FACILITATOR GUIDE

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This module is one of 16 One Health Training Modules developed by the One Health Central and Eastern Africa network (OHCEA), a network of 8 countries, 21 institutions of Public Health and Veterinary Medicine in Africa: Kenya, Uganda, Tanzania, Rwanda, Ethiopia, Democratic Republic of Congo, Cameroon and Senegal. 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, 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 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.

This publication was made possible in part through the support provided by the United States Agency for International Development. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the US Agency for International Development or the US 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.
Epidemiology encompasses issues that relate to health, disease, microbiology and immunology, medicine, control and prevention. In this module, the participants are introduced to the concepts and terminologies relating to epidemiology. The basic principles of epidemiology are surveyed. Also, the burden of communicable diseases is explicitly exposed to the participants. This background knowledge of epidemiology guides participants to support the improvement of disease surveillance and identify how outbreak investigations are conducted. Attempts are also made in the module to relate all aspects of disease outbreak, surveillance and use of health-related data real life examples. The case studies provided within the module will enable the participants to easily articulate epidemiology concepts in relation to the one health concept. Ultimately the module aims at providing knowledge of descriptive, analytic and participatory epidemiology to participants that lead to their appreciation of the value and importance of epidemiology. In a nutshell, the module provides knowledge and skills to health professionals to enable them to analyse and critically interpret information from the health system and health interventions in the community.

Furthermore, epidemiology plays a major role in the transmission and containment of infectious diseases and public health outcomes. Accordingly, epidemiological issues, must be addressed thoroughly to better understand the risks and develop effective control and response strategies as propagated by the one health approach to pandemic disease outbreaks. Fortunately, this training will allow participants to develop critical analysis skills as they explore various aspects of epidemiology, in the realm of emerging pandemic threats (EPT), the One Health intersect, and how policies can be developed and/or implemented to address diseases. Thus, this module is designed to introduce individuals with little or no epidemiological background to the history, concepts, theories, terminology and practice of epidemiology, to enhance their education on key public health issues and to improve their capacity to collaborate with epidemiologists.

Goals

The module is designed to produce professionals with capabilities to:

1. Evaluate disease patterns, determinants and impacts on humans, animals and environment.
2. Develop disease control strategies using One Health Approach e.g. taking consideration of socio-cultural beliefs and values.
3. Design gender sensitive approaches to disease prevention and control through disease surveillance, disease detection and outbreak response

Learning Objectives

- Discuss interactions between humans, animals and environment
- Distinguish the role of human, animal and environment interaction in disease occurrence and spread
- Describe the concept of Epidemiology
- Explain disease occurrence, patterns and their determinants
- Describe measures of disease frequency
- Describe the significance of Epidemic Curves
- Explain measures of disease risks.
- Identify disease control measures focusing on One Health approaches
- Discuss the strategies of disease screening
- Explain epidemiological intelligence of diseases (surveillance)
- Discuss disease intervention techniques
- Analyse socio-cultural impacts of disease prevention and control strategies in a One Health context
• Develop gender sensitive interventions and emergency responses
• Describe the basic gender concepts
• Explain gender influences in disease outbreak investigations
• Evaluate the role of gender in disease control and prevention strategies

**Target audience**

This epidemiology module can be used by undergraduate and postgraduate learners, middle cadre trainees, and in-service personnel from multiple disciplines and sectors (private, NGO’s, civil society). This module can be adapted for continuous professional development by health professional organizations such as medical and veterinary associations, nursing, public health, environmental scientists and biotechnologists.

**Programme/Agenda**

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<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
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<tr>
<td>Definition of epidemiology and One Health Uses and principles of Epidemiology; The epidemiologic Triad; The web of Causation</td>
<td>Factors Contributing to Emergence of Infectious Diseases Measures of Disease Frequency and their uses. Focus on basic gender concepts; Gender and Prevalence of selected diseases; Gender role in prevention and control of selected diseases</td>
<td>Disease outbreak investigations; Significance of Epidemic curves; Disease control strategies</td>
<td>Epidemiological transitions of diseases/Changing patterns of Mortality and Population Dynamics</td>
<td>Evaluation of simulations; Identification of appropriate epidemiology related Case studies for use in various scenarios.</td>
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<tr>
<td>Burden of Communicable and Non-communicable diseases</td>
<td>Applying descriptive, analytic and participatory epidemiology</td>
<td>Simulation exercise &amp; case study reviews on disease; surveillance Economic parameters of disease</td>
<td>Departure</td>
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## Module Overview

<table>
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<th>Topic(goal)</th>
<th>Learning Objectives (LO)</th>
<th>instructional activities (mode of delivery)</th>
<th>Materials</th>
<th>Time (Min)</th>
</tr>
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<tbody>
<tr>
<td><strong>01</strong></td>
<td>Learn the terminology and concepts used in epidemiology and One Health</td>
<td>Define epidemiology and One Health; Explain the meaning of the epidemiologic triad; Discuss the web of causation</td>
<td>Brainstorming using sticky notes and power point slides to articulate the definition of epidemiology; Storytelling to carve out the concept and meaning of epidemiological triad; PowerPoint Presentation on web of causation followed by Group discussion</td>
<td>Sticky Notes Materials</td>
</tr>
<tr>
<td><strong>02</strong></td>
<td>Explore the principles of epidemiology</td>
<td>Explain uses and principles of epidemiology; Identify and describe sources of routine morbidity and mortality; Use epidemiological methods to assess a health problem</td>
<td>Power point Presentation; Guest speaker from relevant institution; Case study and Group work; Simulations</td>
<td>Laptop, Flip charts/ Manilla Paper; Group work guidelines; relevant case studies; Simulation guideline</td>
</tr>
<tr>
<td><strong>03</strong></td>
<td>a) Relationship between one Health, and Epidemiology</td>
<td>Define One Health concept; Describe the uses of epidemiology in the context of One Health; Discuss the major factors contributing to the emergence of infectious diseases; Describe the basic gender concepts</td>
<td>Power point Presentation; Pictionary game: to illustrate OH approach; Complex Case study; Group work; Power point Presentation; Simulation exercise; Group activity</td>
<td>Laptop; Pictorial Game; Case study on one health concept; Group work guidelines; Internet connection; Pre-prepared</td>
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<tr>
<td>04</td>
<td>Understanding the burden of communicable diseases and the significance of gender gaps in epidemics and health care access</td>
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<td><strong>b)</strong> Design gender sensitive approaches to disease surveillance, response, prevention and control.</td>
<td>Explain gender influences in disease outbreak investigations; Evaluate the role of gender in disease control and prevention strategies</td>
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<tr>
<td>Discuss the major causes of morbidity and mortality, nationally, regionally and globally Classify infectious diseases Debate principles of control of communicable diseases Define specific terms related to infectious diseases Analyse gender gaps in communicable diseases</td>
<td>Interactive Power Point Presentation Group discussion videos power point presentation and case studies Power point Presentation Group Discussion Problem Based Learning</td>
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<tr>
<td>Internet connection Internet Pre-prepared case studies Laptop Case study handouts Guidelines to group discussions Brief for students on how to use Problem based Learning case studies</td>
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<tr>
<th>05</th>
<th>To know the various measures of Disease frequency</th>
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<tr>
<td><strong>To understand Descriptive Epidemiology and Analytic Epidemiology</strong></td>
<td>Use the measures of diseases frequency. Define and differentiate the measures of diseases frequency: ratios, proportions, incidence, prevalence, attack rates</td>
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<tr>
<td><strong>To understand Descriptive Epidemiology and Analytic Epidemiology</strong></td>
<td>Power point Presentation Writing Task Debates Critical Review of a peer Journal article</td>
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<td>Internet connection Articles for review Laptop</td>
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<table>
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<tr>
<th>06</th>
<th>To understand Descriptive Epidemiology and Analytic Epidemiology</th>
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<tr>
<td><strong>To understand Descriptive Epidemiology and Analytic Epidemiology</strong></td>
<td>Define descriptive epidemiology Describe categories of time, place and person Discuss the uses of descriptive studies Define Analytical epidemiology Explain the importance</td>
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<tr>
<td>Internet Pre-prepared case studies Laptop Case study handouts Articles for review</td>
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<tr>
<td>07</td>
<td>Understand the importance of disease surveillance and outbreak investigations</td>
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**Session 1: Definition of One Health and epidemiology, the epidemiologic triad and the web of causation**

In this session, the terms epidemiology and epidemiologic triad will be defined with examples. The web of causation will be illustrated and discussed. Besides, the various uses and principles of epidemiology will be described. One Health Approach will be introduced and Explained.

**Session Learning Objectives**

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

- Define epidemiology
- Explain the meaning of the epidemiologic triad
- Discuss the web of causation
- Explain the uses and the principles of epidemiology and
- Display Basic principles and related concepts of epidemiology, disease transmission, and the response cycle (preparation, detection, response and evaluation).
- Explain the One Health approach
- Describe the principles of ecosystem health and the human-animal-environmental interface
- Address health issues that cannot be solved through a single disciplinary approach

