, the following key issues need to be addressed in the plans:

i) Identify key One Health spokespersons who can effectively communicate with the public and media to prepare for response and respond to. Explain why the person was selected.

ii) Establish an emergency public information system, including call-down lists of One Health contacts, backup personnel who can be activated to address communications, and information dissemination issues during the emergency.

iii) Establish mechanisms for tracking and monitoring message dissemination and exposure media coverage, audience reaction and feedback, and changing communication issues and priorities.

## Concluding Comments

Best practices in risk communication:

i) Remember communication is two-way street
ii) Be aware of cultural and language differences
iii) Listen to your audience and seek understanding
iv) Communicate with empathy and concern
v) Don't assume
vi) Use appropriate terminology
vii) Accept uncertainty
viii) Use key points
ix) Provide resources
x) Foster partnerships
xi) Remain accessible

## Session 4: Facilitator Notes

# Karatu Case Study

### Karatu District Arusha Tanzania

Karatu district is located in Arusha region, Tanzania and is known for its agricultural activities. People practice irrigated farming. Among the major drawbacks that faces the farmers are pests. As a means to overcome such problems, farmers indiscriminately use pesticides to protect their crops. This practice has been reported to be associated with many problems to the people, domestic and wild animals and the environment. Cases of abortions in humans and animals are quite high in the district and are associated with pesticide poisoning. Skin diseases and infertility are also rampant especially to people working in horticultural farms. Incidences of fish and aquatic bird mortalities especially Lesser flamingoes (Phoenicopterus minor) are observed and all are linked with pesticide poisoning. In 2004, up to 45,000 Lesser flamingoes died at Lake Manyara which is being fed by rivers draining from the agricultural fields in Karatu district.

Studies have shown high levels of pesticide residues in milk, beef and local chicken eggs. A case control study conducted in pregnant women who go to be delivered at Mount Meru Hospital in Arusha showed that they had very high levels of pesticide residues in breast milk and abdominal fats. The newly born babies had also high levels of pesticides in muconeum and umbilical blood. Studies further showed high levels of pesticides in water collected from Lake Manyara and different rivers around irrigated farms.

Efforts have been made by the government to overcome the problem. The Tanzania Ministry of Agriculture has been conducting seminars, extension work and restricting uses of pesticides including advocating for the integrated pest control systems but the problem still exist and is getting worse.

### Karatu case study questions

1. What is the problem? Who is affected? What are the challenges?
2. What do you see as the social-economic-political angle to this?
3. What key One Health issues can be identified?
4. What sectors are involved?
5. Are there any government policy implications?
6. What measures can be done to protect the health of humans, animals and the environment?
7. Can you give similar examples from your own background/work? How did you deal with it?

# Session 5: Problem Based Learning, Simulation and Evaluation: Putting it all Together

## Session Overview

On day 5, participants will be able to analyze a problem-based learning scenario, and then plan for an emergency, identify and manage challenges that occur in any emergency situation. They should also be able to explain the financial and logistical complications experienced in an emergency. They will then use a simulation tool to bring it all together. A simulation is a tool used for the reproduction of an event and analysis of its results in order to improve readiness for an eventual occurrence of the situation or similar situations. From the point of view of One Health, a simulation is defined as a multi-sector and coordinated approach integrating fauna, animal health, human health, the environment and communication, and aims at responding in a more effective way to an emerging pandemic threat.

## Session Learning Objectives

By the end of this session, participants should be able to:

i) use problem-based learning as a tool to analyze an emergency.
ii) create an emergency response plan.
iii) implement the emergency response plan.
iv) prevent, detect and respond to the emergency.
v) develop a post-emergency evaluation plan.
vi) examine logistics issues in an emergency.
vii) evaluate and assess the course module.

| Time | Activity/Topic | Facilitator Instructions |
|---|---|---|
|  40 min | **Using Rift Valley Fever to Present Problem-Based Learning**  | Using a PowerPoint presentation (PPP No. 15) , introduce the concept of problem-based learning (PBL) to participants including what it is, the process and the roles of facilitators in PBL, the advantages and disadvantages of PBL, what it is and what it is not. |
|  120 min | **Analyzing Rift Valley Fever Case**  | i) After this introduction, divide participants into two groups. One group will analyze the RVF case, while the other will observe the process, specifically looking at the role of the facilitator and group dynamics.<br>ii) Present the RVF case scenario.<br>iii) Start with the first trigger.<br>(See RVF case and notes attached at the end of this document). |
| | **Debrief:**  | At the end of the case: have participants discuss the following:<br>1. What did the facilitator do well?<br>2. What needs to be improved? |

3. What were the group dynamics like?
4. Did participants understand the objectives of the case?

Complete the session by stressing that PBL as a concept helps participants to:

i) develop flexible knowledge.
ii) develop effective problem-solving skills.
iii) become self-directed learners.
iv) become collaborative workers.
v) increase their intrinsic motivation and critical thinking skills.

200 min

## Simulation Exercise

The rest of the day will be spent developing a simulation exercise. Participants will form the following four (4) teams:

1. Preparation team
2. Detection (surveillance) team
3. Response team
4. Post-emergency evaluation team

**Simulation Exercise**

200 min

## Using a Simulation to Integrate Course Concepts, Skills and Knowledge

### Using a Simulation to Integrate Course Concepts, Skills and Knowledge

A simulation is a tool used for the reproduction of an event and analysis of its results in order to improve readiness for an eventual occurrence of the situation or similar situations. From the point of view of "One Health," a simulation is defined as a multi-sector and coordinated approach integrating fauna, animal health, human health, the environment and communication and aims at responding in a more effective way to an emerging pandemic threat. This approach recognises the need to strengthen collaboration, communication and the coordination amongst specialists of different sectors. This implies the need to create bridges between disciplines in order to complete planning, intervention in terms of surveillance or response, reporting, data analysis and evaluation of activities in an integrated manner in order to better fight pandemic threats.

In this module, we are using a simulation to integrate skills and knowledge across the domains of:

i) Epidemiology
ii) Emerging Pandemic Threat Response
iii) Gender Analysis
iv) One Health

This simulation will evaluate participants' ability to:

i) integrate knowledge across multiple domains.
ii) identify the necessary actions within the framework of a national plan of preparation to a pandemic.
iii) follow procedures when planning and responding to epidemics and epizooties.
iv) work on multi-disciplinary teams.
v) coordinate actions across sectors.
vi) communicate clear and consistent messages to multiple audiences.

In this section, participants will be able to prepare and respond to an emergency taking into consideration all the tools and skills given during this training, identify, and manage challenges that occur in any emergency situation. Begin by presenting the following scenario to participants:

5 minutes

**Case Scenario**

You have just been informed that there is a suspected Ebola outbreak in Luwero village, in western Uganda bordering Rwanda. A total of 14 people have died and 26 others are reportedly sick. There is only one health center in the area manned by one local doctor and two nurses. The Government is putting you in charge of the emergency response. You have been given a budget of 10,000 dollars to mobilize a team to prepare and respond to this emergency.

The four different teams are first of all expected to get together, brainstorm and draw up a plan of action for each different group: Preparation team, Surveillance team, Response team and Post-emergency evaluation team.

The following are the key points to consider when brainstorming. Target the following questions:

i) **Coordination structures:** How do you bring gender into the coordination structures that you are creating?

How do you proactively support gender and protection services? (Gender continuum could be useful here)

It would be helpful for the participants to understand coordination at national level, the roles and responsibilities of the national task force, incident management team and incident commander and coordination at district level in an emergency situation (Guideline for National Response, 2015). In this situation, coordination at national level is key followed by the district facing the problem.

ii) **Gender analysis to inform preparedness during and after:** What gender analysis tools are you going to use to support your activity? What gender lessons would you anticipate? What are the lessons to learn and recommended actions?

iii) **Vulnerability assessments:** What tools and approaches can you use to map the gender differentiated risks? What technical support will you provide to gain gender differentiated insight into the capacities and the vulnerabilities of the affected communities? What kind of gender technical support can you provide to monitor threats to vulnerable groups?

iv) **Information gathering and management:** How do you ensure an appropriate mix in an assessment team? How do you ensure that you are consulting with all the required parties? How do you ensure post assessments capture relevant data by sex, age, disability and vulnerability?

v) **Information sharing and communication:** How do you provide technical support to ensure that information and communication flows to all the groups in the community?

vi) **Planning:** How do you ensure that outbreak response prioritization is based on gender analysis? How do you ensure that gender and diversity are included in capacity assessment? How do you ensure that any contingency plans are gender-sensitive? How do you ensure that gender gaps are identified in any section of preparedness, response and evaluation? How do you ensure that gender is mainstreamed in emergency preparedness training?

vii) **Capacity building**: What existing knowledge among your community members can you build on or enhance? What coping strategies can you identify among the different groups and how do you use this to be more effective? How do you facilitate the community to become self-sustaining/create and implement a disaster management plan? How do you help train and build the capacity of key stakeholders and implementing partners? How do you ensure the capacity building efforts are gender balanced and sustainable?

viii) **Resource mobilization:** How do you ensure that gender needs are reflected in each part of the process and that resources being mobilized are utilized to address all groups? How do you evaluate to see if you handled everything in the right manner? How do you develop/put in place a gender sensitive risk assessment plan and a preparedness plan to ensure you are prepared for another outbreak? What are the key challenges facing this community and the country after the outbreak has been contained?

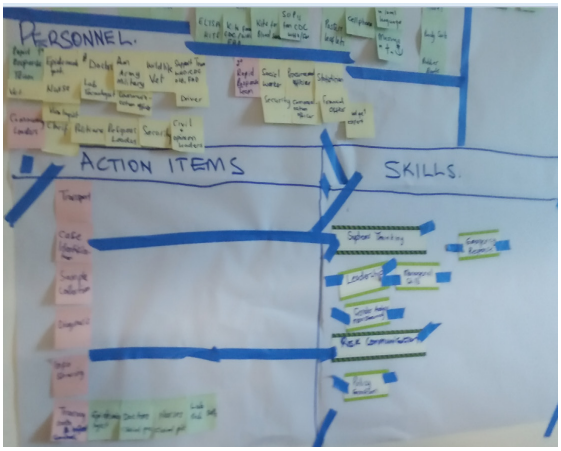
75 min

## Resources Mapping

Give the participants the following instructions.

