

VIETNAM ONE HEALTH UNIVERSITY NETWORK

ONE HEALTH TRAINING MANUAL IN VIETNAM



MANUAL FOR LECTURERS

**Center for Public Health
and Ecosystem Research - 2018**

ONE HEALTH TRAINING MANUAL IN VIETNAM

Lecturer Manual

Editors

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VETERINARIANS
WITHOUT BORDERS

VÉTÉRINAIRES
SANS FRONTIÈRES



In collaboration with the Vietnam One Health University Network (VOHUN)
and Veterinarians without Borders/Vétérinaires Sans Frontières - Canada

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Abbreviations

AMR	Antimicrobial Resistance
CDC	United States Centers for Disease Control
CENPHER	Centre for Public Health and Ecosystem Research
FAO	Food and Agriculture Organization
HMU	Hanoi Medical University
INDOHUN	Indonesia One Health University Network
IUCN	The International Union for Conservation of Nature
MPH - OH	Masters Public Health, One Health program
MYOHUN	Malaysia One Health University Network
OH	One Health
OHCC	One Health Core Competency
OIE	World Organization for Animal Health
PBL	Problem Based Learning
PH	Public Health
SARA	The Support for Analysis and Research in Africa
SEAOHUN	South East Asia One Health University Network
SENASA	National Food Safety and Quality Service
THOHUN	Thailand One Health University Network
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
VOHUN	Vietnam One Health University Network
VWB	Veterinarians without Borders
WASH	Water, Sanitation and Hygiene (formerly Water and Sanitation for Health)
WHO	World Health Organization
WWF	World Wildlife Fund

Definitions

Advocacy: Promoting and encouraging decision-makers to issue policies in accordance to the needs and/or demands of groups or individuals.

Antimicrobial Resistance: The ability of a microorganism such as bacteria, viruses, and even some parasites, to stop an antimicrobial (like antibiotics, antimalarials, and antivirals) from working against it. As a result, treatments become ineffective, allowing the infections to continue and possibly spread to other agents. This is a prominent issue in both human and animal health.

Collaboration and Partnership: The capacity to maintain and strengthen collaboration in One Health initiatives among individuals, stakeholders, communities, and other key actors.

Communication and Informatics: The capacity to collect, analyze, review, share and exchange information among disciplines and sectors to establish, strengthen and promote One Health programming.

Culture and beliefs: The capacity to comprehend, analysis, and assess the diversity of social standard, responsibility, and practice of individuals, communities and organizations. This diversity may affect the planned outcomes of a One Health program.

Eco-Health: Aims to build capacity in participatory, collaborative and trans-disciplinary research, meaning participants and researchers need to develop skills and involve different stakeholders in the research and learning process. Eco-health is an emerging field of study that examines how change's in the earth's ecosystems affect human and animal health.

Inter-disciplines: A set of knowledge and theories that is produced as the result of the collaboration and interaction of two or more disciplines

Leadership: The capacity to build visions for interdisciplinary programs, to make strategic decisions in collaboration, and commitment to promoting an integrated approach in addressing One Health challenges.

Management: The capacity of planning, designing, implementing, monitoring and assessing the multidiscipline programs' activities to maximize the effectiveness of these programs.

Multi-disciplines: Involvement of two or more disciplines that has the same interests in solving a health related issue but with no previous interactions or different approaches.

One Health: An approach that encourages the collaboration of different sectors and disciplines (i.e. public health, veterinarian services, environmental science, etc.) at a local, national, and international level to use shared knowledge to improve human, animal, and environmental health.

One Health Core Competency: The basic knowledge, skill or behaviour that members of the One Health team needs to master to implement the best One Health intervention.

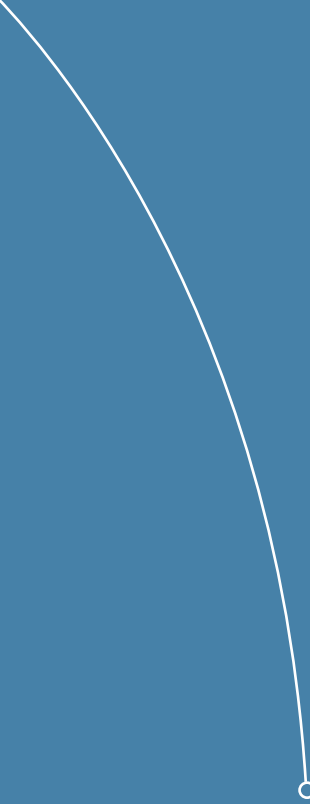
One Health Economics: Considers the socio-economic burden of emerging infectious diseases, outbreaks, and other health related epidemics, will have on the economy, human beings, and the environment. This also includes the consideration of climate change and disease management.

Policy: Action of a government, including socio-economic, environmental, and/or cultural, to achieve particular goals and actions.

Systems thinking: The ability to analyze the interactions and dependences among human, animal, environment and ecological factors and how these interactions have impacts on the relationship between individuals, groups, organizations and communities.

Trans-discipline: The integration of two or more disciplines to share knowledge and solve health related issues.

Values and Ethics: The capacity to identify and respond to One Health issues on different scales, with honesty, equality, responsibility and adaptability.



CHAPTER 1: Introduction to One Health

Overview

One Health (OH) is a trans-disciplinary collaborative effort which aims to improve the health of animals, humans, and the environment. This knowledge can be applied for the optimal health of all communities, animals, and the environment on a local, national, and global scale. The OH approach calls for a shift in developing, implementing and sustaining health policies to engage with medicine, public health, veterinary science, environmental sciences and other fields that relate to health, land use and human interactions.

The South East Asia One Health Network (SEAOHUN) aims to foster sustainable trans-disciplinary capacity building in response to infectious and zoonotic diseases. This network includes South East Asian universities from Vietnam, Thailand, Malaysia, and Indonesia. The network in Vietnam, known as Vietnam One Health University Network (VOHUN), focuses on applying OH policies and teachings in Vietnam. Created in 2011, VOHUN promotes the OH approach through university trainings and research to inspire a new generation of lecturers and researchers. This will equip them with the knowledge and skills needed to integrate the OH approach throughout the country. VOHUN has brought together 18 medical, veterinary, nursing and public health universities to promote and develop OH principles and practices. Moving forward, from 2015 to 2019, the One Health Workforce aims to continue developing the OH capacity through training programs, activities, and research. This will provide the necessary information to detect, prevent and respond to zoonotic and other infectious disease outbreaks.

This manual will serve as a template for lecturers teaching the OH approach to undergraduate and graduate students. This manual aims to teach aspiring OH professionals all the necessary knowledge and skills they need to address health related problems and develop solutions.

This manual was developed in collaboration between VOHUN, the Hanoi Medical University (HMU)'s Centre for Public Health and Ecosystem Research (CENPHER), and Veterinarians without Borders (VWB) Canada.

KEY CONCEPTS

The VOHUN manual contains 16 modules which breakdown into seven core competency modules and eight technical modules. This manual is designed to develop a number of OH training programs, either as individual modules, or integrated course. These modules will increase the knowledge, abilities, and skills and assist students in identifying and solving OH problems.

These modules have been designed to enable students, facilitators, and other learners to solve OH problems in a Vietnam context (university, region, discipline, etc.). There is overlap in the modules, allowing lecturers to tailor modules and learning objectives to meet the needs of the program, audience, and academic level.

The One Health Core Competency Modules	The One Health Technical Modules
1. Collaboration and partnership	1. One Health Concepts and Knowledge
2. Values and ethics	2. Fundamentals of Infectious Disease
3. Leadership	3. Public Health
4. Planning and Management	4. Behaviour Change
5. Communication and Informatics	5. Ecosystem Health
6. Systems thinking	6. Infectious Disease Management
7. Culture and beliefs	7. Epidemiology and Risk Analysis
	8. One Health Economics
	9. Antimicrobial Resistance

ONE HEALTH CORE COMPETENCY MODULES

1. Collaboration and Partnership Module

A core principle of the OH approach focuses on forming partnerships on a local, national, and global scale to encourage collaboration and knowledge-sharing. This module builds an understanding of collaborating and partnering in the context of OH approaches in Vietnam. This will allow health challenges to be addressed while promoting inclusion and gender equity across human, animal, environmental health practices and in other relevant disciplines.

2. Values and Ethics

Students will learn how to demonstrate values and ethics, in a professional manner, throughout the planning and implementation of interventions. This will ensure that students understand the importance of respect and fairness, and select the most

culturally appropriate interventions to solve OH problems. This module will create a comprehensive understanding of information sharing and analysis to select the most appropriate OH intervention.

3. Leadership

This competency discusses leadership in the context of OH. Students will learn how to develop their leadership skills, knowledge, and behaviours to be successful One Health professionals. This will allow for them to reflect on their own leadership styles, its impact on group scenarios, and how to encourage others to take action. This module will discuss what leadership is and how a cultural/sector lens can impact perspectives on effective leadership.

4. Planning and Management

Management and planning focuses on selecting and implementing the correct methodologies to OH interventions. This includes establishing policies, procedures, and systems to guide, monitor, and evaluate. This will maximize the effectiveness of OH actions and meet the most desired outcomes. Students will learn the difference between managing and leading, and the importance every team member plays in implementing.

5. Communication and Informatics

This modules focuses on effective communication and information sharing throughout networks, disciplines, and sectors. Students will learn about effective verbal and non-verbal communication methodologies to improve their communication abilities. This competency will teach basic communication styles and techniques to increase understanding of the risks of communication, and the various ways information is shared.

6. Systems Thinking

Based on a problem-based learning approach, this module equips students with the necessary skills to use a systems thinking approaches to tackling health problems and/or emerging diseases. Key outcomes include the ability to use systems thinking to create maps of complex and complicated systems. Students will learn to work with an OH team, using systems maps to develop solutions, integrate information from multiple disciplines and sectors, to develop strategies to address OH challenges, and to mitigate potential unintended consequences.

7. Culture and Beliefs

Culture and beliefs are a set of capabilities that focus on effective communication and interaction through an understanding of social norms, roles, and practices of individuals, communications and organizations. Because culture is so complex and diverse, it plays a fundamental role in individual health and related barriers. Understanding cultural competencies and beliefs will allow the students to generate trust in communities, by identifying different cultures, values, and ethics, and select the most appropriate OH intervention.

ONE HEALTH TECHNICAL MODULES

1. One Health Concepts and Knowledge

Students will learn the history of One Health, setting from its origins to current issues and methodologies. Key terms and concepts will also be highlighted, allowing students to explain how integrating humans, animals, and the environment can address emerging pandemic health threats.

2. Fundamentals of Infectious Disease

This module will help students foster an understanding of infectious disease principles in the context of One Health. This module will use an OH approach to examine zoonotic infectious diseases in humans and animals. This will allow students to understand the ways in which infectious diseases spread and influence everyday life, in relation to culture and traditional practices. Students will also get to apply communication strategies in writing, oral presentations, and discussions on ecology and epidemiology of infectious diseases.

3. Public Health

This module integrates the OH approach into public health by looking at the relationship between humans, animals, and ecosystems. This explores how to prevent diseases and promotion of health within groups of people, from local communities to the entire country. Topics in this module include air quality/pollution, water quality and sanitation, food safety and security, epidemiology and biostatistics, maternal and child health, and social sciences. It also includes discussions on policy and stakeholder involvement. Students will also use systems thinking to analyze issues and create effective policies.

4. Behaviour Change

Students will use research of behaviour modification from a health care perspective to develop behaviour change models for OH interventions. This will allow them to analyze how human behaviour impacts community, animal and ecosystem health. This module addresses individual behaviour change while the second half addresses institutional/organizational /community level changes.

5. Ecosystem Health

The ecosystem health module will foster an understanding of the basic principles of ecosystem health through an OH approach. Students will explore three ecosystems: mangroves, tropical rainforests and coral reefs, and analyze how natural and anthropogenic changes to the environment can impact animal and human health on a local, regional, and national scale. This will allow them to recognize the inter-relationships while analyzing the effects and impacts of anthropogenic changes on the environment, human and animal health

6. Infectious Disease Management

This module provides a comprehensive understanding of analyzing infectious diseases through multiple perspectives. This covers the spectrum of disease management, including surveillance, health promotion, prevention, detection, treatment and rehabilitation. Students will develop an understanding of the concept within the One Health approach, on an individual and societal scales. They will also understand the interplay amongst agents, hosts, and environments, to control outbreaks and create eradication strategies.

7. Epidemiology and Risk Analysis

This module will focus on epidemiology, health promotions, and population health in relation to OH. Students will learn how to conduct a risk analysis assessment, which is the systematic approach to evaluating the likelihood of an occurrence and the magnitude of its impact. This allows health practitioners to mitigate the risk and communicate with relevant stakeholders. Together, epidemiology and risk analysis increases students' knowledge of the history, concepts, theories, terminologies and practices.

8. One Health Economics

This module will teach students the economic approach to planning One Health interventions and preventative measures. They will learn how to consider human health, animal welfare, and the environment when analyzing the economic lens for disease outbreak and management practices. This will allow future OH practitioners to advocate for further OH interventions on a national and local scale in Vietnam, and worldwide.

9. Antimicrobial Resistance

Due to the increasingly serious threat of antimicrobial resistance (AMR) to global public health, this module will equip students with an understanding of its foundation, evolution and challenges. They will learn about the impacts of AMR across society and government sectors, how to counteract AMR health-related problems present in human and animal health, and how to advocate for proper antibiotic usage.

CHAPTER 2:

One Health Core Competencies and Technical Modules Facilitator's Guide

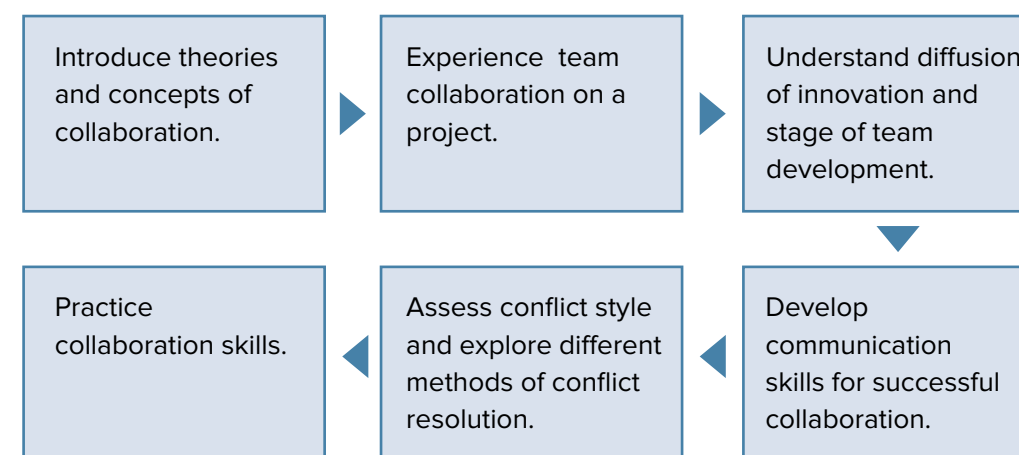
MODULE 1

COLLABORATION AND PARTNERSHIP

Course Overview

Module Description and Learning Outcomes	This module builds an understanding of the basic principles revolving around collaboration and partnership, in the context of a One Health approach to address complex health challenges.
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Promote inclusion of diverse constituencies across human, animal & environmental health	• Collaboratively organize a team and complete a project. • Listen, speak and write to be understood of all (gain understanding of personal working style, styles of others)

Competency #2	Learning Objectives to Develop Competency
Share vision, power, responsibility, accountability, and credit among collaborators	• Compare and contrast individual work, group work, and team collaborative work. • Explain the typical stages in the development of a team. • Demonstrate active listening skills. • Demonstrate constructive conflict resolution skills

Topic Breakdown

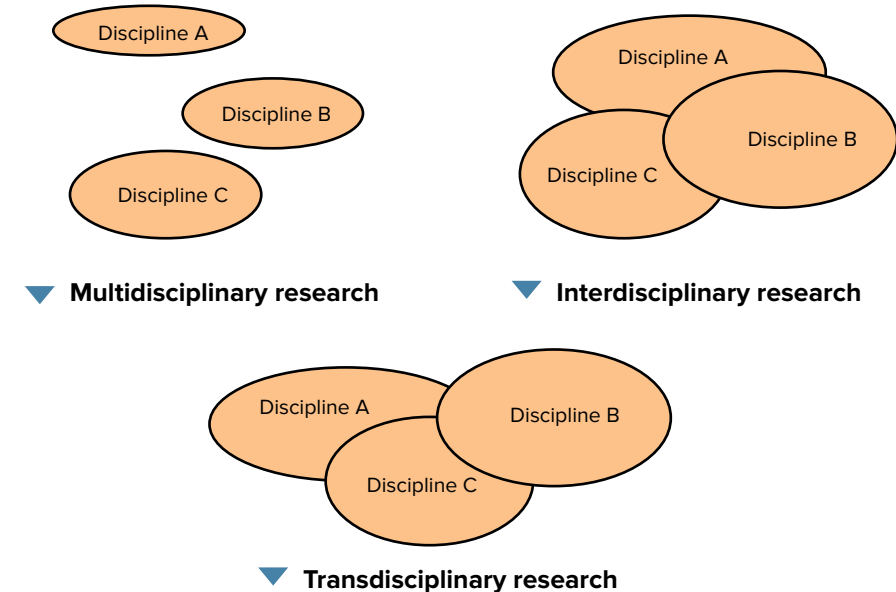
What is Collaboration and Why Collaborate?	
Learning Objective	• Compare and contrast multidisciplinary, interdisciplinary and trans-disciplinary • Describe what collaboration means, and its benefits and challenges in One Health situations

- Read Article, “Multi-Disciplinarity, Inter-Disciplinarity, and Trans-Disciplinarity in Health Research, Services, Education and Policy: 1 Definitions, Objectives, and Evidence of Effectiveness” (Choi, B. and A. Pak)

Module Overview

Explain that collaboration and partnership is one of the most critical One Health Core Competencies (OHCC). A One Health approach is defined by collaboration and this module will help learners develop crucial skills, knowledge and attitudes. This module will highlight the following:

- Promote inclusion of representatives of diverse constituencies across human, animal, environmental health and other relevant disciplines
- Share vision, power, responsibility, accountability and credit amongst collaborators



Degrees of Collaboration

Give students a quiz to review the core terms that were discussed in the pre-work readings. Have each student write down their definitions for the following terms:

- **Discipline** - A branch of knowledge, instruction or learning in Public Health/ Environmental Science/Veterinarian Sciences
- **Multi-disciplinary** - Involving several disciplines, through an additive approach. This includes going to see two different healthcare providers, who are specialists separately (e.g. paediatrician and nutrition counsellor)
- **Inter-disciplinary** - Synthesis of two or more disciplines, establishing a new level of discourse or integration of knowledge
- **Trans-disciplinary** - Using shared conceptual framework to go across and beyond disciplinary boundaries

Motivations for One Health Collaboration

Give a short introduction into the motivations for collaborating and that there are diverse factors motivating individuals and organizations to collaborate. Note that collaborating is not necessarily the most appropriate approach to all challenges, and it will not always lead to successful solutions. Ask the students, “Where does One Health fit in with our definition of the different degrees of collaboration?”

Example of answers include:

- Require government involvement and statutory edict
- To exercise power, control or influence over other people or organizations
- To reciprocate through cooperation and coordination
- Promote greater efficiency in the use of limited resources
- Promote individual and organizational learning

Collaboration Benefits and Challenges

Ask the class the following question: “Thinking about your own experience and One Health, what do you anticipate are some of the benefits and challenges to collaborating in a One Health setting?” Examples of answers include:

Benefits of Collaboration:

- Opportunities to learn and to adapt are established
- New resources (time, money, etc.) can be acquired
- Enhancing influence over a policy or sector
- Parties retain ownership of the solution

Challenges of Collaboration:

- Can result in loss of technological superiority
- Loss of resources (time, money, information, etc.) and/or autonomy
- Perceived danger of being linked with failure and sharing costs of failing such as loss of reputation, status and financial position
- Conflict over domains, goals or methods

Developing Stakeholder Matrices

This model is also referenced in the Leadership model. The text and graphics for this section are taken from the International Centre for Development-Oriented Research in Agriculture (ICRA), “Stakeholder Matrices - Guidelines” handout.

>> http://www.icra-edu.org/objects/anglolearn/Stakeholder_Matrices-Guidelines%28new%29.pdf

Tell the class that an important step in collaborating is understanding who the stakeholders are and what contributions they might make to an initiative. You will want to collect information and assess any potential partners’ influence on and importance to the present issue. Conclude the lecture by emphasizing the connection between stakeholders and partners by saying, “A key is turning stakeholders into partners. Make sure they have a stake in your success.” Key take-aways include:

- Stakeholder matrices compare and contrast the information available about different stakeholders
- Stakeholders matrices can include different types of information
- Developing a stakeholder matrices does not create a participatory process. The information can be gathered on a consultative basis, analyzed, and acted upon by a research team

Influence and Importance Matrix



High Importance	High Importance
Low influence	High influence
Low importance	Low importance
Low influence	High influence

Develop a Stakeholder Matrix Activity

Have students create a list of 4-5 current OH related issues and divide into groups based on the issue they would like to discuss. Give students the following task:

- List the stakeholders who might be involved with the issue
- Create a grid of where you think the stakeholders would be placed
- Which of the stakeholders can become partners to ensure the success of the One Health initiative?
- How can you create these partnerships?

Degrees of Collaboration:

Multi-disciplinary - work does not seek to integrate the multiple disciplines involved

- The methodologies and assumptions of each discipline are not developed from interactions with others
- Multi-disciplinary teams can work concurrently or in sequence, but the activities of the disciplines run parallel and do not blend
- It is the least integrative form of integrated research but is the most attainable
- Collaborators aim to share knowledge and compare results without trying to cross boundaries or generate new integrative knowledge

Inter-disciplinary - has a collaborative focus and blends and *integrates research between disciplines*.

- Two or more disciplines work together and create a shared discourse
- Focus on addressing real world problems to cross boundaries and uncover new knowledge.
- People and ideas are brought from different disciplines to frame a problem, agree on a methodological approach and analyze data. Interdisciplinary research requires a more collaborative approach to problem solving

Trans-disciplinary - an approach that focuses on problems or issues that cut across the boundaries of two or more disciplines, or fall between them, whatever the nature of the interactions between these disciplines

- The aim is to create a unity of knowledge. This includes the interests and involvement of third parties, such as government, and non-government agencies or businesses.
- Difficult to obtain in the form of integrated research
- Incorporate multiple disciplines and non-academic participants.
- Combines interdisciplinary with participatory approaches

EFFECTIVE COLLABORATION	
Diffusion of Innovation and Stages in the Development of a Team/Other Collaboration	
Learning Objectives	• Assess adaptability to technological change • Explain the typical stages in the development of a collaboration/team

Diffusion of Innovation

Give the lecture on diffusion of innovation, adoptive categories and classification of individuals within a social system on the basis of innovativeness. Make participants brainstorm a list of recent “innovations” (e.g., smartphones, etc.) and have them identify the innovation category where the most innovations on the list have occurred.



Innovator Types

Divide learners into five groups based on the following innovator types:

- Innovators
- Early adopters
- Early majority
- Late majority
- Non-adopters

Ask each group to discuss and be prepared to share their responses to the following questions:

- What are the benefits of working with your innovation type?

- What are the challenges?
- What challenges might this innovation type have when working with other types?
- How might they overcome these challenges?

Operating as a Team

Deliver the brief lecture on teams, focusing on the following points:

- Characteristics of a team
- Process roles of team members
- Technical roles of team members
- Stages of Team Development

Homework - Ask students to keep a speech diary. They should record any acronyms, jargon, idioms, or “buzz” terms that they use either in speaking or writing. Encourage them not to censor what they say, but to just note the terms they use often.

EFFECTIVE COLLABORATION	
Communication Skills for Collaboration	
Learning Objectives	• Listen, speak and write different communication skills that can be understood by all individuals (community beneficiaries, team members, internal and external stakeholders)
Pre-class Assignment	• Have students keep a speech diary for a week

Ensure the students keep a speech diary for one week, recording acronyms, idioms, jargon, and/or slang that they use in speaking or writing.

Communication for Collaboration

This session will focus on the speaking, writing and listening skills that are essential for team communication. The lecture will review the following concepts:

- Overview of Team Communication
- Importance of Communication
- Creating Team Communication
- Team Communication Characteristics
- Guidelines of Team Communication
- Responsibilities of Team Members
- Getting Your Message Across

Speaking and Writing Without Jargon, Acronyms, and/or Idioms

Ask participants to share some of the most common slang, jargon, acronyms and idioms they collected during the week. Get some examples and have the students explain terms that others do not understand. Ask them to consider what it is like when they are on the receiving end of slang, acronyms, idioms, and jargon. Tell the class that jargon, acronyms and idioms have limited benefits and mostly create confusion, and misunderstandings. Tell the class that when you eliminate jargon, acronyms, and idioms from your speech, listeners often will be:

- Less likely to feel alienated or offended.
- More likely to comprehend the message you're communicating.
- More engaged in the collaborative effort.

Small Group Activity

Divide participants into small groups to review their speech diaries. Have the groups develop a list of common metaphors, foreign phrases and jargon that they often see in writing (their own or others). Give participants 10 minutes to brainstorm and then have all the group share and add additional ideas of words and phrases to avoid in writing.

EFFECTIVE COLLABORATION Conflict Resolution and Collaboration	
Learning Objectives	• Demonstrate constructive conflict resolution skills

Students should take a self-assessment on how they handle conflict and have them brainstorm a list of issues people have conflict over, especially when working in teams. A copy of the Thomas-Kilmann Conflict Modes Self-Assessment is available below. Possible answers include:

- Politics
- Social/cultural beliefs
- Power dynamics
- Finances
- Miscommunication

Thomas-Kilmann Conflict Modes



Give an overview lecture of the Thomas-Kilmann conflict modes. The lecture will review the following conflict management vs. conflict elimination and conflict management techniques.