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<th>Learning Activity</th>
<th>Materials</th>
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<td>8:00 - 9:00</td>
<td>Registration</td>
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<td>Sign in sheet</td>
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<tr>
<td>9:00 - 10:00</td>
<td>Introduction</td>
<td>Presentations</td>
<td>PowerPoint, Post Its® (2 colors), Flipcharts, Tape, Pre-Test</td>
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<td>- Goals and Agenda</td>
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<td>- Expectations</td>
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<td>- Guest Speaker</td>
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<td>- Pre-Test</td>
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<td>10:00 - 10:15</td>
<td>Tea Break</td>
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<td>10:15 - 1:00</td>
<td>What is One Health</td>
<td>Small Group Activity</td>
<td>Flipcharts &amp; Markers</td>
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<td>What is Epidemiology?</td>
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<td>1:00 - 2:00</td>
<td>Lunch</td>
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<tr>
<td>2:00 - 3:30</td>
<td>Principles of Epidemiology</td>
<td>Small Group Activity</td>
<td>Flipcharts &amp; Markers</td>
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<td>3:30 - 3:45</td>
<td>Tea Break</td>
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<tr>
<td>3:45 - 4:30</td>
<td>Causes of Diseases (Morbidity and Mortality)</td>
<td>Interactive Presentation</td>
<td>PowerPoint</td>
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<tr>
<td>4:30 - 4:45</td>
<td>Evaluation of the Day</td>
<td>Plenary</td>
<td>Flip Chart</td>
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<tr>
<td>Time</td>
<td>Activity/Topic</td>
<td>Facilitator Instructions</td>
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</table>
|        | Registration   | ▪ Have participants sign the OHCEA attendance register  
▪ Explain logistics (e.g., breaks meals, etc.)  
▪ Issue per diem  
▪ If the short course is residential, check on housing accommodations |
| 20 min | Welcome        | Facilitator welcoming remarks and introductions.                                         |
|        |                | Participant introductions:  
▪ In pairs, have participants share their:  
  – Name  
  – Where they are from  
  – Type of work and position  
  – A story about an experience they had that made them aware of the difference between men and women  
▪ Prepare 1-minute introduction of their partner to the class  
▪ Go around the room and have each pair present their partner to the class. |
|        | Expectations   | Set up: Have two flipcharts in the front of the room: one titled “Expectations” and the other “Concerns.”  
▪ Give each participant two different coloured Post It® notes  
▪ Ask participants to write down their expectations for the short course on one of the Post It® notes (specify colour) and their concerns about the course on the second the Post It® notes (specify colour)  
▪ Have participants place their expectation Post It® notes on a flipchart titled “Expectations” and their concerns Post It® notes on another flipchart titled “Concerns”  
▪ Organize the Post It® according to common themes  
▪ Explain the agenda for the week and the goals of the short course highlighting the expectations that will be met over the week and the expectations will not be met. Comment and address concerns. |
| 15 min | Goals of the Short-Course | The goals of this short course are that by the end of the course participants should  
1. Show an understanding of the basic terminology and concepts used in epidemiology.  
2. Demonstrate comprehension of the basic principles of Epidemiology  
3. Recognize the relationship between One Health, Epidemiology and Gender Gap  
4. recognise the burden of communicable diseases and value of the gender gaps in epidemics and health care access  
5. appreciate the various measurements of disease frequency and |
6. show knowledge of the scope of descriptive, analytic and participatory epidemiology and
7. demonstrate an understanding of the need to support and improve disease surveillance and outbreak investigation

- Explain that this course is sponsored by OHCEA.
  - OHCEA is the One Health Central and Eastern Africa network comprised of 14 academic from six African countries consisting of Schools of Public Health and Veterinary schools with two US partners. The US partners are: 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 for 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 gender, culture and beliefs as a critical competent to achieving their vision. For this reason, they are sponsoring this course

Guest Speaker:

30 min

- Opening workshop and Pre-test

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

- Introduce invited guest speaker to “officially open the course.”

Pass out copies of the pre-test. Tell participants they have 15 minutes to complete the pre-test. Explain that a pre-test is used to gauge how much they know about epidemiology in relation to one health concept. A post-test will be administered at the end of the course. The two tests will be compared. There is no grade associated with the pre-test. When participants finish, they can begin their break.

Prior reading materials:

105 min

- In preparation for this module, the class should watch the movie Contagion. They should focus on the infectious disease epidemiology of the disease and try to identify the relevant epidemiological components of the movie

They should also read the following articles:


One Health: Interdependence of people, other species and the planet by Meredith A. Barret and Steven. A. Osofsky

https://rmportal.net/groups/one-health-students-online-platform/one-
Discovery Activity: What is One Health?

Begin the session by having the participants watch the following videos:

One Health: from concept to Action by CDC
https://www.youtube.com/watch?v=TG0pduAYESA

One Health: from Idea to action:
https://www.youtube.com/watch?v=gJ9ybOumITg&t=4s

Briefly discuss the two videos with the participants

Have each participant take 5-7 minutes to think about and legibly write down on separate post it notes the answers to the following questions:

- Define what One Health approach means
- Identify two examples of One Health in practice
- Identify two to three advantages to multiple disciplines working together to promote one health

Have them display these post-it notes on the wall in the three separate sections. Then in a plenary review the following:

- What are the common things identified?
- What are the differences?
- Is there anything that surprised anyone?

Come up with a group description of what One Health is
(See facilitator notes at end of session for definition of One Health)

Overview of One Health Concepts

Give a power point presentation Overview on One Health Concepts

This presentation introduces One Health, the interdependence between humans, animals and the environment and why disciplines need to work together and One Health Core competencies. It also answers the questions: why one health and why now?

Debrief the session by asking students to reflect on:

- What One Health is and any questions they may have related to the power point presentation.

As part of this presentation discuss the One Health Core competencies, and how Epidemiology and Research are key competencies required to be effective One Health change makers

Discovery Activity: What is epidemiology?

Ask the participants to study image 1 below and then ask them to brainstorm on what is happening in the image?
Then show slide 8 and ask them to continue with the brainstorming on the definition of epidemiology referring to the readings posted to them earlier as indicated below:

http://www.cdc.gov/excite/epidemiology.html
http://www.soph.uab.edu/epi/academics/studenthandbook/what

Display slide 10, 11, and 12 in an interval of 15 minutes and request participants to jot down what they think the statements refer to on their postcards; Participants should also begin to include the One health concept in this discussion: the slides make the following statements:

“Epidemiology is the study of the patterns of disease occurrence”
Are we referring to patterns of disease occurrence only in humans, or can this be extended to other species?
What is impacting this pattern of disease occurrence- could they be ecological, environmental factors or man-made factors?

“Epidemiology identifies the risk factors”- Can you think of risk factors related to humans, animals and the environment?

“Epidemiology defines the relationship of disease to the population at risk”- can you extend the population at risk to include other species and not just humans

Pin the Post cards on the wall for reference and inputs. Later the participants may finally adopt the following definition.
The study of the distribution and determinants of health-related states or events in specified populations and the application of this study to the control of health problems.

Remind the participants that we are approaching epidemiology from a One health perspective.

To better understand the importance of the epidemiology of the disease, mode of disease transmission and possible risk factors, and to form a logical disease management plan, consider the following questions based on the movie:

- What are the human animal environmental interactions?
- What type of infectious organism is involved in outbreak?
- What host species are usually infected?
- Are there known reservoir hosts that spread organisms, but do not develop disease?
- How is the disease transmitted from host to host?
- What interventions (treatment, prevention, vaccination) are available?
- Who are the different non-traditional health disciplines involved and what is their relevance to the epidemiology of the disease and the control of the problem?
- How do they go about tracing the disease and making a diagnosis?
- What are possible disease control and prevention strategies?
  - Lower the risk of infection by implementing interventions that limit contact between susceptible hosts and infectious agent.
  - Change high-risk behaviour(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).

Give the power point presentation on contagion fundamentals discussing all the different terms in the movie:

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

Display slide 13 and through groups, ask them to populate the words in the triad and let the group present one by one. To wrap up what the triad refers to in addition to what they have come up with, display slide 14; 15 and 16.

Table 1 as displayed in slide 17 gives an overview of each of the elements of host, Agent and Environment.

<table>
<thead>
<tr>
<th>Host</th>
<th>Agent</th>
<th>Environment</th>
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</table>
14

30 min

Exercise: Story telling on Epidemiological triad

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Race/ethnicity</th>
<th>Religion</th>
<th>Marital status</th>
<th>Lifestyle</th>
<th>Exercise</th>
<th>Behaviour</th>
<th>Co-morbidity</th>
<th>Genetic set up</th>
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<table>
<thead>
<tr>
<th>Biological</th>
<th>Disease vector</th>
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<tbody>
<tr>
<td>Microorganisms</td>
<td>Population density</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Substances in surroundings and workplace</td>
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<tr>
<td>Toxins, tobacco</td>
<td>Air quality</td>
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<tr>
<td>Alcohol drugs</td>
<td>Weather</td>
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<tr>
<td>Physical</td>
<td>Noise</td>
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<tr>
<td>Trauma</td>
<td>Food and water sources</td>
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<tr>
<td>Radiation</td>
<td>Special environments e.g. hospitals, day-care, institutions, bathhouses, crack houses, refugee camps</td>
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<tr>
<td>Fire, nutrition,</td>
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<tr>
<td>Lack of exercise</td>
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</table>

Print out the table and display it on the wall for further references.

**Analyse the three tips of the triad from a One Health perspective - looking at humans, animals and environments and how they interact with the triad**

Participants to discover more what the epidemiology triad means through group work;

Group work will be based on the fundamental axioms/assumptions displayed in slide 8 as shown below. Group 1 to explain assumption 1 and group 2 to explain assumption 2

1. Diseases (or other health events) do not occur at random
2. Disease has identifiable causes
   - which can be altered and therefore prevent disease from developing

Plenary discussions follow

Exercise: Story telling on Epidemiological triad

Explain that the triad helps to relate well the factors that influence disease transmission. This will be followed by an exercise on story telling by every participant as per the instructions below

The epidemiological triad provides a basis of understanding communicable diseases.

Considering that the factors that are involved in disease transmission are the agent, the host and the environment; briefly create a One Health story and present to your colleagues; the story should be relating to the triad. Examples of the story could be: the transmission of a zoonotic disease of your choice from your community, a toxicosis that is present in the environment affecting both humans and animals, a natural event like flooding, earth quakes that causes an outbreak of a disease: The roles of each factor should be clearly brought out.

The story should not exceed 3 paragraphs (1/2 page)
The presentation can be supported by drawing the triad.
The presentation is expected not to last more than 15 minutes.
You will need the following resources: a flip chart; computer and
What is web of causation?

Then display slide 18 after the story telling plenary

What is web of causation?

The participants will study the figure on web causation and explain in their own words what they understand by the phrase “web causation.”

Study the figure that follows.

The web of causation is based on the fact that there is/are no simple cause/causes of disease. But causes of disease are interacting. The web of causation illustrates the interconnectedness of possible causes. This can be linked to drivers of disease emergence. Refer back to the introduction of One Health and the different drivers of disease emergence such as climate change, globalization and travel, habitat reduction, increased interactions between humans and wildlife.

Study the figure provided.

Lunch Break.

The Principles of Epidemiology and Infectious Disease Epidemiology

Participants will study the following quotation:

“epidemiology is the study of the distribution and determinants of health-related states or events in a specified population and the application of this study to the control of health problems.”