### Step 1

Using flipcharts and sticky notes map out a plan of action including the personnel and resources you will need in your group. Put resources and personnel and action items on the left side of one flipchart and on the right indicate how you will make the process gender-sensitive by responding to the above questions. Present this to the plenary. Each group has 10 minutes to make a presentation.

30 min

75 min

### Step 2

Based on the above, identify/select 5 key activities that your group feels are important to achieve your objective of an efficient gender-sensitive preparedness, response or post emergency evaluation program.

### Step 3

Using the material provided, create/build a visual of your plan, focusing on the five activities mentioned above and ensuring that gender issues are reflected in that visual.


75 min

### Step 4

Each group will be allowed 10 minutes to present their visual/ construction plan to the rest of the group. All participants will then grade the groups depending on how good their visual is, how easy it is to understand, how it encompassed gender issues discussed in the training and how efficient it seems to be to achieve its objective. Participants will then select what is considered as the best visual.

30 min

### Debrief:

As you debrief participants, keep them focused on the following:

i) **Why?** – Why are we doing this initiative?

ii) **What?** – What is the work that needs to be performed to successfully complete the initiative? What are the major products/deliverables?

iii) **Who?** – Who will be involved and what will be their responsibilities within the initiative? How will they be organized?

iv) **When?** – What is the timeline and when will milestones be completed?

v) **Where?** – Where is the engendered One Health initiative taking place (e.g. the location)?

These questions are critical in defining the limiting constraints on an initiative, or the scope, resources and schedules available in an emergency.

30 min

**Presentation on Logistics Management in Emergencies**

Give PowerPoint presentation (PPP No. 16) on logistics management in outbreak investigation situations. This should give participants an opportunity to discuss the importance of logistics in any infectious disease outbreak scenario.

15 min

**Tea Break**

15 min

**Simulation Evaluation**

i) Handout simulation evaluation.

ii) Tell participants they have 15 minutes to complete the simulation. evaluation for both self and group.

iii) If participants finish early, ask them to remain quiet until everyone has completed.

45 min

**Closing Session and Course Evaluation**

**Give a Post-Test**

iv) Have participants form a circle and ask each of them to say in one or two words what they thought of the training.

v) Have participants do the post-test.

vi) Give out certificates.

vii) Give out OHCEA event evaluation.

viii) Tell participants to place their completed evaluations in an envelope.

ix) Seal the envelope and give the evaluations to the OHCEA course coordinator.

| Simulation Self-Evaluation | Not Effective | Partially Effective | Effective | Quite Effective | Very Effective | Comments |
|---|---|---|---|---|---|---|
| Communication Skills | | | | | | |
| Listened | | | | | | |
| Shared my point of view | | | | | | |
| Challenged appropriately | | | | | | |
| Ensured everyone contributed | | | | | | |
| Valued equally the opinion of men and women in my group | | | | | | |
| Gender Analysis Skills | | | | | | |
| Advocated for use of gender analysis/ use of gender tools | | | | | | |
| Used gender-sensitive language | | | | | | |
| Ensured that women will be present and participate in the discussions/ activities | | | | | | |
| One Health Team Member Skills | | | | | | |
| Considered the interrelationships among men, women, domestic animals, wildlife and the environment | | | | | | |
| Brought to the discussion my disciplinary skills and knowledge. | | | | | | |
| Solicited inter-disciplinary knowledge | | | | | | |

| Simulation Team Evaluation | Not Effective | Partially Effective | Effective | Quite Effective | Very Effective | Specific example of what they did well | Specific example of what they did poorly |
|---|---|---|---|---|---|---|---|
| Team Effectiveness | | | | | | | |
| Ensured everyone listened, contributed and opinions were valued | | | | | | | |
| Managed time so that we were able to create a response plan | | | | | | | |
| Utilized team members' skills and strengths | | | | | | | |
| Gender Analysis Skills | | | | | | | |
| Advocated gender tools | | | | | | | |
| Used gender-sensitive language | | | | | | | |
| Ensured that women will be present and participate in the discussions/ activities | | | | | | | |
| One Health Perspective | | | | | | | |
| Considered the interrelationships among men, women, domestic animals, wildlife and the environment | | | | | | | |
| Solicited inter-disciplinary knowledge | | | | | | | |
| Was participatory including all stakeholders | | | | | | | |
| Included all relevant categories of staff | | | | | | | |
| Considered budget implications | | | | | | | |

1. As a team, summarize what your team did well in the response and what areas that were challenging.
2. Is there anything you, as a team, would do differently the next time you are responding to an emerging pandemic threat?
3. How can you use a simulation in your work?

## Handouts

1. Simulation Scenarios for each team
   i) Prepare Team
   ii) Detection Team
   iii) Respond Team
   iv) Evaluation Team
2. Post-Test
3. OHCEA Event Evaluation

## Rift Valley Fever PBL Case and Facilitation Notes

*A major Rift Valley Fever Outbreak in the Northeast of Kenya*

**Hellen Amuguni, Anne Waweru, Jairus Mdegela**

### Summary

A livestock herdsman in Northeastern Province, Kenya, was hospitalized at Garissa Provincial Hospital with a two-day history of fever, and vomiting and defecating blood. He died two days later. By December 20, twelve patients had been admitted to the same hospital with fever and bleeding manifestations and without evidence of malaria; 11 died. Of the 11 initial deaths, seven of them were female.

Laboratory tests were carried out at the Centers for Disease Control and Prevention-Kenya Medical Research Institute (CDC-KEMRI). Testing was negative for a variety of other potential etiologies of severe febrile illness. During the 4 months after the initial detection of the outbreak, several hundred additional cases were confirmed in Northeastern Province and additional clusters of cases occurred in 18 districts within 6 of the 8 provinces in Kenya. Livestock deaths and abortions were noted within the same provinces.

The CDC-KEMRI confirmed that the disease was RVF. The Kenya Ministry of Health (MoH) established nationwide surveillance for RVF, initially with intensified efforts in Northeastern Province. The Kenya Ministry of Health operates a national surveillance system for epidemic prone diseases and vaccine preventable diseases, known as Integrated Disease Surveillance and Response (IDSR).

During the outbreak, IDSR surveillance officers in all districts of Kenya were informed about RVF and encouraged to report suspect or probable cases. The MoH teams were dispatched to areas where RVF cases were occurring. Because of the high degree of flooding in this normally arid area, many areas were inaccessible by ground transport and a helicopter provided by the World Food Program was used to move epidemic response teams and supplies.

### Goals

i) To understand and appreciate the epidemiology, pathogenesis, clinical signs, transmission, control and treatment of RVF.

ii) To understand the role of the environment in the emergence and re-emergence of diseases.

iii) To understand the **policies** related to the zoonotic, emerging and re-emerging diseases.

iv) To appreciate the values of identifying partners who are necessary in dealing with a particular outbreak.

v) To appreciate the values of good engendered communication strategies and skills.

vi) To understand and appreciate the epidemiology, pathogenesis, clinical signs, transmission, control and treatment of RVF.

vii) To understand culture and gender role differences among pastoralist communities (who does what and who controls what in relation to animals).

### Objectives

i) To describe the pathogenesis, clinical signs, transmission, control and treatment of RVF.

ii) To describe the epidemiology of RVF.

iii) To describe RVF and differentiate it from other similar diseases.

iv) To list and describe the steps of an outbreak investigation.

v) To describe and explain zoonotic diseases.

vi) To analyze the role played by the environment (climate, weather, soil types) on the occurrence of RVF.

vii) To describe the clinical signs and manifestations of RVF both in animals and humans.

viii) To describe the epidemiology of RVF.

ix) To identify the role of animals in transmission of RVF to humans.

x) To differentiate RVF from other similar diseases.

xi) To identify the benefits of a multidisciplinary approach in solving issues regarding infectious diseases, RVF in particular.

xii) To explain gender roles and distribution of labor in the pastoralist community and the impact of culture in this particular outbreak.

xiii) To list the stakeholders that could be involved in a RVF outbreak and describe their role including different gender roles.

xiv) To identify the benefits of a good engendered communication strategy.

xv) To create a model for a good strategy to be used by these stakeholders.

xvi) To identify the policies related to RVF.

xvii) To illustrate the control measures that can be taken to control RVF.

xviii) To list and describe different tests carried out to diagnose RVF.

xix) To identify the causative agent of RVF.

## 1. Bloody herder and spreading

A livestock herdsman in Northeastern Province, Kenya, was hospitalized at Garissa Provincial Hospital with a two-day history of fever, and vomiting and defecating blood. He died two days later. A 45-year-old butcher was later on admitted that same day at Garrissa General Hospital. A twelve-year-old girl who had been taking care of her parent's goats presented at the same hospital with signs of an acute influenza-like illness with transient fever, rigor (shivering), headache, severe muscle and joint pain, photophobia and anorexia sometimes with a petechial rash, nausea, vomiting and epistaxis. Within a couple of days, 12 other patients were hospitalized with signs of fever and bleeding. Tests showed no evidence of malaria. 11 of these died. Of those who died, seven of them were women. Over a period of 4 months several hundred additional cases were confirmed in Northeastern Province and additional clusters of cases occurred in 18 districts within 6 of 8 provinces in Kenya.

### What do I know?

i) The disease has occurred in Garissa northeastern province, Kenya.
ii) The patient died in 2 days' time.
iii) A butcher was affected.
iv) A young girl caring for parent's goats was affected.
v) Other people have died of the disease.
vi) And out of 11 cases dead, seven were women.
vii) Clinical signs show transient fever, and vomiting and defecating blood, rigor (shivering), headache, severe muscle and joint pain, photophobia and anorexia sometimes with a petechial rash, nausea, vomiting and epistaxis and death.
viii) The disease is infectious.
ix) The affected is a man.