Conflict Styles - Pros and Cons

Divide students into small groups based on their guessed conflict handling mode. Have the groups discuss and be prepared to share their thoughts on the following questions:

- How do you perceive "conflict"?
- Develop a metaphor or think of an image you associate with conflict as a group.
- In what conflict situations is your style beneficial? Which situation is not your style?

Conflict Resolution Techniques Include:

- **Negotiation** - Usually associated with bargaining, when parties come to an agreement through discussion. Typically used when a contract or transaction is involved.
- **Mediation** - A third person acts as an intermediary to help settle a dispute and generate a solution. Parties must want to settle.
- **Arbitration** - An impartial third party listens to both sides of a dispute and decides on the issue. The disputing parties are bound by the decision. Often flows from a contract of dispute over money (no flexibility) or when mediation has failed.
- **Collaboration** - Parties work together to develop creative solutions that produce mutually desirable outcomes.

MODULE 2

COMMUNICATION AND INFORMATICS

Module Description and Learning Outcomes	This module fosters an understanding of effective communication and information sharing across disciplines and sectors. Key outcomes include: • Describe how to use basic communication techniques and tools in the One Health approach • Demonstrate familiarity with various information management and technological applications that may be used in the One Health approach
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Learning Map



Course Competencies

Competency #1	Learning Objectives to Develop Competency
Describe basic communication techniques and tools	• Demonstrate communication skills that encourage the open communication needed during an effective One Health response. • Understand how a variety of communication techniques may be used to effectively articulate and exchange ideas on the implementation of One Health in various situations • Apply communication strategies for promotion OH concepts (including two-way communication)

Competency #2	Learning Objectives to Develop Competency
Understand the fundamentals of risk communication	• Identify the designated spokesperson(s) for particular issues • Demonstrate the ability to communicate risk at multiple levels • Communicate effectively with the media and public
Competency #3	Learning Objectives to Develop Competency
Understand a variety of ways to manage and share information	• Collect, manage, organize, and report data to ensure that each person in the team has the information they need to do their jobs • Organize and analyze data and disseminate findings using available tools, including database and social networks

INTRODUCTION TO COMMUNICATION SKILLS	
Learning Objectives	• Demonstrate communication skills that encourage open communication • Understand how a variety of communication techniques may be used to effectively articulate and exchange ideas during the implementation of OH initiatives

Introduction to Communication Skills

Welcome students to the module on Communication and Informatics then review the module. They are listed as the following:

- Describe basic communication techniques and tools (i.e. written communication, multi-media, social media, interactive discussion)
- Understand the fundamentals of risk communication and a variety of ways to manage and share information

Face-to-Face/In Person Communication

Communication can be in-person or through writing. Face-to-face, or in-person communication involves speaking and listening. It is impacted by the speaker's tone and the listener's body language. Then introduce the following basic questions that should be considered before communicating. These questions are relevant in verbal, non-verbal and written communications.

- What is the intent or purpose of the communication?
- What needs to be communicated?
- To whom is this information being communicated to?



Key Components of Spoken Communication

- **Verbal** - actual words spoken
- **Tone** - vocal inflection while speaking (sarcastic, bored, interested, excited, etc.)
- **Non-verbal** - physical aspects while delivering the message (facial expressions, gesture, eye contact, posture, etc.)

Ensure words, tone and body language work together to communicate a consistent message. Think about the following concepts:

- What is the intent or purpose of the communication?
- What needs to be communicated?
- To whom is the information being communicated?
- How are you going to communicate the information?

Transition To Body Language

Without stating that you are going to focus on body language, ask students to get into pairs and complete the following tasks:

- You need to give a co-worker a message from your supervisor. Decide if the message is going to be good or bad news.
- Turn to your partner and say, “*Our supervisor just asked me to let you know that...*” and stop the sentence then. Ask your partner to guess if the message will be good or bad, and what prompted that assumption
- Switch roles.

Debrief the exercise with the following questions:

- How many people guessed right? Raise your hands.
- How did you know if the message was positive or negative?
- Has this ever happened to you in real life? What are the lessons learned from this exercise?

Key Components of Body Language

Ask students to generate a few ‘conversation topics’ and write the ideas down. Ideas might include current events from the news or a One Health-related issue. Ask for 3-5 students to volunteer to give a 3 minute talk on one of the topics. Give each student a few minutes to prepare. Do NOT tell the class that they are supposed to listen. After all the students have spoken, ask the class to reflect on the following questions and write down some notes for each.

- How much do you recall about each of the conversation topics you listened to?
- Do you feel you listened to the session? Why or why not? If you listened, what was it like to sit back? If you did not listen, what made you tune out?
- If you were a presenter, what was it like to be in front of the group? How did you know people were listening? Or not listening?

Then, ask the class:

- Have you ever had someone carefully listen to what you said? How did that feel?
- What did that person do that communicated to you that they were listening?

Personal Listening Assessment

Instruct the students to complete the Personal Listening Assessment, a self-assessment of learning skills and behaviours. The template is below.

Rate how often you demonstrate the behaviours described in the statements.					
Statements	Never	Rarely	Sometimes	Often	Always
1. My family and friends say I am a good listener.					
2. I find myself daydreaming while I try to listen.					
3. I find myself pretending to listen.					
4. I fidget a lot when I am trying to listen to others.					
5. I only focus on the parts of a conversation I am interested in.					
6. If I disagree with an opinion or statement someone else has made I have a hard time listening.					
7. I finish peoples' thoughts and sentences.					
8. I listen to part of a story and then start to think about what story I will tell next.					
9. I can accurately repeat back what someone has told me.					
10. I let the people I am listening to know that I am interested by using verbal and non-verbals.					

Excellent	Above Average	Average	Below Average	Poor
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ONE HEALTH PROMOTION COMMUNICATION STRATEGIES

Learning Objectives

- Apply communication strategies for the promotion of One Health Concepts



Introduction to Communication Strategies

Have students read the article and introduce the lecture by saying that communication strategies are plans for communicating information related to a specific issues,

events, situations, or audiences. They serve as the blueprints for communicating with the public, stakeholders, or colleagues. Stress that communication strategies should identify the why, who, what and how!

Specifically the strategy should:

- Outline the objective/goals of communication
- Identify stakeholder
- Define key messages
- Pinpoint potential communication methods for communicating information
- Specify the mechanisms that will be used to obtain feedback on the strategy

Promoting a One Health Approach

Divide the students into groups and give them 40 minutes to complete the following task:

- You have been asked to speak to a community or an organization about One Health
- Your goal is to promote the OH approach as it relates to a recent outbreak
- In your group, select one of the scenarios, develop a communication strategy for the threat

Students will have 5-10 minutes to give their presentations to the class. Take 10 minutes for feedback and have students respond to the following questions.

- What pieces of the communication strategy would be effective with the community or organization? Give specific examples.
- What pieces of the strategy need to be enhanced?

INTRODUCTION TO RISK COMMUNICATION

Learning Objectives

- Understand the fundamentals of risk communication
- Demonstrate the ability to effectively communicate risk to multiple audiences (public, politicians, media, stakeholders, health workers, etc.)

Introduction to Risk Communication

Have students write down the situations they thought of and answered the following questions:

- How did you communicate about the risk to the other person?
- Was your communication well received? If so, what made it effective or ineffective?

Cover the following points:

- What is risk communication?
- What can risk communication do?
- When is risk communication most effective?
- Risk paradigms and emotion
- Risk analysis paradigm
- Emotion
- Risk Perception
- Interpreting Risk
- Viewing Risk

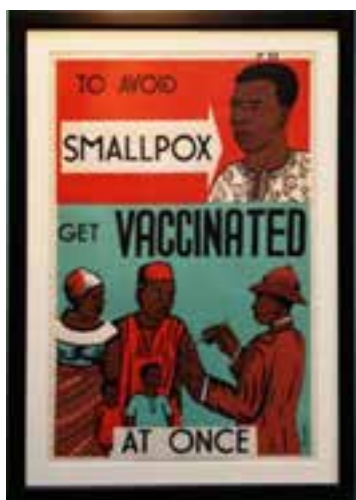
Ask the students, “Based on our conversation so far, what would you say are some of the best practices for risk communication?”

10 Best Practices of Risk Communication

1. Risk and crisis communication is an ongoing process
2. Conduct pre-event (e.g., pre-disease outbreak) planning and preparedness activities
3. Foster partnerships with public (e.g., involve stakeholders such as farmers, law enforcement, and health agencies in pre-event planning)
4. Collaborate and coordinate with credible sources
5. Meet the needs of media and remain accessible
6. Listen to public's concerns and understand audience
7. Communicate with compassion, concern, and empathy
8. Demonstrate honesty, candor, and openness
9. Accept uncertainty and ambiguity
10. Give people meaningful actions to do

Talking Points for Risk Communication

For the remainder of the session, the group will practice creating talking points for interactions with various audiences. Good talking points include:



- Clear and succinct summaries of key messages. They provide the most important information, so that the public is not overwhelmed. Do not use non-technical language or jargon!
- Consistent and delivered from the same spokesperson. This prevents panic, as it can arise from inconsistent or contradictory messages.
- Addressing concerns and clarify mis-information or mis-conceptions. This will (hopefully), motivate people to take do-able actions
- Providing the audience with advice on where to find additional information
- Can be used by a variety of stakeholders and media

The 'Rule of Three'

In the case of high stress situations, messages should be based on the 'Rule of Three'.

Rule of Three states in high stress situations, we should:

1. Present 3 key messages
2. Repeat key message 3 times
3. Prepare 2-3 supporting messages for each key message

DELIVERING RISK COMMUNICATION MESSAGES

Learning Objectives

- Demonstrate ability to communicate risk at multiple levels
- Communicate effectively with the media and public

Introduction to Delivering Risk Communication Messages

Key messages of Risk Communication messages include:

- Pre-prepared talking points are useful and allow you to be prepared to speak with the public about what should be done during an outbreak. You are armed with the words and facts to motivate and help others.

- Research shows that showing competency and empathy, as well as giving the public specific actions to take. This helps avoid panic and allows the public to better handle a crisis or an emergency.
- Consider how to word messages to best show empathy and competency. These two qualities of messaging are key, because they motivate individuals to accept and act upon your recommendations.

Highlight the following points:

- Research shows that trustworthiness is established in first 9-30 seconds
- Trust, caring and empathy are shown through both body and verbal language.
- Using simple language, or common words and terms familiar to the general public
- The public is more likely to listen to and believe in a speaker who establishes trust and empathy immediately

COMMUNICATING WITH OR THROUGH THE MEDIA

Learning Objectives

- Identify the designated spokesperson(s) for particular issues
- Communicate effectively with the media and public

Introduction to Communicating With or Through the Media

Welcome students to the class on communicating with or through the media. The group will apply their new skills and knowledge in this session. Hold a brief discussion about a health event your local community and outline the basic information on the event. Ask students the following questions:

- How did the public get information on the health event?
- How did the media present the information? Was it done well or poorly?
- What spokespersons were involved? Were they credible? Why or why not?

Lead a discussion regarding spokespersons and individuals involved on a communication team in a disease outbreak scenario. Examples include local or regional NGO's, local leaders/politicians, veterinarians, doctors, nurses, health officers/epidemiologists, security/police officers/first responders. Ask the class, "What makes for a good spokesperson?" and "Why is the media so important for One Health communications?" Take some of their responses and connect them to the importance of working with and through the media. Highlight the following points:

- Media can reach many people and provide emergency information
- Media provides the public with resources to turn to (addresses and phone numbers)
- Allows the public to voice their concerns

As a One Health representative you must:

- Be prepared to meet the press and get your message out first
- Work with journalists before an emergency or outbreak so you can establish a working relationship based on trust and respect.
 - >> This allows information to be released in a timely fashion.
- Have your messages ready and feel confident in your message.
- Select the best spokesperson(s).

Media Interview Activity: Preparation

The class will use the talking points developed in the previous session in a media interview setting. Assign students to represent a variety of individuals who might be involved in a One Health communications team. This can be a mayor/local leader, community health worker, emergency responder, etc.

Give them the following instructions:



- You have been selected as the One Health representative responsible for speaking with the media. You will be interviewed by a local media representative and have a three minute interview that will be shown on the evening news.
- Take 10 minutes to review and revise talking points before the interview.

Media Interview Activity Practice

Give pairs the following task:

- **Individual Interview:** A media representative will interview each OH representative about the current outbreak. Each individual will have three minutes to answer and the interview will be videotaped for review.
- **Small Group Interview:** A media representative will conduct panel interviews with teams of OH representatives. Everyone will receive a different question to answer.
- Each group will have 6 minutes to answer questions.

Media Interview Activity: Discussion and Debrief Summary

Facilitate a group discussion on their overall observation and lessons learned. Use the following questions to guide discussions:

- What made it easy to use the talking points?

- What was challenging about using the talking points?
- Was there more information that you wanted to provide? If so, what and why?
- What questions did the interviewer have that were off topic for you? How easy or difficult was it to redirect?
- What questions do you have about the skills on the observation sheet?
- If you had the opportunity to select the best spokesperson(s) for this topic, who would you choose? Why?

INTRO TO INFORMATICS	
Learning Objectives	• Collect, manage, organize, and report data to ensure that each person in an OH team has the information they need to do their job • Organize and analyze data and disseminate findings using available tools including databases and social networks

Introduction to Informatics

Welcome learners to the session on informatics. Start by showing the following video on Health Informatics and sharing the following general definition of informatics and ask participants for their general reactions to the video and the definition. Then ask them, “How is your everyday life touched by informatics?”

- YouTube —Health Informatics <http://www.youtube.com/watch?v=rFxewUq1cE4>

Lecture

Give a brief, interactive presentation on the basics of informatics that addresses the points outlined below. Key topics include:

- Why Informatics is Important?
- How Informatics Already Impacts Us
- The Goal of Informatics
- Informatics & One Health
- The Flood of Information
- The Key Elements of Informatics

Informatics Scavenger Hunt Activity

Assign participants to groups for a web-based scavenger hunt. Give each group a One Health topic to focus on and give the following task: For the topic assigned to you have 45 minutes to acquire, store and develop a 3 minute presentation on current data available. Each group should hunt for the following at a minimum:

- One human health related data source
- One environment related data source
- One animal health related data source
- One country related resource

Have each group answer the following questions:

- How easy or hard was it to acquire data? Why or why not?
- Do you believe the data you gathered is credible? Why or why not?
- How did you “store” your data? Would your storage option work to share information with others? How about 6 months-1 year from now?
- What process did you use to create the presentation?

What is Informatics?

Informatics studies the application of information technology to any field, while considering its impact on individuals, organizations, and society. It uses computation as a universal tool to solve problems, to communicate, and to express ideas. Informatics is the study of the structure and behaviour of natural and artificial systems that generate, process, store, and communicate information. Informatics includes:

1. The study of the cognitive, social, legal, and economic impact of information systems
2. Research and development of technologies needed to implement artificial information systems that enhance our cognitive abilities
3. The development and use of advanced information systems in science, engineering, arts, humanities, education, and business.

Information technology (IT) has become an indispensable component of modern life, helping — or hindering — us as we manage information, create knowledge, and make decisions. To leverage these advances to solve problems requires knowledge of how to represent problems and domain-specific data, how to handle work-flow, and interpret results.

MODULE 3

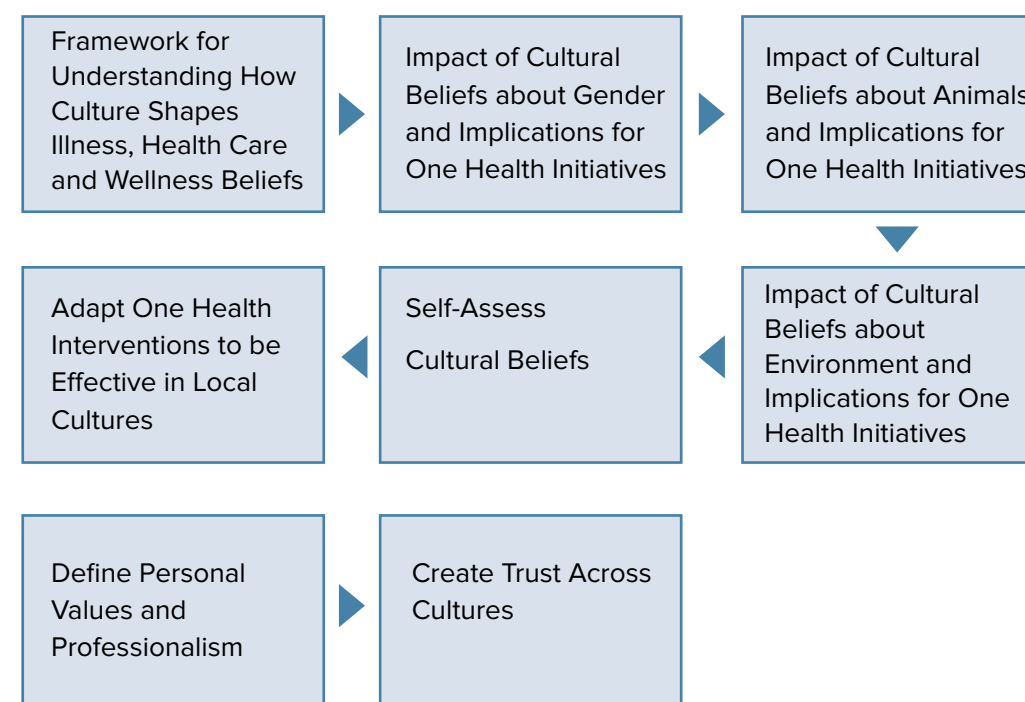
CULTURE, BELIEFS, VALUES AND ETHICS

Module Description and Learning Outcomes

This module provides learners with an understanding of culture, beliefs, values and ethics at the individual and societal level, which is critical when working in multiple disciplines. Key outcomes of this module include:

- Understanding, analyzing, and respecting social, religious and historical diversity for individuals, societies, and across cultures
- Know how to work professionally with One Health stakeholders across multi socio-economic and cultural differences

Learning Map



Course Competencies

Competency #1	Learning Objectives to Develop Competency
Identify and interpret local norms, wisdoms, and culture regarding humans, animals, and environmental health	Understand and distinguish different cultures and beliefs about human, animal health, health care, and the environment, and the impact these beliefs have on One Health initiatives by: - Analyzing local cultures and their beliefs about illness, medical care and health - Identifying common and specific cultural norms and sensitive topics
Competency #2	Learning Objectives to Develop Competency
Generate trust among the community within One Health interventions	Understand personal beliefs about health/health care and how, as a OH practitioner, you can adapt OH interventions to be effective in local cultures and belief systems, by: - Demonstrate familiarity with local languages and/or working with a translator, local leader(s), and/or cultural guides - Adapting appropriate disease management practices in outbreak areas
Competency #3	Learning Objectives to Develop Competency
Demonstrate values, professionalism, and ethics in planning and interventions	Define personal values, code of conduct and response(s) to ethical situations to model OH professionalism and demonstrate an understanding of cultural norms

INTRODUCTION TO CULTURE AND HEALTH BELIEFS

Learning Objectives	
	Learn the differences in culture and beliefs about healthcare, animals and the environment, and the impact that these beliefs have on OH initiatives by: - Analyzing notions of illness, medical care and health and understand the expected roles - Identifying cultural norms and sensitivity issues around health/health care, animals and the environment

Culture, Beliefs, Values and Ethics Module Core Competencies



- Identify and interpret local norms, wisdom and culture about human, animal and environmental health
- Generate trust among the community within OH interventions
- Demonstrate values, ethics, and professionalism in planning and implementing OH interventions

Culture and Health Care - Simulation

Background Information: Orangutans and the Minangkabau

The future of the orangutan (*Pongo spp.*) in Sumatra is far from secure despite the species' high profile and media attention. The traditional threat to the orangutan has been widespread logging, but the continuing conversion of their remaining habitat for oil palm (*Elaeis guineensis*) is hastening the orangutan's extinction in the wild. This situation is driven by a robust global market for palm oil as a vegetable oil and biofuel. In tackling this conservation problem, therefore, economic factors cannot be overlooked. Of significance are the high opportunity costs of orangutan conservation and market failures associated with the public-goods nature of the orangutans' forest habitat. Conservationists should consider these constraints when formulating remedial action.

There have been reports that the local human community in Kalimantan living near oil palm plantations are suffering from higher than expected rates of infection due to *Mycobacterium tuberculosis*. Some individuals believe this problem may be due to tuberculosis (TB) being transmitted to humans from orangutans being kept as pets (after being orphaned as a result of the forest clearing for plantations), so additional scientific studies are needed to determine whether the actual origin of this outbreak was TB infection among humans. The Indonesia Government is concerned whether a Minangkabau community in Saluang village in Sumatera is also vulnerable to such zoonoses because they, too, keep orphaned orangutans as pets. The government has assigned a group of One Health practitioners to assess the situation in Saluang village.

Role Playing Assignments

Assign two-thirds of the class the role of the Minangkabau people of the Saluang village and assign the remaining one-third of the class the role of One Health practitioners. Designate one area of the classroom into the village and provide them with handout cards. Make sure the Minangkabau do not share the information on their cards with the OH Team. Then designate an area (preferably in a different room) for the One Health Team Command Center and send the One Health practitioners to that area. Hand out the One Health Team cards to the One Health practitioners and have the students select specific One Health Team roles. They should prepare a team that will best meet the challenges based on the somewhat limited information that they have been provided. All the groups that they each have 10 minutes to study their roles and prepare for the visit. Then bring the One Health Team into the village and allow for 20 minutes of interactions.

Large Group Discussion

Ask the OH practitioners the following questions:

- Were you successful in getting permission to interview each family and do a TB screening?
- If yes, how did you approach community members and what made you successful?
- If not, what do you think were the stumbling blocks?
- What did you learn about the Saluang village culture? Who makes the decisions and what is the protocol for approaching them?
- How did the different One Health practitioners (e.g., veterinarian, health care worker, ecologist, etc.) work together?

Ask the students who were in the Saluang community:

- What were your reactions to the One Health Team?
- What did the One Health Team do that made you trust them?
- What could the One Health Team have done to better gain your trust?

Ask the whole class:

- From your perspective as a One Health practitioner, what did this activity demonstrate about working with people from a different or new culture?
- How would the simulation have been different if this was a patriarchal culture?
- What skills and knowledge are required before working with a local community? How might you develop these skills or obtain necessary information?

Individual Reflection

Have students write their personal reflections on the following questions:

- What surprised you about your behaviour during the activity?
- What surprised you about the behaviour of others during the activity?
- What are your key learnings or take-aways from this activity?
- Why did individuals keep pets and/or were there any socio-economic benefits, perceived health risks, etc?

CULTURAL DIMENSIONS AND MODELS	
Learning Objectives	Learn the different cultures and beliefs about health/health care, animals and the environment, and the impact these beliefs have on OH initiatives by: • Analyzing local cultures and their beliefs about illness, medical care and health • Understanding the role of healthcare providers, healers and leaders in decision-making within the context of a culture

Have the class read the following articles prior to class:

- Read article, “Cultural Health Attributions, Beliefs and Practices”
- Read article, “Indigenous healers in Southeast Asian Refugee Communities”

Understanding Culture Lecture

Ask the class, “How would you define culture?” Give the short lecture that reviews the following key points:

- Definitions of culture
- The Iceberg Model
- Three Models for Understanding Culture (Hofstede, Trompenaars, Hall)

Guide them through a group discussion with the following questions:

- Is it possible to understand a culture outside of your own? Why or why not?
- How can we avoid stereotyping?
- How are the cultural models similar? Different?
- Do you think these models are applicable to gaining cultural insight into Vietnamese communities?
- How could you apply these models to beliefs about health/health care, animals and the environment?

My Own Iceberg (Individual Assignment)

Asks students to define culture and draw an iceberg of their culture. They should include elements that are above the surface, just below the surface and at the deepest levels of their culture. They should focus on the elements that have the most impact on their individual beliefs about illness, wellness, healthcare, animals and the environment. Encourage the students to compare and contrast their views on culture.

Culture and the Iceberg Metaphor



- **Surface culture** is above the surface, or what we can see
- Deep culture is below the surface and includes unspoken rules, behaviours, and emotions
- Deepest culture is value-based and intensely emotional

Possible Definitions of Culture

- Culture is that complex whole which includes knowledge, belief, art, law, morals, custom and any other capabilities and habits acquired by man as a member of society. (Edward Taylor, 1871)
- Culture consists of patterns, explicit and implicit, of and for behavior acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiment in artifacts; the essential core of culture consists of traditional ideas and their attached values. (Kroeber and Kluckhohn 1952)
- Culture means the whole complex of traditional behavior which has been developed by the human race and is successively learned by each generation. A culture is less precise. (Margaret Mead, 197)

Three Models to Help Us Understand Culture

Dr. Hofstede Key Concepts

- 1 **Power distance index (PDI)** - “Power distance is the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally.” Cultures that endorse low power distance expect and accept power relations that are more consultative or democratic. People relate to one another more as equals regardless of formal positions. Subordinates are more comfortable with and demand the right to contribute to and critique the decision-making of those in power. In high power distance countries, the less powerful accept power relations that are more autocratic and paternalistic. Subordinates acknowledge the power of others simply based on where they are situated in certain formal, hierarchical positions.
- 2 **Individualism (IDV) vs. collectivism** – These concepts characterize “the degree to which individuals are integrated into groups.” In individualistic societies, the stress is put on personal achievements and individual rights. People are expected to stand up for themselves and their immediate family, and to choose their own affiliations. In contrast, in collectivist societies, individuals act predominantly as members of a life-long and cohesive group.
- 3 **Uncertainty avoidance index (UAI)** – Indicates “a society’s tolerance for uncertainty and ambiguity.” It reflects the extent to which members of a society attempt to cope with anxiety by minimizing uncertainty. People in cultures with high uncertainty avoidance tend to be more emotional. They try to minimize the occurrence of unknown and unusual circumstances and to proceed with careful changes step-by-step by planning and by implementing rules, laws and regulations. In contrast, low uncertainty avoidance cultures accept and feel comfortable in unstructured situations or changeable environments and try to have as few rules as possible. People in these cultures tend to be more pragmatic and they are more tolerant of change.
- 4 **Masculinity (MAS) vs. femininity** – These concepts illustrate “the distribution of emotional roles between the genders.” Values in masculine cultures are competitiveness, assertiveness, materialism, ambition and power, whereas feminine cultures place more value on relationships and quality of life. In masculine cultures, the differences between gender roles are more dramatic and less fluid than in feminine cultures where men and women have the same values emphasizing modesty and caring.