From the quotation participants, will identify the principles of epidemiology.

Participants should note that Epidemiologists ask the following
questions e.g.
What----referring to event
Who referring to person
Where referring to place
When----referring to time
As far as disease outbreaks are concerned

Ask the participants to individually reflect on the community where their homes are based. Identify a disease outbreak they witnessed, and using the above questions (what, who, where, and when) and considering the principles of epidemiology and One Health, to describe the events and then show the epidemiological issues evident in a paragraph.

Do a Power point presentation on Infectious Disease epidemiology

A range of Participatory methodologies

Briefly review the participatory methodologies in the facilitator notes that can be used to establish rapport with stakeholders and support epidemiologic investigations. The participants should know when to use various participatory methods. The Participatory research typically combines a different set of methods.

Give the participants the following scenario. There is a suspected outbreak of Rift Valley in a village in North Eastern Province of Kenya. 20 people have died and hundreds of animals have died as well. More seem to be infected. You are the lead epidemiologist going in to investigate.

- Identify the team that is needed to carry out investigations (remember, it must be a multidisciplinary team)
- Identify which participatory methodologies you will use and why those methods provide you with the relevant information? Participants should try to use methods that are inclusive of all stakeholders, culturally and gender sensitive and provide qualitative as well as quantitative information. Participants should keep in mind the role of different disciplines in this scenario—environmentalists, veterinarians, medical personnel, entomologists

Break the participants into two main groups and each group should develop a plan for investigating their case. They should identify what They should use both qualitative and quantitative methodologies to investigate. As they present their methodologies, they need to ensure they are One Health inclusive looking at both the human component, animal component and environmental component.

Give the groups the following case scenario and have them answer the questions that follow:

There are reports from a local radio station about a strange illness that kills animals suddenly without prior symptoms in Sheema District, Uganda. So far, 12 animals have been reported dead on 3 farms. In one of the farms, 2 people who ate the dead animals have also died. The
other 5 people who ate the same animal are in a critical state and have been rushed to the nearby health facility. The community where these deaths of animals and people have occurred are worried and are seeking for government intervention. Your supervisor has requested you to intervene in this worrying situation, describe how you would proceed?

- How are you going to constitute your investigative team?
- Which participatory approaches would you apply to obtain the relevant information? Why do you do think the participatory approaches you selected are suitable for this case study?

On a piece of paper each participant jots down types of diseases they are aware of? Exchange the paper and a colleague reports what the other colleague has jotted down.

Then flush slide 21 that shows a variety of types

- Epidemic Communicable Disease
  - Zoonotic disease
  - Infectious diseases
- Endemic Communicable Disease
- Non-communicable Disease
- Chronic Diseases
- Injuries
- MCH, Occupational, and Environmental Health
- Health Behaviours

Together with participants outline the diseases mentioned under each of the categories above

Expose participants to levels of disease (the increasing amount of disease) as displayed in the figure below

The facilitator will then display the slide below

Before the class, create four groups ensuring that all disciplines are represented in each group. Post the group assignments so that the
students assemble in the correct groups. 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 disease prevented.

**Give students the following instructions:**

“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.”

Give the students 15 minutes to plan their role plays and then have each group present their role play over the next 20 minutes.

**During role play presentations:**

Instructors will observe the presentations and take notes to provide feedback as well as identify gaps. An instructor checklist may be developed to aid in evaluation.

**After role play presentations:**

Students will individually fill out an index card listing one thing they think would help prevent transmission of the disease they presented. This aspect will allow the instructors to assess individual student knowledge of disease transmission.

Have students discuss the activity and identify key take-home messages and conclusions. 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 and control vary?
4) Are there other professionals you may need to work with to understand transmission mechanisms or implement prevention and control measures?

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

Divide the participants into groups. Each group to develop a role play that mimics a disease that attacks many people. The other groups should be able to name it and the facilitator writes it on board.

From the mimic, together with the participants the level of the disease will be identified and the facilitator will explain the increasing amount of disease from sporadic to endemic to epidemic and finally to pandemic.

- Epidemiology – Study of how disease is distributed in populations, and the factors that influence or determine this distribution
Session 1 Facilitator notes

1) Definition of One Health

There are many similar definitions of One Health by health organizations, but for 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 different 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 movement and it is moving fast. The approach has been formally endorsed by the European Commission, the US Department of State, US Department of Agriculture, US Centres 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 current 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

2. Methods used in Participatory Epidemiology (Adapted from Saito and Spurling, 1992: 10; Catley, Alders & Woods, 2012; Ahlers et al., 2009:157)

Informal interviews
- Semi-structured interviews and focus groups: Combined with visualization, ranking and scoring methods. Also, used as a stand-alone method. Same sex focus groups are used to identify specific needs of men and women
- Timelines: History and timing of disease events
- Walking tour: Used by inter-disciplinary team of technicians and male and female farmers to develop maps locating main infra-structures, scavenging areas, biosecurity issues and to understand the farming systems
- Family roles and access, control and benefits: Identify ownership, control over benefits of poultry production and activities carried out by male and female adults and children in relation to breeding specific species Dreams realized or visioning: To identify indicators and to discuss how to measure the benefits and changes expected by men and women

Visualization methods
- Participatory mapping: Look at each of the specific agro-ecological and social situation and discuss the implication of these situations for biosecurity
- Seasonal Calendars: Seasonal variation in disease incidence; seasonal variation in human livelihoods e.g. consumption of livestock products and livestock trade; seasonal variation in contact with disease vectors, neighbouring livestock and wildlife; seasonal variation in vector populations
- Radar diagrams: Analysis of disease control strategies
- Venn Diagrams: Well-being stratification exercise and analysis of community structures. Helps to understand who will be affected by proposed development activities

Ranking and scoring
- Counting: Identification of consumption and sale
- Simple ranking: Analysis of disease control strategies; ranking of activities per their contribution to household income
- Simple scoring: Prioritisation of livestock diseases or impact of project activity per defined indicators
- Matrix scoring: Analysis of disease control options
- Before and after scoring: local characterization of the clinical signs and causes of disease; local characterization of disease vectors; comparison of clinical diagnoses of livestock keepers and veterinarians; analysis of veterinary service providers
Session 2: One Health, Epidemiology and Gender Gaps, factors contributing to emergence of infectious diseases, measures of diseases frequency and their uses, burden of communicable diseases

Session 2- Overview:

This session will provide a foundation for understanding “One Health” concepts and how developing “One Health” competencies enhances health professionals, practitioners, and partners’ effectiveness. Epidemiology in the context of One Health approach (human, animal and environmental health and other relevant professionals) will be explained to the participants and with this base, the gender sensitive approach to epidemiology in addressing emerging pandemic threats will be explored as well. Participants in a participatory manner will explore factors contributing to emergence of infectious diseases. They will also learn about measures of diseases frequency and their uses, the burden of communicable diseases will also be explored in a participatory approach, through analysis of tools used which will be introduced and applied. Examples will be drawn from multiple public health related outcomes, case studies and video displays.

Session Learning Objectives

Learning Objective: By the end of this session Participants should be able to:
- Use epidemiological methods to assess a health problem
- Identify the major causes of morbidity and mortality nationally, regionally or globally
- Classify infectious diseases
- Explain the principles of control of communicable diseases
- Discuss the burden of communicable diseases
- Explain the One Health approach
  - Describe the principles of ecosystem health and the human-animal-environmental interface
  - Address health issues that cannot be solved through a single disciplinary approach
- Use a gender-sensitive approach to epidemiology
  ● Develop gender sensitive interventions and emergency responses
  ● Describe the basic gender concepts
  ● Explain gender influences in disease outbreak investigations
  ● Evaluate the role of gender in disease control and prevention strategies

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Topic/Activity</th>
<th>Learning Activity</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 - 9:00</td>
<td>Registration</td>
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<td>Sign in sheet</td>
</tr>
</tbody>
</table>
| 9:00 - 10:00| Introduction           | Presentations     | PowerPoint
<pre><code>              | Goals and Agenda      | Post Its® (2 colors)  |
              | Expectations           | Flipcharts         |
              | Guest Speaker          | Tape               |
              | Pre-Test               | Pre-Test           |
</code></pre>
<p>| 10:00 - 10:15| Tea Break              |                   |                         |
| 10:15 - 1:00| What is Epidemiology?  | Small Group Activity| Flipcharts &amp; Markers    |
| 1:00 - 2:00| Lunch                  |                   |                         |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity/Topic</th>
<th>Facilitator Instructions</th>
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</thead>
<tbody>
<tr>
<td>2:00 - 3:30</td>
<td>Consequences of Gender Roles</td>
<td>Small Group Activity</td>
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<tr>
<td></td>
<td></td>
<td>Flipcharts &amp; Markers</td>
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<tr>
<td>3:30 - 3:45</td>
<td>Tea Break</td>
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<tr>
<td>3:45 - 4:30</td>
<td>Quick Facts About Gender, One Health</td>
<td>Interactive Presentation/Role Play</td>
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<td>and EPT</td>
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<tr>
<td>4:30 - 4:45</td>
<td>Evaluation of the Day</td>
<td>Plenary</td>
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<td>Flip Chart</td>
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**Time**  | **Activity/Topic** | **Facilitator Instructions**  |
<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>Morning</strong></td>
<td>Reflections</td>
<td>Ask participants to jot down</td>
</tr>
<tr>
<td>15 min</td>
<td></td>
<td>1. things new they learnt yesterday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. something they knew that was clarified yesterday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. something that was not clear yesterday and required more clarification</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. something to be used when they go back to their work stations</td>
</tr>
</tbody>
</table>

**Power point presentation on factors Contributing to Emergence of Infectious Diseases**

Remind the participants about the levels of diseases and display the slide again slide 23
- Epidemiology – Study of how disease is distributed in populations, and the factors that influence or determine this distribution
- Sporadic level: occasional cases occurring at irregular intervals
- Endemic – habitual presence of a disease within a given geographic area
- Epidemic – the occurrence in a community or region of illness of similar nature, clearly more than normal expected rate, and derived from a common or from a propagated source

Ask participants to brain storm on what infectious diseases are and name them. Participants to go further and brainstorm on the causes of infectious diseases.