### What do I need to know?

i) What is so peculiar about Garissa Northeastern Province, Kenya?
ii) What is fever, what do these other signs mean?
iii) Which diseases present with these signs?
iv) Which diseases present with these signs and are zoonotic?
v) Why does it seem to be affecting more women in this community?

### Hypothesis

i) Ebola
ii) RVF
iii) Marburg
iv) Yellow fever
v) West Nile virus
vi) Malaria
vii) Poisoning

### Key learning issues

i) To describe the pathogenesis, clinical signs, transmission, control and treatment of RVF.
ii) To describe the epidemiology and distribution of RVF.
iii) To describe RVF and differentiate it from other similar diseases.
iv) To list and describe the steps of an outbreak investigation.
v) To describe and explain zoonotic diseases.
vi) To identify gender role differences among pastoralist communities (who does what in relation to animals) and what causes its social construction (culture).

## 2. Flooded Christmas

In December of 2006, unusually heavy rainfall occurred in Garissa District, the hot semi-arid region, resulting in flooding. Accompanying the flooding was an increased population of mosquitoes and other biting insects in the region. As a result of this, the sale of mosquito nets was booming as the traders who imported them all the way from Nairobi, hiked the prices. Most of the people in this area are nomadic pastoralists, who move around with their animals in search of water and pasture. Despite the flooding, they were excited that they did not have to go far to fetch water for their animals.

### What do I know?

i) The time of the year
ii) It is a period of heavy rainfall
iii) There is flooding
iv) There are a lot of mosquitoes and other insects
v) Increased pricing of mosquito nets
vi) They are pastoralists

### What do I need to know?

i) What is the geography of Northeastern Province?
ii) Who are pastoralists and what is their lifestyle like?
iii) What are the diseases associated with heavy rainfall?
iv) What is the cause of the flooding?
v) What are the diseases that are caused by mosquitoes and biting insects?

### Hypothesis

i) Malaria
ii) RVF
iii) Yellow fever

### Key learning issue

To analyze the role played by the environment (climate, weather, soil types) on the occurrence of RVF.

## 3. Kids, lambs and carcasses all over

While sick people were seen at the hospitals, there was an increase in livestock deaths and abortions especially among the livestock. Many women and girls who were responsible for the care and birthing of small ruminants reported seeing an increased number of abortions in the animals. They also reported severe reactions in newborn lambs and kids which died within hours of infection, rarely surviving more than 36 hours. The onset was marked by high fever which subsided sharply before death. The affected animals were listless, disinclined to move or feed and respiration was rapid. Mortality reached 90 percent or more in animals less than one week of age. This later spread to six of the eight regions of Kenya. No other signs were apparent in animals. Veterinarians in the region were informed about this. They also became aware of the number of people affected.

### What do I know?

i) Animals are dying concurrently with humans.
ii) Animals have signs of abortions.
iii) Younger kids and lambs are more susceptible with very high mortality.
iv) The disease is spreading to multiple districts in Kenya.
v) The disease is affecting both humans and animals.

### What do I need to know?

i) How many animals have died?
ii) After how long are they dying following the onset of signs?
iii) Who is responsible for the care of kids and lambs in the family?
iv) Are they exposed and how can they be protected?

### Hypothesis

i) RVF

ii) A zoonotic arthropod borne virus

### Key learning issues

i) To describe the clinical signs and manifestations of RVF both in animals and humans.
ii) To describe the epidemiology of RVF.
iii) To identify the role of animals in transmission of RVF to humans.
iv) To differentiating RVF from other similar diseases.
v) To identify the gender roles of animal care in the family.

## 4. One World One Medicine One Health

The Kenya Ministry of Health initiated surveillance and sample collection initially concentrating on Northeastern Province. Personnel from the Ministry of Agriculture and Livestock embarked on community sensitization on personal protective measures. Public awareness programs were essential to keep the public fully and accurately informed, not only to reduce concern but also to assist in recognition of disease cases.

An informed press statement was released immediately the disease diagnosis was confirmed. World Food Program and Red Cross were assisting with rescuing the people from the floods and providing food. Residents of the Kenya Field Epidemiology and Laboratory Training Program (FELTP) which is a One Health program helped with outbreak investigation. CDC-Kenya Medical Research Institute investigated the problem. The Zoonotic Disease Unit was in the forefront of coordinating all these stakeholders.

### What do I know?

i) Several stakeholders are involved

ii) Lab diagnosis is underway

iii) There is coordination of the stakeholders

### What do I need to know?

i) Which tests will be carried out?

ii) Where are these tests being carried out?

iii) Which samples should be taken?

iv) Which measures should be taken while taking samples?

v) How do they make sure they are including all stakeholders in the sensitization process?

vi) What mechanisms best reach the women versus the men?

vii) Which measures will be instituted to control the disease?

### Hypothesis

Multiple stakeholders are getting things moving.

### Key learning issues

i) To identify the benefits of a multidisciplinary approach in solving issues regarding infectious diseases, RVF in particular.

ii) To list the stakeholders that could be involved in an RVF outbreak and describe their role.

iii) To identify the benefits of a good communication strategy.

iv) To create a model for a good communication strategy to be used by these stakeholders.

## 5. No more meat for Kenya

A public notice was issued saying no slaughter of animals should be carried out in Kenya. Slaughter houses and butcheries were closed and strict measures were put to ensure this was followed.

### What do I know?

Control measures have been put in place.

### What do I need to know?

i) Did the control measures work?

ii) What was the reaction of Kenyans?

iii) What are the laws governing slaughtering and meat marketing?

### Hypothesis

Slaughter process has something to do with disease transmission.

### Key learning issue

To identify the policies related to RVF.

## 6. "Diagnosis"

Centers for Disease Control and Prevention-Kenya Medical Research Institute (CDC-KEMRI) carried out laboratory tests. Enzyme immunoassay (EIA) tests, enzyme-linked immune sorbent assay (ELISA) and reverse transcriptase-polymerase chain reaction (RT-PCR) were carried out. RVF Immunoglobin M antibodies to RVF were detected.

### What do I know?

i) Tests carried out and results are out

ii) ELISA tests were carried out

iii) RT-PCR tests were carried out

### What do I need to know?

i) Which treatment was given to the humans?

ii) Which treatment was given to animals?

iii) Is there a vaccine for animals or humans?

iv) What are the long-term effects of this disease?

### Hypothesis

RVF

### Key learning issues

i) To identify the causative agent of RVF.

ii) To describe the features of the RVF virus.

iii) To explain the concept of One Health and how important it is in this kind of emergency scenario.

# Facilitator Notes on Problem-Based Learning Case Study

## Introduction

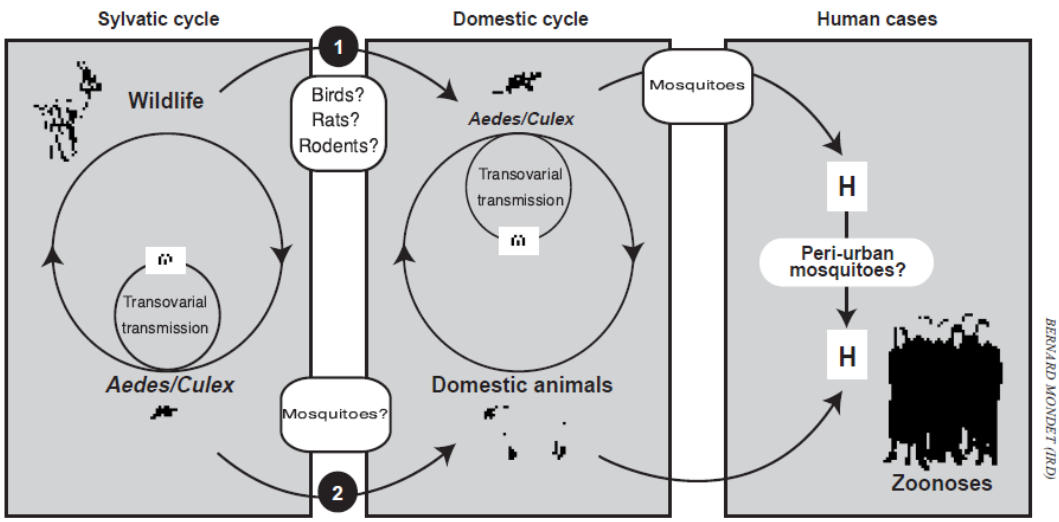
Rift Valley Fever (RVF) is an acute and deadly viral disease that is known to affect both animals and humans. It can be of particular concern to those persons who raise, transport, and sell animals and to those who butcher and consume meat. RVF is a mosquito-borne disease and can cause abortions in pregnant animals and a high mortality in young animals. It is caused by a member of the Phlebovirus genus of the family Bunyaviridae.

In humans, RVF causes a severe influenza-like illness, occasionally with more serious hemorrhagic complications and death. The disease in humans presents most commonly with influenza-like syndrome (fever [37.8–40°C]), headache, muscular pain, weakness, nausea and, epigastric discomfort as well as photophobia.

Most human cases recover within 4-7 days, and complication can include; retinopathy, blindness, meningo-encephalitis, hemorrhagic syndrome with jaundice, petechia and death. Mild symptoms include hemorrhagic fever, muscle pains and headaches whereas severe symptoms range from loss of sight within weeks of infection due to brain inflammation, which can lead to headaches and seizures.

Populations at risk include both humans and ruminant animals (goats, sheep, cattle) in areas where the mosquito species known to transmit the virus are found. Human populations at risk are those involved in the raising, caring, selling, slaughtering and consuming meat from goats and other ruminants. Animal populations at risk include goats, sheep and cattle, as well as wild ruminant species and non-human primates (e.g. vervet monkeys, gorillas).