5 Long-term orientation (LTO) vs. short-term orientation - This model describes societies' time horizons. Long-term-oriented societies attach more importance to the future. They foster pragmatic values oriented towards rewards, including persistence, saving and capacity for adaptation. In short-term-oriented societies, values promoted are related to the past and the present, including steadiness, respect for tradition, preservation of one's reputation, reciprocity and fulfilling social obligations.

Alfonsus (Fons) Trompenaars Key Concepts

1 Universalism vs. particularism (What is more important, rules or relationships?) - Describes how people judge other's behavior. The Universalist attaches great importance to the observance of rules. The behavior tends to be abstract. In Universalist, rule-based societies, there are certain comprehensive absolutes. They apply regardless of circumstances or particular situations. What is right is always right in every situation and for everybody. A Universalist tries to apply the same rules in all situations. The Particularist always considers specific circumstances or personal backgrounds in every situation and these dictate behaviour

2 Individualism vs. collectivism (communitarianism) (Do we function in a group or as individuals?) - An individualistic culture as the characteristic of a modernizing society, while communitarianism can also apply to modern society when thinking of mass media control and populism. Both dimensions are more complementary than opposing. Each can be effectively reconciled by an integrative process: a communitarian society that learns its limitations from particular instances, and by the individual voluntarily addressing the need of the larger group.

3 Neutral vs. emotional (Do we display our emotions?) This addresses the importance of feelings and relationships. In a neutral culture, people do not openly express their feelings, but keep them carefully controlled and subdued (North American). People in such a culture are not necessarily cold or unfeeling, nor are they repressed but rather a result of convention. In neutral cultures, where emotions are controlled, irrepressible joy or grief will still signal loudly. In emotional cultures, emotions are more immediate, open and passionate.

4 Specific vs. diffuse (How separate we keep our private and working lives) This dimension is expressed at the level of an individual affected by a particular situation or action. In specific-oriented cultures, areas of life (work

and family) are recognized widely. A member of a specific-oriented culture is more open in the public space, but closed in the private one. In diffuse-oriented cultures, areas of life such as work and family are closely linked.

5 Achievement vs. ascription (Do we have to prove ourselves to receive status or is it given to us?) This dimension refers to the question of whether the status of an individual is given as a result of religion, origin or age, or whether the status is an acknowledgement of the individual's proven performance. In achievement-oriented cultures, a title is used only when it is relevant to the competence an individual brings to the task. In ascription-oriented cultures, a title is extensively used when these clarify you in an organization. Respect for a manager is based on seniority and hierarchy.

6 Sequential vs. synchronic (Do we do things one at a time or several things at once?) This dimension deals with the question of how people in different cultures manage time. Managing time sequentially means that people feel time as a series of passing events. In synchronic time management, events have a past, present and future, which are interrelated, so that ideas about the future and memories of the past shape present action.

7 Internal vs. external control (Do we control our environment or are we controlled by it?) People in an internal control culture tend to identify with mechanisms while people in an external control culture view an organization as a product of nature, owing its development to the nutrients in its environment.

Edward T. Hall Key Concepts

Context

- **High context:** There are many contextual elements that help people understand the rules to shape their lives. This can be very confusing for a person who does not understand the 'unwritten rules' of the culture.
- **Low context:** In a low-context culture, very little is taken for granted. Whilst this means that more explanation is needed, it also means there is less chance of misunderstanding, particularly when visitors are present.
- **Contrasting the two:** French business contracts tend to be short (in physical length, not time duration) as much of the information is available within the high-context French culture. This differs in America, considered a low-context country, so contracts tend to be longer in order to explain the necessary details.

2 Time

- **Monochronic time (low context):** Time means doing one thing at a time. It assumes careful planning and scheduling and is a familiar Western approach that appears in disciplines such as ‘time management.’
- **Polychronic time (high context):** In polychronic cultures, human interaction is valued over time and material things, leading to a lesser concern for ‘getting things done’—they do get done, but more in their own time.
- **Contrasting Context and Time:** Western cultures vary in their focus on monochronic or polychronic time. Americans are strongly monochronic whilst the French have a much greater polychronic tendency; thus, a French person may turn up to a meeting late and think nothing of it

3 Space

Hall coined the term “proxemics” to describe differences in culturally defined personal space. People have concerns about space, from personal body space to space in the office, etc. The need for space comes from all areas. People who encroach into that space may be perceived as a threat. Personal space is an example of a mobile form of territory and people need less or greater on their culture. *The concept of personal space may differ widely based on gender, culture and/or religious beliefs.*

- **High territoriality** - Territoriality could be defined as the behaviour of animals or people designed to protect a specific area, or designed to prevent others from using this area. Some people are more territorial and concerned with “ownership” than others. Wars have been fought over geographical boundaries. At a personal level, there may be territorial concerns in an office, work space or other location.
- **Low territoriality** - People with lower territoriality have less concern or interest in ownership of space, and boundaries are less important to them. They will share territory and ownership with little thought. They also have less concern for material ownership and their sense of ‘stealing’ is less developed.

CULTURE AND GENDER

Learning Objectives

Understand and distinguish the difference in cultures and beliefs, in relation to gender, and the impact that these beliefs have in the OH realm. This will include:

- Examining the impact of cultural beliefs about gender, the impacts of beliefs, and access/barriers to healthcare
- Advocate for gender equality and equity in OH initiatives

Detailed Facilitator Notes

Prior to class, have students read and prepare the following article:

“Culture: Culture, Gender Equity, and Development Cooperation,” (Johanna Shalkwyk, CIDA)

Large Group Discussion

Open the session by asking for reactions to the article. Questions include:

- What are your key learning/take-aways from the reading?
- What areas would you like to learn more about?
- What do you think about culture? How does it incorporate (or ignore gender)
- How can you connect this article to One Health?

Case Study: Women In Indonesia

Women play a major role in family nutrition and efforts to improve nutrition but lack of female education can result in a lack of understanding. The lower socio-economic status of a woman can also result in malnutrition, and effect children. The number of women and children younger than 18 years of age comprises more than half of Indonesia’s population. Many of these women and their children have been categorized as vulnerable in the areas of health, education, employment and income. UNICEF reports that half a million women die from pregnancy complications each year. WHO reports that women represent about half of people with HIV/AIDs infections. As a result of these statistics, there is a need for the protection and empowerment of vulnerable men. Pose the following questions to the class:

- In your community, what do you see as the most serious issue facing women? How are the issues facing women different from the issues facing men?
- How do the issues change over a women’s life cycle (e.g., infant, childhood, adolescence, child-bearing, nursing, old age)?
- When do girls/women enter the “child-bearing” stage of the life cycle?
- What is the impact of these challenges on women’s health? How do these issues impact men
- What assumptions and stereotypes do you make about genders? How do these stereotypes reflect in healthcare systems?

CULTURE AND ANIMALS	
Learning Objectives	Understand and distinguish the difference in cultures and beliefs regarding animals, and the impact that these beliefs have on OH initiatives by: Examining the impact of cultural beliefs about animals and the impact these beliefs have on human relationships, both with domestic and wild animals

Food, Pets, or Gods?

Have students fill out the following topics on a chart. Topics include:

- Brainstorm all domestic animals in their region
- Brainstorm the wildlife in the region
- Classify each animal as a food, pet or god

Debriefing Questions

- Why do you think we see certain animals as food or a pet or a god?
- Have you been to another culture that might classify these animals differently?
- What would you do if you were in another culture and you were given an animal as food to eat, but, in your culture, the animal is seen as a pet or a god?
- What are the One Health implications for how different cultures view animals differently?

CULTURE AND THE ENVIRONMENT	
Learning Objectives	Understand and distinguish the difference in cultures and beliefs about the environment, and the impact that these beliefs have on OH initiatives by: Examine and evaluate the impact of cultural beliefs about the environment on OH initiatives

Instructor Pre-Class Preparation

Before the class starts, write the following quotes on flip charts and post them around the room

- If there is any wisdom running through my life now, in my walking on this earth, it came from listening in the Great Silence to the stones, trees, space, the wild animals, to the pulse of all life as my heartbeat. – Vijali Hamilton

- Only when the last tree has been cut down, only when the last river has been poisoned, only when the last fish has been caught, only then will you find that money cannot be eaten. – Cree Indian Prophecy
- We do not inherit the earth from our ancestors; we borrow it from our children. – Navajo Proverb
- Nature does not hurry, yet everything is accomplished. – Lao Tzu
- Once a tree falls, the monkeys on it will scatter. – Unknown
- The surrounding environment is the best erudite master to teach us the fundamental laws of nature and the basics of living in life. – Anuj Somany

Session Introduction

Tell the learners that one way to learn about a culture's views on nature is to look at proverbs that are passed down from generation to generation. Have the learners read all of the proverbs written on the flip charts and select one. Divide the learners into small groups according to the proverb they chose. Ask them to discuss the following questions:

- What is the meaning of the proverb?
- What does the proverb say about the culture's view of nature and its relationship with the environment?
- How would this impact a One Health initiative?

Ask students to write a reflection on the following questions:

- What is a proverb that you remember hearing about nature that has shaped your relationship with the environment?
- How does your view about nature/the environment shape you as a One Health practitioner?

CREATING TRUST ACROSS CULTURES	
Learning Objectives	Understand how personal beliefs about healthcare, animals, and the environment impact the ways a community responds to emerging pandemics and how to adapt OH interventions in local cultures and belief systems, by: - Being aware of one's own culture and beliefs - Demonstrating familiarity with local languages and/or working with a translator - Understanding gender diversity - Adapting disease management in order to effectively involve ethnic groups in outbreak areas

Read article, “Other Voices, Other Ways, Better Practices: Bridging Local and Professional Environmental Knowledge” (Kim M. Wikinson, Susan G. Clark and William R. Burch)

Models of Culture Self-Assessment

Have students select one of the three models on culture by Hofstede, Trompenaars, or Hall and complete a self-assess where they are on the dimensions of the selected model. Ask them the following questions:

- Where do you fit in comparison to the majority of people in your culture?
- Where do you tend to be different from the majority of people in your culture?
- How do these similarities and differences impact you as a One Health practitioner in your culture?

Field Assignment: Creating Trust Across Cultures

Brainstorm about ways an OH practitioner can develop trust when working across cultures within their team and within the community. Use the brainstorming list to set guidelines/norms for going into the field to complete the class assignment. Divide learners into small teams and have each group identify a vulnerable group in a local community. Ask them to select one of the three models of culture and use the model to gain insight into how the community might view health, animals and the environment. Ask students to create a checklist of what they would like to observe. The list might include:

- How do men and women interact? How do men interact with men? How do women interact with women? Does there appear to be a hierarchy?
- How do men and women interact with domestic animals? Is it the same or is it different?
- How do men and women interact with wildlife? Is it the same or different?
- How do women and men interact with their environment? Is it the same or different?
- Who provides health care/animal care leadership?
- What are the roles of the health care provider, traditional healers, veterinarians and community or government leaders?
- How are decisions made about health care and wellness?
- How do people see the relationship between health/illness and the environment?

- How might the community be culturally vulnerable to emerging pandemic diseases?
- What aspects might increase risk of coming into contact with a pandemic disease?
- What aspects might make disease prevention, disease transmission or treatment of illness difficult?

Group Debriefing Questions

- Consider the presentations. What can we conclude about the communities visited? What do they have in common? How are they different?
- If teams selected the same group to observe, how were the observations similar? Different? What could cause groups to see the same community differently?
- What advice would you give a One Health practitioner to be effective in preventing disease in the community(ies) visited? For promoting human, animal and ecological wellness?

***** Note:** The session could also be used to teach students about the Participatory Rural Appraisal (PRA) approach. PRA is used by many agencies operating in the international development sphere and aims to incorporate the opinions and knowledge of rural people in the planning and management of projects and programs.

PERSONAL VALUES AND PROFESSIONALISM

Learning Objectives

Define personal values, code of conduct and response to ethical situations in order to model OH professionalism, by:

- Articulating personal views and reviewing professional codes of conduct
- Identifying ethical issues that occur in OH interventions
- Determine the most appropriate/professional response.

Values Clarification: A Self-Assessment, by A. Bronwyn Llewellyn with Robin Holt, M.A.

Ask students to conduct the Values Clarification: A Self-Assessment to clarify values. This is a critical in understanding your own definitions of success while helping you find career options and specific organizations to work in. The process establishes a deeper sense of what makes your life meaningful and helps you see how certain decisions affect your life. Reflect on what each value word means and how these values influence your existence.

- List their ten most important values in the chart below. Select the five that are most important. Narrow the final list to the three core values. Values can include *curiosity, self-discipline, diversity, fun, health, teamwork, trust, love, loyalty, etc.*
- Explain why they are important

Connecting Values to Professionalism

Ask each learner for a professional association in his/her discipline:

- Does this association have a professional code of ethics? How does the professional code of ethics match your values?
- If the code of ethics does not match your values, what does this value conflict mean to you?
- If they do not have a code of ethics, why do you think there is not one? What are the ramifications without a code of ethics?

PROTECTION OF HUMAN SUBJECTIVES, CONFIDENTIALITY AND VOLUNTARY PARTICIPATION	
Learning Objectives	To raise awareness about the issues of protecting human subjects and assuring voluntary participation according to the existing legal framework and consistent with the need for involvement of Institutional Research Boards at universities, as part of the development of One Health professionals.

Large Group Discussion

Have your students read from the Helsinki Declaration on the history of policy development and regulations governing government and industry funded research on human populations, and the need to acknowledge and organize compliance to assure the following:

- Respect for humans (“human subjects”) during any type of research.
- Need to assure any study guarantees that human subjects are voluntary participants, and have the right to refuse treatment or participation.
- Researchers are responsible for “protecting” human subjects, assuring they are informed of any potential risk(s) or benefits during participation, and that opting out of participating does not limit that person’s access to medical care. Researchers are also responsible for respecting the privacy of individuals and protecting confidential information.

Summary of the Helsinki Declaration

- 1 The physical must act “in the patient’s best interest when providing medical care.” It is the duty of the physician to promote and safeguard the health, wellbeing and rights of patients.
- 2 Medical progress is based on research that must include studies involving human subjects.
- 3 The primary purpose of research involving human subjects is to understand the causes, development and effects of diseases and improve preventive, diagnostic and therapeutic interventions (methods, procedures and treatments). Interventions must be evaluated continually through research for their safety, effectiveness, accessibility and quality.
- 4 Medical research is subject to ethical standards that promote and ensure respect for all human subjects and protect their health and rights.
- 5 While the primary purpose of medical research is to generate new knowledge, this goal can never take precedence over the rights and interests of individual research subjects.
- 6 It is the duty of physicians to protect the life, health, dignity, integrity, right to self-determination, privacy and confidentiality of personal information of research subjects.
- 7 Physicians must consider the ethical, legal and regulatory norms and standards for research involving human subjects in their own countries, international norms, and standards. No national or international ethical, legal or regulatory requirement should reduce or eliminate the protections for research subjects.
- 8 Medical research should be conducted in a manner that minimizes possible harm to the environment.
- 9 Medical research involving human subjects must be conducted only by individuals with the appropriate ethics and scientific education, training and qualifications.
- 10 Groups that are underrepresented in medical research should be provided appropriate access to participation in research.

11 Physicians who combine research with medical care should involve their patients in research only to the extent that this is justified by its potential preventive, diagnostic or therapeutic value.

12 Appropriate compensation and treatment for subjects who are harmed as a result of participating in research must be ensured.

Group Debrief Questions

- How can universities with IRBs and/or Ethical Committees assure compliance to the principles of protecting human subjects when researchers work with human populations?
- How important is this matter, and are there examples of medical research that caused harm to participants?
- When researchers discuss risks and benefits with potential participants, discuss issues that might be important when working with “high-risk” populations?

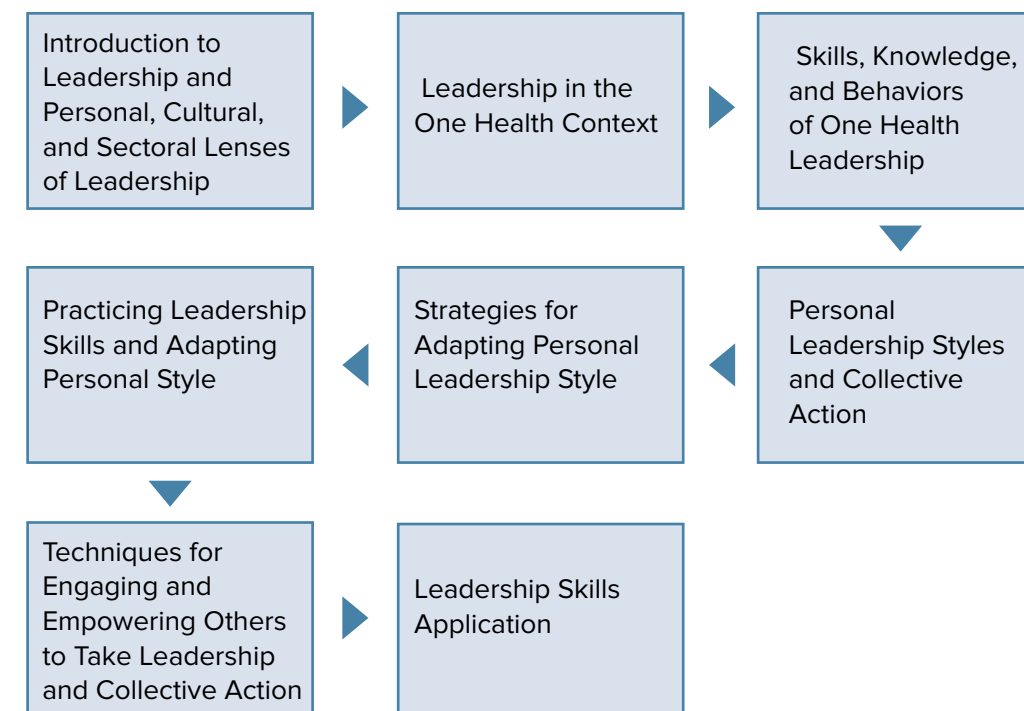
MODULE 4 LEADERSHIP

Course Overview

Module Description and Learning Outcomes

This module discusses leadership in the OH context. It is defined as the ability to catalyze collective action for positive change. Students will explore a range of leadership skills, knowledge, and behaviours that OH professionals must demonstrate to be effective in their work. They will examine personal leadership styles and the impact it has. Also review techniques for empowering others to take collective action.

Learning Map



Module Course Competencies

Competency #1	Learning Objectives to Develop Competency
Develop a shared vision of leadership	Discuss what leadership is and how cultural and sectoral lenses impact our perceptions of effective leadership
Competency #2	Learning Objectives to Develop Competency
Demonstrate an understanding of effective leadership in the OH context	- Describe the skills, knowledge, and behaviours necessary to promote collective action in the OH context - Assess OH situations to identify what is working and what leadership challenges need to be addressed
Competency #3	Learning Objectives to Develop Competency
Understand and adapt personal leadership styles	- Assess personal leadership styles and discuss strengths and weaknesses - Reflect on the impact of your own styles and how to adapt effectively in different situations
Competency #4	Learning Objectives to Develop Competency
Develop and apply strategies for engaging and empowering others to take collective action	- Understand different perspectives on complex issues - Identify and apply techniques for engaging, empowering and influencing others to take collective action in different leadership situations

INTRODUCTION TO LEADERSHIP AND ONE HEALTH

Learning Objective	Discuss what leadership is and how cultural and sectoral lenses impact our perceptions of effective leaderships
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Provide an overview of One Health and the Leadership Core Competencies. This will allow students to develop a shared vision of leadership and demonstrate an understanding of effective leadership in the OH context. Students will develop strategies to empower others into taking collective action.

Leadership Definition

Have the class share their definitions of leadership and discuss the similarities and differences within the definitions. Ask the following questions and record the responses:

- What similarities exist among the definitions? Were there terms/concepts/ideas that were repeated multiple times?
- What differences exist among the definitions?

Explore the differences between leadership and 'leaders.' Definitions include:

- Leadership is a process of social influence, which maximizes the efforts of others, towards the achievement of a goal. (Kevin Kruse, Forbes magazine)
- Leadership is the art of leading others to deliberately create a result that wouldn't have happened otherwise. (Search Inside Yourself [SIY] Leadership Institute)
- Leadership is the capacity to translate vision into reality. (Warren Bennis)
- Management is about arranging and telling. Leadership is about nurturing and enhancing. (Tom Peters)

What Makes a Leader?

As the students share their thoughts, capture the ideas on a flip chart, identifying where similarities exist.



Discuss the skills and attributes that are similar among leaders you admire?

Note what leadership is NOT!

It is not based on seniority, one's position or title, or management. Then ask students about selected leaders:

- How many of you picked one well-known, international leader?
- Who picked a leader from their own country? A local leader?
- Who picked a female leader?

Lenses on Leadership: Assignment Introduction

Identify a zoonotic disease scenario in Vietnam that will be used for this activity and arrange students into groups to explore a lens on leadership in solving the problem. Provide an overview of the activity and provide students with a detailed example of how the activity should be conducted. Give the students the following instructions:

- Consider the assigned zoonotic disease scenario and the first leadership lens. Review the scenario your lens and identify the specific qualities or skills/attributes associated with it.
- Consider the zoonotic disease scenario and the second leadership lens you were assigned. Review the scenario and identify the unique leadership qualities or skills/attributes
- Discuss the differences between two approaches and prepare a report

Questions you might consider during the discussion include:

- Who are you leading?
- Is the group homogenous or constituted of a variety of individuals?
- What is the context?
- What outcomes are you looking for?

THE ROLE OF LEADERSHIP IN ONE HEALTH	
Learning Objective	Describe the skills, knowledge, and behaviours necessary to motivate and inspire teams across sectors to organize, manage, and foster action in the OH context Be able to assess One Health situations and identify what is working and the leadership challenges that need to be addressed

Review of One Health Concepts

One Health is characterized by the collaborative efforts of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals and the environment. To understand complex health challenges, students will require an intersectional foundation of these concepts. Key leadership challenges include:

- Integrated nature of OH issues and challenges
- Collective action is necessary to make a sustainable and substantial difference
- OH issues impacts and social, political, economic, and cultural considerations.
- Action can be take on local, national, state, regional, and global scales

Ask the students, *“Based on what you have learned about OH related challenges, mixed with your own experience, what qualities, skills and knowledge does an OH leader need to be effective?”*

One Health Leadership Domains Presentation

Give a short presentation on the OH leadership domains and provide a quick overview on demonstrating them. The domains are listed as the following:

- Shared vision
- Collaborative solutions
- Critical thinking
- Team commitment
- Decision making

>> More information can be found on this website: <http://www.onehealthinitiative.com/news.php>

LEADERSHIP STYLES	
Learning Objective	Assess personal leadership styles and discuss the strengths/weaknesses Understand how your personal leadership style impacts OH action when working in groups or in a team Understand self-reflection and the impact of your own style in different situations

Prior to the session, ask participants to complete the Leadership Style Assessment designed by Peter G. Northouse, a leading research and theorist on models of leadership, ethical leadership, leadership assessments and leadership dynamics. You can print the assessment for students or ask them to download the assessment at the following link:

>> Northouse Leadership Assessment: www.sagepub.com/northouseintro2e/study/resources/questionnaires/89527_03q.pdf

Exploring Personal Leadership Styles

Students will explore how to adapt their personal leadership styles in different situations. They will complete Kurt Lewin's leadership self-assessment and compare with the leadership styles outlined below.

- **Directive:** Make decisions independently with little or no input from the rest of the group.
- **Participative:** Provides guidance to group members, but they also participate in the group and allow input from other group members.
- **Delegative:** Offers little or no guidance to group members and leave decision-making up to group members.

Split participants into groups by their leadership style and discuss the following questions:

- Do you agree with the author's description of your leadership style? Why or why not?

Share examples of how this leadership style looks in action and pick 2 examples to share.

- What are the pros/cons of this leadership style in the One Health context?

Leadership Styles, Theories and Approaches

There are different types of leaders and approaches because no single leadership style will fit every situation. Rather the difference between a great and average leader is their ability to adapt their leadership style to different scenarios and their ability to understand personal leadership preferences, strengths and weaknesses. Common leadership styles include *directive leadership*, *bureaucratic leadership*, *participative leadership*, *delegate leadership*, *people/relations-oriented leadership*, etc.

Leadership Action Logic Framework

Introduce leadership action logics - a theory that suggests there are several approaches to leadership and that we can transform our leadership capacities to fit different scenarios. Key points include:

- Most psychologists agree that what differentiates leaders is not their leadership philosophies, personalities, or management styles, but rather their 'Action Logic.' That is, how they construct reality and respond to emerging situations, particularly when power or safety is challenged.
- Seven key Action Logics – *Opportunist*, *Diplomat*, *Expert*, *Achiever*, *Individualist*, *Strategist* and *Alchemist*.
- Each Action Logic describes an overall approach to managing or leading inherent strengths and weaknesses, and each Action Logic incorporates the previous, implying a new set of assumptions.

Core Leadership Styles

- 1 Directive/Authoritarian Leadership** - Directive leadership is an extreme form of transactional leadership, where leaders have a lot of power. It's incredibly efficient and decisions are made quickly, and work gets done efficiently.

Team members have little opportunity to make suggestions and resentful, prompting a high turnover rate.

- 2 Bureaucratic Leadership** - Leaders follow rules and ensure staff follow procedures precisely. This is an appropriate leadership style for involving serious safety risks or where large sums of money are involved. The downside of this style is that it is ineffective in teams and organizations that rely on flexibility, creativity or innovation.