Explain to the participants the various causes in technical terms. Some of them they could have already mentioned in the brain storming exercise

Flush power point slides 25,26,27,28 which show Chain of Infection, Dynamics of disease transmission, chain of infection, factors affecting disease transmission, and routes of transmission.

Also, introduce the Zoonosis, epizootic and enzootic

**Zoonosis, epizootic and enzootic**

- Zoonosis is an infection that is transmissible under natural conditions from vertebrate animals to man, e.g. rabies, plague, bovine tuberculosis....
- An epizootic is an outbreak (epidemic) of disease in an animal population, e.g. rift valley fever.
- An Enzootics is an endemic occurring in animals, e.g. bovine TB.

Divide the participants in three (3) groups
Group 1------show how Zoonosis infection affect areas you know of
Group 2------show how epizootic outbreaks end up affecting human beings
Group 3——show how Enzootics endemic end up affecting human beings

Participants should Refer to the case study on Rift Valley Fever “facilitator notes” attached.

Cross check also with slide 29 that indicate various routes of transmission direct and indirect Exposure to Infectious Agents infection. As part of that review the following terms as well

Clinical
Sub clinical
Carrier
Death
Carrier
Immunity
No Immunity

Ask participants to identify how they could have caught a disease (infectious) at any one time. This could be a buzz session whereby a neighbour tells a neighbour. In the process exposure to infectious agents may be mentioned e.g. Clinical, Non-clinical, carrier

It would be good to associate the exposure to outcomes. E.g. Death, carrier, immunity, no immunity, see fig below

Explain the transmission process to participants as indicated in slide 31 Participant to use the table below to further understand the transmission agents

<table>
<thead>
<tr>
<th>Agents</th>
<th>Bacterial, viruses, fungi parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>Pesticide, Drugs</td>
</tr>
<tr>
<td>Physical</td>
<td>Automobile, Guns</td>
</tr>
</tbody>
</table>

Cover the main categories of infectious organisms using slide 34 and ask students if they can think of a couple of examples of diseases caused by each.

A few examples are shown below, if needed for discussion:

Ask the participants to identify those they know

Bacteria: Leptospira interrogans (pictured), Yersinia pestis (causes plague), Borrelia burgdorferi (Lyme disease), E. coli, Salmonella, Campylobacter (all food borne)

Viruses: avian influenza (pictured), SARS, Ebola, Dengue, Japanese encephalitis, Nipah, Hendra

Parasites: malaria (protozoan), roundworms, hookworms, tapeworms (helminths), cryptosporidium (protozoan)

Fungi: Candida albicans, Aspergillus, Histoplasmosis, Cryptococcus, Pneumocystis

Prions: bovine spongiform encephalopathy (mad cow disease), Creutzfeldt-Jakob disease, kuru
Bacterial viruses, fungi parasites Biological
Explain using a small lecuturrette those that are not familiar to them.
Flush slide 35 to show more pictorial examples

Break Tea

Summarise transmission: Method by which the infectious agent passes from
a source to the host
Display a video to show Modes of DISEASE transmission
Then show slide 38 to enhance knowledge of transmission
e.g. Contact, airborne, vector borne, vehicle

You may need to further explain key words like
Direct contact, vehicle borne, unclean hands and fingers
Droplet infection, vector borne
Contact with soil, mechanical
Inoculation into skin or mucosa, airborne
Transplacental or vertical formula borne

Ask participants to list diseases they think they acquired through direct
contact transmission? What kind of direct contact please the participants
should be able to indicate

The following summary will enhance the participants answers
1. Direct contact with infected individual person or animals, or their
secretions
2. Infectious organisms can enter via:
   respiratory tract – inhaled particles from sneezing and coughing
   mucous membranes – eyes, nose, reproductive, digestive tracts
   Skin – cuts, wounds, open sore, injury can facilitate entry
   ingestion – swallowing

Introduce another mode of transmission which is Contact with Fomite
“a fomite is an inanimate object that can carry pathogenic agents from one
susceptible animal to another e.g.
Contaminated brushes
- Clippers,
- Needles,
- Balling gums
- Clothing, milking units
- Teat dip cups
- Feed or water
- Bucket and shovels

Urge participants to read further about contact with Fomite
www.cfsph.iastate.edu/Infection_Control/Routes/fomite.php
www.cfsph.iastate.edu/.../DirectContact_Fomite
www.infectioncontroltoday.com/.../fomites-and-

introduce the mode of transmission through Food and Water

Food and
water

Distribute Post cards to the participants and ask them to disaggregate
diseases that are transmitted through water and food. The post cards are
transmission then displayed on the wall. They should show possible spots of contamination.

Flush slide 42 to enhance the learning.

The participant is introduced to the term Host explain that the term Host refers to “A person who becomes infected with an infectious agent “Reservoir Hosts is a term worth exploring. Ask the participants to define the word “reservoir”

“The medical dictionary defines reservoir host as an infection in which the infectious agent multiplies and/or develops and on which the agent depends for survival in nature, the host essential for the maintenance of the infection during times when active transmission is not occurring”

http://medical-dictionary.thefreedictionary.com/reservoir+host

The following summary explains the nature of the host reservoir
Reservoir Hosts & Transmission
- Reservoir hosts with infectious agents can transmit the organism, but may not develop disease
- Hosts provide a reservoir for the organism in the environment
- Management difficult if host population is large or difficult to control
- Host may be required for stage(s) of an organism’s development or transmission cycle before capable of infecting another host or vector

Ask participants to draw on a piece of paper, reservoirs host they can think of. The drawn hosts will be displayed on a wall for all to see.

Participants then can categorise whatever has been drawn under “Human reservoir” “Animal reservoir,” “non-living reservoir”

Then explore further what we mean by a human host and what is involved
in human reservoir. Flush slide 47

![Diagram of infection outcomes](image)

**Outcome**

- No Infection
- Clinical
- Sub-clinical
- Carrier
- Death
- Carrier
- Immunity
- No immunity

**Biological vectors**

Ask participants to identify what the reservoir host for malaria, rift valley fever and rabies are?

Participants should note that there are biological vectors – Arthropods:

- Display slide 48 and 49 to illustrate the act of transmission

Divide participants in two groups and request them to come up with examples of “environment” hosts using mime. The group that will mime more factors in 5 minutes will be the winner.

Then flush slide 50 showing the various factors

<table>
<thead>
<tr>
<th>Environmental Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population density</td>
</tr>
<tr>
<td>- Nutrients</td>
</tr>
<tr>
<td>- Food supply for animals</td>
</tr>
<tr>
<td>- Temperature</td>
</tr>
<tr>
<td>- Rainfall-Floods</td>
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<tr>
<td>- Humidity</td>
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<tr>
<td>- Sunlight</td>
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<tr>
<td>Radiation</td>
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<tr>
<td>Pollutants-chemical agents</td>
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<tr>
<td>Toxins</td>
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<tr>
<td>Air currents</td>
</tr>
<tr>
<td>Sound</td>
</tr>
<tr>
<td>War</td>
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<tr>
<td>Geology-soil type</td>
</tr>
</tbody>
</table>

**Case study: Sirari village**

Participants are now competent to identify various transmission of diseases modes they have discussed: they should discuss the case study on Sirari found in the facilitators notes provided and answer the questions below

1. Who are the people affected?
2. What different stakeholders are involved?
3. What disease are you thinking about?
4. How do you link the history of the disease with the epidemiological triad?
5. What should be done differently to prevent and control their conditions?
6. What further investigations should be done at the district hospital?
7. What is the One health aspect of this case study?

Lunch Break

Introducing Measures of Diseases Frequency and their uses. (understanding the principles of epidemiology)

Introduce to the participants the two axioms that explain the major principles of epidemiology. Divide the participants into groups and let each group come up with issues that explain the axiom allocated to them

1. Diseases (or other health events) do not occur at random
2. Diseases (or other health events) have causal and preventive factors that can be identified

In addition to what participants show, flush the key issues that emerge out of the study of epidemiology

Epidemiology helps to;

- Determine the magnitude and trends
- Identify the aetiology or cause of disease
- Determine the mode of transmission
- Identify risk factors or susceptibility
- Determine the role of the environment
- Evaluate the impact of the control measures

Do we then say epidemiology issues are measurable?
Yes! Judging from the Basic Epidemiologic Methods that encompass the following;

- Count cases (events)
- Define involved population
- Determine rates/proportions
- Compare rates
- Make inferences

Ask the participants to explain how they would judge that a disease is epidemic disease. (Brain Storm)

Then introduce the 3 steps of Epidemiology)

Epidemiology “3 Steps”

- Counting number of events or conditions in populations or subgroups of persons. (C)
- Dividing the number of events by the number of persons in the population to make rates. (D)
- Comparing rates from different populations to make inferences about the cause for the observed differences in rates. (C)
Provide a case study for the purpose to enable participants practically to go through the three steps’

**Step 1**

**Epidemiology: Step 1 - Counting**
- Counting number of events or conditions in populations or subgroups of persons.
- The first step in descriptive epidemiology
  - How many persons experienced a particular condition?
  - Count = “numerator”.

**Epidemiology: Step 2 - Dividing**
- Dividing the number of events by the number of persons in the population to make rates.
- The second step in descriptive epidemiology.
  - What group of persons experienced the event?
  - Population group = denominator.
  - Use events and population to make: proportions, rates, odds.

**Epidemiology: Step 3 - Comparing**
- Comparing rates from different populations to make inferences about the cause for the observed differences in rates
  - Analytic epidemiology
    - Cohort (exposed vs. non-exposed)
    - Case-control (sick vs. healthy)
  - Comparison of rates to make rate ratios or rate differences.
  - Comparison of odds to make odds ratios.
  - Use ratios or differences to identify risk factors.
  - Use statistical tests to determine reliability of ratios or differences.
- You should then summarise the steps as follows

*Describe* an event in terms of:
- Time
- Place
- Person

*Analyze* the association between the event (disease, death) and its determinants (risk factors)

*Make recommendations:*
preventive actions, control measures

Ask participants to see the case study below

Ask the students to read through the case study on outbreak of Brucellosis in Mukono District and then answer the following questions:
1. Explain whether an epidemic has occurred and why
2. Develop a hypothesis/es from the case study
3. Interpret available data
4. Show how availability of data led to formulation of policies
5. Are these policies related to both human health and animal health?
6. In which area were policies formulated faster and why?