RVF is transmitted from its sylvatic cycle (wildlife) to susceptible animals (and humans, although this is less common) by blood-sucking mosquitoes (aedes or culex). Clinical signs in newborn goat kids (extremely susceptible) include: biphasic fever (40–42°C), which subsides just prior to death, anorexia, weakness, listlessness, abdominal pain, rapid abdominal respiration prior to death and death within 24–36 hours. In older kids and adult goats, clinical peracute disease includes sudden death with no appreciable signs; acute disease (more common in adult animals); fever (41–42°C) lasting 24–96 hours, anorexia, weakness, listlessness and depression, increased respiratory rate, vomiting, bloody/fetid diarrhea, nasal discharge, and icterus may be evident in a few animals. In pregnant goats, the disease presents with 'abortion storms' with rates approaching 100%.



In humans, the main route of infection is through direct contact with fluids from infected animals: direct contact with aborted fetuses (and or blood, secretions) from affected animals, consumption of meat from infected animals, and consumption of raw milk from infected animals. Humans can also be infected via mosquito bites.

The first indication of development of an epidemic is frequently the abortion, usually in ruminants such as cattle, sheep and goats. Index cases and sporadic cases are usually misdiagnosed. Signs of the disease in animals tend to be non-specific, making it difficult to recognize individual cases of RVF. The simultaneous occurrence of numerous cases of abortion and disease in ruminants, together with disease of humans, following heavy and prolonged rainfall, is characteristic of RVF.

## Species affected

Clinical disease has been observed in sheep, goats, cattle, domesticated Asian buffaloes, camels and humans. The susceptibility of wild antelopes to disease has not been established fully but it is believed that at least some species suffer mortality and abortion. Some breeds of sheep and goats appear to be relatively resistant to the disease.

## World distribution and occurrence

RVF appears to be restricted to Africa. It was recognized first in the Rift Valley of Kenya at the turn of this century but the agent was not isolated until 1930. The disease was first observed in southern Africa in 1950. Most epidemics have occurred in eastern and southern Africa and not until 1977, was the disease known to have occurred in the furthest north, the Sudan. During 1977 and 1978, a major epidemic occurred in the Nile Delta and valley in Egypt. A severe epidemic affected the Senegal River basin in Mauritania and Senegal in 1987 and again in Egypt in 1993. [The periodicity of major epidemics is discussed below in epidemiological features.]

The epidemics in Egypt indicate that the potential exists for spread to other regions of the world outside the African continent. The East African region has experienced many outbreaks of Rift Valley Fever through the 2000 era. In 2006, Kenya had an outbreak, which has become sporadic since then. In 2010, there were persistent sporadic abortions in Rwanda although this was never confirmed. Currently, there is an RVF outbreak in Uganda. The Uganda Ministry of Health confirmed an outbreak of RVF in the western district of Kabale.

## Clinical signs in humans

Uncomplicated RVF in humans characteristically manifests as an acute influenza-like illness with transient fever, rigor (shivering), headache, severe muscle and joint pain, photophobia and anorexia sometimes with a petechial rash, nausea, vomiting and epistaxis. The course is 4 to 7 days, leading to full recovery in two weeks. The most frequent complication is retinitis, usually bilateral, occurring 1 to 3 weeks after the primary febrile illness. Permanent loss of central vision is suffered by some 50 percent of those affected; there may be permanent unilateral or bilateral blindness. Other, often fatal, complications have been more prominent in the epidemics in West Africa and Egypt.

In a proportion of RVF cases, a biphasic fever is seen with encephalitis developing during the second febrile phase. Patients suffer confusion, hallucinations, vertigo and choreiform movements sometimes leading to coma. The case mortality rate is generally low but full recovery may be protracted and long-term neurological complications have been reported.

A hemorrhagic diathesis with hepatitis is a relatively new form of the disease, first described in 1975 in South Africa. It is an acute febrile illness of 2 to 4 days duration, followed by jaundice and widespread hemorrhages in mucosae and subcutaneously. Bleeding occurs at needle puncture sites, from the gums and nose and there may be hematemesis and diarrhea with melena. Death usually occurs within another 3 to 6 days and a few patients recover after a long slow convalescence.

## Clinical signs in animals

Infection is more common than severe disease, it is often mild or sub-clinical. Most, if not all, infected pregnant sheep, goats, cattle (and most likely domesticated Asian buffaloes) and camels abort affected fetuses at any stage of gestation, usually undergoing autolysis. The most severe reactions occur in newborn lambs and kids which die within hours of infection, rarely surviving more than 36 hours. Onset is marked by high fever which subsides sharply before death. Affected animals are listless, disinclined to move or feed and respiration is rapid.

Mortality reaches 90 percent or more in animals less than one week of age. Older lambs and kids and mature sheep and goats may develop in apparent peracute or acute disease. In peracute disease, death occurs before the development of notable signs. Acute disease is characterized by high fever for 1 to 3 days, anorexia, weakness, listlessness and rapid respiration. Some animals regurgitate ruminal contents and exhibit blood-stained nasal discharge, fetid diarrhea and melena. Jaundice may be evident. Death occurs after about three days of illness. The mortality rate is lower than in one-week-old lambs but can still reach 50 percent or more. The disease in calves resembles that in lambs—essentially fever, weakness, inappetance and diarrhea, which may be blood-stained—but jaundice is more frequent. Death occurs from 2 to 8 days and the mortality rate is generally low at around 20 percent.

Adult cattle exhibit clinical signs of disease infrequently but some may develop acute disease with fever for 2 to 3 days, anorexia, lachrymation, hyper salivation, nasal discharge, dysgalactia and diarrhea which may be blood-stained. Frequently, abortion is the only manifestation in this species. The mortality rate does not usually exceed 10 percent but can be higher. A prolonged course of 10 to 20 days with marked jaundice has been described in the Sudan.

Antibodies to RVF virus have been detected in camels and the virus isolated from them during epidemics. Deaths and abortions almost certainly occur but the disease has been little studied in this species. Antibody surveys and experimental infection studies have demonstrated that many species of wild ruminants (African buffaloes and numerous antelope species) sustain infection, yet, the results of that infection have not been clearly described. It is highly likely that both abortions and mortalities occur in at least some wildlife species during epidemics.

## Pathology

The pathogenesis of RVF results from the spread of the virus from the site of introduction to the body and initial replication sites to critical organs such as the spleen, liver and brain. These are either directly damaged by the effects of the virus or by immunopathological mechanisms. Even in benign infections of livestock, there is a marked leukopenia during the first 3 to 4 days of infection, corresponding with the peak fever and viremia. At the same time, there are marked increases in the serum concentrations of some enzymes indicative of liver cell damage.

The most severe lesions are found in aborted sheep fetuses and newborn lambs. The liver is usually enlarged, soft, friable and yellowish-brown to dark reddish-brown in color. Irregular congested patches and hemorrhages of varying size are often present in the substance of the liver together with pale foci. Jaundice is seen in only a relatively small proportion of lambs because of the short time to death. In older sheep, the hepatic lesions are generally not so severe but jaundice may be more marked. Pale areas of cell necrosis combined with large hemorrhages give a mottled appearance to the liver.

Hemorrhages and edema of the gall bladder are common and the bile may contain blood. Elsewhere, in newborn lambs, petechial and ecchymosis hemorrhages are found in the abomasal mucosa and the contents are often dark brown from the presence of partly-digested blood; the contents of the small intestine may be similar. Most mature sheep have hemorrhages and edema in the abomasal folds and sometimes free blood in the intestinal lumen. Aborted cattle fetuses, calves and older cattle show lesions essentially similar to those in sheep fetuses, lambs and older sheep.

In all animals, the peripheral and visceral lymph nodes are enlarged, edematous and may contain petechial hemorrhages and, in most cases, the spleen is enlarged with hemorrhages in the capsule. Hepatic necrosis of varying degree is the most striking microscopic lesion in all animals. Many animals have lung congestion, edema, hemorrhage and emphysema.

## Laboratory diagnostic confirmation

The clinical diagnosis can be confirmed by a number of tests amongst which are:

i) histopathology performed on formalin-fixed sections of liver; lesions are distinctive but immunoperoxidase staining of viral antigen adds specificity.

ii) virus isolation in cell culture or by intraperitoneal or intracerebral inoculation of weanling mice or hamsters confirmed by immunofluorescent or immunoperoxidase staining.

iii) detection of viral antigen by immunofluorescent or immunoperoxidase staining of frozen sections, immunodiffusion, complement fixation and ELISA.

iv) detection of viral RNA by reverse transcriptase polymerase chain reaction (RT-PCR).

v) detection of antibodies by virus neutralization and ELISA (not the haemagglutination-inhibition test which is non-specific), and these are used mainly retrospectively to determine the extent of an epidemic. For diagnostic confirmation, recent or current infection must be distinguished from pre-existing immunity. Paired samples collected during the acute phase and again 2 to 3 weeks later provide evidence of recent infection. IgM-capture ELISA allows diagnosis of recent infection to be made on a single serum sample.

Specimens required include heparinized and clotted peripheral blood, heart blood, tissue samples (liver, spleen, kidney and lymph nodes), collected preferably at the height of fever, and serum. Samples from aborted fetuses should include brain. Where delay is anticipated in samples reaching a laboratory or where samples have to be transported at ambient temperature, tissue samples can be preserved in glycerol-saline solution (50:50).

It should be noted that the conditions which precipitate an epidemic of RVF (inter alia, heavy and prolonged rainfall leading to flooding) are also those predisposing to the occurrence of other major disease epidemics which can occur simultaneously. In pastoral areas, the movement of humans and their livestock away from flooded areas and their congregation on higher land favors the transmission of other disease agents including foot-and-mouth disease, contagious bovine pleuropneumonia, contagious caprine pleuropneumonia, capri pox and morbillivirus infections (rinderpest and peste des petits ruminants).