- 3 Charismatic Leadership** - A charismatic leadership can resemble transformational leadership because these leaders inspire enthusiasm in their teams and are energetic. This ability to create excitement and commitment is an enormous benefit. Charismatic leaders are often focused on themselves and may not want to change.

- 4 Democratic/Participative Leadership** - Leaders make the final decisions, but include team members throughout the decision-making process. They encourage creativity, and includes staff. This prompts team members to be satisfied with their jobs and allows them to develop skills. Although the process is slow, the end results are incredible.

- 5 Laissez-Faire Leadership** - This French phrase means "leave it be," and it describes leaders who allow their people to work on their own. This type of leadership can occur naturally, when managers don't have sufficient control. They provide team support with resources and advice, if needed, but don't get involved.

- 6 People-Oriented Leadership** - Leaders are focused on organizing, supporting and developing their teams. This is a participatory style and encourages good teamwork and creative collaboration. This prompts higher levels of productivity and willingness to take risks, as the leader will provide support if required.

- 7 Servant Leadership** - Leaders lead by example and they have high integrity. This is a form of democratic leadership but they prefer to remain out of the limelight. This style also takes time to apply properly and is ill-suited in situations requiring quick decision making.

- 8 Task-Oriented Leadership** - Task-oriented leaders focus on getting the job done and can be autocratic. They actively define the work plan and team roles.

9 Transactional Leadership - This style starts with the idea that team members have to obey their leader when they accept a job. The “transaction” involves the organization paying team members in return for their effort and compliance.

10 Transformational Leadership - This is often the best leadership style to use in business situations because leaders are inspiring and expect the best from everyone. This leads to high productivity and engagement.

ADAPTING YOUR LEADERSHIP STYLE - Working Collectively	
Learning Objective	Assess personal leadership styles and discuss the strengths and weaknesses of each
	Understand how your personal leadership style impacts OH action when working in groups or in a team
	Understand self-reflection to understand the impact of your own style in different situations and how to adapt

Large Group Discussion

Explore the choice of competition vs. collaboration between the sub-teams and relate the concepts to a larger One Health team with various stakeholders. Ask participants to share their thoughts on how the success of the overall OH response team relates to the two approaches. Conclude the session by sharing the following comments:

- Be aware of your own leadership style/preferences and how they impact the group
- Acknowledge the different insights of others and be open to new ideas
- Ask questions to ensure that you hear and understand others' perspectives
- Make sure to focus on the end goal!



ENGAGING AND EMPOWERING OTHERS TO TAKE ACTION (Part 1)	
Learning Objective	Understand perspectives of different stakeholders on complex issues
	Identify and apply techniques for engaging, empowering and influence others to take collective action in different One Health leaderships scenarios and/or issues

Individual Activity

Ask students to record their responses to the following question, “What are the underlying issues impacting the community?” Have everyone share their perspectives and ask the following questions:

- What similarities/differences did you hear among the responses?
- What caused some of us to have similar interpretations? Why are other interpretations so different?
- What does this exercise begin to illustrate about stakeholder engagement?

Definition and Examples of Collective Action

- Collective action focuses on behaviour or actions of a group working towards a common goal
- When individuals engage in collective action, the strength the group's resources, knowledge and effort is combined to reach a shared goal
- The ability to refrain from individually profitable actions for the sake of the common good

Then ask, *"What are some examples you have of people taking collective action?"*

Stakeholders, Collective Action and One Health

Divide the class into 3 groups and assign a level (regional, country, community) to each group. Each group will have 3 minutes to share their ideas. Have students brainstorm on the following questions:

- Why is collective action critical to the success of One Health at this level?
- What might be some of the challenges in getting stakeholders to engage and take leadership in One Health at this level?

Stakeholder Engagement Principles, Assumptions and Process

Tell the class that there are many different interpretations, theories, frameworks, and methods for stakeholder engagement. There are some principles of stakeholder engagement and a few key steps in stakeholder engagement process that occur everywhere.

Principles/Assumptions of the Stakeholder Engagement

- People already know their issues and have the means to address them. They need to be involved in the decision-making process.
- Involving stakeholders from the beginning of a process leads to more effective and sustainable solutions.

- Transparency and dialogue with everyone involved is crucial to success.
- You can use the opinions of the most powerful stakeholders to shape your projects at an early stage. Their input can also improve the quality of your project.
- Make sure to include all community members (children, men, women, elders, etc.)
- Gain support from powerful stakeholders (i.e. community leaders). This can increase access to resources which will improve your project's chance of success, along with project implementation and sustainability
- By communicating with stakeholders early and frequently, you can ensure that they understand what you are doing...and mitigate possible risks and problems.

Basic Steps of the Stakeholder Engagement Process:

1. Define the problem
2. Identify your stakeholders
3. Conduct a stakeholder analysis
4. Co-create vision, goals, objectives, solutions and a plan.
5. Decide on roles and responsibilities in implementation.
6. Implement and adjust as needed

Identifying Stakeholder Presentation

Introduce the presentation by posing the following rhetorical question, *"How do you identify stakeholders and their interests?"* Give students a quick overview of the following steps:

- Brainstorm - identify categories of important stakeholders and individuals
- Collect information from key informants
- Consult with organizations that are working or have worked on similar efforts, with the same population, etc.
- Collect more ideas from stakeholder as they are identified
- Advertise

Methods for Collecting Stakeholder Data - Understanding Various Perspectives

Share that one of the most important parts of stakeholder engagement is talking with stakeholders! This allows concerns and challenges to be vocalized. This is critical in understanding viewpoints and relationships while allowing you to map your stakeholders and where they might be able to help (or hinder). It also ensures the sustainability of the project and creates a system of accountability.

Asking Critical Questions

Stress that in addition to the method that they choose for collecting stakeholder data, they must question individuals to gain insight. Make sure to include both genders and various age ranges. The appropriate questions allows you to collect all the information you need. Types of Questions include:

- *Closed Questions* - Receives a single word, or very short, factual answer (i.e. yes or no)
- *Open Questions* - The response elicits a longer answer, generally with more of an explanation, with their knowledge, opinions and/or feelings
- *Funnel Questions* - This technique involves starting with general questions, then homing in on a point in each answer, and asking more and more details at each level.
- *Probing Questions* - Asking probing questions is another strategy for finding out more details. Sometimes it can be as simple as asking for an example.

Make sure to review the following points:

- **Learning:** Ask open and closed questions, and use probing questioning.
- **Relationship building:** People generally respond positively if you ask about what they do or enquire about their opinions.
- **Managing and coaching:** Using rhetorical and leading questions can be useful. They can help and prompt people to reflect.
- **Avoiding misunderstandings:** Use probing questions to seek clarification, particularly when the consequences are significant. Don't jump to any conclusions!
- **Defusing a heated situation:** You can calm an angry customer or colleague by using funnel questions to get them to go into more detail about their grievance. This will not only distract them from their emotions, but will help you identify a small practical thing that you can do.

- **Persuading people:** No one likes to be lectured, but asking a series of open questions will help others embrace the reasons behind your point of view.

Stakeholder Engagement Methods Group Work

Have learners review the lists and then discuss the following questions:

- Think of your own communities. Which of these methods would work best and why?
- Think about your issue and the relevant stakeholders. Which method(s) do you believe would best work to get them engaged?
- Develop a set of questions that you would ask and which methods you would use to collect the data

ENGAGING AND EMPOWERING OTHERS TO TAKE ACTION	
Learning Objective	Understand perspectives of different stakeholders on complex issues
	Apply techniques for engaging, empowering and influence others to take collective action in different OH leaderships scenarios and/or issues

Stakeholder Engagement Data Presentations

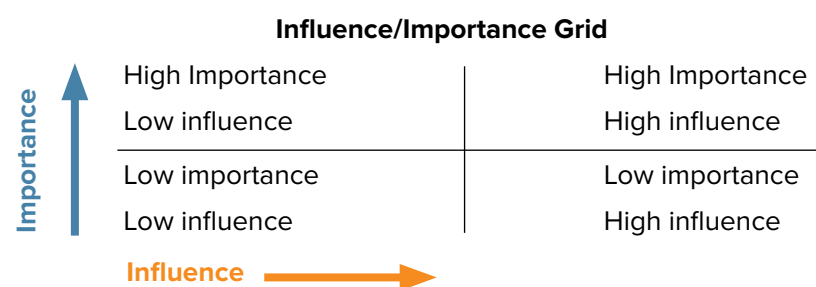
Have students share their summary of findings from their stakeholder analysis and allow for comments. Prompt students with the following questions:

- What made you successful in completing this exercise? What, if anything, hindered you in this exercise? Consider:
 - >> Leadership skills necessary to get the team organized
 - >> Questioning skills necessary to gather relevant data
 - >> Listening skills necessary to understand stakeholders statements
- What have you learned about understanding stakeholder issues?

Stakeholder Analysis

The "Influence/Important Grid" is a standard framework for stakeholder prioritization. The results of identifying the position of various stakeholders can develop a strategy on how key stakeholders should participate in the OH initiative. Begin by building a

strong and positive working relationship with stakeholders who have a high degree of influence and importance to ensure support. Stakeholders of high importance to the system but low influence often need to be aware or informed of what is going on. Stakeholders with high influence but low importance need careful monitoring as their interests are likely to be affected by the initiative and they could be a source of significant risk to the achievement of project objectives. Stakeholders of high importance but with low influence may need special initiatives to protect their interests. Stakeholders with high influence but with low importance need to be monitored, as their interests are likely to be affected by the initiative and they could be a source of significant risk.



Stakeholder Analysis and Strategy Planning

Reconvene the working groups and ask them to use the information they just learned to complete the following tasks:

- Create an importance/impact grid for the issues and stakeholders that you identified earlier
- Based on your stakeholder analysis, the data you collected will help you develop a strategy to move forward.
- Consider what elements of engagement, empowerment and influencing will be needed.

MODULE 5 MANAGEMENT

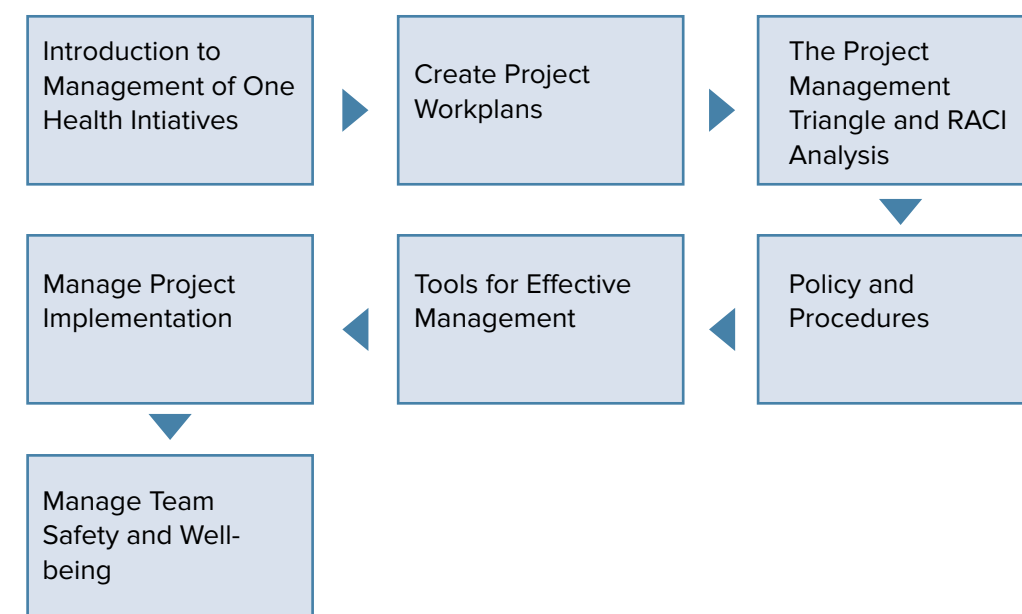
Course Overview

Module Description and Learning Outcomes

This module provides learners with an understanding of the skills needed to manage an OH initiative, including:

- Planning for staffing, budget, and resources
- Implementing policies and procedures needed to guide and support the day-to-day operation of the initiative
- Managing and monitoring the initiative to maximize effectiveness of One Health actions and the achievement of desired health outcomes
- Problem solving and taking corrective action during the initiative, as well as learning and sharing post-project
- Ensuring the safety and well-being of the OH team

Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Understand the difference between managing and leading, and the importance of each to a successful One Health initiative	Understand the different roles an individual plays in a One Health initiative through a project's life cycle, including: - Managing to create a predictability and ensure that results are produced - Leading to create positive disruption and large-scale change
Competency #2	Learning Objectives to Develop Competency
Develop work plans to monitor and achieve progress	Create work plans that will achieve the following outcomes: - Clearly identified activities/tasks and outcomes - Staffing, budget, and resources needed to achieve results - Timelines to ensure that sequential and parallel activities are completed so that the initiatives finish on time Understand the relationship among the project scope, timelines, resources, and quality of outcomes
Competency #3	Learning Objectives to Develop Competency
Ensure policies, procedures and systems are in place to support the OH Initiative	Understand the role policies and procedures play in One Health initiatives. Define the elements for good policies and procedures
Competency #4	Learning Objectives to Develop Competency
Oversee implementation and monitor the One Health initiative to maximize the effectiveness of OH actions and desired outcomes	Manage and monitor a One Health initiative to ensure that the initiative is: - Tacking indicators - Operating within a budget - Being on time - Achieving results and meeting outcomes - Demonstrating excellence, competence, and professionalism

Competency #5	Learning Objectives to Develop Competency
Overcome barriers, solve problems and apply corrective actions during initiatives.	Identifying and overcoming barriers Proactively addressing and solving problems Adjusting plans and applying corrective actions in response to changes and/or new information
Competency #6	Learning Objectives to Develop Competency
Ensure the safety and well-being of the One Health team	- Prepare a communication and emergency action plan for the team - Monitoring the physical and mental health of team members - Providing mechanisms for stress reduction

Topic Breakdown

INTRODUCTION TO ONE HEALTH MANAGEMENT	
Learning Objective	Understand the different roles one plays in a OH initiative throughout the project life cycle, including: - Managing to create predictability and order to ensure results are produced - Leading to create positive disruption and large scale change

Management Module Core Competencies

- Understand the difference between managing and leading, and the importance of each.
- Ensure policies, procedures and systems are in place to guide and support an OH initiative.
- Oversee barriers, problem solve, and apply corrective actions.
- Evaluate and share learnings post-initiative

Introduction to One Health Management

The session will begin by identifying the basic questions that every manager must ask when planning an activity. Give the class the following task: *Imagine that your professor asked you to organize a one-day symposium for a visiting scholar. You are*

to invite everyone in the department and the leaders of the university. Afterwards, have them read their lists and arrange the responses in the order that they need to be completed. The group **must reach consensus**. Tell students that this serves as the core of project management, also known as *The Project Management Triangle*. This approach balances *scope, available resources, schedule and quality outputs*.

WORK PLANS The Key to Successful OH Initiative Management	
Learning Objective	Create work plans that are designed to achieve outcomes with: • Identified activities/tasks and outcomes • List of staff, budget, and resources required • Project implementation schedule

Designing Project Work Plans

Deliver a lecture on designing project work plans. A project work plan documents planning assumptions and decisions, facilitates communication among stakeholders and outlines approved scope, cost and schedule baselines. A project work plan answers the basic questions of:

- **Why?** – Why are we doing this initiative?
- **What?** – What is the work that needs to be performed to successfully complete the initiative? What are the major products/deliverables?
- **Who?** – Who will be involved and what will be their responsibilities within the initiative? How will they be organized?
- **When?** – What is the timeline and when will milestones be completed?
- **Where?** – Where is the One Health initiative taking place (e.g., the location)?

These questions are critical in defining the limiting constraints on an initiative, or the scope, resources and schedule of a project. The combination of these elements is referred to as the Project Management Triangle. Key elements of the project management include:

1. **Schedule:** Refers to the amount of time available to complete a project.
2. **Resources:** Refers to the people, budget, materials, etc. available to produce the initiative's outcomes.
3. **Scope:** Refers to what must be done to produce the initiative's outcomes.

Progress to outcomes and quality is tracked by using indicators. They measure the change to be evaluated, either quantitatively or qualitatively, to achieve a result.

- Quantitative indicators a quantity, such as an index, ratio, or percentage, and are numerically comparable. e.g., a person's height and weight.
- Qualitative indicators require subjective evaluation. While qualitative data are sometimes numerical, they do not hold direct arithmetic meaning. Some examples are a score, a rating, or progress along a milestone scale.

Creating a Project Work Plan - Template

TITLE OF PLAN
Expected Outcomes: 1. Steps/process 2. Category 3. Starting date 4. End date 5. Team members and roles
Initiative:
Implementation Schedule
Status of Indicators
Potential Risks and Mitigation Measures
Budget

The RACI Model Lecture

RACI charts are a simple way to clarify roles and responsibilities, making sure that nothing is overlooked. RACI charts also eliminate duplicative efforts by assigning clear ownership for each task.

- **Responsible.** The person who performs the work. There must be at least one "R" for each task or activity.
- **Accountable.** The person ultimately accountable for the work or decision being made. The individual carries the "yes" or "no" authority and has full veto power

for an activity. Only one “A” can be assigned to a task or activity and authority must accompany accountability. Some tasks or activities may not have an “A.”

- **Consulted.** Anyone who must be consulted prior to a decision being made and/or the task or activity being completed. There can be as many “C’s” as are appropriate in each row. Consulting involves two-way communication.
- **Informed.** Anyone who must be informed when a decision is made or work is completed. There can be as many “I’s” as are appropriate. Informed may only involve one-way communication.

Checking a RACI Analysis	
Vertical Analysis • No empty columns • Too many R’s or A’s • Qualifications	Horizontal Analysis • No empty rows • No R’s • Too many R’s or A’s • Too many C’s or I’s

POLICIES AND PROCEDURES: The Key to Guiding and Supporting One Health Initiatives	
Learning Objective	• Understand the role that policies and procedures play in One Health initiatives • Define the elements of “good” policies and procedures

Definition and Importance of Policies and Procedures

- Policies and procedures provide a framework for decision-making. They standardize practices, test and improve services, and achieve greater understanding amongst staff.
- Policies reflect the philosophy of organization, including a statement of purpose, commitment to national policies, timescales and requirements of individuals
- Procedures lets managers guide operations without constant management. This creates an understanding of roles and responsibilities while creating consistency.
- A good policy or procedure is factual with the requirements and laws. It includes why the policy is needed, what are the intentions, when it comes into effect and who it affects

Debriefing Questions:

- Are there any revisions we need to make to our checklist? What are they?
- How do you think policies/procedures could benefit One Health initiatives?
- When managing a One Health initiative, what will be the challenges of getting teams to follow policies/procedures?

TOOLS FOR MANAGING ONE HEALTH INITIATIVES	
Learning Objective	• Identifying and overcoming barriers • Proactively addressing and solving problems • Adjusting plans and activities to include new information

Introduction to Six Sigma

This session has students research Six Sigma quality improvement tools to improve project quality and efficiency. Introduce the concept of Six Sigma to the class. The Six Sigma is a set of tools and techniques/strategies for process improvement. It seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.

>> Use the link below for more information: <http://asq.org/learn-about-quality/six-sigma/overview/overview.html>

MONITORING IMPLEMENTATION TO ACHIEVE OUTCOMES	
Learning Objective	• Tracking indicators, results and meeting outcomes • Demonstrating excellence, competence, and professionalism • Operating within budget and on time • Preparing a communication and emergency action plan for the OH team • Monitoring the physical and mental health of team members • Providing mechanism for stress reduction • Providing “employee assistance” support during post initiatives

Managing A One Health Project Simulation

This session challenges students to adjust work plans when faced with common management-related challenges. This includes budget reductions, loss of critical personnel or other resources, or reduced timelines. Have students revise budgets, resources, timelines, and/or scope then fill every column for the status of indicators, potential risks, and mitigation measures. Encourage students to share one risk and the mitigation plan(s) and see if other students identified the same risk and mitigation plan.

Management Planning for Emergencies

Tell students that emergencies happen when they are least expected, so preparation is critical! This activity focuses on the importance of designing emergency communication plans. Ask the class, “*What should be included in an emergency communication plan?*” Answers include:

- Assigned roles and responsibilities including primary decision-maker/emergency coordinator
- Emergency contacts (e.g., police, fire department, doctors, etc.)
- Contact list of all personnel and phone numbers/emails
- Employee evacuation plans
- Website and/or phone/voice mail emergency messaging plan
- System to account for all personnel
- Stakeholder and media communication plans
- Training and summary booklets/brochures/cards

Have students create their own emergency planning checklists, including the importance of stress management. This can include a self-care plan, with coping strategies. Introduce four types of stress. They are listed below.

The Four Common Types of Stress

1 Time Stress - Comes from worrying about time, or the lack thereof. You worry about the number of things that you have to do, and you fear that you will fail to achieve something important.

2 Anticipatory Stress - Describes stress that you experience concerning the future. This stress can be focused on a specific event, such as an upcoming presentation that you’re going to give. It can also be vague and undefined,

such as an overall sense of dread about the future, or a worry that, “something will go wrong.”

3 Situational Stress - Occurs when you’re in a scary situation that you have no control over, such as an emergency, loss of status, acceptance, etc. For instance, getting laid off or making a major mistake in front of your team are examples of events that can cause situational stress.

4 Encounter Stress - Revolves around people. You experience encounter stress when you worry about interacting with a certain person or group of people—you may not like them, or might think that they’re unpredictable.

Debrief

Assessment is the first important step in developing a plan to mitigate and manage stress. Stress can trigger physiological changes. Symptoms of stress can include headache, muscle tension, insomnia and a host of other warning signs. Perception is key when assessing stress. The same situation can elicit a very different stress response in individuals due to different perceptions of the experience. Remind students to include all dimensions of health, physical, mental, emotional, spiritual and social. Facilitate a discussion on the following questions:

- How did completing the assessments help you become more aware of what causes you stress?
- What are some actions you can share with the group about managing the stress?
- What are potential causes of stress during a OH initiative?
- What can OH initiative manager do to help members become aware of when they may be experiencing too much stress?
- How can an OH manager support individuals in managing their stress? How can the team support each other?

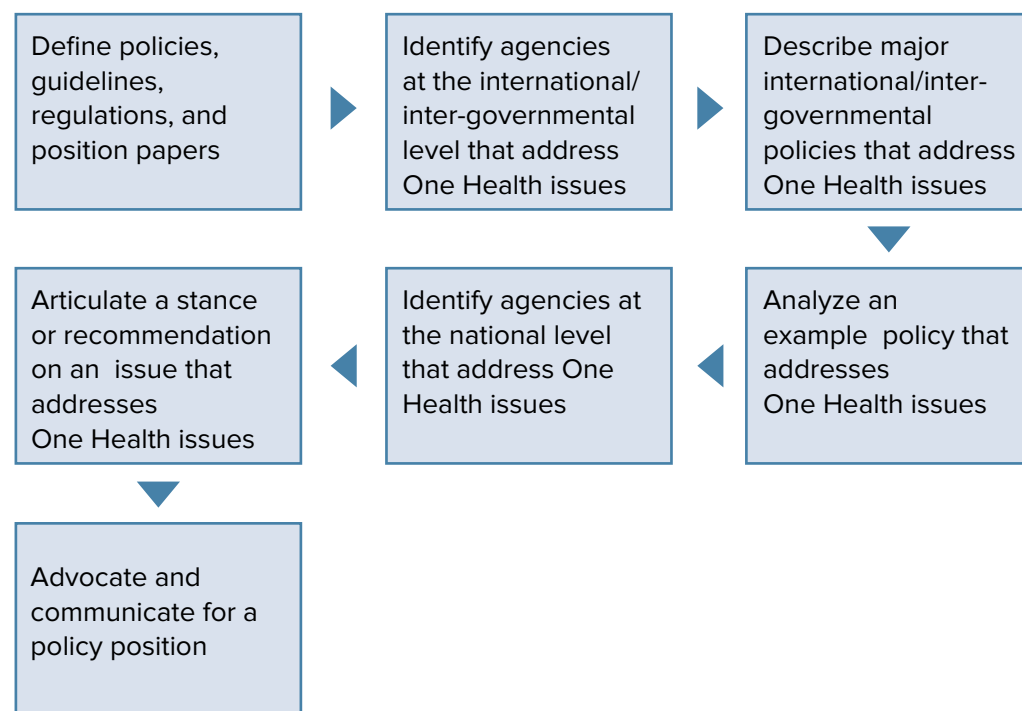
MODULE 6

POLICY, ADVOCACY, AND REGULATION

Course Overview

Module Description and Learning Outcomes	This module provides learners with an understanding of policy frameworks conducive to achieving OH outcomes, Key outcomes include • Understanding how policies, regulations and guidelines are developed and implemented • Identify local, national, and intergovernmental agencies that create and oversee policies, guidelines, and regulations that impact OH issues • Advocate across multiple agencies and organizations for a position on an OH issue
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Identify and understand the role of international agencies and their policies as influence OH approaches	• Define the differences among policies, guidelines, and regulations • Identify agencies on the international/ intergovernmental level that participate and/or affect in the health sector, OH issues, and describe their scope and roles
Competency #2	Learning Objectives to Develop Competency
Identify the role of national ministries/ agencies and policies on OH issues	• Identify agencies in the national level that are involved in OH issues and describe their roles and scope • Identify national level policies that support/affect One Health initiatives to evaluate and make recommendations
Competency #3	Learning Objectives to Develop Competency
Advocate for a policy that addresses OH issues	Understand systems thinking, identify OH problems and potential policy recommendations, by: • Identify key stakeholders and considering pros/ cons of a policy recommendation • Communicate potential conflicts and consider different perspectives
Competency #4	Learning Objectives to Develop Competency
Analyze the effects of regional/local policies, economics and cultures on OH issues	Describe health infrastructure (veterinary, medical, public health, environmental, etc.) in the context of: • Regional politics, economics and infrastructure • Regional sociology and behaviour

INTRODUCTION TO POLICY, ADVOCACY, AND REGULATION	
Learning Objective	Give learners an overview of the module and learning objectives which include: • Advocate for OH policies • Identify and understand the role of and policies enacted by international and national agencies that impact OH • Advanced course: Analyze impact of regional policies, economics, and culture on OH policies

Policies, Regulations, Guidelines, Procedures, and Position Papers - Definitions

- **Policy** - the general principles by which a government or organization is guided in its management of public affairs or the legislature in its measure. It provides the purpose of tendency considered as directed to the welfare or prosperity of the state and/or community.
- **Health policies** - “decisions, plans, and actions that are undertaken to achieve specific health care goals within a society.” According to the WHO, “an explicit health policy can achieve several things: it defines a vision for the future; it outlines priorities and the expected roles of different groups; and it builds consensus and informs people.” It also includes personal health care policy, pharmaceutical policy, and policies related to public health, such as vaccination policy, tobacco control, etc.
- **Regulations** - set of enforced rules established by a competent authority and are created to support the implementation of policies. This creates, limits or constrains and allocates a responsibility. They can take many forms and in its legal sense, regulation can and should be distinguished from primary legislation
- **Guidelines** - recommendations or instructions that provide a framework for achieving compliance with policies or regulations. They are more technical in nature than policies and standards and are updated on a more frequent basis
- **Standards** - minimum requirements designed to address requirements that ensure compliance with a policy, regulation or standard. These provide a basis for verifying compliance with audits and assessments.
- **Procedures** - instructions for accomplishing tasks/activities that are part of a regulation or standard
- **Processes** - a series of actions that produce something or that lead to a particular result and are often documented throughout procedures.
- **A position paper** - an essay that presents an opinion, typically that of a recognized expert or organization, about an issue.