Participants should note that those same measures could have been used to study a whole district or a whole country.
Ask participants to work and finish ready to report in the next session

What is the role of the Epidemiologist?

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:

1) Prepare for fieldwork.
2) Establish the existence of an outbreak.
3) Verify the diagnosis.
4) Define and identify cases.
5) Describe and orient the data in terms of time, place, and subject.
6) Develop hypotheses.
7) Evaluate hypotheses.
8) Refine hypotheses and carry out additional studies.
9) Implement control and prevention measures.
10) Communicate findings.

Ask the class to volunteer/shout out steps that they identified in the outbreak investigation discussion. When one is correctly identified, hang the piece of paper with the corresponding step on the wall/whiteboard. As additional steps are identified, ask the students to put them in order so that by the end of the exercise, all steps in the outbreak will be identified. The steps listed above are in a logical order, so the final list produced by the students should be similar.

Note: In practice, the steps of outbreak investigation are usually not followed in the order listed above. There are always variations depending on the nature of the outbreak and how it presents
Case Studies in Outbreak Investigation and stakeholder involvement

Divide the class into groups. Give each group a different case study.

1. Panic in Rwanda;
2. Trouble on Farm X in Mubende District, Uganda;
3. Mysterious deaths of Wild Birds in Uganda
4. Bovine Tuberculosis

Have the groups read their case study, answer the questions at the end of the case and prepare a 10-minute report summarizing the case and conclusions.

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

**Trouble on Farm X in Mubende District, Uganda**
Imagine, you have been called to help the residents of that community, how would you proceed?
Explain how One Health approach is relevant to this case study?
What kind of team should be mobilized to respond to this emergency and to work with the community?
What process would the team use to investigate the outbreak?
What interventions would be used in this situation?
What is the role of the community and how should they be involved?

**Mysterious deaths of Wild Birds in Uganda**
How would you solve this dilemma?
What kind of team should be mobilized to respond to this emergency and to work with the community?
What process would the team use to investigate the outbreak?
What interventions would be used in this situation?
What is the role of the community and how should they be involve?
Explain how One Health approach is relevant to this case study?

**Bovine TB**
Who and what are the different elements involved and stakeholders in the case of TB?
How do you carry out an investigation and what disciplines should work together to control this re-emerging pandemic?
What are the benefits of cross-sectoral cooperation and the sharing of resource and information between countries?
What gender issues do you see in this scenario and how would you deal with them?

Presentation on Gender and infectious diseases

Give a brief power point presentation on Epidemiology and gender gaps. This will cover some 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 males and females.
  - Gender: refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for males and females
  - Gender differences: both socio-cultural factors as well as 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 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

Mapping Gender risks and disease transmission

In two groups discuss the importance of gender in epidemiology and one health.

Hint: gender inequality has effect in the occurrence and prevalence of certain
diseases. Due to different factors women, may have high prevalence to certain diseases. Some of the factors are: lack of information, financial problem to visit health care centres, shortage of food and access to education etc.

Activity: Divide the class into three groups, allow them 20 minutes to discuss on and prepare a PowerPoint presentation, what is it about being female or being male in exposure to certain diseases. The power point should not be more than 3 slides

Activity: Consider the following three diseases:

- TB
- Brucellosis
- Cryptosporidiosis.

Map disease transmission pathways and the role of men and women, and how to prevent and control these diseases. Clearly indicate where to break the lifecycle of these diseases. Who is more susceptible at each point of transmission?

Gender influences on outbreaks

Give a PowerPoint presentation on gender influences in disease outbreak investigations and the role of gender in disease control and prevention.

Group activity: Cryptosporidiosis and Gender

Have the participants review the abstract in the facilitator notes on cryptosporidiosis and gender and discuss the following questions

Questions
1. Who has high risk of contracting the disease from taking care of sick ones?
2. Who has got more daily contact with cattle faeces?
3. Discuss the gender dynamics in relation to disease transmission

Power point presentation on gender roles and influences in disease management

Give a power point presentation on gender roles and influences in an outbreak investigation, disease control and prevention.
Case Study 1: Sirari in Tanzania

“Sirari is a village located in the North of Tanzania, at the border of Kenya. The estimated population is 5000. The main livelihood activity is agriculture and livestock. The climate is cool and experiencing subtropical temperatures.

An NGO is assisting the community to improve livelihood, food security and income. The NGO introduced exotic breed of goats. Almost on average each household keeps 5 to 8 goats.

The community members’ love their goats so much that when they kidded, they carry the kids, live with them in the same houses. After a while the female goats started experiencing late abortion and some died. They could not get service from vets as they are no vets in the area.

Later some members of the family started experiencing fever, like symptoms, joint pains. The fever is on during a week, and then off the other week and keeps on alternating for at least 4 months. They bought anti-malarial drugs from local drug shop but show no improvement.

The drug shop recommended them to visit a health facility for further management. A lab test for Malaria turned out to be negative. The health center referred the two children to the district hospital for further investigations…”

1. Who are the people affected?
2. What different stakeholders are involved?
3. What disease are you thinking about?
4. How do you link the history of the disease with the epidemiological triad?
5. What should be done differently to prevent and control their conditions?
6. What further investigations should be done at the district hospital?

Case Study 2: Outbreak in Brucellosis in Mukono District

Mr James Illaho enjoys pork and a local brew called Malwa or Ajono with his friends. On the evening of 10th Oct.2012, he revealed that he had been suffering on and off from malaria for the last 5 months. Sometimes the fever disappeared on its own without swallowing Coartem. Many of his friends were surprised as they were experiencing the same problem.

They resolved to go to a private diagnostic clinic in Mukono town where results were positive for brucellosis. The doctor who had received few cases before got concerned and informed the DHO who was already being alarmed by similar reports from 2 other private clinics and a government health center. Apparently records showed that the affected persons were mainly adult males and few women who took malwa at various pork joints.

The DHO consulted his counterpart, the DVO and decided to jointly conduct a preliminary investigation. They informed and requested for support from the Local council chairperson (LC5) and the Chief Administrative Officer (CAO). The LC5 Chairperson informed them that three of his councillors were under medication for the same disease and he quickly ordered the CAO to provide logistics for the investigations. This was a turnabout as the councillors had previously not cooperated on matters of disease control especially with the DVO.

Investigations at the pork/malwa joints revealed that most of the pork was coming from Kyampisi and Ntenjeru sub-counties and few from around the town. Most of the pork was half roasted on sticks using local charcoal ovens. In the sub-counties, pigs were being slaughtered anywhere under trees without inspection by a competent authority. Transportation of pork to trading centres and Mukono was by motorcycles and boda in dirty sacks. Most farmers owned between 1-6 pigs and could not afford to rear a boar. As a result, a person kept a village boar to serve sows at a fee or a piglet in return which apparently served as a point of spread for brucellosis.
Screening tests among pig handlers and pigs on randomly selected farms revealed that on average 36% and 45% of meat handlers and pigs were respectively positive for brucellosis. A report was made to the district council with suggestions for mitigation measures. The council immediately passed by-laws banning all illegal slaughter places in the district. People were advised to eat pork which is deep fried. Plans to seek for funds and carry out a district wide survey on all pigs were made. All positive cases would be destroyed with compensation or sold and eaten after deep frying. Sensitization about the disease on its expensive treatment and consequences on reproduction in men (orchitis) was immediately launched on the media. People with on and off fevers were advised to go for medical check-up. It was also resolved that all pigs to be brought from outside the district whether donated or otherwise had to be tested for brucellosis to stop further introduction and spread of the disease.

Questions
1. Explain whether an epidemic has occurred and why
2. Develop a hypothesis/es from the case study
3. Interpret available data
4. Show how availability of data led to formulation of policies

Case study 3: 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 wildlife 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 was 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 send them to investigate and to work with the community. This incident led to the extinction of the lion in Rwanda.

Analytical questions
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 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. 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 4: Trouble on Farm X in Mubende District, Uganda

In 2013, trouble befell farm X that was a major supply of Milk in one of the communities in Mubende District. The workers reported a series of abortions from farm X in cattle to Mrs Mukasa (Not Real Name). Mrs Mukasa notified his busy husband to act. Due to Mr. Mukasa’s busy schedule he took another 1 week before taking action. After one week, he finally got the veterinary Doctor whom he called to his farm to
investigate the cause of abortions. Meanwhile, there were reports in that community that the humans were having fevers not responsive to anti-malarials. Imagine, you have been called to help the residents of that community, how would you proceed? Explain how One Health approach is relevant to this case study?

**Case Study 5: Mysterious deaths of Wild Birds in Uganda**

In early 2017, mysterious deaths of large number of Birds were reported at Lute be beach on Lake Victoria, Entebbe. The dead birds were found upstream where a flower factory was situated. This was reported by the fishermen to Uganda Wildlife Education Centre.

**Case Study 6: 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/AIDS is widespread. The biggest killer of people with HIV/AIDS is TB. However, the Impact of Bovine TB on humans is poorly documented. BTB is a major problem for livestock in developing countries and wildlife play a major role in the failure of TB eradication programmes. In many cases, consumption of raw meat and milk and development of bush meat consumption as cheap source of protein are the principal routes of human contamination with BTB. 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/AIDS is fuelling the TB epidemic, and coordination between the 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 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.