Following rain, there is a lag phase before increase in tick population, generating epidemics of tick-borne diseases. Ephemeral fever and lumpy skin disease also occur at this time, favored by vector multiplication. Orbivirus infections, such as bluetongue and epizootic hemorrhagic disease, may also increase in incidence but bluetongue disease will only be seen clinically in imported sheep and their crosses, for example, wool and Dorper sheep.

## Epidemiological features

Outbreaks of RVF occur generally when particularly heavy, prolonged and, often, unseasonal rainfall favors the breeding of mosquito vectors. Epidemics in most of eastern and southern Africa occur in 5 to 20 year cycles, but, in the dry semi-arid zones of eastern Africa, the periodicity is 15 to 30 years.

## Vaccines

The mouse-adapted Smithburn strain of RVF virus is used to produce live vaccines. They are highly immunogenic and induce durable, probably life-long immunity within 7 days after a single inoculation,

although cattle may not be fully protected. Large quantities can be produced readily and inexpensively. However, the virus is only partially attenuated and can cause abortion or fetal damage and prolonged gestation in a proportion of pregnant animals. It is also conceivable that the virus could be transmitted between animals by mosquitoes and revert to full virulence. The use of such vaccines is therefore inadvisable in countries where the presence of the virus has not been proven.

Vaccines prepared by the inactivation of wild strains of RVF virus with formalin or J-propriolactone give low antibody responses. Repeated inoculation after an initial double vaccination with an interval of 2 to 4 weeks is required to maintain immunity which is short-lived. They are safe in pregnant animals but are expensive to produce. Sheep are protected better than cattle whilst colostral immunity is inadequate.

Other experimental vaccines are undergoing assessment.

## RVF virus survival in the environment

The survival of RVF virus in the environment is limited and it is susceptible to low pH (acid). Areas contaminated with blood spillage can be decontaminated with 2 percent acetic acid or 5 percent sodium hypochlorite. Blood, even dried blood, may remain contaminated and infectious for humans for some months at ambient temperature. Pasteurization renders milk safe. Chilled or frozen meat is probably safe to eat after storage and cooking. Hides and skins, bones and manure are rendered safe if sun-dried.

## Control

The limits of an area for control activities may be determined by prior knowledge of the distribution of RVF in earlier epidemics in the country and of potential vector species. Theoretically, measures taken could include, inter alia:

i) chemical control of vectors by, for example, ultra-low volume spraying of insecticides and application of systemic insecticides to target species.

ii) movement of stock from low-lying areas to well-drained and wind-swept pastures at higher altitudes.

iii) the confinement of livestock to mosquito-proof stables.

iv) control of livestock movements.

v) slaughter and disposal of all infected livestock.

However, such measures are usually impractical, instituted too late and at best palliative in the face of a RVF epidemic. Immunization remains the only effective means of protecting livestock.

Vaccination in the face of established RVF epidemics has usually been applied too late to avert them or prevent considerable losses from occurring. Nevertheless, vaccination of large numbers of animals could ultimately have contributed to the abatement of epidemics, and have been beneficial in reducing losses through their impact on herd immunity.

The fact that epidemics of RVF occur at long, irregular intervals of many years, and that outbreaks tend to occur simultaneously across an extensive area, makes it difficult to advocate and justify the expense of, repeated prophylactic vaccination of susceptible livestock species during the long inter-epidemic periods. A promising approach to resolving this dilemma is the prediction of RVF epidemics. Monitoring of meteorological and remote sensing data, inter alia, Cold Cloud Duration (CCD—a measure of rainfall) and Normalized Difference Vegetation Index (NDVI—a measure of vegetation density/soil moisture), within a geographic information system can indicate when conditions suitable for high vector multiplication are developing, and sero-monitoring of livestock can indicate periods of increased viral activity. Prophylactic immunization of livestock could then, conceivably, be applied in time to avert the most serious consequences.

## Control and elimination of outbreaks in newly-infected countries

Activities undertaken should attempt to contain the virus at the site of introduction (by movement controls) and then eliminate it (destruction of infected and potentially infected livestock). It is very important that the timing and sequence of operations give the greatest chance of eliminating the virus before it becomes widespread in an insect vector or animal populations, including wildlife.

## Quarantine and movement controls

Immediately on suspicion of the disease, an infected area should be designated extending at least 10km from known infected animals. The area at risk is also determined with respect to geographical features, prevailing winds, and the presence of possible vectors and the density of prospective hosts. Movements in and out of the area are prohibited.

After introduction of RVF to a new area, effective quarantine and movement controls are essential to reduce spread, even if the virus has become established in an insect vector population. Initially stringent, these controls can be relaxed a little in favor of zonal restrictions, centered on the infected area, once the extent of infection has been assessed.

## Surveillance and tracing

Infected humans can play an important role in the transmission of RVF and it will be necessary to trace both animal and human movements. Close collaboration between human and medical staff is called for to trace both the source of infection and possible secondary cases. Surveillance involves clinical examination of livestock at risk and serological monitoring of a statistically significant sample at short intervals to determine if virus transmission is occurring. Vector studies may also be needed. Vector and serological surveillance will need to be continued for at least one year to start to demonstrate freedom from infection. The actual or potential role of wild ruminants must be assessed early.

## Vaccination

All ruminants in herds within the infected area should be vaccinated immediately with an inactivated RVF vaccine and revaccinated after 2 to 4 weeks. The use of live attenuated vaccines should only be considered if RVF spreads outside the initial area affected.

## Vector control

A realistic assessment of the feasibility of vector control must be made at the earliest possible time in discussion with locust and other plant pest control personnel. Aerial or ground ultra-low volume application of insecticides or thermal fogs or mists generated on the ground could be considered. Treatment of livestock with a systemic insecticide (e.g. an avermectin) or a topical insecticide (e.g. a synthetic pyrethroid) over a wide area could assist in reducing the populations of potential vectors. Biological control systems using Bacillus thuringiensis or hormones suppressing larval development are more acceptable alternatives.

## Public awareness

Public awareness programs are essential to keep the public fully and accurately informed, not only to reduce concern but also to assist in recognition of disease cases. An informed press statement should be released immediately the disease diagnosis is confirmed.

## Differential diagnosis

- **Ebola hemorrhagic fever**

The Ebola virus causes an acute, serious illness which is often fatal if untreated. Ebola virus disease (EVD) first appeared in 1976 in two simultaneous outbreaks: one in what is now, Nzara, South Sudan, and the other in Yambuku, Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name.

The most recent outbreak in West Africa, (first cases notified in March 2014), is the largest and most complex Ebola outbreak since the Ebola virus was first discovered in 1976. There have been more cases and deaths in this outbreak than all others combined. It has also spread between countries starting in Guinea then spreading across land borders to Sierra Leone and Liberia, by air (1 traveler) to Nigeria and USA (1 traveler), and by land to Senegal (1 traveler) and Mali (2 travelers).

The most severely affected countries – Guinea, Liberia and Sierra Leone – have very weak health systems, lack human and infrastructural resources, and have only recently emerged from long periods of conflict and instability. On August 8, the WHO Director-General declared the West Africa outbreak a Public Health Emergency of International Concern under the International Health Regulations (2005).

The virus family Filoviridae includes three genera: Cueva virus, Marburg virus and Ebola virus. There are five species that have been identified: Zaire, Bundibugyo, Sudan, Reston and Taï Forest. The first three, Bundibugyo ebolavirus, Zaire ebolavirus, and Sudan ebolavirus have been associated with large outbreaks in Africa. The virus causing the 2014 West African outbreak belongs to the Zaire species.

## Transmission

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead in the rainforest. Ebola then spreads through human-to-human transmission via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids.

Health care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola. People remain infectious as long as their blood contains the virus.

## Symptoms of Ebola virus disease

The incubation period, that is, the time interval from infection with the virus to onset of symptoms is 2 to 21 days. Humans are not infectious until they develop symptoms. First symptoms are the sudden onset of fever, fatigue, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rash, symptoms of impaired kidney and liver function; and in some cases, both internal and external bleeding (e.g. oozing from the gums, blood in the stools). Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes.

## Diagnosis

It can be difficult to distinguish EVD from other infectious diseases such as malaria, typhoid fever and meningitis. Confirmation that symptoms are caused by Ebola virus infection are made using the following investigations:

i) Antibody-capture enzyme-linked immunosorbent assay (ELISA)
ii) Antigen-capture detection tests
iii) Serum neutralization test
iv) Reverse transcriptase polymerase chain reaction (RT-PCR) assay
v) Electron microscopy
vi) Virus isolation by cell culture

Samples from patients are an extreme biohazard risk and laboratory testing on non-inactivated samples should be conducted under maximum biological containment conditions.

## Treatment and vaccines

Supportive care-rehydration with oral or intravenous fluids, and treatment of specific symptoms, improves survival. There is as yet no proven treatment available for EVD. However, a range of potential treatments including blood products, immune and drug therapies are currently being evaluated. No licensed vaccines are available yet, but 2 potential vaccines are undergoing human safety testing.

## Prevention and control

Good control of outbreak relies on applying a package of interventions, namely: case management, surveillance and contact tracing, a good laboratory service, safe burials and social mobilization. Community engagement is key to successful control of outbreaks. Raising awareness of risk factors for Ebola infection and protective measures that individuals can take is an effective way to reduce human transmission. Risk reduction messaging should focus on several factors.

- **Marburg Hemorrhagic Fever**

Marburg hemorrhagic fever (Marburg HF) is a rare but severe hemorrhagic fever which affects both humans and non-human primates. Marburg HF is caused by Marburg virus, a genetically unique zoonotic (or, animal-borne) RNA virus of the filovirus family. The five species of Ebola virus are the only other known members of the filovirus family.

The reservoir host of Marburg virus is the African fruit bat, *Rousettus aegyptiacus*. Fruit bats infected with Marburg virus do not show obvious signs of illness. Primates (including humans) can become infected with Marburg virus, and may develop serious disease with high mortality. Further study is needed to determine if other species may also host the virus.