International/Intergovernmental Organizations

The major international/intergovernmental organizations that create One Health-related policy are the **World Health Organization (WHO)**, **World Organization for Animal Health (OIE)** and the **Food and Agriculture Organization of the United Nations (FAO)**. Other key players include the International Union for Conservation of Nature [IUCN], the World Wildlife Fund [WWF], and the World Bank influence OH policies, but are not discussed in this module. WHO, OIE, and FAO are the most important organizations and promote key cross-sectoral approaches.

International/Intergovernmental Organization

Have students conduct a web-based hunt for organizations that influence OH policies. Give them 30 minutes to visit the WHO, OIE and FAO websites and collect the following information:

- Mission of the organization and current projects (bonus marks if students find Vietnamese based projects)
- One Health strategic plans/areas of focus/themes/agenda
- Policies, guidelines or procedures that impact human, animal or ecological health and would benefit from a One Health approach

Debrief Sessions

Have student share the following information:

- Ask for a volunteer to share the information they found about WHO.
- Ask the class if anyone found any additional or different information on the organization
- Have someone share the information the discovered about OIE.
- Ask if any additional or new information was uncovered.
- Encourage the class to list other organizations they found and/or researched

Anatomy of an International/Intergovernmental Policy	
Learning Objective	Describe major international/intergovernmental policies that support and/or affect OH initiatives

The WHO definition of a policy

- The WHO defines **health policy** as “decisions, plans, and actions that are undertaken to achieve specific health care goals within a society.
- An explicit health policy can achieve several things: it defines a vision for the future which in turn helps to establish targets and points of reference for the short and medium term. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people.” A regulation provides the specific rules for implementing a policy.

Policy Analysis with a One Health Homework Assignment

Have each individual find and review a policy, regulation or guideline from one of the organizations listed below that could or should have a One Health perspective:

- WHO
- OIE
- FAO
- Any other international/intergovernmental organization

Students will give a presentation that addresses the following elements of the policy, regulation or guideline:

- If the organization isn't WHO, OIE or FAO, give an overview of the organization and explain why you selected the organization and policy.
- Describe the purpose of the policy, regulation or guideline.
- Provide highlights of the policy, regulation or guideline.
- How does the policy, regulation or guideline represent an OH perspective? Highlight the relevant features.
- How could the policy, regulation or guideline be amended or revised to better reflect a One Health perspective? Explain how it could be revised and expanded to address the human-animal-ecological interface.

Analyzing WHO, OIE, and FAO policies, regulations, guidelines, and policy papers	
Learning Objective	Describe major international/intergovernmental policies that support and/or affect OH initiatives

Policy Analysis using an OH Lens

Ask the students which organization they want to research and give them 5 minutes to give an overview of their findings. Lead the following debrief discussion questions:

- Do the policies, regulations and guidelines overlap or complement one another? If yes, how? If no, how do they differ?
- How would you address the differences among policies, regulations or guidelines established by international entities? In what scenario might this play out?
- Do any of the policies, regulations or guidelines take an OH perspective? If yes, how was this perspective incorporated? If no, how would you modify the policy, regulation or guideline to achieve a One Health perspective?
- How does or would an OH perspective strengthen the policies, regulations or guidelines?

Discovering National Policies	
Learning Objective	• Identify national agencies and describe their scope and role(s) • Identify national-level policies that support/affect OH initiatives • Evaluate recommendations for policies supporting an OH approach

Large Group Discussion

Ask for a volunteer to explain how laws and regulations are developed in their country. Identify the government organizations in their country that have policies on:

- Agriculture
- Animal health
- Protection of the environment
- Public health
- Wildlife

Divide the class into five groups and assign each group to one of the policy areas outlined above. Have students identify:

- Two or three national policies in their policy area.
- Stakeholders affected by each policy.
- Whether the policy, regulation or guideline includes an OH perspective

Vietnam Context - Information

The Socialist Republic of Vietnam (Vietnam) is a one-party systems led by the Communist Party of Vietnam (CPV). The Party's peak organ, the sixteen-member Politburo, holds authority over the implementation of all major areas of policy. The

Politburo is elected by the Party's Central Committee. Day-to-day policy guidance comes from the ten-member Secretariat to the Central Committee, which comprises some Politburo and Central Committee members. The Central Committee considers important policy issues several times per year, and five-yearly Party Congresses ratify major policy changes. Some ministries are included, in no particular order:

- Ministry of Public Security
- Ministry of Foreign Affairs
- Ministry of Justice
- Ministry of Industry & Trade
- Ministry of Agriculture & Rural Development
- Ministry of Transport
- Ministry of Education & Training
- Ministry of Finance
- Ministry of Health

Becoming an Advocate for OH Policies	
Learning Objective	Using systems thinking, identify an OH problem and potential policy recommendation(s) by: • Identifying key stakeholders and articulating their stance on the problem • Considering the pros and cons of a policy recommendation on the affected stakeholders • Communicating potential conflicts with interests and perspectives

The Importance of Policy Advocacy Skills in the One Health Context

Provide the following introduction to the importance of policy advocacy skills for a One Health professional.

Why are policy advocacy skills important for a One Health professional?

Support for Analysis and Research in Africa (SARA) cites: "Recognizing that this [generating research findings and presenting information to decision-makers] has not been enough to change policies and programs. A SARA study reviewed the process of policy change and identified the three activities that converge to produce changes in policies and programs:

1. Identifying problems
2. Finding solutions
3. Advocacy.

What is policy advocacy?

"Policy advocacy is any effort to influence public policy by providing information, speaking to decision-makers, demonstrating benefits for policy change and other such activities that encourage the adoption of the desired policy change. For communities desiring to improve health, the focus of policy advocacy will be on public policies and environmental changes that influence the health of the community," (Genesee County Health Department). Advocating for a One Health perspective at the policy level has the potential to ensure that organizations will adopt a more holistic approach in prevention and response to emerging pandemic threats.

What does policy advocacy involve?

- Awareness raising
- Communication
- Campaigning
- Research
- Publication
- Alliances
- Developing partnerships
- Social mobilization

How do you advocate for a policy?

1. Identify the issues for policy action:

- What do you want to change and why?
- What are the different perspectives of those who will support the policy change and those who will not be in favour of the change?

2. Assess the environment:

- Who are the key decision-makers?
- Who are the key technical experts?
- What is the public's perspective?

3. Identify key stakeholders and potential partners.

4. Develop a communication strategy.

5. Craft key messages:

- What do you want decision-makers to KNOW, FEEL and DO?
- What do you want the public to KNOW, FEEL and DO?

6. Advocate.

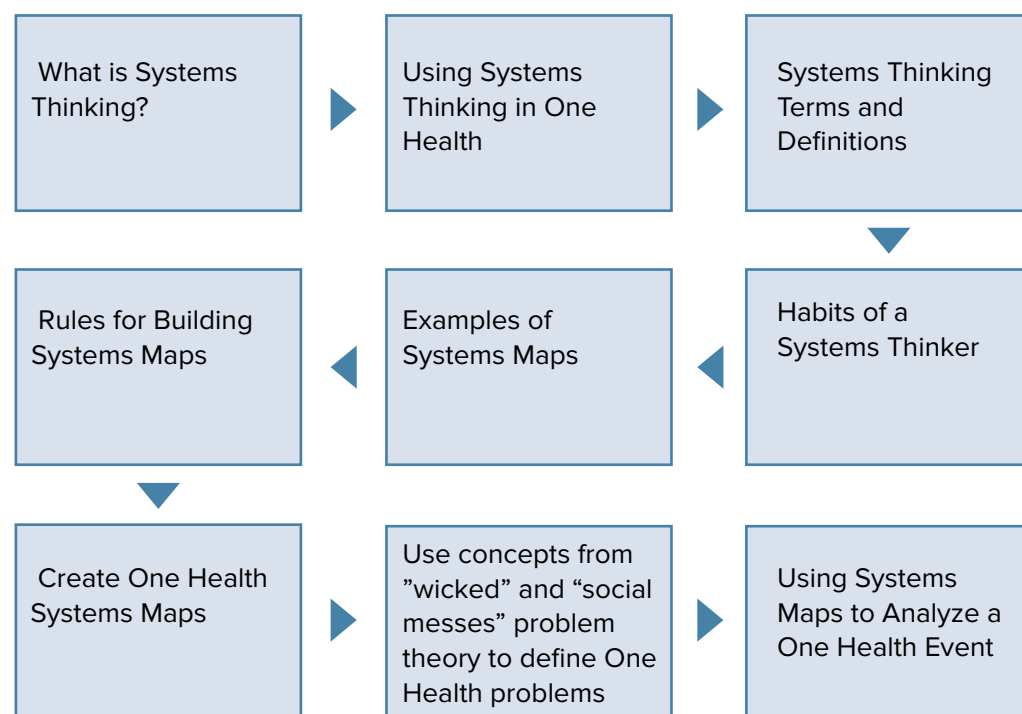
MODULE 7

SYSTEM THINKING

Course Overview

Module Description and Learning Outcomes	This module equips students with the skills necessary to take a systems thinking approach to emerging pandemic diseases. Key outcomes include: - Using systems thinking to create maps of complex and complicated systems that include human, animal, environment, and ecological health and components. - Operate as part of a OH team that uses systems maps to integrate information from multiple disciplines and sectors, to develop strategies to address challenges
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Describe the elements of complex problems and systems thinking	Understand core concepts of systems thinking and their application in OH interventions by: Describing key systems concepts (complex, complicated and adaptive systems)
Competency #2	Learning Objectives to Develop Competency
Create and use systems mapping to strengthen the understanding of OH challenges	Create systems maps of OH challenges, by: - Identifying the elements of the OH problem and the connections between the humans, animals and environment - Mapping the integration points where individual system elements interact
Competency #3	Learning Objectives to Develop Competency
Partner with OH team members to develop solutions for complex problems, using system thinking and relevant tools/maps	Contribute on an OH team to developing solutions to problems, by: - Using concepts from wicked and super wicked problem theories to understand how to formulate and approach OH challenges - Integrating information and actions across disciplines/sectors using system thinking tools - Determining and mitigating unintended consequences of planned interventions - Creating essential feedback and feed-forward loops

This module teaches systems thinking using a teaching methodology called **Problem-Based Learning (PBL)**. PBL requires special teaching techniques in which the teacher facilitates learning by supporting, guiding and monitoring the learning process. The teacher does not answer questions, but rather poses questions in a Socratic method so that students discover their next steps. The goals are to help the students develop flexible knowledge, effective problem solving skills, self-directed learning, effective collaboration skills and intrinsic motivation. This encourages students to work collaboratively to solve real-world, complex problems by creating learning plans for how they will acquire the knowledge and skills necessary to develop solutions.

The problem-solving process can be summarized in seven steps:

- 1** The group discusses the problem or learning challenge based on their prior knowledge and experience. They will define the problem.
- 2** The group identifies what they need to know to solve the problem. They will analyze these questions and break the problem down into components, discussing implications, entertaining possible explanations or solutions, and developing working hypotheses.
- 3** The team will identify and allocate learning tasks and develops study plans to discover the needed information. The group will develop a plan outlining what further information or knowledge they need for the solution.

The plan should include: A list of resources (articles, websites, etc.) to consult and a list of specific actions that need to be completed. This will include the name of the individual who will complete the task(s).
- 4** Collect information through experiments, mini-lectures, etc., and outside of the classroom through field trips, interviews, etc.
- 5** As the group gathers information, analyze and evaluate the data. Data may confirm or challenge working assumptions. This causes the group to reexamine what they know and what they need to know.
- 6** The group proposes a solution to the problem or learning challenge.
- 7** Communicating their solution is the final step. This allows others to review, confirm or challenge the findings.

INTRODUCTION TO SYSTEMS THINKING

Learning Objective

Give students an overview of the Systems Thinking module and its learning objectives. Key outcomes include:

- Describing the elements of complex problems and systems thinking
- Creating systems mapping to deepen understanding of OH problems
- Partnering with OH teams to develop solutions to complex problems

Session Introduction

When you begin to learn about a system, its complexity may be a bit overwhelming. A systems thinking approach allows us to begin to understand the complexity and use it to find answers that matter. Watch a TED Talk by Eric Berlow, an ecologist and

network scientist who is recognized for his research on food webs and ecological networks and for his creative approaches to complex problems.

- TED Talk – Eric Berlow, Simplifying Complexity http://www.ted.com/talks/eric_berlow_how_complexity_leads_to_simplicity.html

Developing Your Systems Thinking Learning Plan



Have students write their name on a flip chart/whiteboard. Underneath their names, create two columns with titles “Things I Know about Systems Thinking” and “Things I Do Not Know about Systems Thinking.”

Have them create a list in each column. The students will then review one another’s lists and form teams with students whose lists complement their own. Each team will complete the first two columns of the Systems Thinking Learning Plan table shown below. They will create their plan for learning about systems thinking. This plan should aim to fill any gaps in knowledge and ensure that they have a comprehensive understanding of systems thinking. Teams should consider the following questions before completing the third column of the table:

- What do you need to know about systems thinking in order to use a systems thinking approach in addressing One Health problems?
- In what order should you research the items identified in the previous question?
- What are the primary resources that you will use?
- What will you do when you cannot find the information that you want?
- What will you do when you have questions?

CREATING A LEARNING PLAN

Things we know about systems thinking	Things we do not know about systems thinking	Plan for learning more about what we do not know

WHAT IS SYSTEMS THINKING?	
Learning Objective	Understand core concepts of systems thinking and their application in OH interventions, by: • Accurately describing key system concepts (complex, complicated and adaptive systems) • Understanding what is distinctive about systems thinking as opposed to other forms of thinking (logic, causal, etc.) • Evaluating the advantages and implications of taking a systems approach to OH problems

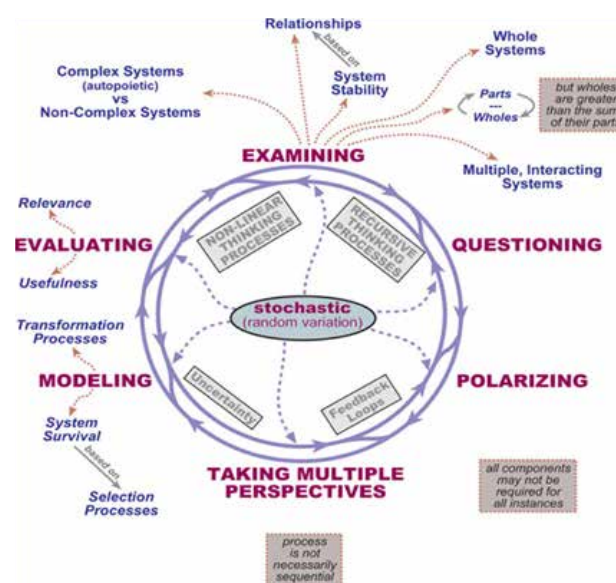
Module Introduction

The WHO defines health policy as “decisions, plans, and actions that are undertaken to achieve specific health care goals within a society. An explicit health policy can achieve several things: it defines a vision for the future which in turn helps to establish targets and points of reference for the short and medium term. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people.” A regulation provides the specific rules for implementing a policy.

Creating a Systems Thinking Map

Direct students to use the systems thinking learning plans created in the last class to create a poster using systems mapping techniques that:

- Define systems thinking and summarize distinctive key concepts
- Demonstrate how to create a systems map.
- Evaluate the advantages and implications of taking a systems approach to understanding One Health problems.



Characteristics of a System of a System Thinking Approach

1. A very deep and persistent commitment to real life learning
2. Be prepared to be wrong: An individual's own way of thinking can be limiting; willingness to challenge own mental model.
3. Triangulate: Need people who can look at something from different points of view to work collectively.

Building a Systems Map (Systems Maps at The Open University, www.open.ac.uk)

Top-Down Approach:

- Identify a clear purpose for your system of interest (Title of System Map).
- Draw boundary.
- Identify subsystems.
- Consider what subsystems and components might be needed in each subsystem.
- Continue moving down levels.
- Might be useful if designing a subsystem from scratch.

Bottom-Up Approach:

- Useful if undecided about the purpose of your system of interest but where you can identify the elements that can combine to make it up.
- Begin with the components that your system will include.
- Group the components.
- Continue grouping until you have a boundary.
- Identify the purpose of your bounded system and insert the title.

Other Types of Related Diagrams/Maps

- **Concept Map:** A diagram that depicts relationships between concepts and is used to organize and structure knowledge.
- **Mind Map:** A diagram used to visually outline information. It is often created around a sign word or text, placed in the center, to which associated words and concepts are added. Major categories radiate from a central node and lesser categories are sub-branches of larger branches. Categories can represent words, ideas or tasks. (John W. Budd, 2004)
- **Spray Diagram:** Similar in look to a mind map, but used for representing the structure of an argument, to encapsulate the relationship between ideas of others or for note-taking.

- **Rich Picture:** Provides a mechanism for learning about complex or ill-defined problems by drawing detailed “rich” representations of them. There is no agreed-upon syntax, and consists of symbols, sketches or doodles.
- **Flow Chart:** A diagram that shows a step-by-step progression through a procedure or a system with a set of conventional symbols.
- **Causal Loop Diagram:** Aids in visualizing how different variables in a system are interrelated. The diagram consists of a set of notes and edges.

WHAT IS SYSTEMS THINKING?	
Learning Objective	Create system maps of OH problems by: • Identifying the elements to an OH problem and the linkage between humans, animals, and the environment • Mapping the integration points where individuals system elements interact

Systems Thinking - Wicked Problems

Deliver the presentation on Systems Thinking - Wicked Problems. The following topics will be covered:

- Wicked Problems: Finding Solutions to One Health Problems through Systems Thinking
- What is a Wicked Problem?

Wicked One Health Problems

- Challenge #1** - There is an outbreak of influenza-like illness among people and animals in a small town in Thailand.
- Challenge #2** - Fifty (50) chickens die before the TET holiday in one village in Vietnam.
- Challenge #3** - Three individuals come to a health station showing signs and symptoms of dengue fever in a small town in Indonesia.

Challenge Directions

Have students form teams around the challenge that interests them. Students should use systems thinking to explore the challenge they selected. They should consider the following questions and also propose solutions to the challenge. Each team should create a poster capturing this information to present during the next class meeting.



- **Who?** Who has the disease? Who else does the disease impact? Who should be on a One Health team?
- **Where?** Where was the first case discovered? Where has it spread?
- **When?** When was the first case discovered? How quickly is it spreading?
- **How?** How is the disease transmitted? How serious is it? How can the disease be managed and controlled?
- **What?** What are the implications for human, animal and ecological health?
- **Why?** Why did the outbreak occur?

Wicked One Health Problems

Ask each group to explain why they chose their OH challenge and their proposed solution(s). Then have them respond to any questions from the class. If students select the same challenge, compare and contrast solutions. A template example of a Wicked Outline is provided below.



CHAPTER 3:

Eight One Health Technical Modules

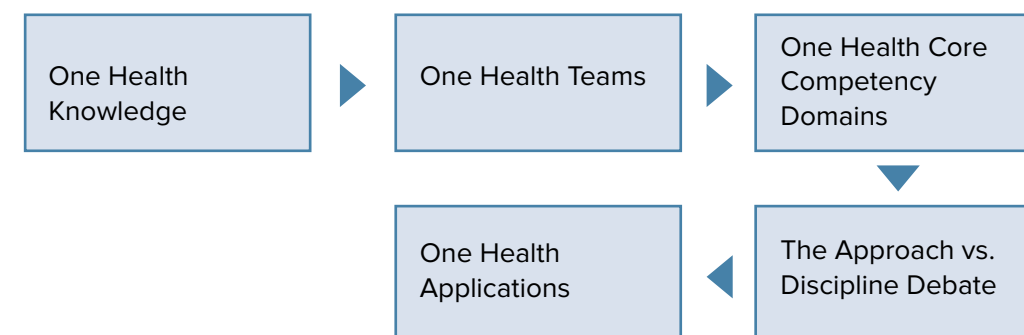
MODULE 1

ONE HEALTH CONCEPTS AND KNOWLEDGE

Course Overview

Module Description and Learning Outcomes	This module provides students with an understanding of the OH approach, including its history, key players, and application. Key outcomes include: • Understanding the history, concepts and applications of the OH approach • Explain the OH approach to others
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Explain the history and concept of One Health	Explain the One Health approach by being able to: • Define One Health, identify key concepts and describe it in a historical context • List stakeholders currently using the OH approach • Compare and contrast OH with eco-health, ecosystem health, global health and environmental health

Competency #2	Learning Objectives to Develop Competency
Describe the One Health Core Competency domains and their application	Demonstrate an understanding of the OHCC domains by being able to: - Describe who should be involved in a OH team approach and how to work together - Describe the OHCC domains
Competency #3	Learning Objectives to Develop Competency
Describe the application of the One Health Approach	Demonstrate understanding of the application of the One Health approach by being able to: - Explain how One Health is an approach and trans-disciplinary - Explain how One Health brings together stakeholders to address complex emerging and re-emerging disease threats

ONE HEALTH KNOWLEDGE	
Learning Objective	Explain the One Health approach by being able to: - Define One Health and describe it in a historical context - Identify One Health concepts - List stakeholders using the One Health approach - Compare and contrast One Health with eco-health, ecosystem health, global health and environmental health

Introduction to One Health

Distribute a blank sheet of paper to each student and have them define “One Health” without searching the internet, in anyway that they would like (e.g as an acronym, a sketch/drawing, etc.). Ask students to label this side “Side A” and keep the sheets until the end of the class.

Why One Health? Why Now?

Provide the following introduction to the class then build the table below, explaining and giving examples for each of the components.

One Health is not a new concept, but it has become more important in recent years. In the past 100 years, many factors have changed in the interactions among humans, animals and the environment. These factors, including globalization, urbanization and industrialization, have caused the emergence and reemergence of many diseases. (www.cdc.gov)



Why now...	As a result...
Human populations are growing and expanding into new geographical areas	More people live in close contact with wild and domestic animals. Close contact provides more opportunities for diseases to pass between animals and people.
The earth has experienced changes in climate and land use, such as deforestation and intensive farming practices	Disruptions in environmental conditions and habits provide new opportunities for diseases to pass to animals
International travel and trade have increased	Diseases can spread quickly across the world

Table from www.cdc.gov

One Health Definitions and Stakeholders

Instruct the students to conduct an individual internet search to define the following terms and then write down the local, regional and international organizations that operate in each sector:

- Eco-health
- Ecosystem Health
- Global Health
- One Health
- Environmental Health

Organizations Operating in the One Health Sphere

- World Health Organization (WHO)
- Food and Agriculture Organization (FAO)
- World Organization for Animal Health (OIE)
- One Health Initiative

- EcoHealth Alliance
- United States Agency for International Development (USAID)
- Southeast Asia One Health University Network (SEAOHUN)
- Vietnam One Health University Network (VOHUN)
- Universities - Departments
- Ministries of Health, Agriculture, Environment, etc.
- Medical/Health Professional Associations

Key Definitions

- The One Health concept is a strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. When properly implemented, it will help protect and save untold millions of lives in our present and future generations. – *One Health Initiative*
- The One Health concept recognizes the health of humans as being connected to the health of animals and the environment. CDC uses a One Health approach by working with physicians, ecologists, and veterinarians to monitor and control public health threats. We do this by learning about how diseases spread among people, animals, and the environment. – *United States Centers for Disease Control*

Facilitator Notes - History of One Health

Retrieved from: <http://www.cdc.gov/onehealth/people-events.html>

History of One Health

Although the term “One Health” is fairly new, the concept has long been recognized nationally and globally. Since the 1800s, scientists have noted the similarity in disease processes among animals and humans. However human and animal medicine were practiced separately until the 20th century. In recent years, the One Health concept has gained more recognition.

Timeline: People and Events in One Health

1821-1902: Virchow recognizes the link between human and animal health

Rudolf Virchow, MD, was one of the most prominent physicians of the 19th century. Dr.

Virchow was a German pathologist who became interested in the linkages between human and veterinary medicine while studying a roundworm, *Trichinella spiralis*, in swine. He coined the term “zoonosis” to indicate an infectious disease that is passed between humans and animals.

1849-1919: William Osler, father of veterinary pathology

William Osler was a Canadian physician who is considered the father of veterinary pathology in North America. He was deeply interested in the relationship between human and veterinary medicine, and lectured many veterinary and medical students. In 1889, he became the first Physician-in-Chief of Johns Hopkins Hospital and played an instrumental role in establishing the Johns Hopkins University School of Medicine.