Questions:
1. Who and what are the different elements involved and stakeholders in the case of TB?
   - Wild animals, domestic animals, humans, birds
   - Multiple governments, veterinarians, medical doctors, wildlife specialists
   - Consumers of milk and meat products, handlers of these products, business people, hunters, women selling milk and handling food, caring for the sick
   - International travel organizations and their governments, WHO, OIE, FAO,
   - 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 disciplines medical, 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 resource and information between countries?
   - Needed for the effective control of highly contagious disease emergencies
   - They 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?
   Women are responsible for milking, and cooking food.
   - They are care givers
   - If not targeted for intervention, cannot be able to control TB
   - Men are hunters bringing bush meat home
   - Traders in illegal bush meat sometime women are middle men or intermediaries.
   - Access to medical care, training less for women than men in most communities
   - Drug resistance (MDR ad XDR) make control difficult

7. Abstract: Social and Gender determinants of risk of cryptosporidiosis, an emerging zoonosis in Dagoretti, Nairobi, Kenya

The aim of the study was to investigate the social and gender determinants of the risk of exposure to Cryptosporidium from urban dairying in Dagoretti, Nairobi. Focus group discussions were held in six locations to obtain qualitative information on risk of exposure. A repeated cross-sectional descriptive study included participatory assessment and household questionnaires (300 randomly selected urban dairy farming households and 100 non-dairying neighbours). One-hundred dairy households randomly selected from the 300 dairy households participated in an additional economic survey along with 40 neighbouring non-dairy households. We found that exposure to Cryptosporidium was influenced by gender, age and role in the household. Farm workers and people aged 50 to 65 years had most contact with cattle, and women had greater contact with cattle faeces, and older women had more contact with raw milk. However, children had relatively higher consumption of raw milk than other age groups. Adult women had more daily contact with cattle faeces than adult men, and older women had more contact than older men. Employees had greater contact with cattle than other groups and cattle faeces, and most (77%) were male. Women took more care of sick people and were more at risk from exposure by this route. Poverty did not affect the level of exposure to cattle but did decrease consumption of milk. There was no significant difference between men and women as regards levels of knowledge on symptoms of cryptosporidiosis infections or other zoonotic diseases associated
with dairy farming. Awareness of cryptosporidiosis and its transmission increased significantly with rising levels of education. Members of non-dairy households and children under the age of 12 years had significantly higher odds of reporting diarrhoea: gender, season and contact with cattle or cattle dung were not significantly linked with diarrhoea. In conclusion, social and gender factors are important determinants of exposure to zoonotic disease in Nairobi.

**Questions**

1. Who has high risk of contracting the disease from taking care of sick ones?
2. Who has got more daily contact with cattle faeces?
3. Discuss the gender dynamics in relation to disease transmission
Session 3: Disease outbreak investigations, descriptive, analytic and participatory epidemiology

Session 3 will be a participatory exercise, with participants studying case studies of reports on disease outbreak investigations and the measures taken to deal with the situation. There will also be further practice on applying descriptive, analytic and participatory epidemiology while dealing with health issues in any given situation. Basic gender concepts and role of gender in epidemiology will be introduced. Participants will also explore the different roles men and women play in disease outbreak investigation, control and prevention.

**Learning Objectives**

Learning Objective: By the end of the session participants should be able to

- Show case the burden of communicable diseases
- Explain descriptive, analytic and participatory epidemiology
- Discuss the uses of descriptive and analytical studies’ data
- Explain the different types of analytical study designs
- Differentiate various measures of diseases frequency-ratios, proportions, and incidence, prevalence and attack rates

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<tr>
<th>Time</th>
<th>Activity/Topic</th>
<th>Facilitator Instructions</th>
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| 45 min | The Burden of communicable diseases | Present a brief power point on the definition of communicable diseases slide 67  
“A communicable or infectious disease is an illness caused by transmission of a specific infectious agent or its toxic products from an infected person or animal to a susceptible host, either directly or indirectly through an intermediate animal host, vector or inanimate environment” (Last 1995)  
Ask participants to brain storm why they think currently we have a burden of communicable diseases  
Then flush slide 68 reaffirming what they would have identified as burden of disease  
*Global epidemiology of infectious disease*  
- *Infectious diseases are the leading cause of death worldwide*  
- *New diseases are emerging*  
- *Old diseases are re-emerging* |
and re-emergence of infectious diseases and are expected to continue to influence such trend. Some recent studies at both global and regional scales have suggested that climatic factors, human movement, and agricultural practices are important factors underlying the distribution, emergence, and re-emergence of infectious disease.”

Reading the extract, participants should brainstorm on what they think is a burden of disease!

The following statistics makes the case clearer as indicated in slide 69-81.

The slides should be distributed to the participants.

The following two slides would make a good summary:

Global epidemiology of infectious disease:

- Infectious disease account for more than 25% of all deaths in the world.
- Diarrhoea and Respiratory tract infections (RTI) account for 50% of all infectious deaths.
- HIV, tuberculosis, malaria and measles are significant causes of deaths.

Global Burden of Disease: 10 leading causes of death:

**Developed Countries**
1. Ischaemic heart disease
2. Cerebrovascular disease
3. Lung cancer
4. Lower RTI
5. COPD
6. Colon/rectal cancer
7. Stomach cancer
8. Road Traffic accidents
9. Self inflicted injuries
10. Diabetes mellitus

**Developing Countries**
1. Lower RTI
2. Ischaemic heart disease
3. Cerebrovascular disease
4. Diarrheal disease
5. Perinatal conditions
6. HIV
7. Tuberculosis
8. Measles
9. Malaria
10. Road Traffic accidents

Flush or distribute slide 70-78 which all emphasise the burden of disease.

Ask participants to reflect on their own areas where they reside and come up with a list of the cause of deaths in the last 2 years.

What are the most common diseases that have led to death?

They may wish to represent those using percentages% or a pie chart.

Participants may wish to highlight the issue that “60% of disease burden or global mortalities are due to infectious diseases which result in a total of 445 million cases per day”.

39
Classified of infectious diseases

Flush slide 83 and 84 and briefly give the technical classification of infectious disease

Divide participants in 2 groups

- Group 1 to classify infectious diseases through transmission Spread by common vehicle and give examples
  - Ingestion
  - Inhalation
  - Inoculation

- Group 2 to classify infectious diseases through Propagation by serial transfer from host to host
  - Respiratory
  - Anal-oral
  - Genital

Participants will present their findings and the facilitator will supplement by mentioning those diseases that may not have been mentioned.

Measures of disease frequency (descriptive, analytic and participatory epidemiology)

Introduce measurement of disease as is commonly known in epidemiology.

Can flush slide 143

Measures of frequency are;

- The basic tools to describe quantitatively the causes and patterns of disease, or any other event related to health in human populations.

For example:

- How many people are affected by a certain disease?
- What is the rate at which the disease is occurring through time?
- How does the disease burden vary by geographical region, by sex, by age, or various modes of exposure? Etc., etc.

The facilitator to emphasise that epidemiology measures are basically about C ount  
D ivide
C ompare

At this time, introduce various measures used in epidemiology through a short lecture. Should particularly mention descriptive, analytic and participatory measures and introduce the following vocabulary

- Incidence: New cases in each time (percent per year or per person time of observation)
- Prevalence: Number of cases at a given time (percent at a given time)
- Attack rate

Proportion of non-immune exposed individuals who become clinically ill

Primary case: Person who brings infection into a population

Secondary case: Persons who are infected by the primary case (further spread is described as 'waves' or generations')

Epidemic: Occurrence of case of illness more than expectancy. An epidemic whose incidence remains stable for a long period of time is described as endemic.

Pandemic: A global outbreak

All the above vocabulary refers to particular measures the participants should get to know of.

The facilitator should divide the participants into 3 groups 1. group one to
develop a case study and calculate the incidence of an outbreak of a given disease.
2. Group two to develop a case study and calculate the prevalence of a disease.
3. Group three to develop a case study and calculate the attack rate of a given disease.

Still within groups distribute slide 144 – 155 for practice purposes up to lunch time.

Lunch Break

Plenary: Group Presentations
Each group is given 10 minutes to present the brief case they developed and the measures they carried out.

Concluding comments,
Each group presents the formulae for a basic measurement e.g. formulas for the measures of: ratios, proportions, incidence, prevalence and attack rates.

Ask each of the participant to develop own case studies and practice the measurement of ratios, proportions, incidences, prevalence and attack rates later at home.

Gender and Epidemiology
Divide the class into two groups: One group will review the case study on the First Ever Rift Valley fever outbreak in Kabale, Uganda. The second group will review the case study on Crimean Congo Haemorrhagic Fever (CCHF) in Nakaseke Uganda.

The groups should then discuss the following questions and present to the plenary:

Rift Valley Fever in Kabale, Uganda: Questions
1) What more measures do you think could have been taken to control RVF?
2) What aspects of descriptive, analytical epidemiology, and participatory epidemiology do you think were involved in this investigation?
3) What do you think could have been the role of gender in this outbreak investigation?

CCHF in Nakaseke, Uganda Questions:
1) Suppose, you were the lead investigator in this outbreak, how would you proceed?
2) What measures should be taken to control Crimean Congo Haemorrhagic Fever in this case study?
3) What aspects of descriptive, analytical epidemiology, and participatory epidemiology were involved in this investigation?

What do you think could have been the role of gender in this outbreak investigation?
Uses measures of diseases frequency: ratios, proportions, incidence, prevalence and attack rates

The facilitator will explain using power point presentation the various uses of measures of disease frequency (slide 141). The following may be mentioned:

- The basic tools to describe quantitatively the causes and patterns of disease, or any other event related to health in human populations.
- For example:
  - How many people are affected by a certain disease?
  - What is the rate at which the disease is occurring through time?
  - How does the disease burden vary by geographical region, by sex, by age, or various modes of exposure?

**Divide the participants into groups and distribute the following extract**

“counting cases of disease in a population is the unique domain of epidemiology, a core component of disease surveillance and of a critical stage in investigating outbreak. Case counts must be placed in proper perspective by using rates to characterize the risk of disease for a population. Calculating rates for different subgroups of age, sex, exposure, history and other characteristics may identify risk groups and casual factors. Such information is vital to the development and targeting of effective control and prevention measures”

https://www.uic.edu/sph/prepare/.../epilesson02.pdf

Using the information in the extract, groups should be able to extract the use frequency measures and share in a plenary there after.

Each group has 10 minutes to present and 10 minutes for discussion on the uses of frequency measurers.

The facilitator introduces another measure “rates”

Using slide 157

**RATES are:**

- Something that may change over time
- Something that is observed during some time
- Measures the speed of occurrence of an event
- Measures the probability to become sick by unit of time
- Measures the risk of disease
- Time is included in the denominator!!
- However, rate is frequently used instead of ratio or proportion!!