Marburg HF typically appears in sporadic outbreaks throughout Africa, and laboratory confirmed cases have been reported in Uganda, Zimbabwe, the Democratic Republic of the Congo, Kenya, Angola, and South Africa. Many of the outbreaks started with male mine workers working in bat-infested mines. The virus is then transmitted within their communities through cultural practices, under-protected family care settings, and under-protected health care staff. It is possible that sporadic and isolated cases occur as well, but they go unrecognized.

## Transmission

Originally, human infection results from prolonged exposure to mines or caves inhabited by Rousettus bats colonies. Transmission is mainly human-to-human, resulting from close contact with the blood, secretions, organs or other bodily fluids of infected persons. Burial ceremonies where mourners have direct contact with the body of the deceased can play a significant role in the transmission of Marburg. Transmission via infected semen can occur up to seven weeks after clinical recovery. Transmission to health care workers has been reported while treating Marburg patients, through close contact without the use of correct infection control precautions. Transmission via contaminated injection equipment or through needle-stick injuries is associated with more severe disease, rapid deterioration, and, possibly, a higher fatality rate.

## Signs and symptoms

The incubation period (interval from infection to onset of symptoms) varies from 2 to 21 days. Illness caused by Marburg virus begins abruptly, with high fever, severe headache and severe malaise. Muscle aches and pains are a common feature. Severe watery diarrhea, abdominal pain and cramping, nausea and vomiting can begin on the third day. Diarrhea can persist for a week. The appearance of patients at this phase has been described as showing "ghost-like" drawn features, deep-set eyes, expressionless faces, and extreme lethargy. In the 1967 European outbreak, non-itchy rash was a feature noted in most patients between 2 and 7 days after onset of symptoms.

Many patients develop severe hemorrhagic manifestations between 5 and 7 days, and fatal cases usually have some form of bleeding, often from multiple areas. Fresh blood in vomitus and feces is often accompanied by bleeding from the nose, gums, and vagina. Spontaneous bleeding at venipuncture sites (where intravenous access is obtained to give fluids or obtain blood samples) can be particularly troublesome. During the severe phase of illness, patients have sustained high fever. Involvement of the central nervous system can result in confusion, irritability and aggression. Orchitis has been reported occasionally in the late phase of the disease (15 days). In fatal cases, death occurs most often between 8 and 9 days after symptom onset, usually preceded by severe blood loss and shock.

## Diagnosis

The differential diagnoses usually include malaria, typhoid fever, shigellosis, cholera, leptospirosis, plague, rickettsiosis, relapsing fever, meningitis, hepatitis and other viral hemorrhagic fevers.

Marburg virus infections can be diagnosed definitively only in laboratories by a number of different tests as outlined below:

i) Enzyme-linked immunosorbent assay (ELISA)
ii) Antigen detection tests
iii) Serum neutralization test
iv) Reverse-transcriptase polymerase chain reaction (RT-PCR) assay
v) Virus isolation by cell culture

Tests on clinical samples present an extreme biohazard risk and are conducted only under maximum biological containment conditions.

## Treatment and vaccine

Severe cases require intensive supportive care as patients are frequently in need of intravenous fluids or oral rehydration with solutions containing electrolytes.

No specific treatment or vaccine is yet available for MHF. Several vaccine candidates are being tested but it could be several years before any are available. New drug therapies have shown promising results in laboratory studies and are currently being evaluated.

## Reducing the risk of infection in people

In the absence of effective treatment and human vaccine, raising awareness of the risk factors for Marburg infection and the protective measures individuals can take to reduce human exposure to the virus, are the only ways to reduce human infections and deaths.

- **Yellow fever**

Yellow fever is caused by a virus (Flavivirus) which is transmitted to humans by the bites of infected aedes and haemogogus mosquitoes. The mosquitoes either breed around houses (domestic), in forests

or jungles (wild), or in both habitats (semi-domestic). Yellow fever occurs in 34 countries in sub-Saharan Africa and in 13 countries in Latin America. Around 90% of cases reported every year occur in sub-Saharan Africa.

Occasionally, infected travelers from areas where yellow fever occurs have exported cases to countries that are free of yellow fever, but the disease can only spread easily if that country has mosquito species able to transmit it, specific climatic conditions and the animal reservoir needed to maintain it.

Angola is currently grappling with a yellow fever outbreak, which has infected more than 450 people and killed 178 – the first epidemic of the disease to hit the country in 30 years. The outbreak, which was first reported in the capital city Luanda in December 2015, has since spread to 6 of the country's 18 provinces.

Yellow fever virus is transmitted by infected mosquitoes, the most common species being Aedes aegypti – the same mosquito that spreads the Zika virus. Symptoms include fever, headache, muscle pain, nausea, vomiting, and fatigue. A small percentage of infected people experience a second more severe phase of illness which includes high fever, jaundice and internal bleeding. At least half of severely affected patients who don't receive treatment die within 10 to 14 days.

Angola is one of 34 countries in Africa where yellow fever occurs, and vaccination against the disease is recommended.

## Symptoms

Illness with yellow fever begins with an 'acute' phase with general symptoms of fever, muscle pain, backache, headache, shivers, loss of appetite, and nausea or vomiting. Most patients show improvement after 3 to 4 days. Around 15% of people with the disease will then go through a second, 'toxic' phase within 24 hours of the initial remission. They will experience high fever, jaundice, and abdominal pain with vomiting and deteriorating kidney function. Bleeding can occur from the mouth, nose, eyes or stomach, with blood then appearing in vomit and feces. Around half of the people who enter the toxic phase of yellow fever disease die within 10 to 14 days.

## Diagnosis

Yellow fever is difficult to diagnose (especially during the early stages) because its symptoms can be confused with other common diseases such as malaria, dengue, leptospirosis and Zika virus, as well as with poisoning. Doctors or clinicians who see a sick patient may not be able to tell that they have yellow fever from their symptoms alone, especially if they are in an area where many of these diseases are occurring at the same time.

To confirm a suspected diagnosis of yellow fever, laboratory tests need to be done. Blood tests can detect antibodies produced in response to yellow fever, proving that the person has been infected. Several other techniques are used to identify the virus in blood specimens or liver tissue collected after death. These tests require highly trained laboratory staff and specialized equipment and materials.

## Transmission

There are three types of transmission cycle:

1. Sylvatic (or jungle): In tropical rainforests, yellow fever occurs in monkeys that pass the virus to mosquitoes that feed on them. The infected mosquitoes bite humans entering the forest resulting in sporadic cases of yellow fever, usually in young men working in the forest (e.g. loggers).
2. Intermediate: In humid or semi-humid parts of Africa, semi-domestic mosquitoes (mosquitoes

that breed in the wild and around households) infect both monkeys and humans. Increased contact between people and infected mosquitoes leads to increased transmission and small-scale epidemics can occur. An outbreak can become a more severe epidemic if the infection is carried into an area populated with both domestic mosquitoes and unvaccinated people.

3. Urban: Large epidemics occur when infected people introduce the virus into a densely populated area with high numbers of non-immune people and aedes mosquitoes. Infected mosquitoes transmit the virus from person to person.

## Treatment

There is no specific antiviral treatment for the yellow fever virus but supportive care can treat symptoms of the disease such as dehydration and fever. Associated bacterial infections can be treated with antibiotics. Specific management of organ failure (kidney, liver, etc.) can help seriously ill patients but this is rarely available in low-resource settings.

## Prevention and control

Yellow fever can be prevented through vaccination and mosquito control. The yellow fever vaccine is safe and affordable, and a single dose provides life-long immunity against the disease. Mosquito control can also help to prevent yellow fever, and is vital in situations where vaccination coverage is low or the vaccine is not immediately available. Mosquito control includes eliminating sites where mosquitoes can breed, and killing adult mosquitoes and larvae by using insecticides in areas with high mosquito density. Community involvement through activities such as cleaning household drains and covering water containers where mosquitoes can breed is a very important and effective way to control mosquitoes.

## Pastoralists

Pastoralists are:

i) herders whose livelihoods depend on the animals they breed and tend.

ii) herders who have optimum human adaptation to the arid and semi-arid areas.

iii) well adapted to scarcity of resources.

iv) low ecological potential of their land.

v) able to cope through:

- High level of mobility
- Split herd management
- Diversification of livestock holdings/ many species
- Mutual support networks
- Supplementation of income through ancillary

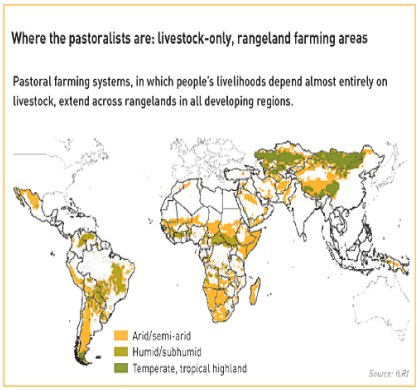
## Facts on pastoralists

i) 30-40 million pastoralists are in the world

ii) 20-25 million are found in Africa: Sudan, Ethiopia, Somalia, Kenya, Eritrea, Chad and Djibouti

iii) Comprise 10-25% of national population

iv) Two-thirds live below the poverty line
v) Forage and livestock are their main resources
vi) Main determinant of human welfare is the performance of the livestock economy
vii) Pastoralist way of life is under pressure
viii) Larger political and economic events/World Bank
ix) Demographic explosion
x) Forced sedentarization policies
xi) Recurrent droughts and famines
xii) Occupy remote frontiers: no central government control
xiii) Lack of good development policies & institutions
xiv) Conflict areas




## Gender roles among pastoralist communities

Women in pastoralist communities are perceived as:

i) reproductive actors/their productive role ignored.
ii) traditional image of mother and wife.
iii) not involved in decision-making.
iv) most pastoralist societies live in a culture of conflict/war
v) Men have full control
vi) labor men use in exploitation of resources.
vii) cattle kept for dowry and prestige.
viii) Owners of smallstock-small animals can be used by the women - goats and sheep

## Role of women in labor provision

i) Collecting grass
ii) Mudding houses/building houses
iii) Cooking
iv) Fetching water and firewood
v) Cleaning cattle areas/building animal bomas
vi) Milking
vii) Feeding animals
viii) Veterinary care
ix) Nursing new born kids/calves/lambs
x) If there is conflict, men are at war or dead, women are providers and caretakers
xi) Extended family: they are responsible for caring for orphans and older people
xii) Livestock is their only source of livelihood

## Women's strategic needs

i) Ways to increase food production
ii) Training and education, access to information concerning disease
iii) To be involved in decision-making
iv) Communication channels accessible to all people
v) Equitable distribution of resources
vi) Sensitization information related to disease delivered directly to women
vii) Exchange of information on the roles, opportunities and challenges of women in livestock development

## Gender awareness and sensitivity on part of service providers and policymakers

i) Lack of baseline data, especially on the role of women in animal health provision (e.g. guinea worm training provided to men)
ii) No data dis-aggregated by gender. Assumption that men take care of the animals and treat sick animals.
iii) Household as a monolithic unit: information provided to head of household will reach every member of the household.
iv) Training of service providers in gender related issues: includes female veterinarians.
v) Institutional capacity: misconception-real scientists do not do gender training-that is for social scientists
vi) It is women's role to do what they do.