1947: The Veterinary Public Health Division is established at CDC

In 1947, James H. Steele founded the Veterinary Public Health Division at CDC. He understood the importance of animals in the epidemiology of zoonotic diseases, and recognized that good animal health plays a crucial role in good public health. This played an important role in the public health responses to diseases such as rabies, brucellosis, salmonellosis, bovine tuberculosis, etc.

1927-2006: Calvin Schwabe coins the term “One Medicine” and calls for a unified approach against zoonoses that uses both human and veterinary medicine

In 1966, Dr. Schwabe became the founding chair of the first Department of Epidemiology and Preventive Medicine at the Veterinary School at the University of California Davis. In the 1964 edition of his monograph, he proposed that veterinary and human health professionals collaborate to combat zoonotic diseases. In his textbook, *Veterinary Medicine and Human Health*, Dr. Schwabe coined the term “One Medicine,” which emphasizes the similarities between human and veterinary medicine.

2004: The Wildlife Conservation Society publishes the 12 Manhattan Principles expanded

On September 29, 2004, the Wildlife Conservation Society brought a group of human and animal health experts for a symposium at Rockefeller University in New York City. Attendees of this symposium, titled “Building Interdisciplinary Bridges to Health in a ‘Globalized World,’” discussed the movement of diseases among humans, domestic animals, and wildlife. The symposium set 12 priorities to combat health threats to human and animal health, which became known as the “Manhattan Principles.” This served as the basis for the One Health concept.

2007: The One Health approach is recommended for pandemic preparedness

December 4–6, 2007, representatives of 111 countries and 29 international organizations met in New Delhi, India, for the International Ministerial Conference on

Avian and Pandemic Influenza. Governments were encouraged to develop the One Health concept by building linkages between human and animal health systems for pandemic preparedness and human security.

2008: FAO, OIE and WHO collaborate with UNICEF, UNSIC and the World Bank to develop a joint strategic framework in response to the evolving risk of emerging and re-emerging infectious diseases

The World Bank and UNSIC developed the “[Contributing to One World, One Health™—A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal-Human-Ecosystems Interface](#).” It built on the lessons learned from the highly pathogenic H5N1 avian influenza response and presented a strategy for applying the One Health concept to emerging infectious diseases.

2008: One Health becomes a recommended approach and a political reality

October 25–26, 2008, representatives from more than 120 countries and 26 international/regional organizations attended the International Ministerial Conference on Avian and Pandemic Influenza to create a joint strategic framework. Participants endorsed a new strategy for fighting avian influenza and other infectious diseases, with a focus on disease control in areas where animals, humans and ecosystems overlap.

2009: The One Health Office is established at CDC

In 2009, Lonnie King, then director of CDC’s National Center for Zoonotic, Vectorborne and Enteric Diseases, proposed the One Health Office. The office was created as a point of contact for external animal health organizations and maximized funding opportunities. The role of the One Health Office has expanded to include supporting public health research that furthers the OH concept, and facilitating the exchange of data and information.

2009: USAID establishes the Emerging Pandemic Threats program

In 2009, the USAID launched the Emerging Pandemic Threats (EPT) program to ensure a coordinated international effort to prevent the emergence of diseases of animal origin that could threaten human health. The program draws on expertise from across the animal and human health sectors to build regional, national and local One Health capacities for early disease detection, laboratory-based disease diagnosis, rapid disease response and containment, and risk reduction.

2009: Key recommendations for One World, One Health™ are developed

March 16–19, 2009, the Public Health Agency of Canada’s Centre for Food-borne, Environmental and Zoonotic Infectious Diseases hosted representatives from 23 countries at the [One World, One Health™ Expert Consultation](#). This meeting

discussed the One World, One Health strategy and the objectives in the [Strategic Framework](#). Key recommendations emerged for countries to take to promote the One Health approach.

2010: The Hanoi Declaration, which recommends broad implementation of One Health, is adopted unanimously

April 19–21, 2010, a total of 71 countries, international organizations representatives, development banks and other stakeholders, attended the International Ministerial Conference on Avian and Pandemic Influenza in Hanoi, Vietnam. With the experience of the H1N1 pandemic and highly pathogenic H5N1 avian influenza, participants confirmed the need to bring greater attention to the links between human and animal health to address threats that happen when animals, humans and the ecosystem overlap. This led to the creation of the [Hanoi Declaration](#).

2010: Experts identify clear and concrete actions to move the concept of One Health from vision to implementation

May 4–6, 2010, CDC hosted the “[Operationalizing ‘One Health’: A Policy Perspective—Taking Stock and Shaping an Implementation Roadmap](#).” It was designed to define specific actions to move the concept of One Health forward. Participants identified seven key activities to advance the One Health agenda. These activities formed the basis of six workgroups, focusing on:

- Cataloguing and developing One Health trainings and curriculum.
- Establishing a global network.
- Developing a country-level needs assessment.
- Building capacity at the country level.
- Developing a business case to promote donor support.
- Gathering evidence for proof of concept through literature reviews and prospective studies.

2010: The United Nations and the World Bank recommend adoption of One Health approaches

In July 2010, the World Bank and the UN released the “Fifth Global Progress Report on Animal and Pandemic Influenza.” The report emphasized the importance of adopting a One Health approach to sustain momentum in pandemic preparedness.

2010: The European Union reaffirms its commitment to operate under a One Health umbrella

In August 2010, the European Union published the “[Outcome and Impact Assessment of the Global Response to the Avian Influenza Crisis](#)” report, which stated new OH initiatives were in the works.

2011: The 1st International One Health Congress is held in Melbourne, Australia

February 14–16, 2011, the 1st International One Health Congress was held in Australia. More than 650 people from 60 countries and a range of disciplines came together to promote a One Health approach. In addition to understanding the interdependence of human, animal and environmental health, attendees agreed that a multi-sectoral approach was crucial.

2011: The 1st One Health Conference in Africa is held

July 14–15, 2011, the Southern African Centre for Infectious Disease Surveillance organized the 1st One Health Conference in Africa at the National Institute for Communicable Diseases in Johannesburg, South Africa.

2011: The High Level Technical Meeting to Address Health Risks at the Human-Animal-Ecosystem Interface builds political will for the One Health movement

Building on the agreements in the Tripartite Concept Note, the Tripartite organized a High Level Technical Meeting in Mexico City November 15–17, 2011. The focus was to address health risks that occur in different geographic regions by highlighting three priority One Health topics—rabies, influenza and antimicrobial resistance.

2012: The Global Risk Forum sponsors the first One Health Summit

In February 2012, the Global Risk Forum One Health Summit was held in Switzerland. The Summit presented the OH concept as a way to manage health threats, focusing on food safety and security. The conference ended by approving the “Davos One Health Action Plan,” which pinpointed ways to improve public health through multi-sectoral and multi-stakeholder cooperation.

2013: The 2nd International One Health Congress is held in conjunction with the Prince Mahidol Award Conference

The 2nd International One Health Congress was held in conjunction with the Prince Mahidol Award Conference. With more than 1,000 attendees from over 70 countries, it was the largest One Health conference to date. The conference encouraged collaboration across disciplines to promote effective policy development related to human, animal and environmental health.

Facilitator Notes - Definitions of Eco-Health, Ecosystem Health, Global Health, One Health and Environmental Health

Ecological Health (Eco-Health)

- The Eco-Health approach focuses on human beings within their environment. It recognizes that there are links between humans and their biophysical, social,

and economic environments, and that these links are reflected in a population's state of health. (International Development Research Centre)

- The mission of EcoHealth is for sustainable health of people, wildlife and ecosystems by promoting discovery, and understanding.
- Eco-Health Alliance works at the intersection of ecosystem, animal and human health through local conservation programs and develops global health solutions to emerging diseases. It is an international organization of scientists dedicated to the conservation of biodiversity. EcoHealth Alliance focuses efforts on innovative research, education and training, and accessibility to international conservation partners.

Environmental Health

- Environmental health is concerned with all aspects of the natural and built environment that may affect human health. The field of environmental health is related to environmental science, and public health, as it is concerned with environmental factors that affect human health.
- Environmental health addresses all the physical, chemical and biological factors external to a person and all the related factors impacting behaviours. It encompasses the assessment and control of those environmental factors that affect health. It is targeted towards preventing disease and creating health-supportive environments.
- Environmental health is defined as those aspects of human health and disease that are determined by factors in the environment. It also refers to the theory and practice of assessing and controlling factors in the environment that can potentially affect health. This includes the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often indirect) on health and wellbeing of the broad physical, psychological, social and cultural environment.

Global Health

- Global health is the health of populations in a global context and transcends the perspectives and concerns of individual nations. Problems transcend national borders and can have a global political and economic impact. It has been defined as “the area of study, research and practice that places a priority on improving health and achieving equity in health for all people worldwide.”
- Global health is about worldwide improvement of health, reduction of disparities, and protection against global threats that disregard national borders.

One Health

- One Health is the collaborative effort of multiple disciplines working locally, nationally and globally to attain optimal health for people, animals and our environment. (Barrett and Osofsky)
- One Health seeks to promote, improve and protect the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians, other scientific health and environmental professionals and by promoting strengths in leadership and management to achieve these goals.
- In 2008, the FAO, OIE, WHO and UNICEF, along with the World Bank and UNSIC, produced a strategic document entitled “Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface.” <http://www.oie.int/doc/ged/D6296.PDF>

The One Health Approach:

- Recognizes the interdependence of, and seeks to improve human, animal and ecosystem health through communication and collaboration.
- Needs to promote feasible solutions, such as improving surveillance and response for emerging infectious diseases while improving the broader approach.
- Emphasizes community participation and development of community capacity.
- Recognizes that understanding ecosystems as an essential part of OH approach.
- Recognizes OH as being a major component of food security and safety.

The 12 Manhattan Principles

The document stems from a meeting held in the USA in September 2004, hosted by the Wildlife Conservation Society. It brought experts in various disciplines from around the world together to discuss problems arising from the circulation of diseases between humans, domestic animals and wildlife. The product of the meeting was the formation of the “Manhattan Principles.” These twelve principles aim to define a holistic approach in the prevention of epidemic/epizootic diseases, while maintaining the integrity of ecosystems for the benefit of mankind, animals and the environment.

The Manhattan Principles

- 1 Recognizing the link between human, domestic animal, and wildlife health, and the threat disease poses to people, their food supplies and economies, and the biodiversity essential to maintaining the healthy environments and functioning ecosystems we all require.
 - 2 Recognizing that decisions regarding land and water use have real implications for health.
 - 3 Including wildlife health science as an essential component of global disease prevention, surveillance, monitoring, control, and mitigation.
 - 4 Recognizing that human health programs can greatly contribute to conservation efforts.
 - 5 Devising adaptive, holistic, and forward-looking approaches to the prevention, surveillance, monitoring, control, and mitigation of diseases that account for the complex interconnections among species.
 - 6 Seeking opportunities to integrate biodiversity conservation perspectives and human needs when developing solutions to infectious disease threats.
 - 7 Reducing demand for and better regulating the international live wildlife and bushmeat trade, not only to protect wildlife populations but to lessen the risks of disease movement, cross-species transmission, and the development of pathogen-host relationships. The costs of this worldwide trade in terms of impacts on public health, agriculture, and conservation are enormous, and the global community must address this trade as the real threat it is to global socioeconomic security.
 - 8 Restricting the mass culling of free-ranging wildlife species for disease control to situations where there is a multidisciplinary, international scientific consensus that a wildlife population poses an urgent threat to human health, food security, and wildlife health more broadly.
 - 9 Increasing investment in the global human and animal health infrastructure commensurate with the nature of emerging and re-surfing disease threats to people, domestic animals and wildlife. Enhanced capacity for global human and animal health surveillance, and information sharing, to improve coordination of responses of key players.
- Forming collaborative relationships among governments, local people, and the private and public sectors to meet the challenges of global health and biodiversity conservation.

11 Providing resources and support for global wildlife health surveillance networks to exchange disease information with the public health and agricultural animal health communities. This means including them in early warning systems for the emergence and resurgence of threats.

12 Investing in educating and raising awareness among the world's people and in influencing the policy process to increase recognition that we must understand the relationships between health and ecosystem succeed in improving prospects for a healthier planet.

WHO MIGHT BE ON A ONE HEALTH TEAM

Learning Objective	Understand who should be involved in a One Health approach and what role they should play within a team
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Members of an OH Team Case Scenario

Introduce this activity as a brainstorming session to identify disciplines that might be represented on an OH team during an outbreak. The class will create a team to investigate and design a plan to address a dengue or malaria outbreak in Vietnam. Ask the following questions:

- o Who should be involved in addressing community and environmental/ecosystem issues (i.e deforestation, etc) during an outbreak of dengue and/or malaria?
- o What are the key disciplines that must be represented?
- o What disciplines/courses of action would you recommend if time and money were not barriers?
- o What would your ideal team look like? For each of the disciplines listed, what would their role be?
 - Why is each position critical to the success of the team?
 - Prompt a class discussion with the following questions:
 - o What tasks cannot be completed by the individuals on the list?
 - o What types of individuals have the skills and knowledge to complete these tasks?

Members of a One Health Team

Team Member	Example of Skills or Roles they Might Bring Or Play on a OH Team
Veterinarian	For animal health and food safety issues, epidemiology of animal diseases
Physician	For human health issues, epidemiology of human diseases
Nurse	For human/community health issues
Public Health Worker	For community health issues, disease prevention strategies, epidemiology, communicable disease knowledge
Epidemiologist	Epidemiology, disease control, surveillance, questionnaire design
Wildlife Support	Wildlife ecology, zoology
Traditional Healer	Community health issues, understanding of local healing methods
Local Leader/ Politician	Important for support and any action in the local community
Environmental Health Worker	Assess environmental contamination, source of disease, alteration of environmental factors
Ecologist	Connection between organisms and the relevant components of the environment
Economist	Assessing financial impact of the disease and the cost of the recommendations for control or eradication, often money and numbers are important to politicians
Communications Specialist	Risk communication, interaction with media, engaging with communities
Emergency Responder	For acute outbreaks or disasters
Laboratory Technican	For confirmation of organism causing the disease
Pharmacist	For treatment of disease
Logistician	Outbreak response logistics

ONE HEALTH CORE COMPETENCY (OHCC) DOMAINS

Learning Objective

Demonstrate an understanding of the OHCC domains, by being able to:

- Describe the OHCC domains, including their purpose and how they can be used
- Describe how the OHCC domains can be used to identify team members who should be involved in a OH team approach

Introduction to the One Health Core Competency (OHCC) Domains (Game)

In the last activity, you identified various disciplines that might be represented on an OH team investigating a dengue and/or malaria outbreak. Each member brings expertise in their field, yet they must be able to work well with others and understand what other members of the team have to offer. An OH team must know their capabilities and limitations, and be able to identify gaps in technical knowledge/skills that someone else could fulfill. To identify the competencies that each person needs for the team to operate successfully, an international group of experts from a variety of disciplines was assembled. The competencies identified by this group have been termed the **One Health Core Competency Domains or Categories**.

Class Game - One Health Core Competency Domains

***Note: The game's main purpose is to elicit the simple answers to the questions and use the completed statements as group discussion points on the composition, roles and responsibilities of One Health teams.

One Health Jeopardy Instructions

- Form three teams and come up with a One Health-related team name.
- Teams will answer questions about competencies for each of the OHCC domains
- Teams may "buzz" in once the question has been fully read aloud, but no sooner. Any team may buzz in for any question. The judge (or instructor) will acknowledge the team who buzzed in first then the team spokesperson may answer the question. He/she will have 5 seconds to answer the question after he/she is acknowledged. If he/she answers correctly and in time, the team will

get the points listed. If he/she answers incorrectly or after 5 seconds, the team will LOSE the points listed.

- When a team answers incorrectly or after 5 seconds, the remaining teams may buzz in once the first team is told their answer is wrong or after the judge says 5 seconds is over.
- The team that correctly answers the question gets to pick the next category and point value.
- Once all the questions with points are done, you will play "Final Jeopardy." (Calculate total team points now.) There is one question for Final Jeopardy related to the overall OHCC domains. Before the question is revealed, each team will need to choose how many of their points they want to wager on this question (announce each team's points). They can wager as little as 0 points or as much as their total amount of points, but no more. Each team needs to write down their wager and hand it to the judge.
- The Final Jeopardy question will be revealed. The teams will have 60 seconds to write down their answers.

The questions of categories are listed below

Question and Answer Key for Jeopardy

Management

Question 1: Team members should be able to overcome _____, solve problems, and course-correct during the initiative and evaluate and share learning post-initiative.

- A. Fences B. Hunger C. Boredom D. Barriers

Answer 1: D

Question 2: Team members should be able to _____ resource needs for a One Health intervention (prevention, surveillance or outbreak).

- A. Assess B. Beg for C. Loan D. Dream of

Answer 2: A

Question 3: Team members should be able to understand their roles and _____ on a One Health team.

- A. Dreams B. Responsibilities C. Homework D. Salaries

Answer 3: B

Question 4: Team members should be able to _____ work plans to plan and monitor a process in order to achieve results.

- A. Develop B. Print C. Translate D. Imagine

Answer 4: A

Question 5: Team members should be able to understand how to monitor and _____ a response effort to a zoonotic disease outbreak.

- A. Enjoy B. Evaluate C. Cancel D. Fund

Answer 5: B

Question 6: Team members should be able to ensure the _____ and wellbeing of the One Health team.

- A. Amusement B. Demise C. Safety D. Relaxation

Answer 6: C

Question 7: Team members should be able to ensure _____, procedures and systems are in place to guide and support the One Health initiative.

- A. Rewards B. Obstacles C. Policies D. Workshops

Answer 7: C

Cultures, Beliefs, Values and Ethics

Question 1: Team members should be able to distinguish between different existing belief systems and spiritual practices among various _____ groups involved in outbreak areas.

- A. Species B. Ethnic C. Musical D. Dance

Answer 1: B

Question 2: Team members should demonstrate a willingness to change _____, perceptions or opinions based on new information or situations.

- A. Clothes B. Languages C. Jobs D. Ideas

Answer 2: D

Question 3: Team members should actively seek to _____ others.

- A. Gain from B. Learn from C. Take advantage of D. Outsmart

Answer 3: B

Question 4: Team members should be able to generate _____ among the community within One Health interventions.

- A. Trust B. Income C. Standards D. Uniformity

Answer 4: A

Question 5: Team members should be able to identify and _____ local wisdom, norms and culture about illness, health care and wellness.

- A. Change B. Ignore C. Influence D. Interpret

Answer 5: D

Collaboration and Partnership

Question 1: Team members should share vision, _____, responsibility, accountability and credit among collaborators.

- A. Power B. Meals C. Money D. Emails

Answer 1: A

Question 2: Team members should be able to ensure _____ is accessible to everyone and keep stakeholders informed through a variety of communication strategies.

- A. Facebook B. Internet C. A computer D. Information

Answer 2: D

Question 3: Team members should be able to recognize and _____ barriers to collaboration and progress.

- A. Build B. Encourage C. Remove D. Embrace

Answer 3: C

Question 4: Team members should promote the _____ of representatives of diverse constituencies across human, animal, environmental health and other relevant disciplines.

- A. Exclusion B. Inclusion C. Duplication D. Replacement

Answer 4: B

Question 5: Team members should be able to _____ and demonstrate respect for others' expertise, professional abilities, perspectives and cultures.

- A. Recognize B. Record C. Remember D. Rank

Answer 5: A

Leadership

Question 1: Team members should be able to create and communicate a shared _____ across sectors and disciplines.

- A. Website B. Tweet C. Vision D. Budget

Answer 1: C

Question 2: Team members should be able to make _____ decisions in order to move forward after consensus-building by a multidisciplinary team.

- A. Rushed B. Minor C. Financial D. Informed

Answer 2: D

Question 3: Team members should be able to motivate the outbreak team to _____ to achieve the agreed-upon goals of the team.

- A. Argue B. Doubt each other C. Work together D. Relax

Answer 3: C

Question 4: Team members should be able to formulate objectives, _____, and strategies for One Health teams and organizations.

- A. Priorities B. Formulas C. Games D. Barriers

Answer 4: A

Question 5: Team members should be able to facilitate _____, mutual trust, team function and commitment throughout an outbreak response.

- A. Conflict B. Cooperation C. Payments D. Rewards

Answer 5: B

Communication

Question 1: Team members should be able to use basic information technology (IT) methods and demonstrate _____ to learn new technologies as needed.

- A. Anxiety B. Boredom C. Fear D. Willingness

Answer 1: D

Question 2: Team members should be competent at verbal, non-verbal and _____ communication.

- A. Tri-lingual B. Silent C. Written D. Twitter

Answer 2: C

Question 3: Team members should be able to collect, manage, organize and _____ data to ensure that each person in the team has the information they need to do their job.

- A. Report B. Hide C. Protect D. Delete

Answer 3: A

Question 4: Team members should be able to listen to others and communicate in a manner that fosters _____ communication to support and enable a One Health response.

- A. Open B. Closed C. Hostile D. Uniform

Answer 4: A

Question 5: Team members should be able to demonstrate the ability to communicate _____ to multiple audiences.

- A. Fear B. Risk C. Rumors D. Pressure

Answer 5: B

Systems Thinking

Question 1: Team members should be able to identify _____ component(s) in a system.

- A. Zero B. Half C. One D. Several

Answer: D

Question 2: Team members should be able to determine the _____ between components in a system.

- A. Diseases B. Relationships C. Persons D. Responses

Answer: B

Question 3: Team members should be able to _____ information across disciplines and sectors within a One Health framework.

- A. Generate B. Remove C. Integrate D. Manipulate

Answer 4: C

Question 4: Team members should be able to _____ and _____ systems maps to better understand One Health problems.

- A. Create/analyze B. Destroy/ignore C. Copy/paste D. Prioritize/cancel

Answer 4: A

Question 5: Team members should be able to provide an example of _____ consequences on a portion of a One Health system produced by changes to another part of that system.

- A. Minor B. Insignificant C. Intended D. Unintended

Answer 5: D

Question 6: One Health systems need feedback mechanisms to _____ interventions.

- A. Improve B. Reduce C. Stop D. Restart

Answer 4: A

MODULE 2

FUNDAMENTALS OF INFECTIOUS DISEASE

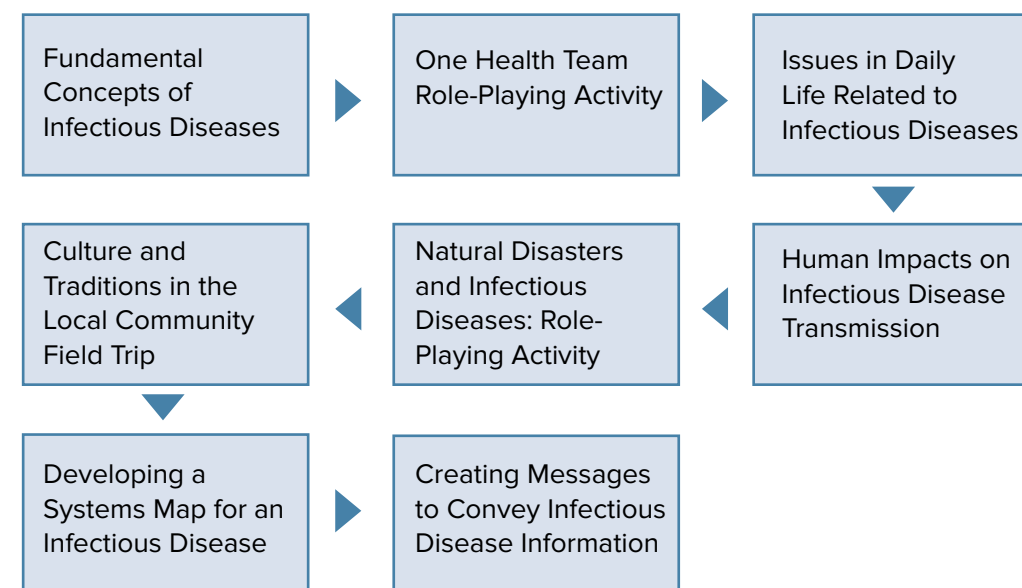
Course Overview

Module Description and Learning Outcomes

This module provides an understanding of the basic principles of infectious diseases in the context of OH. The modules uses an OH approach to examine various important zoonotic infectious diseases of animals and humans, while helping students understand the fundamentals of infectious disease ecology and their impacts on humans, animals, and the environment. Key outcomes of the module are the ability to:

- Describe and interpret fundamental concepts of selected infectious diseases and how they affect human, animal and environmental health
- Understand how culture and tradition influence infectious diseases
- Use systems thinking in the context of infectious diseases

Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Describe the fundamental concepts of Infectious Diseases	- Describe the ethology and epidemiology of infectious diseases - Compare the pathology, pathogenesis, clinical manifestations and treatments of various infectious disease - Apply fundamental concepts to develop an OH approach in the context of infectious disease control
Competency #2	Learning Objectives to Develop Competency
Interpret fundamentals of infectious diseases and daily impacts	Use fundamental concepts of infectious disease to be able to identify and classify the types of infectious diseases endemic in a given area in humans and animals.
Competency #3	Learning Objectives to Develop Competency
Identify infectious disease issues relating to culture and traditional practices	Understand problems associated with culture, beliefs, values, and ethics that are related to infectious disease by being able to: - Describe traditional livestock production practices and livestock-transmitted infectious diseases - Understand how local cultural practices can influence the emergence and transmission of diseases
Competency #4	Learning Objectives to Develop Competency
Integrate the concepts of infectious disease	Understand systems thinking in relation to infectious diseases and use it to describe the fundamental concepts and how they are related. Students will develop a transmission diagram that incorporates components of the system for an infectious disease.
Competency #5	Learning Objectives to Develop Competency
Apply various communication strategies	Understand how to use methods to convey information about an infectious disease issues by being able to: - Effectively communication information about an infectious disease to professionals and laypersons - Describe the history, current epidemiology, pathology, treatment, control and prevention

FUNDAMENTAL CONCEPTS OF INFECTIOUS DISEASE

Learning Objective

- Describe the ethology and epidemiology of important infectious diseases
- Compare the pathology, pathogenesis, clinical manifestations and treatments of various infectious diseases
- Apply fundamental concepts useful to develop a OH approach to the control and prevention of an infectious disease

Fundamentals of Infectious Disease Module Competencies

- Describe the fundamental concepts of infectious diseases
- Interpret infectious diseases and its impact on daily life
- Identify problems relating to culture and traditional practices (i.e. livestock, sanitation)
- Integrate the respective elements of fundamental concepts of infectious disease

Overview of Key Terms and Concepts

- Introduction to infectious diseases of medical and veterinary importance and key concepts
- Biological classification of the causative agents
- Common nomenclatures
- Concepts of host-pathogen relationships
- Specific and non-specific clinical manifestations
- Cross re-activity between selected infectious agents

Identifying Infectious Organisms - Practical Laboratory Session

This activity will allow students to practice laboratory techniques and include the handling of specimens for diagnosis of infectious disease. This can be adapted to the time available or left out if resources are not available, in which case we recommend that the facilitator simply discuss and show pictures for each of the laboratory topics. You will give students unprocessed clinical specimens and permanent slides to identify organisms and to perform basic diagnostic techniques. Materials will include feces/urine/blood OR permanent slides/pictures.