Following is an example of a calculation of a rate

**Mortality rate of tetanus in X country in 1995**

- Tetanus deaths: 17
- Population in 1995: 58 million
- Mortality rate = 0.029/100,000/year
- Rate may be expressed in any power of 10
  - 100, 1,000, 10,00, 100,000
Case study 3.1: First ever Rift Valley Fever detected in Kabale, Uganda, 2016

On 11th March 2016, the Ministry of Health (MoH) announced two confirmed cases of RVF in Humans after testing positive by RT-PCR by Uganda Virus Research Institute (UVRI).

The two confirmed cases were a 48-year-old butcher man from bugongi north ward, Kabale municipal council and a 16-year-old student from omururinda village, Kabale District. Uganda had never had outbreak of RVF before. The National Task force, responded by dispatching a multisectoral team starting on 11th March 2016 to the field for immediate intervention. The multisectoral team composed of experts from MOH, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Uganda Virus Research Institute (UVRI), Centres for disease control (CDC), School of Public Health, Makerere University, One Health Central and Eastern Africa (OHCEA) and Kabale District staff. The objectives were 3-fold i.e.-

1) to establish the existence of RVF in animals; 2) to determine the magnitude of the Outbreak; 3) to report the findings to MAAIF and MoH for actions and planning. Identify the measures mentioned that were taken to control RVF in Kabale. What more measures do you think could have been taken to control RVF? What aspects of descriptive, analytical epidemiology, and participatory epidemiology do you think were involved in this investigation? What do you think could have been the role of gender in this outbreak investigation?

Case study 3.2: Crimean Congo Haemorrhagic Fever (CCHF) in Nakaseke, Uganda

Patient A, 19 (Student) from village K, Nakaseke S/C in Nakaseke District. On July 10, 2017, he developed high grade fever, cough and dizziness for a week before admission to Nakaseke Hospital. During this time, he was managed for typhoid from Kasambya Clinic for filariasis and typhoid. He was admitted to Nakaseke hospital on July 17, 2017. He had a high-grade fever, was very sick looking, petechial rash, bleeding from venu-puncture site, GBW, dizziness, productive cough, mild chest pain, dark and loose stool (with four episodes a day). He tested malaria negative by merit, typhoid RDT (IgG/IgM) positive, CBC showed reduced cells and was sputum negative for TB by GeneXpert™. On July 24, 2017 he vomited blood while on admission and was referred to Mulago NRH on July 25, 2017 but he did not go. He died on July 27, 2017.

Patient B, 20, Male, from village L, Makulubita Sub County, Luweero district. He was admitted on July 14, 2017 to Nakaseke Hospital with swollen Eyes, dry cough, yellow urine, black stool, epigastric pain and was oozing blood out of teeth before death. Malaria, typhoid, Brucella and H. Pylori tests were all negative, CBC showed pancytopenia – with reduced WBCs, and marked thrombocytopenia; HB was 6.1 and stool analysis showed nothing found. His blood sample tested negative for CCHF by PCR at UVRI. On July 18, 2017 he was referred to Mulago NRH but he did not go to. He died in the community on August 19, 2017 and was buried on August 20, 2017.

Patient C, 16, Male from village N, Makulubita S/C in Luweero district. He was admitted to Nakaseke Hospital on August 10, 2017. He developed low grade fever associated with abdominal pain about August 4, 2017. He had a productive cough associated with mild chest pain. He also had Jaundice, ascites, hepatomegaly and was anaemic with pancytopenia, reduced HB and HbSAg negative. Other symptoms included recurrent gingival hypertrophy, gum bleeding, epistaxis and joint pains. He escaped from the hospital on August 17, 2017.

Patient D, 30, Male from village P, Nakaseke S/C in Nakaseke district; a boda rider/charcoal burner. He used to burn for charcoal in Ngoma village. On August 10, 2017 he developed high grade fever and headache and was managed at Kaweweta Military Hospital. On August 17, 2017 he collapsed in Nakaseke Hospital while attending to his expectant wife. He reported having noticed epistaxis on the morning of the same day. He was admitted the same day. Key signs included vomiting blood, epistaxis and high-grade
fever. He tested positive for CCHF by PCR at the UVRI labs. He was isolated at Nakaseke Hospital.

Patient E, 48, Male from village R, Nakaseke S/C in Nakaseke district; a peasant farmer. He reported a date of onset of high grade fever on August 20, 2017 and first reported for management at Nakaseke Hospital on the same day. He started bleeding from the mouth on August 22, 2017. He also had oral sores and diarrhoea. He tested mRDT negative and Widal reactive. He was isolated at Nakaseke Hospital

Questions:
Suppose, you were the lead investigator in this outbreak, how would proceed? What measures should be taken to control Crimean Congo Haemorrhagic Fever in this case study? What aspects of descriptive, analytical epidemiology, and participatory epidemiology were involved in this investigation? What do you think could have been the role of gender in this outbreak investigation?
Session 4 Disease Surveillance and Outbreak Investigation,

Session 4 will focus on disease surveillance. Participants will be assisted with the help of case studies and simulations to discover the need to support and improve disease surveillance and outbreak investigation.

Session Learning Objectives

Learning Objective:
By the end of this session Participants should be able to:
▪ Explain the steps in disease outbreak investigations
▪ Describe different types of surveillance
▪ Define elements of public health surveillance
▪ describe functions of public health surveillance
▪ Explain the surveillance “feedback loop” of data and information flow through local, state, and federal channels
▪ List some of the uses of surveillance data
▪ Indicate role of laboratory in surveillance
▪ Compare common surveillance strategies and systems
▪ Describe and discuss the existing surveillance systems in a given country.

Time Activity/Topic Facilitator Instructions

15 min Review of previous day work Ask participants to reflect on previous day work and point out what they enjoyed most and why?

45 min The elements of public Health surveillance Give participants a chance to define Health surveillance

You should also as a facilitator give them as many definitions as possible e.g. Disease surveillance is an information-based activity involving the collection, analysis and interpretation of large volumes of data originating from a variety of sources.

For effective and efficient practice of the One Health approach, there are defined competencies -- skills, knowledge and behaviours -- that build upon the foundation of multiple health-related disciplines. One Health competencies are critically important for the early identification and appropriate response to epidemics of emerging infectious pathogens.

Flush side 287that describe the meaning of public health surveillance

Public Health Surveillance

“The ongoing, systematic collection, analysis, and interpretation of data on specific health outcomes, closely integrated with the timely dissemination of these data to those responsible for prevention and control.”
Facilitator uses slide 288 as shown above that show the public health surveillance place on a continuum and divide the participants in groups.

Each group should play a role on the continuum. Give each group a card on a section of the continuum. Other groups should not know what they are doing. They should then present a role play on their section. The role play should be based on a real-life outbreak of any given disease and guided by the notes on slide 299. In surveillance, there ought to be

- Systematic
- Ongoing
- Collection
- Analysis
- Interpretation
- Dissemination
- Of health data and
- Link to public health practice

And that these are the elements that are (or should be) included in any definition of surveillance:

- Systematic - organized, not haphazard
- Ongoing - not just a one-time survey
- Collection
- Analysis
- Interpretation
- Dissemination
- Of health data
- Link to public health practice

Notice it is not just “the collection of.” It is not just vital statistics. It is data collected with the expectation that public health officials will look at it and act. And We will talk about each one of these features.

From the role play, ask participants the following questions,
Is identifying a problem all that is needed to come up with a solution?
Why identify risk factors?
What intervention measures are necessary?
How can implementation be carried out?

The facilitator will then summarise by flushing slide no 291 which outlines the purpose of public health surveillance as to; but before the groups should consider case study below and see how surveillance principles worked in the given situation

Case study
On Malaria

Present the following case study on Malaria to the group and have them respond to the following questions

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 anymore. The number of Malaria cases had indeed gone down. However, in June 2015, the Uganda National Medical stores reported increased consumption of antimalarials in Northern Uganda. This prompted the ministry of health to investigate the cause of this increased consumption of antimalarials. The ministry discovered that there was an ongoing malaria epidemic that had gone undetected for 3 months.

Questions:
How was the public health hazard assessed?
How was public health action triggered?
What were public health priorities
How could the response be evaluated?

The facilitator should then summarise and flush the slide on the purpose of public health surveillance.

- Assess public health status
- Trigger public health action
- Define public health priorities
- Evaluate programs

The facilitator should ask another vital question: what are the sources of data? Participants should be able to brainstorm, before the facilitator flushes slide 290 as a summary of the Sources.

- Notifiable diseases
- Laboratories
- Vital records
- Registries
- Surveys
- Administrative data systems
- Media
- Other data sources

Break Tea
The facilitator will introduce the types of surveillance using slide 294.

The slides are accompanied by the following notes which the facilitator will share participatory with the participants.

Surveillance systems can be classified in a variety of ways. One distinction is whether the system expects reports on the entire population or only a subset. A system that targets the entire population is called (appropriately enough) a population-based system.

A system that targets only a subset is often called a sentinel system. Note in the diagram that both population-based and sentinel systems can be active or passive.

The facilitator will ask the participants whether anyone of them know the difference between active and passive surveillance.

The terms active and passive are from the perspective of the health agency. Can the health officials sit back, feet up on the desk, and wait for reports to come in? That’s a passive system from the perspective of the health agency. In passive system physicians, clinics, laboratories and others required to report disease are given the appropriate mailing forms and instructions, with the expectation that they will report all the cases of reportable disease that come to their attention. So, more work for the clinicians, less work for the health agency.

Alternatively, do the health officials make periodic (usually weekly) telephone calls or personal visits to the reporting individuals to obtain the required data? That’s active.

Q. Which is more common? Why?

A. Most routine surveillance systems are passive. Because they are cheaper and
less work for the health agency, require fewer resources.

Ask participants whether they had ever witnessed any of the active and passive surveillance discussed above!

The women probably would say so as it is done for HIV among expecting women, the hospitals collect data regularly.

Dissemination of Surveillance Data

Ask participants to pair up and discuss why dissemination of surveillance data is necessary and important. They should write their findings on a card to be posted on the wall for others to see.

The facilitator then summarises as follows using slide 296:

For appropriate public health action to be taken, those responsible for taking that action need to know, and need to know in a timely fashion. Public health officials in neighbouring areas might want to know, so they can be vigilant for cases that might occur across geographic lines.