## Some recommended solutions

i) Provide sensitization extension and training for women
ii) Bring it closer to women: hold it in the village rather than a fancy hotel where only men can attend.
iii) Plan with the men: avoid domestic disturbance!
iv) Select times conducive to women's participation
v) Group meetings: build women's confidence, women only meetings
vi) Networking
vii) Gender mainstreaming: create awareness
viii) Include women in decision-making: communication channels have to be accessible to women
ix) Leadership skills
x) Direct contact with women in the community

## Policies for pastoralist development

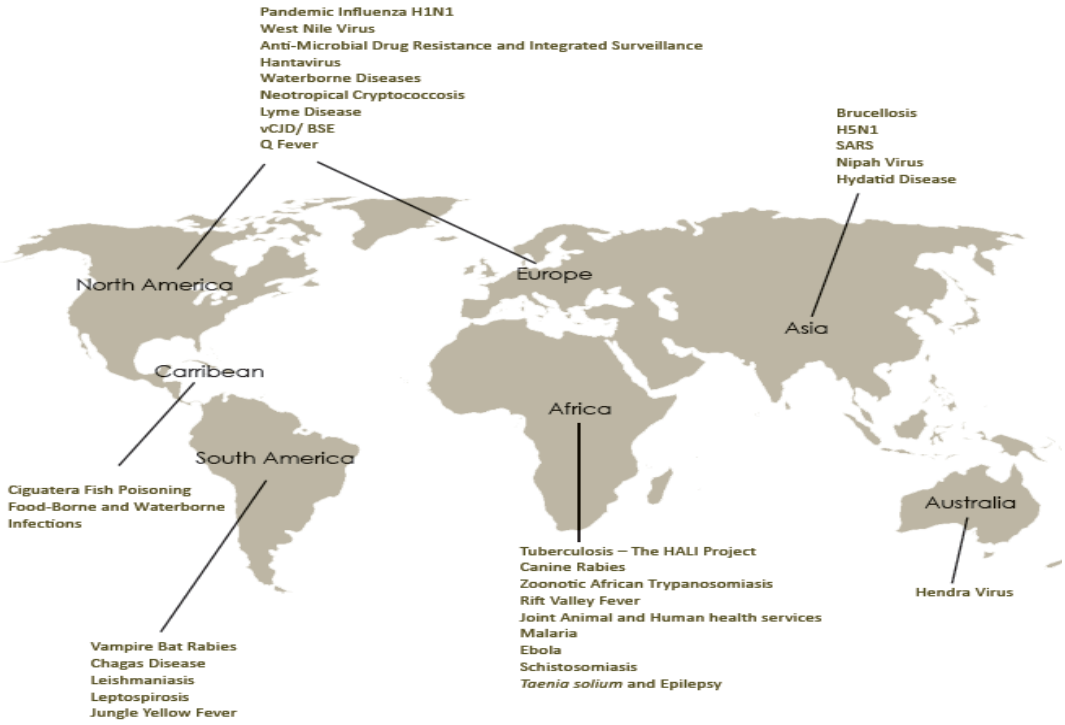
Due to conflict and distance from centers of government support, most pastoralists have:

i) Little say in policy formulation and implementation
ii) Occupy peripheral social, political and economic positions
iii) Small national budget allocation
iv) Poor infrastructure

v) Aim to maximize production
vi) Experience environmental degradation
vii) Increased vulnerability to market fluctuations
viii) To sell off of livestock
ix) Increasing dependency on relief especially from foreign agencies

## Aim of One Health

To improve health and well-being through the prevention of risks and the mitigation of effects of crises that originate at the interface between humans, animals and their various environments. For that purpose, there is a need to promote a multi (cross) sectoral and collaborative approach as well as promote a "whole of society" approach to health hazards, as a systemic change of perspective in the management of risk. One Health is more of an approach than a new concept. It is rapidly becoming an international movement based on cross-sectoral collaborations.




## The benefits of One Health

The benefits of a One Health approach include:

i) Improving animal and human health globally through collaboration among all the health sciences, especially between the veterinary and human medical professions to address critical needs.
ii) Meeting new global challenges head-on through collaboration among multiple professions—veterinary medicine, human medicine, environmental, wildlife and public health.
iii) Developing centers of excellence for education and training in specific areas through enhanced collaboration among colleges and schools of veterinary medicine, human medicine and public health.
iv) Increasing professional opportunities for multiple professionals as well as adding to scientific knowledge to create innovative programs to improve health.

## Definition of One Health

Regardless of which of the many definitions of One Health is used, the common theme is collaboration across sectors. Collaborating across sectors that have a direct or indirect impact on health involves thinking and working out of silos and optimizing resources and efforts while respecting the autonomy of the various sectors. To improve the effectiveness of the One Health approach, there is a need to establish a better sectoral balance among existing groups and networks, especially between veterinarians and physicians, and to increase the participation of environmental and wildlife health practitioners, as well as social scientists and development actors.

AVMA definition: One Health is the collaborative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment. The more recent use of One Health may be traced to a story about Ebola hemorrhagic fever on April 7, 2003, when Rick Weiss of the Washington Post quoted William Karesh, DVM as saying, "Human or livestock or wildlife health can't be discussed in isolation anymore. There is just one health. And the solutions require everyone working together on all the different levels. The following year, Karesh and colleagues Robert Cook, VMD and Steve Osofsky, DVM launched a series of conferences around the world with the theme of One World - One Health

## The One Health Approach

i) Recognizes the interdependence of, and seeks to improve human, animal and environmental health.

ii) Recognizes that communication, collaboration and trust between human and animal health practitioners is at the heart of the One Health concept.

iii) Has a broad vision and includes other disciplines such as economics and social behavior that are essential to success.

iv) Needs to promote the 'doable,' such as improving surveillance and response for emerging infectious diseases whilst developing the broader approach.

v) Emphasizes community participation and development of community capacity, and especially, an open transparent dialogue.

vi) Requires both 'ground up' and 'top down' action.

vii) Recognizes that understanding ecosystems, including molecular ecobiology, are an essential part of One Health.

viii) Recognizes that One Health is a major component of food security and safety.

## Identify the parties that should be involved in the notification and investigation of an infectious disease outbreak.

The first people to be contacted in a disease outbreak are hospital personnel, such as the nurses, medical assistants, and primary care doctors to prepare them for the potential influx of sick people to the local hospitals and clinics. The state and district health officers should investigate and confirm the disease outbreak. The investigating team visits the affected areas and cooperates with their counterparts from the Department of Veterinary Services and the Department of Environmental Health. The information obtained from the investigation is transmitted to the authority of the country that decides on the course of action for the outbreak. The authority after being informed of the severity of the outbreak institutes measures to control, contain, and if possible, eliminate the disease in animals and compensate the farmers for the losses. The government, as a mean of risk communication, periodically inform and update the public on the risk and status of the disease. This action is to prevent unnecessary concern among the public.

## Discuss "One Health" approach in the control and prevention of RVF disease outbreaks

One Health is a public health management approach involving people, animals, and the environment. One health approach is a coordinated multidisciplinary and multi-sectoral local, national and international collaboration to detect, prevent and control emerging and re-emerging diseases at the animal-human-ecosystem interface. Thus, the success of One Health approach in the monitoring and control of public health threats lies in the full cooperation of the physicians, veterinarians, environmental experts, policymakers and the community. This can be achieved through the understanding of mode of diseases spread among people and animals and in the environment.

Outbreak of RVF virus infection implicates animals, humans and the environment. Thus, the stakeholders responsible for the control and prevention of RVF outbreaks include the Department of Veterinary Services, Department of Wildlife, Ministry of Health, Ministry of Housing and Ministry of Environment. Among the functions of these stakeholders is restricting entry of unauthorized people into the area where the outbreak is occurring. The stakeholder must also formulate and execute the safe disposal of animal carcasses. A carcass burial grounds is assigned after due consideration is given to water seepage from the burial grounds into ponds and waterways. If burning is the choice of carcass disposal, it must be done with due consideration for dioxin emission. The public must be informed of the status of outbreak, and if necessary, the authorities can declare a state of national emergency/crisis for the outbreak. The following stakeholders should be involved:

i) Department of Veterinary Services
ii) Ministry of Health
iii) Department of Wildlife
iv) Community members: women and men separately
v) Ministries of Environment and Health
vi) Ministry of Information
vii) Local politicians/community elders
viii) Any local NGOs and CBOs

## Describe the management of a disease outbreak

Management of an outbreak should follow the sequence listed below:

i) Determine that an outbreak has occurred
ii) Contact and coordinate the key personnel to be involved
iii) Obtain clinical specimens and samples for laboratory analyses
iv) Implement control and prevention measures
v) Define cases and conduct case finding
vi) Describe the outbreak according to time, place and people affected
vii) Develop hypotheses
viii) Plan and conduct an epidemiologic study to test hypotheses
ix) Analyze collected data and interpret results
x) Report findings of the outbreak investigation to relevant authorities
xi) Respond to control outbreak
xii) Develop communication strategy for communicating effectively with affected community

## Recommend good and effective communication strategies for dissemination of information on RVF

Dissemination of information on RVF can be done through awareness campaigns and educational programs for affected personnel including livestock handlers, butchers, veterinarians and community members. Special attention should be paid to gender roles and ensure that both women and men have access to information since they are affected and exposed differently by the disease. Channels of communication for awareness creation should take into consideration gender roles.