Practical Session 1 : Direct Fecal Examinations

This session will introduce the basic diagnostic techniques for gastrointestinal parasitic infections such as helminths (nematohelminths and platyhelminths) and protozoan parasites (amoeba, *Giardia*, *Cryptosporidium*, *Balantidium*). Students are expected to perform direct fecal examination of human and animal fecal specimens. They are expected to recognize the gastrointestinal parasites and differentiate from fecal debris. The students are also provided with permanent slides and pictures for reference.

References:

- Fecal Exam Procedures, Companion Animal Parasite Council (CAPC). <http://www.capcvet.org/resource-library/fecal-exam-procedures1>.
- Laboratory Identification of Parasitic Diseases of Public Health Concern <http://www.cdc.gov/dpdx/>.

Practical Session 2: Thin and Thick Blood Smears

This session will introduce the basic diagnostic techniques used for blood parasitic infections such as malaria, trypanosomes and filarial worms. Students will be provided with human and animal blood samples and will perform thin and thick blood film procedures. The slides are subsequently stained using Giemsa stain. Students are expected to recognize the following components of blood:

- Red blood cells (i.e., erythrocytes)
- White blood cells (including lymphocytes, neutrophils, eosinophils and monocytes)

References:

- Diagnostic Procedures, U.S. Centers for Disease Control and Prevention. <http://www.cdc.gov/dpdx/diagnosticProcedures/>.
- Laboratory Identification of Parasitic Diseases of Public Health Concern. <http://www.cdc.gov/dpdx/>.

Practical Session 3: Bacterial Culture and Staining

This will introduce basic diagnostic procedures for bacterial infections. Clinical specimens such as feces, urine and sputum will be distributed with pre-prepared agar plates. Students will perform a bacterial culture from these clinical specimens and are expected to introduce basic principles of aseptic technique and to safe procedures for handling clinical samples in the lab. At the end of the session, students are required to perform basic bacterial staining, such as Gram and Ziehl–Neelsen staining, using prepared cultures to help differentiate various types of bacterial pathogens.

References:

- Procedure – Bacteria Morphology. Introduction to the Microbiology Laboratory, University of Wyoming website (Lab Manual). http://www.uwyo.edu/molb2210_lab/labmanual/lab_03.pdf.

ONE HEALTH TEAM ROLE-PLAYING ACTIVITY

Learning Objective

- Describe how various stakeholders are involved in an infectious disease outbreak and how they may be impacted by the disease
- Use a role-play scenario to demonstrate how to communicate with various stakeholders following an outbreak of a new infectious disease
- Design a One Health approach for health promotion related to infectious diseases at the community level

Components of Disease Management and Stakeholders

Review One Health concepts and history, the components of human and animal disease management agencies and the stakeholders involved. See the overview includes:

- The One Health approach and history
- Overview of human health and animal health management systems
- International health agencies
- Human health management systems and animal health management systems
- Why a One Health approach involving multiple stakeholders is important

Stakeholder Role Play

Assign students a role as one of the stakeholders listed and guide them through a role-play activity surrounding a zoonotic disease outbreak that could occur in Vietnam. In this scenario, there is an interaction among the local community with health agencies. Key roles include:

Stakeholders from Control Agencies	• Veterinarian from World Organization for Animal Health • Public health expert from Centers for Disease Control and Prevention • International health agency staff from World Health Organization • Government officials – national and local (e.g., district) level
Stakeholders from the Local Community	• Farmers and agricultural extension officers • Local doctors, healthcare practitioners, nurses, etc. at a health clinic • Local veterinarian practitioners • Community members (shop owners, customers, etc.) • Slaughterhouse workers

Give students the following instructions: *Imagine an outbreak of a novel (“emerging”) zoonotic infectious disease. You know that this disease is causing high fever, headache and muscle aches in humans, and leads to neurologic disease, causing death in 10% of human patients as reported by hospitals/clinics. You also have reports of undiagnosed illness in local cattle, which have not yet been investigated. Farmers have sent sick animals to the slaughterhouse before death. People in the village have also noticed an apparent increase in mortality of birds around town, but it is not known if this is related to the human cases. The area has begun clearing existing forest areas to make room for farmland. You will play the role of your assigned stakeholder to investigate this outbreak of an unknown infectious disease.*

The stakeholders need to decide how to work as an OH team and define every role. They develop a plan to investigate and respond a new outbreak. Have the students consider the following:

- What activities could be implemented in the community by the stakeholders to respond to the disease?
- How do you think you are involved in transmission of this disease?
- How do you solve issues related to your role?
- What is each stakeholder’s responsibility?

- How should members of health agencies (national or international) work with local health officials and university experts?
- How should they communicate with the local community?
- What are the challenges and obstacles stakeholders face when addressing the emergence of the new disease?
- How can all members feel important on an OH team improve community health?

ISSUES IN DAILY LIFE RELATED TO INFECTIOUS DISEASES	
Learning Objective	• Give examples of infectious diseases in humans and animals • Explain their effect on the daily lives of the affected populations

Infectious Disease and Daily Life

Have students complete personal logs (for two days) to record daily activities and identify events in their lives in relation to infectious disease transmission. Students should record, at a minimum, the time each activity occurred, a brief description, and how this could serve as an opportunity for disease transmission. After the students have completed their personal logs, deliver the presentation on Infectious Diseases. This lecture will provide a short overview of how normal activities that people engage in during daily life can result in the transmission and outbreak of infectious diseases.

Individual Activities	• Food preparation • Eating and serving food • Care of pets • Interaction with livestock, feral animals, wildlife • Personal hygiene • Interaction with other people
Family Activities	• Sharing meals and food preparation • Care of children and elders • Cleaning • Celebrations
Community Activities	• Food markets • Restaurants and catered events • Gatherings – religious, celebrations • School, lectures

The class should discuss the activities at each level that are most likely to be involved in the transmission of an infectious disease. Make sure the students focus on the following topics:

Food and Eating	• Safe food preparation and storage • Clean and portable water • Purchasing of food - grocery and/or market
Cleaning and Hygiene	• Child care • Personal hygiene/WASH practices • Household cleaning
Animals	• Livestock and husbandry practices • Wildlife roaming in the community • Household pets
Other Disease Prevention Methods	• Vaccination practices • Role of children, elders, animals, etc.

Infectious Disease and Daily Life: Interview

Students should choose an individual from the local community to interview. This will serve as a baseline but encourage them to ask other questions, if appropriate, regarding infectious diseases. Also have students inquiry about local interactions with animals, such as livestock, pets, and wildlife. They should ask questions in relation to: *cooking/eating, hygiene/WASH practices, celebrations, religions practices, cleaning, etc.*

HUMAN IMPACTS ON INFECTIOUS DISEASE TRANSMISSION	
Learning Objective	• Give examples of infectious disease in humans and animals, and explain their effects on the daily lives of affected populations • Understand local cultural practices influence the emergence and transmission of an infectious disease • Analyze an infectious disease problem and identify solutions to conflicts with culture and traditional practices

This module focuses on how humans can drive the emergence of infectious diseases, as well as how diseases can impact humans on a local and global scale. Lecture on the different human factors that can be involved in infectious disease transmission. Key concepts include:

- How do humans alter the ecosystem, resulting in the emergence of disease at the local or global levels?
- Effects of infectious diseases on an individual, local and global community scale

Ask each group to discuss the following questions:

- What is meant by the term 'human ecology'?
- What are some local cultural, traditional or livestock husbandry practices that result in infectious disease?
- How do human activities result in a local change and land use, on a global scale?
- What are some human impacts that can result in disease emergence?
- How can we advocate for a OH approach to deal with human influenced impacts on disease transmission?
- How can we include land usage, culture, traditions and livestock practices?

CULTURE AND TRADITIONS IN THE LOCAL COMMUNITY	
Learning Objective	• Classify infectious diseases influencing human and animal health • Describe traditional livestock production practices and disease transmission • Understand how local cultural practices influence the emergence and transmission of an infectious disease • Convey information about an infectious diseases in written forms.

Prior to class have the students read the following articles that relate to culture and beliefs.

- Website – “Traditional Asian Health Beliefs and Healing Practices” <http://www.dimensionsofculture.com/2010/10/traditional-asian-health-beliefs-healing-practices/>

Since the goal of this activity is to examine culture and traditions, select a site prior to. Request any required permission from local authorities or the university and schedule time for the trip in advance. Check with your local Human Ethics Committee to ensure the planned activities are acceptable! Consider locations in Vietnam that will offer students the ability to observe practices and human-animal interactions. Examples include:

- A local market in a town or city
- A natural area (park or reserve)
- A traditional farm
- A temple or other religious site
- University campus

Culture and Infectious Disease Transmission

Encourage students to discuss aspects of culture, beliefs, values, ethics and religion in relation to the spread of an infectious disease. They should discuss culture, traditional practices, beliefs, ethical issues, and values that pertain to Vietnamese communities.

Field Trip Preparation

Share specific details of the local community that you are about to visit and the expectations for the field trip. Review the information outlined below:

The Selected Community

- Details about the population in the local community that you will visit, such as demographics, cultural norms, medical services and sites, most common jobs
- **Example:** If you are visiting a temple, discuss the religion and its influence on culture and beliefs in relation to infectious diseases.
- Types of animals present in the environment, the location, and if they are considered as pets, wildlife, livestock or religious figures.
- **Example:** Discuss the animals that are likely to be observed at the temple and their public perception.
- Any known infectious diseases present
- **Example:** As the leader, you try to meet with a local medical official and/or traditional healers to identify common diseases

Field Trip Expectations

- Dress appropriately (cover shoulders and knees!) and demonstrate respect
- Ask for permission IF you take photos and collect their information (name, age, role, etc.)
- Demonstrate interest in the community and their practices
- Do NOT project assumptions, or pre-conceived notions OR impose your own ideas or beliefs
- Do NOT engage in excessive informal communication with classmates during the trip (laughing, talking about subjects other than the field trip, using phones, text messaging, etc. may be inappropriate)
- Identify your own privilege and the ways in which it might influence your interactions with community members

Field Trip Task

The objective of this field trip is to observe cultural and traditional practices that can result in infectious disease transmission. Students should walk around the community and observe facilities and/or practices relating to: *housing, personal hygiene, sanitation, the environment, and housing situation*. They should note what they see and answer the following questions:

- What population are you observing? What are observed cultural practices?
- What animals are present? Are they house pets, farm animals/livestock, wildlife, etc?
- What practices are used and treatment of animals?
- What is the ecosystem in and around the community?
- What factors related to the humans, animals and their environment that impact infectious disease transmission?
- How have infectious diseases influenced local culture or practices?
- What are common health issues in the community?
- What is the direct impact of infectious diseases on the families? The indirect impact?
- What is the impact when an individual contracts an infectious disease?

Debrief Questions

- What is meant by culture and traditional practices? (Describe culture and beliefs)
- What are traditional practices observed in this community? (Focus on gender roles)
- What were the observations of culture that can impact the transmission of diseases?
- What are examples of traditional livestock production? Did you observe any of these?
- How could these practices impact infectious disease transmission?

DEVELOPING SYSTEMS MAPS FOR INFECTIOUS DISEASES

Learning Objective

- Develop a transmission diagram that incorporates all components of the system for an infectious disease, including downstream effects.
- Describe how various stakeholders are involved and how they may be impacted by the disease
- Describe the fundamental concepts for an infectious disease and their relation

Using Systems Thinking to Map Infectious Diseases

This activity will introduce the concept of systems thinking and create a systems map for an infectious disease. To guide discussion, the facilitator can ask:

- What is meant by systems thinking or systems approach?
- How does systems thinking relate to One Health?
- Why is systems thinking important for a One Health approach?

Use the food and poverty systems map images as examples to demonstrate elements of a systems map, including:

- The use of color to indicate different parts of a system.
- Placing the focal idea or problem in the center of the map.
- Using arrows to indicate direction of effects.

See the example below:



Offer thoughts on how students might design a systems map, differentiating related areas with colour, to display the components of a system for an infectious disease, include:

- Place the central idea or concept in the middle.
- Use connecting lines and arrows to show interrelated parts of the system.
- Organize the map into related areas (could be human, animal, environment, etc.)

Creating a Systems Map for Avian Influenza

After covering the main elements of a systems map and the core concepts, develop a systems map for diseases in Vietnam. Ask students to complete the systems map by:

- Integrating all parts of the system for avian influenza.
- Developing a way to show impacts on parts of the system and the downstream effects.

- Developing a way to show intervention points where the disease can be controlled.
- Then finalize their written map into a computer program for a digital map to save and share.

Have each group display their systems map. Have them note similarities and differences. Comment on the importance of systems thinking for infectious disease management, and its utility in identifying all related factors, intervention points and unintentional effects.

CREATING MESSAGES TO CONVEY INFECTIOUS DISEASE INFORMATION

Learning Objective

- Convey information about an infectious disease to professionals and the general public in written communication forms.
- Describe the history, current epidemiology, pathology, treatment, control, and prevention of an infectious disease

Communicating Infectious Disease Information

Give a presentation on the key terms and concepts of communication infectious disease information. The following topics include:

- Role of communication in the management of infectious diseases
 - Sharing of information
 - Collaboration
 - Practical tools for the proper management
- Content of the message needs to be:
 - Accurate, honest information
 - Easy to understand
 - Timely
- Policy of communication
 - Approval of content and ensure accuracy of information

Demonstrate the websites of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) and how to access information on infectious diseases. Make sure to include news reports from Vietnam, and try to make them specific to the local community you are teaching in. Both agencies provide basic information on a number of zoonotic diseases and news briefs are available. ProMed can also be an alternative website used. Explore the following questions with the large group:

- How do these international organizations report on disease news?
- What elements of information do they include in their reports?
- Why are the messages effective?

Divide students into groups and have them create their own messages aimed at the community to convey information about infectious disease(s). They can select a disease from the FAO or WHO websites, or a current outbreak appropriate for the local area in Vietnam. Have the groups practice writing messages to describe an emerging infectious disease, including the disease history, current epidemiology/pathology, treatment, control and prevention. Once they have completed that task, students should create an oral presentation, including:

- General information about a disease outbreak, the etiological agent, background, etc
- Impact of this disease on human and animal health (include economic impact)
- Important points about the epidemiology, symptoms and pathology related to the disease
- Effective prevention, control measures, and treatment procedures
- Appropriate community activities to mitigate the effects of the disease

Each group will present their message to the class and have class critique the message. Ensure feedback is offered. The communication should be evaluated in terms of:

- Appropriate language for the audience.
- Completeness of information.
- Accuracy of information.
- Recommendations made for prevention.
- Interesting and engaging communication.

MODULE 3

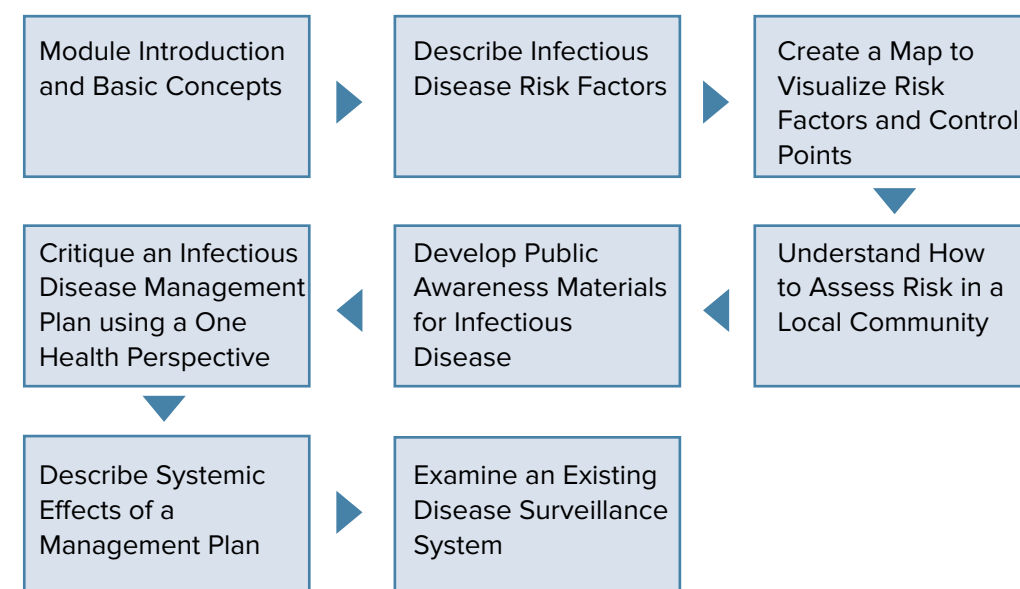
INFECTIOUS DISEASE MANAGEMENT

Course Overview

Module Description and Learning Outcomes

Infectious disease management focuses on thinking about the problem of diseases and strategizing to minimize its impact on the global economy and public health. This module fosters a better understanding of infectious disease management from an OH perspective at the individual and societal levels. Educational topics reviewed in this module include the classical “epidemiological triad,” representing the important interrelationships among three key factors: the infected host, the etiological agent, and the environment). We also view infectious disease management and on emerging zoonotic diseases, disease surveillance systems, outbreak detection, health promotion and health education, disease prevention and control, and treatment and rehabilitation.

Learning Map



Competency #1	Learning Objectives to Develop Competency
Identify and analyze the risk factors associated with illness during an infectious disease outbreak or epidemic	Understand how to identify factors associated with an increased risk of an infectious disease during an outbreak and the impact they have on OH program, by: • Identify the principles of infectious disease and factors associated with a increased risk • Understand the modes of infectious disease transmission • Describing examples of risk factors with various zoonotic diseases • Analyzing the potential impact of risk factors on the population during a disease outbreak
Competency #2	Learning Objectives to Develop Competency
Design an infectious disease management plan	Create a OH protocol to manage a specific infectious disease outbreak by: • Understanding diagnostic tests and quarantine concepts • Developing an effective infectious disease management plan • Strengthening disease prevention activities, including public awareness plans
Competency #3	Learning Objectives to Develop Competency
Evaluate the effectiveness of OH actions in infectious disease management	Evaluate disease control activities and strategies of programs, and conduct situational assessments for effective outbreak response by being able to: • Understand what measures are useful to evaluate a management plan • Evaluate and critique an infectious disease eradication plan • Describe advantages and disadvantages of disease control strategies

Competency #4	Learning Objectives to Develop Competency
Design a disease surveillance and monitoring system	Developing new strategies for infectious disease surveillance by: • Understanding core concepts in surveillance methods • Describing components and methods for evaluating surveillance system • Creating a plan for collection of disease surveillance data • Describing the data collection procedures and techniques • Performing quantitative and qualitative data analysis

INTRODUCTION AND BASIC CONCEPTS	
Learning Objective	• Understand the principles of risk during an infectious disease outbreak • Understand various possible modes of disease transmission and their influence on designing effective disease control measures • Describe possible risk factors for zoonotic diseases

Prior to the class, have students read the article below and come prepared to discuss them in class:

- “Interventions for Avian Influenza: A (H5N1) Risk Management in Live Bird Market Networks (Fournie et al. 2013)
- Avian Influenza Fact Sheet (WHO 2011)

Basic Terms and Concepts of Infectious Disease Management

Provide the basic terminology and concepts important in infectious disease management. In order to understand how to effectively manage infectious diseases, students must understand what etiological agent is responsible for the outbreak, why individual humans or animals are at risk for becoming infected by a particular agent and the fundamental principles of infectious disease management.

Transmission Dynamics

- Infectious diseases are those caused by bacteria, viruses, parasites, fungi or prions.

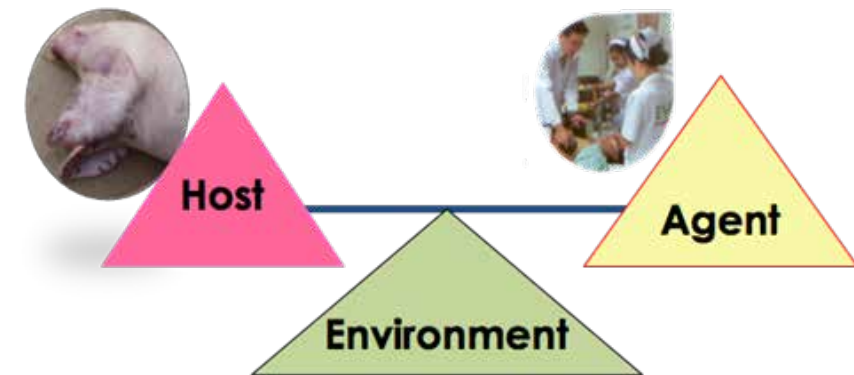
- Routes of Transmission – Individuals become infected by contact with:
 - Blood or bodily fluids, secretions or cough of an infected person or animal (person-to-person, or animal contact).
 - Contaminated object (fomite) or surface (e.g., in hospital).
 - Contaminated food or water (foodborne or waterborne disease).
 - A biological vector, such as an insect, ticks, bats, rats, dogs, birds, etc.
 - An environmental contaminant or toxin.
- Risk of infectious diseases is mediated by multiple factors, including:
 - Intrinsic factors (host susceptibility): genetic, nutritional status, immunodeficiency, other pre-existing disease(s), age group (e.g., neonates, infants, elderly)
 - Extrinsic factors (exposure risks): outside factors that influence a host (e.g., environmental exposure)
 - Exposure to infected individuals, contaminated objects, contaminated food or water, or transmission vectors
 - Infected host species (proximity, contact with)
 - Other high risk exposure: occupational, environmental, natural disaster or climatic conditions (flooding, drought)

Infectious Disease Management Fundamentals

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

- 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?
- What are possible prevention strategies?
 - Lower the risk of infection by implementing interventions that limit contact between susceptible hosts and infectious agent.
 - Change high-risk behavior(s) through health education.
- Quickly identify, properly treat and, where appropriate, isolate newly infected cases (i.e., persons or animals with the disease of interest).
- How to evaluate a plan, including positive and negative consequences.

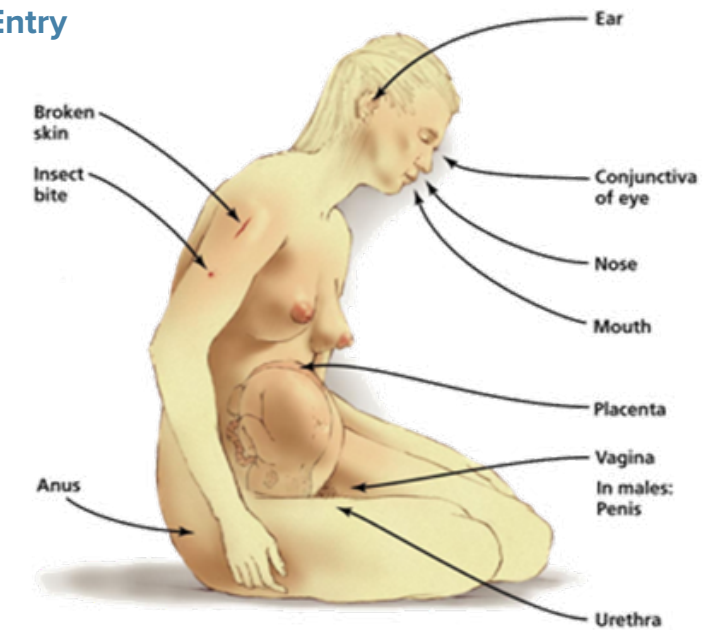
Epidemiological Triad



Ask students to review the pre-class reading assignment and answer the questions below.

- What species are infected by avian influenza H5N1?
- What is the role of live bird markets in the transmission of H5N1, and why were they a focus of this investigation?
- What is the difference between susceptibility and infectiousness in terms of the live bird markets studied in this paper?
- What are the management recommendations for H5N1 in live bird markets?

Portals of Entry



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DESCRIBING POSSIBLE RISK FACTORS FOR AN INFECTIOUS DISEASE DURING AN OUTBREAK SCENARIO

Learning Objective	Identifying and analyze risk factors associated with infection during a disease outbreak or epidemic
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Prior to this session, ask students to read the following documents and come prepared to discuss them in class:

- “The Human Risk Factor: Rabies” (Texas A&M University)
- “Rabies and Rabies-Related Lyssaviruses” (Center for Food Security & Public Health, Iowa State University)

Rabies Outbreak Case Scenario

Open the session with a brief class discussion on the pre-class readings about rabies transmission and risk factors. To guide the discussion, ask the following questions:

- How is rabies transmitted to humans?
- What are the symptoms and outcome of rabies infection in humans?
- Which animal species can be infected with rabies?
- Which animal species transmit rabies to humans?
- What risk factors increase the risk of rabies infection to domestic animals? To humans?

Read the following rabies case scenario out loud to the students

Rabies Case Scenario

Observing that almost a year had passed since the last rabies case was reported on the island of Bali, Indonesia, the provincial administration expressed confidence that the island would soon be completely free of rabies. To be officially categorized as “rabies free,” an area must have two consecutive years without a single occurrence of rabies in either animals or humans. “It could be possible that Bali will be free of rabies because the last rabies case found in a human was last April,” the head of the Bali Health Agency, I Ketut Suarjaya, was quoted as saying.