- Other government authorities (mayor, governor, etc.) usually want to know, particularly if the situation is serious.
- Those who sent in the case reports appreciate being “in the loop”, because then they know that their efforts to report are not a waste a time and that the reports they sent in are not just being filed in some dusty file room. Also, clinicians like to know what diseases are prevalent at any given time, since it may help them with a differential diagnosis.
- Finally, the public is sometimes interested.

Linking Surveillance to Action

Surveillance should be Linked to Action

Review the previous case studies on panic in Rwanda, CCHF in Uganda, and RVF in Kabale, Uganda and analyse the following in relation to the cases:

Is Surveillance linked to action as follows?

- Outbreak investigation
- Disease control
  - Vaccination / prophylaxis
  - Elimination of cause
  - Interruption of transmission
- Development, targeting of programs (education, risk reduction, etc.)
- Development of policies, regulations

If not, what should be done?

Actions can include:

- Outbreak investigation
- Disease control, such as
  - Vaccination / prophylaxis (e.g., immune globulin for hepatitis A outbreak)
  - Elimination of cause (e.g., discarding contaminated food)
  - Interruption of transmission (e.g., spraying to kill mosquitoes transmitting arthropod-borne disease)
• Development, targeting of programs (education, risk reduction, etc.)
• Development of policies, regulations

The facilitator can now flush slide 297 and summarise in addition to groups presentations

Further brainstorming of uses of public health surveillance is carried out and ultimately the facilitator flushes slide 298 to wind the subject.

Public Health surveillance is used to:

- Investigate cases and implement control measures
- Detect epidemics/define a problem
- Estimate magnitude of the problem
- Evaluate control measures
- Facilitate planning
- Determine geographic distribution of illness
- Portray the natural history of a disease
- Generate hypotheses, stimulate research
- Monitor changes in infectious agents
- Detect changes in health practices

Lunch Break

The Laboratory in Surveillance

Introduce Laboratory surveillance to the participants

Participates to discuss in a panel on what they think laboratory surveillance means then the facilitator will flush the following slide

Peripheral (e.g. health center, outpatients)
Explain the importance of accurate and timely laboratory information that has become the foundation upon which current disease treatment, prevention and control programs are based.

Divide them into 3 groups and let groups discuss the following questions:

1. How can laboratory surveillance help to clarify clusters and outbreaks of diseases?
2. How can laboratory surveillance help to compare infection rates?
3. How can laboratory surveillance help to measure internal improvement over time?

On a piece of paper ask participants to indicate examples from their local environments of disease surveillance at levels where laboratories have been involved in disease surveillance using the following as subheadings:

- Peripheral (e.g. health center, outpatients)
- Intermediate (district/regional laboratory)
- National (e.g. national meningitis reference) laboratory
- International (International polio laboratory)

Again, ask participants to indicate on pieces of papers the usefulness of Laboratory surveillance and flush power point slide 302, 304, and 305.

Case studies disease surveillance

Simulation exercise & case study reviews on disease surveillance

Form groups and have them discuss the case study on Karatu and review the Sirari case study.
Karatu case study

Questions on Karatu case study

1. What is the problem?
2. Who is affected by the problem?
3. What are the sectors that can be involved in solving the problem?
4. What measures/actions can be done to safeguard the public health, animals and the environment?

Questions on Sirari case study:

1. Who are the people affected?
2. What different stakeholders are involved? What could be their interest in this scenario?
3. What disease are you thinking about?
4. How do you link the history of the disease with the epidemiological triad?
5. What should be done differently to prevent and control their conditions?
6. What further investigations should be done at district level?

Case Scenario: provide the students with the following scenario

You are working at the Ministry of Health’s Epidemiology Surveillance Division. A school in Kakamega District, Kenya reported an outbreak of suspected measles; the symptoms included fever and rash. Your supervisor asked you to take the lead to deal with this situation. What would you do? How would you link surveillance data from the Epidemiology Surveillance Division to this outbreak? What public health interventions would you take in this case study to stop further spread of the disease and/or prevent future outbreaks?
Karatu District Arusha Tanzania

Karatu district is located in Arusha region, Tanzania and is known by its agricultural activities. People practice irrigated farming. Among the major drawbacks that face 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 at large. 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 deliver 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 mucous 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 done 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 the integrated pest control systems but the problem still exist and is getting worse.

Karatu case study questions

✓ What is the problem? Who is affected? What are the challenges?
✓ What do you see as the social, economic, political angle to this?
✓ What key One Health issues can be identified?
✓ What sectors are involved?
✓ Are there any government policy implications?
✓ What measures can be done to protect the health of humans, animals and the environment?
✓ Can you give similar examples from your own background/work? How did you deal with it?
Case Study 4.2: Measles case study

You are working at the Ministry of Health’s Epidemiology Surveillance Division. A school in Kakamega District, Kenya reported an outbreak of suspected measles; the symptoms included fever and rash. Your supervisor asked you to take the lead to deal with this situation. What would you do? How would you link surveillance data from the Epidemiology Surveillance Division to this outbreak? What public health interventions would you take in this case study to stop further spread of the disease and/or prevent future outbreaks?
Session 5: Case study Reviews

The morning session will focus on identification of case studies that can be used for training purposes. Based on examples already used in the training participants will be required to review at least 4 case studies in total and suggest situations whereby they can be used.

**Session Learning Objectives**

By the end of this session participants should have acquired ability to;

- Identify or develop epidemiology case studies related to one health initiatives.
- Determine possible ways of mitigating widespread disease outbreaks in a given community.
- Use existing case studies to respond to an emerging pandemic threat as members of a One Health Team.

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity/Topic</th>
<th>Facilitator Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10min</td>
<td>Reflection</td>
<td>Begin with an ice breaker and Circulate the following fig to everyone and ask them how yesterday training was! giving support to their opinions. Groups present the role plays they derived from the case studies they took home the previous night, and participants note their observations and questions. The following questions may be of help: 1. What sources of data might be available? 2. What factors make one source of data more appropriate than the other? Who is going to utilize the data? How can data be routed transferred and stored? Debrief the participants after the role play and discussions outlining key issues on data for surveillance.</td>
</tr>
<tr>
<td>15 min</td>
<td>Tea Break</td>
<td></td>
</tr>
<tr>
<td>90 min</td>
<td>Case study identification</td>
<td>Using the 5 case studies provided for this section, have the participants analyse how each case study is relevant for epidemiology training and One Health and review them based on the following questions. The National Task Force appointed you to take the lead in the</td>
</tr>
</tbody>
</table>
investigation, how would you proceed to handle this scenario?

To ensure that you are applying the principles of One health, what kind of team would you constitute to investigate and what would be their roles?

What kind of data would your team collect?

Describe the steps that you would take to solve the problem in each case.

What lessons could be taken from this scenario?

Describe, how you would investigate this cluster to identify the cause and recommend prevention measures.

Then after discussion of these case studies, divide the participants into 4 four groups. Each group should identify a case study that can be used for epidemiology training purposes. The case study must be one health relevant addressing aspect of human, animal and environmental health and including multiple stakeholders. They should feel free to search the internet or to create their own case studies and present these.

Presentations, each group to present a case study and other groups to critique and supplement. Ensure that every case study is One health relevant.

The case studies to be collected and documented for future use.

Tea Break

Post Test

- Handout Post-Test.
- Tell students they have 30 minutes to complete the post test.
- If they finish early, ask students to remain quiet until everyone is done.

Closing Session and Course Evaluation

- Have students form a circle and ask each student to say in one or two words they associate with either disease surveillance or infectious diseases.
- Pass out certificates.
- Pass out OHCEA Event Evaluation.
- Tell participants to place their completed evaluations in an envelope.
- Seal the envelope and give the evaluations to the OHCEA course coordinator.
Session 5: Facilitator Notes

Case study 5.1:

On 17th October 2017, a national reference lab in Uganda confirmed by PCR a positive case of Marburg Virus Disease (MVD) from a sample obtained from District X, in Eastern Uganda. An outbreak of Marburg was officially declared by the Ministry of Health on 19th October 2017. The index case was believed to have been an adult male, aged about 35 years, who was a herdsman with frequent hunting missions to the areas where there are caves heavily infested with Egyptian Fruit bats. Bats are known to be a delicacy in District X since time immemorial. The National Task Force appointed you to take the lead in the investigation, how would you proceed to handle this scenario?

Case study 5.2:

On the May 7th, 2017, the UNHCR public health officers reported suspected cases of anthrax at Olujobi HC III- Rigbo Health centre. i.e. 2 from the same family (children aged 6 and 12 years respectively had consumed meat from a dead animal. The children came from Walope village, Rigbo subcounty. The 3rd case (18 months old) was from Malangacia village. On 5th June 2017, Rhino Camp HC IV reported to Arua DHO death of a 35-year-old male. On 4th June 2017, a resident of Ledriva village, Eramva parish, Rhino Camp Sub-county was admitted with restlessness, sweating and confusion; Papulo-vesicular lesion became an eschar. He deteriorated, got dyspnoea and died on 5th June 2017. Skin sample tested positive for Bacillus anthracis by gram stain on 8th June/2017. You got to know about this scenario on 9th June/2017 and you were tasked to take charge of the investigations by your supervisor. Describe the steps that you would take to solve the problem in Arua? What lessons could be taken from this scenario?

Case study 5.3:
A district in northern Rwanda reported a sudden influx of refugees from a neighbouring country. Local newspapers and social media reported terrible hygienic conditions at the refugee reception centre and rumours of communicable disease outbreaks. The Ministry of Health appointed you to take the lead to deal with this situation. What would you do?

Case study 5.4:

During the week of 6th Dec 2015, a man running a veterinary drug shop in Kibera, Nairobi, reported to Kibera clinic with a slight fever, and headache for treatment in the first week of his infection virus. In the second week when the fever intensified, he then visited Kenyatta National hospital from where his blood was suspiciously drawn and sent to Entebbe virus research institute where it was diagnosed positive with Crimean Congo Haemorrhagic Fever (CCHF). Describe how you would deal with this situation.

Case study 5.5:

On November 2016, 3 deaths of unknown cause occurred in the same household in the Rural District, Mekelle, Ethiopia. All were reported to have eaten the meat of a dead pig. Describe, how you would investigate this cluster to identify the cause of death and recommend prevention measures.

References

10. SEAHOUN Module on Epidemiology
Company; 1985.