## National policy to improve screening and control of the disease

The primary goal of a national policy on RVF is to control and prevent spread of the disease to the human population. Thus, the policy should clearly describe methods and procedures for prompt detection and diagnosis of infections in patients and animals. Treatment of human or animal patients must be appropriately instituted under supervision of medical practitioner or veterinarian until full recovery. There should be a section on contact-tracing and surveillance. RVF control procedures must include effective infection control strategies. The full commitment of the government and adequate funding are keys to a successful RVF control program and this must be included in the policy. The policy must clearly state the organizations, sectors and personnel to be involved in the periodical review of the control and prevention of the disease and response to outbreaks. Among new strategies to be included in the policy are risk analysis and screening programs using current methods and awareness campaigns. Since animals transmit disease to humans, the policy must include disease control in the animal population, with provisions for compensations to owners when forced culling of animals is necessary.

# *Resources*


Daszak, P., Zambrana-Torrelio, C., and Bogich, T. L. (2012). Interdisciplinary approaches to understanding disease emergence: The past, present and future drivers of Nipah virus emergence. Proceedings of the National Academy of the United States of America. Retrieved on December 1, 2013, from http://www.pnas.org/content/110/Supplement_1/3681.full.

Zinsstag, J., Schelling, E. and Waltner-Towes, D. (2011). From "One Medicine" to "One Health" and systemic approaches to health and well-being. Preventive Veterinary Medicine. 101(148–156). Retrieved from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3145159/.

Barrett, M.A., and S.A. Osofsky. (DATE) One Health: Interdependence of People, Other Species and the Planet. Section 4 Public Health. 364–377.

Kahn, L.H. (2013).One Health concept for the 21st century. 1st International Symposium Biosafety and Biocontainment 2013, 49p.

Kahn, Laura H. et al. (2008). Teaching "One Medicine-One Health." The American Journal of Medicine. 121(2008) 169–170.

Conrad, P.A. et al. Evolution of a transdisciplinary "One Medicine–One Health" approach to global health education at the University of California, Davis. Preventive Veterinary Medicine 92 (2009) 268–274. Available online at: http://mwqdesign.com/ionehealth/wpcontent/uploads/2012/08/Dr.Conradspublication.pdf

Websites

International Society for Infectious Diseases. Website at http://www.isid.org.

National Institute of Health. NIH Curriculum Supplement: Understanding Emerging and Re-Emerging Infectious Diseases. Website at: http://www.ncbi.nlm.nih.gov/books/NBK20370/.

ProMED Infectious Disease Reports: http://www.promedmail.org.

World Health Organization: Ethics and Infectious Disease. Website at: at www.who.int/bulletin/volumes/86/8/08-056242/en/.

World Health Organization: South-East Asia Journal of Public Health. Available free online at http:// http://www.searo.who.int/publications/journals/seajph/en/.

World Health Organization: Zoonoses. Website at: http://www.who.int/zoonoses/diseases/en/

# *OHCEA EVENT EVALUATION – Infectious Disease Management Short Course*

Facilitators: _____

Dates: _____

OHCEA supported you to attend the **Infectious Disease Management Short Course** event. Please take a few minutes to fill out the following confidential questionnaire. Your responses will help us better understand the value of this event and improve future programs. Thank you!

*Please circle your response to each of the following*

1. This event met my expectations.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
2. This event was relevant to my personal interests.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
3. This event was relevant to my professional interests.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
4. The information presented was new to me.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
5. The amount of information provided was:
    a. Not enough
    b. About right
    c. Too much

6. This event helped clarify my understanding of "One Health."
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
7. The pre-event logistics were well organized.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
8. The event itself was well organized.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
9. Overall, I found this event to be worthwhile.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
10. I intend to take actions in my work as a result of what I learned at this event.
    a. Strongly disagree
    b. Disagree
    c. Agree
    d. Strongly agree
    e. Don't know
11. Describe what, if any, actions you will take in your work as a result of this event.

12. What were the strengths of this event?

13. What can be done to improve this event?

14. What single most important lesson did you learn from this event?

15. Please write any additional comments you may have about this event.

16. Did you present at this event?

    a. Yes
    b. No

17. 16a. If yes, what was the topic of your presentation?

18. What is your primary area of work?

    a. Nursing
    b. Human Medicine
    c. Veterinary medicine
    d. Wildlife Medicine
    e. Public Human Health
    f. Public Veterinary Health
    g. Other (please specify): _____

19. Which sector do you represent?

    a. Government
    b. Private sector
    c. Education
    d. Non-governmental organization (NGO)
    e. Research
    f. Other (please specify): _____

20. What is your sex?

    a. Male
    b. Female

21. Nationality: _____

# *References*


American Veterinary Medical Association. 2008. One Health Initiative Task Force. One Health: A New Professional Imperative. Retrieved from: https://www.avma.org/KB/Resources/Reports/Documents/onehealth_final.pdf.

Barrett, M. A. and S. A. Osofsky. 2013. "One Health: Interdependence of People, Other Species, and the Planet," pp. 364-377 (and online supplement pp. 407(e1)–416(e10) at studentconsult.com), in Katz, D. L., Elmore, J. G., Wild, D. M. G., and S. C. Lucan (eds.), Jekel's Epidemiology, Biostatistics, Preventive Medicine, and Public Health (4th ed.). Elsevier / Saunders, Philadelphia, Pennsylvania.

Eddy C., Stull, P.A., Balster, 2013. "Environmental Health- Champions of One Health," Journal of Environmental Health, 76(1): 46–48. Retrieved from: http://www.onehealthinitiative.com/publications/JEH78%2013_Feature_EH_Champions_of_One_Health.pdf

Barreto M., Teixeira M.G., Carmo E.H. 2006. Infectious diseases Epidemiology. J Epidemiol Community Health 2006, 60: 192-195

Betts R.F, Chapman, S. W. and Penn, R. L. (2002). Reese and Bett's A Practical Approach to Infectious Diseases, 5th ed. United States: Lippincott Williams & Wilkins.

Cleveland, S., Haydon, D.T., Taylor, L. (2007). Overviews of Pathogen Emergence: Which Pathogens Emerge, When and Why? Current Top Microbiology Immunology. 315(85-111). Summary (abstract) retrieved on December 1, 2013, from: http://link.springer.com/chapter/10.1007%2F978-3-540-70962-6_5#page-1.

Lederberg. J. (2000) Infectious History. Science Magazine: 288 (5464); 287-293.

National Institute of Health (US); Biological Sciences Curriculum Study. NIH Curriculum Supplement Series [Internet]. Bethesda (MD): National Institutes of Health (US); 2007-. Understanding Emerging and Re-Emerging Infectious Diseases. Retrieved from: http://www.ncbi.nlm.nih.gov/books/NBK20370/.

One Health Approaches to Ebola:

https://www.youtube.com/watch?v=OSAJJcg1a1c

Root, K.R., Waldvolgel, F., and Corey, L. Clinical Infectious Diseases: A Practical Approach. 1991. New York: Oxford University Press. ISBN-0-19-508103-X.

Center for food security and Public Health (2008). Routes of disease transmission.

Brainard J., Hooper L., Pond K., Edmunds K., Hunter P (2015). Risk factors for transmission of Ebola or Marburg virus disease: a systematic review and meta-analysis. International Journal of Epidemiology, 2015, 1-15. doi: 10.1093/ije/dyv307

Factors that contributed to undetected spread of the Ebola virus and impeded rapid containment. WHO, 2015. http://www.who.int/csr/disease/ebola/one-year-report/factors/en/

Social economic impact of Ebola virus disease in West Africa countries. A call for national and regional containment, recovery and prevention. UNDG West – Central Africa (2015). http://reliefweb.int/sites/reliefweb.int/files/resources/ebola-west-africa.pdf

Seagle, HM, Morrow CB, Cibula D, et al. Appraising outbreak investigation skills in a public health emergency: an examination based on an actual event. J Public Health Manag Pract. 2007 Sep-Oct: 13(5):506-509.

Sistrom MG and Hale PJ. Outbreak Investigations: Community participation and role of community and public health nurses. Public Health Nurs. 2006 May-Jun; 23(3):256-263.

Infectious disease simulation training center (2013). Infection control tool kit on emerging infectious disease outbreaks.

Goleman, D. (2011). HBR's 10 Must Reads on Managing People. United States: Harvard Business School Publishing Company. Harvard Business Review.

Craig, J. C. (2012) Project Management Lite: Just Enough to Get the Job Done…Nothing More. North Charleston, SC: Create Space.

Ahmed H., Naik G., Willoughby H., Edward A.G. (2012). Communicating risk: clinical review.BMJ (2012), 344; 1-7.

Crisis and emergency risk communication. CDD (2014)

Dickmann P., Abraham T., Sarkar S., Wysocki P., Cecconi S., Apfel F., Nurm Ü. (2015). Risk communication as a core public health competence in infectious disease management: Development of the ECDC training curriculum and programme. LSE Research (2015); 21(14): pii=30188. DOI: http://dx.doi.org/10.2807/1560-7917.

Farmer P. Social inequalities and emerging infectious diseases. Perspectives, 2, 259 – 269.

Taking sex and gender into account in emerging infectious disease programmes: an analytical framework. WHO, 2011.

Infectious disease simulation training centre (2013). Infection control tool kit on emerging infectious disease outbreaks.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