Sanglah Hospital reported that, overall, only about 2 percent of dog bite cases developed rabies. Disease surveillance data showed that in 2008 a total of four persons with rabies infection (“cases”) were reported, compared to 48 cases reported during 2009 and 82 cases during 2010. Following implementation of a mass dog vaccination campaign, a substantial reduction in the number of persons with rabies infection (“cases”) was observed, a total of 24 in 2011, and by 2012, only 8 human cases were reported.

Meanwhile, Sanglah Hospital’s Secretary of the Rabies Mitigation Team, Dr. Ken Wiransadhi, acknowledged that rabies vaccine distribution had become more selective recently. Distribution was prioritized for multiple and deep wounds caused by stray dogs. Free-of-charge rabies inoculations are provided at state-owned hospitals only for humans with dog bite wounds in vital organs, including the head, face, fingers and genitalia. The vaccine can also be purchased at medical clinics. Last week, the Bali Health Agency stocked up with 5,000 vials of anti-rabies vaccine, an amount estimated to be sufficient for approximately 1,250 people during the next few months. Some 750 vials have been distributed to rabies centers in regencies.

Over the past several years, Bali has attempted to control the spread of rabies through a mass dog vaccination program and sterilization. The head of Bali’s Husbandry Agency, Putu Sumantra, recently announced that stage four of the mass dog vaccination campaign, which will include vaccine for all 300,000 dogs on Bali, would start mid-April and run through June this year. According to agency records, the latest mass rabies vaccination resulted in the immunization of approximately 80 percent of the dog population on the island (approximately 250,000 dogs), while 500 more had been sterilized. The Balinese administration remains confident that the island will be able to achieve its target of being a “rabies-free” area by 2015.

Residents are expected to bring their dogs to receive this free vaccination. But since the rabies outbreak began on the island in 2008, some experts have maintained that there has not been much improvement in behaviors related to rabies prevention strategies among pet owners in Balinese communities. “There’s only been a small change in attitude in the way they care for their dogs. The dogs are still let loose to look for food on the streets,” chairman of the Bali chapter of the Indonesian Association of Veterinarians, Gusti Ngurah Mahardika, said recently. Mahardika stated it was urgent for Balinese communities to properly care for their dogs by feeding them at home and vaccinating them regularly because, “Dogs do bite. Thus, preventing them from contracting rabies is most important.” The virologist further stated that the main methods of prevention include the proper care and regular vaccination for dogs, as well as increasing public awareness about the need to have proper treatment, including a rabies shot, after being bitten by a dog.

The spokesperson for the National Commission on Zoonoses, said that the main challenge to free the island from rabies was maintaining the commitment and participation of both individuals and communities. "If an outbreak occurs for several years, it is crucial to maintain the commitment of local people to participate in the eradication efforts." He said the 2015 target for being rabies-free was reasonable, considering that the administration had implemented efforts to accomplish this since the first case of rabies was found in Jimbaran during 2008.

Ask students to form small groups to discuss and analyze the rabies scenario. They should answer the following questions:

- How serious is the rabies outbreak?
- What are the most significant risk factors in the rabies outbreak?
- Who is responsible for monitoring risk factors for this disease?
- What is a major concern in a rabies outbreak situation?
- What would you do to mitigate risk factors for rabies during an outbreak?
- What is your group's plan of action?

After reviewing questions, each group should identify three risk factors or behaviours associated with infection and discuss how these factors led to an increased disease risk in the scenario. The groups should propose one or more method(s) to reduce the outbreak. Have each group present briefly on the outcomes of their discussion and review any similarities or differences.

Have students also reflect on the impact of rabies in Northern provinces in Vietnam, as this is a prominent OH issue!

CREATING A CONCEPTUAL MODEL TO VISUALIZE RISK FACTORS AND CONTROL POINTS	
Learning Objective	• Identifying disease transmission and design effective control measures • Describe zoonotic disease risk factors, prevention and public awareness • Create a map to visualize risk factors, modes of transmission and risk control

Disease Prevention Strategies

Give the short lecture on prevention strategies. See the outline below for an overview of levels of preventive strategies below:

Levels of Preventive Strategies

- **Primary prevention**, i.e., specific practices to prevent disease transmission to susceptible individuals, person-person, or from animal to humans; e.g., vaccination, health promotion, etc.
- **Secondary prevention**, e.g., the prevention of recurrences or exacerbations of a disease already diagnosed
- **Tertiary prevention**, e.g., supportive and rehabilitative services to minimize morbidity and maximize quality of life after a long-term disease or injury is present

In preparation for the next assignment, show the following clips:

- The Danger of Avian Influenza from the Food and Agriculture Organization report: <http://www.youtube.com/watch?v=8RApk1t9XDo>
- A Risk-Based Approach to Avian Flu Control in Developing Countries: <http://www.youtube.com/watch?v=R9Un5fD5RIk>

In this activity, students will develop a conceptual model that diagrams the relationships among potential risk factors, the host, the infectious agent and the environment, as well as modes of transmission and management. Ask the class to think about the risk factors, transmission and control of avian influenza and list one or two responses to the following items:

- Host-related risk factors
- Virus-related risk factors
- Risk factors related to the environment
- Transmission routes
- Control or intervention points

Ask them to share their points and create a master list. Once the list is complete, the class should create a conceptual model using the master list. The goal of this conceptual model will be to identify possible risk factors for avian influenza and intervention points in the transmission cycle. Give students another opportunity to practice mapping infectious disease risk and to consider effective methods of disease control. Divide students into groups and assign them one of the following diseases:

- *Streptococcus suis*
- Rabies
- Dengue

Students should discuss the items outlined below and create a plan to control the zoonotic disease through the appropriate diagnosis, disease prevention and public awareness campaigns. They should prepare to present this information to the class through a conceptual model.

- Potential risk factors (relation to host, agent and environment)
- Mode of transmission
- Management of the disease

Streptococcus suis

Streptococcus suis is an important bacterial cause of zoonotic disease in swine (pigs) and humans. The organism may be isolated from healthy pig carriers, but reported infections among swine include arthritis, meningitis, pneumonia, septicaemia, endocarditis, abortions and abscesses. Humans at higher risk for infection include those in direct contact with pigs or raw pig products, including farmers and abattoir workers, and those with pre-existing illness resulting in immunosuppression. Human infection follows direct contact with infected pigs or raw pig products and is thought to occur through cuts or abrasions on the skin, handling infected pig material, or possibly inhalation or ingestion. In humans, *Streptococcus suis* infection may cause meningitis. Endocarditis, pneumonia, toxic shock-like syndrome and septic arthritis have also been reported.

Additional information available from the WHO Factsheet: <http://www.who.int/foodsafety/micro/strepsuis/en/>

Rabies

Rabies is a preventable zoonotic disease (i.e., a disease transmitted to humans from animals) that is caused by the rabies virus. The disease is endemic in many countries, affects mainly domestic and wild mammals, and is spread to humans through contact with infectious material, usually saliva, via bites or scratches by a rabid animal. More than 95% of human deaths occur in Asia and Africa, most often following contact with bats, dogs or carnivores with rabies infection. Once symptoms of the disease develop, rabies is nearly always fatal. WHO estimates rabies causes 60,000 human deaths per year. The high mortality of rabies highlights the importance of a global canine rabies elimination strategy through dog vaccination, and the importance of preventing infection in humans exposed to potentially rabid animals by following effective post-exposure prophylaxis protocols, including proper wound care and post-exposure vaccination.

Information from in the WHO Fact Sheet: <http://www.who.int/mediacentre/factsheets/fs099/en/>

Dengue

Dengue is a mosquito-borne viral infection found in tropical and sub-tropical regions around the world. Dengue virus exists in four serotypes (DENV 1, 2, 3 and 4). DENV transmission has increased, predominantly in urban and semi-urban areas and has

become a major international public health concern. Severe Dengue affects most Asian and Latin American countries and has become a leading cause of hospitalization and death among children. Dengue virus control strategies have focused on vector control activities and enhanced disease surveillance. No candidate vaccine has been proven effective against all four dengue fever virus serotypes. Transmission of dengue among forest monkeys has been reported in Asia and Africa, but human infection is sufficient to maintain transmission in urban areas where insects can breed in uncovered water storage containers.

Information from the WHO Factsheet: <http://www.who.int/mediacentre/factsheets/fs117/en/index.html>

Have each small group give a presentation that answers the following questions:

- How is the model organized?
- What are the risk factors related to the host, the agent and the environment?
- What is the transmission cycle for the disease?
- What are possible control or intervention points?
- What is the group's plan to control the disease based on the known risk factors and possible interventions?

As a class, discuss the similarities and differences and consider the following questions:

- What do you notice about each group's model? Are they similar or different for the various zoonotic diseases?
- What do the students notice about each group's model? Are they similar or different for the various zoonotic diseases?
- What are common risk factors for zoonotic diseases?
- What are common intervention points?
- What is the best organizational strategy for a model showing risk and control points?

RISK ASSESSMENT	
Learning Objective	• Engage in the risk assessment process (hazard identification, exposure assessment, dose-response evaluation and risk characterization)

Prior to class, give students the following homework assignment:

- Read "Introduction to Risk Assessment Concepts" (European Environmental Agency): <http://www.eea.europa.eu/publications/GH-07-97-595-EN-C2/chapter1h.html>

- “The Basics of Risk Assessment” (FAO Corporate Document Repository): <http://www.fao.org/docrep/007/y4722e/y4722e05.htm>
- Advanced Reading: Nurminen M, Nurminen T, Corvalan CF. Methodologic Issues in epidemiologic Risk Assessment. *Epidemiology*. 1999 Sep; 10(5): 585–93.

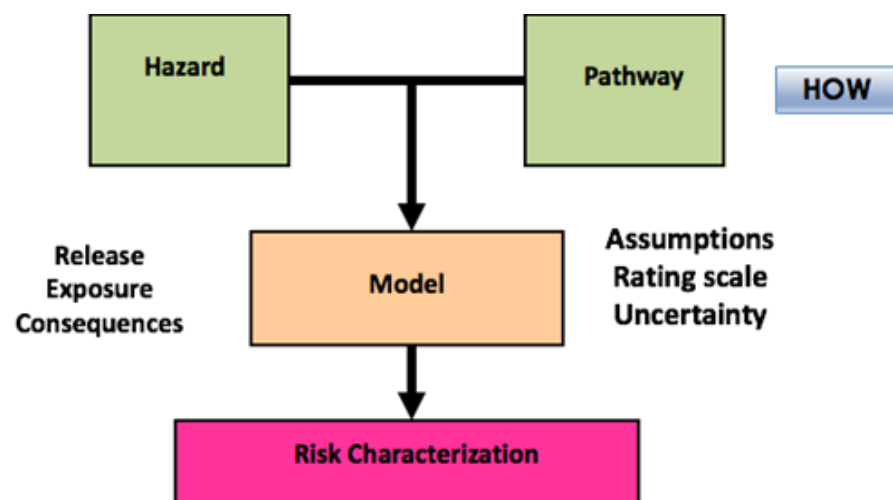
Principles of Risk Assessments and the Quantitative Microbial Risk Assessment Wiki Software (QMRA Wiki)

Deliver the lecture that reviews risk assessment principles and key points include:

- Overview of Risk Assessment Process
- 4-Step Risk Assessment Process: Hazard Identification, Exposure Assessment, Dose-Response Assessment, Risk Management
- Risk Communication



Overall Risk Assessment Process Diagram



Microbial Risk Assessment

Students will learn about the components and steps of a microbial risk assessment, and the types of information that is needed to complete one. Divide students into groups and have them select one of the case studies found in the QRMA Workshop pages:

http://qmrawiki.msu.edu/index.php?title=Case_Studies#tab=QMRAII_Workshop

Each team should review the information and prepare a presentation that reviews:

- Summary and key elements of the case study
- Overview of the types of data used for each section, and the location where the data was found.

COLLECTING COMMUNITY-BASED DATA TO SUPPORT INFECTIOUS DISEASE INVESTIGATIONS OR RISK ASSESSMENT

Learning Objective	• Understand how to collect data and use data throughout the risk assessment process
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Read – “Choosing Data Gathering Methods” and focus on Method 7: Using Community Measures in the article.

Defining and Using ‘Community Measures’

The objective of this field trip is to learn about the types of information that can be obtained using data collected about a community and to understand when community measures are useful in a risk assessment. Students will develop a conceptual model of the potential exposure pathway for an acute gastroenteritis outbreak. They should gather information about acute gastroenteritis/E. coli, so they understand the microbes and potential routes of exposure (e.g., waterborne, foodborne, person-to-person) and if there are any susceptible group(s).

Community Field Trip

Prior to departing for the field trip, divide students into groups of four. Tell students that they are participating in a simulation and that there has been an outbreak of acute gastroenteritis (possibly due to a pathogenic strain of E. coli) in the community and they need to determine what the potential cause of outbreak was. Students will need to know about known modes of disease transmission and who are susceptible subgroups. They should be gathering population-based prevalence data, and

identify where there could be exposure routes. They should develop a conceptual model of potential exposure pathways for that community and should create a risk assessment based on the information available, or that which could be collected, for each component of a risk assessment:

- Hazard identification
- Exposure assessment
- Dose-response assessment
- Risk characterization

Each group should review their objectives and research questions to determine if community measures will be useful to the evaluation. They should determine the type of data that they would like to collect, the availability of that information, if the available data would be useful for the risk assessment, and if additional data is necessary. Have students practice their questions and ask themselves the following:

- Are the questions clear and will they elicit the intended response?
- Are the questions culturally appropriate?
- Will the questions enable the group to gather the data needed for the assignment?
- Are the questions in a logical order?
- How do we ensure validity and reliability?
- How do we plan to capture the data? Notes, photos, video, etc.?
- Does the team leader for the activity have suggestions for questions based on his/her experience in the field or the topic being studied?

After the teams are finished planning, review the following field trip expectations:

- Wear appropriate dress (e.g., formal school attire, clothes appropriate for the location being assessed).
- Be prepared to introduce yourself to community leaders or other persons being interviewed to explain what you/your group are doing in the area, and the planned activities.
- Act respectfully and in a professional manner at all times
- Demonstrate interest in the community and their practices.
- Do not project your assumptions or impose your own ideas/beliefs on the community.
- Do not engage in informal communication with classmates during the trip (laughing, talking about subjects other than the field trip, using phones, text messaging, sharing/taking awkward or potentially embarrassing photographs, etc.).

- Assure local or district-level health authorities and/or clinic staff are aware of the work planned, confirm the location has security and is safe for students and that local cooperation is expected

Debrief and Concluding Remarks

Debrief with the students about the field trip back in the classroom. Encourage students to discuss observations related to the risk assessment. Be sure to cover the following points:

- General background of the community.
- Total population, number of households, relevant cultural information, key issues about local economy, principal occupation, farming practices, etc.
- Where could exposure occur?
- Is there a population sub-group at risk? Possible technical issues (if possible) observed:
 - Any information on availability of potable water?
 - Where is drinking water normally stored?
 - Containers covered or uncovered?
 - Chlorine used, or water boiled normally?
 - Awareness of national policy?
 - Hand-washing practiced, or soap available?

DEVELOPING INFECTIOUS DISEASE AND PUBLIC AWARENESS MATERIALS Part 1

Learning Objective	• Develop infectious disease prevention and public awareness materials
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Key Components of Public Awareness Materials

- **Audiences:** To have effective communication materials, target audiences must be identified. Some educational topics, materials and approaches may suit a broad spectrum of audiences while others should be tailored to a specific audience. Audience may include: Children/teenagers/adults; General/specific audiences; Public or private sectors; Illiterate persons, or sub-group or minority with different dialect or language.
- **Messages:** The messages delivered in public awareness materials should be appropriate for each target audience. They should include general information on an infectious disease, risk factors and methods of protection and prevention. Materials should be simple enough for the entire target audience to understand, be culturally sensitive and gender balanced.

- **Materials/Approaches:** Tools that can be used for informal education include publications, e-learning platforms, audio and visual aids, websites and online activities, social media, performance and cultural arts, etc.

Developing Public Awareness Materials for Infectious Disease

Divide students into small groups and have them select a locally relevant infectious disease and develop public awareness materials to address the disease. Groups should consider the following questions before they develop the materials:

- What is the infectious disease for which you want to conduct the public awareness?
- Who is the target audience(s)?
- What are the messages you want to deliver to the target audience(s)?
- What is the best method for relaying these messages? What types of materials are appropriate?
- How can the materials be adapted to target other audiences(s)?
- Are your materials supportive of, or consistent with, the existing public health policy for this disease?
- Do you have materials that target minority populations, such as illiterate persons or persons who do not speak the primary language?

After discussing the questions, groups should share their ideas and get feedback.

Presentation of Public Awareness Materials

Have each group share basic information about their infectious disease in the local context and their concept for the public awareness materials. Tell students that they should meet with their group out of class to develop the public awareness materials for the infectious disease selected. They will also need to develop a plan to engage the local community, ensuring that they speak with appropriate community leaders and set up suitable communication mechanisms.

A few weeks prior to class, you should begin planning for the field trip. Be sure to request permission from local authorities and the university. Once the students select their target audiences and communication mechanisms you can assist them, when needed, with their communication engagement strategies. Prior to this session, students should prepare the public awareness materials and community engagement strategy. They should consider the following:

- Location
- Profile of the target group
- Targeted number of expected attendees
- Objectives
- Primary issues
- Necessary documents

Sample Poster Topics:

- Rabies Prevention
- Antimicrobial Resistance
- Salmonella (pork contamination)

Applying Public Awareness Materials to Target Audiences

Once the materials have been developed and are ready to be distributed, students will go on a field trip to deliver their public awareness materials to their target audiences. Discuss the following questions:

- Did you encounter any challenges when you introduced the material to the target audience(s)?
- How well did the target audience(s) understand the messages delivered by your material?
- What feedback did you receive from the audience(s)?
- Did the level of education of persons exposed to the materials influence their understanding of the content?
- Would it have been useful to “pilot” test the questions initially?
- Why is pilot testing important? What would have been the best method to do this?

Example of a Public Awareness Campaign for Rabies (by a One Health Student Club in Vietnam (in Vietnamese))

DEVELOPING INFECTIOUS DISEASE AND PUBLIC AWARENESS MATERIALS Part II	
Learning Objective	• Develop disease prevention and public awareness materials



CRITIQUE OF AN INFECTIOUS DISEASE MANAGEMENT PLAN (EXAMPLE) USING A ONE HEALTH PERSPECTIVE

Learning Objective	• Understand what measures may be used to determine the strategy of an infectious disease management plan • Evaluate and critique an infectious disease management plan • Assess an infectious disease management plan and how these plans may have unintentional effects when implemented • Describe the pros and cons of an infectious disease control strategy
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Assessing a Canine Rabies Management Plan using a One Health Approach

Canine rabies is one of the most important and feared zoonotic disease, despite being preventable, with a mortality rate of nearly 100% in humans. In some regions, rabies elimination is being successfully coordinated, whereas in other areas, rabies is endemic and continues to spread to previously uninvolved areas. As epidemics emerge, both accepted and contentious control methods are used. Questions

remain over the most effective strategy to eliminate rabies, and this strategy may vary depending on factors in the location being discussed, such as the principle types of animal currently responsible for human disease the local culture, availability of vaccine and other resources, and other factors.

Guide the students through the following questions:

- How common is rabies in your local community (in Vietnam)? What is the prevalence rate?
- What are possible interventions to consider including in a rabies management plan in your local region?
- **Answers:** Mass campaign for dog vaccination, best practices among pet dog owners, dog sterilization, diagnosis of rabies or quarantine/observation of dogs that have bitten humans, proper wound care and post-exposure prophylaxis/vaccination in humans bitten by dogs with suspected/possible rabies infection
- What is R_0 ? What is the calculated R_0 for rabies in this paper?
- **Answer:** R_0 is the basic reproductive number and estimates the number of new cases that result from one infectious individual. In this paper, R_0 for rabies in dogs was estimated to be 1.2, so we can expect 1.2 new rabies cases from each infected dog.
- In what ways does the rabies management plan discussed in the paper use a One Health approach?
- What aspects of this management plan could be improved from a One Health perspective in Vietnam?

SYSTEMIC EFFECTS OF AN INFECTIOUS DISEASE MANAGEMENT PLAN

Learning Objective	• Recognize when a OH approach is being applied to an infectious disease management plan or program • Evaluate and critique an infectious disease management plan • Assess infectious disease control plans and understand how (and why) they may have unintentional effects if implemented • Describe pros and cons of any control strategy
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Before class, have students read the following articles:

- “Influenza at the Human-Animal Interface” (WHO)
- “Thailand to Cull Ducks in Avian Flu Fight” (Center for Infectious Disease Research and Policy)
- “Thai Farmers Worry Controls on Bird Flu Threaten Livelihoods” (The Washington Post)

- “Improving Risk Models for Avian Influenza: The Role of Intensive Poultry Farming and Flooded Land during the 2004 Thailand Epidemic” (Van Boeckel TP, Thanapongtharm W, Robinson T, Biradar CM, Xiao X, et al.)

Systemic Effects of an Infectious Disease Management Plan

This activity helps students understand the collateral effects caused by implementing an infectious disease management plan. Begin the activity by reading aloud to the class (or consider selecting several students to read aloud the CIDRP article “Thailand to Cull Ducks in Avian Flu Fight,” which briefly describes a management plan for avian influenza in Thailand).

Divide students into small groups and have them discuss the following questions:

- Why are ducks important to consider in the transmission of avian influenza?
- How many ducks contributed to the spread of avian influenza to humans?
- Why was duck culling part of the management plan for controlling avian influenza in Thailand?

Ask students to create a list of the pros and cons for the duck culling management plan. Ensure they consider issues outside of disease transmission, such as economics, social systems, poverty, demographics, agriculture, cultural history in area of implementation, etc. They should consider the role of ducks in the ecosystem and any ecologically negative effects of culling. Each group should create a list or map of the possible systemic effects.

EXAMINE AN EXISTING INFECTIOUS DISEASE SURVEILLANCE SYSTEM

Learning Objective	• Understand core concepts in infectious disease surveillance methods • Describe the components and methods for evaluating a public health surveillance system
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Core Concepts in Disease Surveillance Methods

Introduce the concept of surveillance methods and tell students that public health surveillance is defined as an ongoing systemic collection, analysis and interpretation of outcome-specific data for the use in planning, implementation and evaluation of public health practices. Give a short lecture that reviews the key points outlined below:

SMART (Strategic, Measurable, Adaptable, Responsive, Targeted) **Objectives**.

***Remember effective disease surveillance systems should be able to:

- Identify key drivers of zoonotic disease emergence.
- Detect disease outbreaks or new trends or patterns of diseases.
- Forecast events that may lead to disease emergence.
- Assist governments in the development of prevention strategies.
- Provide accurate, timely information to program managers.
- Establish a sustainable, global early-warning system.

Sources of disease surveillance data include (examples):

- **Field surveillance** – data collected in the field, both quantitative and qualitative data.
- **Digital disease surveillance** – data collected through automatic web-based monitoring.
- **Population-based surveillance** – data based on disease-specific events in the entire target population (representative of population).
- **Laboratory-based surveillance** – information including diagnostic test results for diseases reported by laboratories.
- **Sentinel surveillance** – data about a disease collected only from selected sites (useful information, but not necessarily complete or representative of the entire population).

Have each group display their data collection and evaluation plans for their chosen zoonotic disease. Discuss the similarities and differences between the plans in terms of the WHO/CDC evaluation criteria, which represent an evaluation of the usefulness of the surveillance system:

- **Simplicity** - For a public health surveillance system, refers to both its structure and ease of operation. Systems should be as simple as possible while still meeting their objectives
- **Flexibility** - Refers to a system being able to adapt to changing information needs or conditions with little additional time, personnel or allocated funds, e.g., new health-related events, case definition or diagnostic test.
- **Acceptability** - Willingness of persons and organizations to participate in the surveillance system.
- **Sensitivity** - Reflects two levels: the proportion of cases or other health-related events detected by the system, and/or the ability to detect outbreaks and monitor changes in the number of cases over time.
- **Specificity** - Proportion of healthy persons [without disease or health of interest] correctly classified as not infected.
- **Accuracy**

- **Positive predictive value** - The proportion of reported cases that actually have the health-related event under surveillance.
- **Representativeness** - A system representative if it accurately describes the occurrence of a health-related event over time and its distribution in the population by place and person.
- **Sustainability** - Whether adequate resources exist to sustain the activity.
- **Timeliness** - Reflects the speed between steps in a public health surveillance system, e.g., the date the disease was identified and the date reported.

Another discussion question is, “What other types of monitoring data may be useful to analyze or predict where zoonotic diseases could occur?” Answers you should look for include:

- Meteorological data
- Climate change
- Land use/habitat change
- Migratory animal patterns
- Analysis of surveillance data (showing increasing trends over time)

ANALYSIS OF DISEASE SURVEILLANCE DATA USING HEALTH MAP

Learning Objective

- Understand core concepts in disease surveillance
- Create a plan for surveillance data collection
- Describe the data collection procedures and techniques
- Perform quantitative and qualitative data analysis

Introduction to HealthMap



Understanding how managing infectious disease involves understanding how cases or outbreaks are reported and how surveillance is performed. This activity will use HealthMap, a free online website

reporting infectious disease across the world, to practice analyzing surveillance data for an infectious disease. Lead the students through an online tutorial using either the HealthMap video or slides, available online at www.healthmap.org.

Provide the following introduction to HealthMap: *HealthMap, a team of researchers, epidemiologists and software developers at Boston Children’s Hospital founded in 2006, is an established global leader in utilizing online informal sources for disease outbreak monitoring and real-time surveillance of emerging public health threats.*

The freely available website healthmap.org and mobile app ‘Outbreaks Near Me’ deliver real-time intelligence on a broad range of emerging infectious diseases for a diverse audience including libraries, local health departments, governments and international travelers. HealthMap brings together disparate data sources, including online news aggregators, eyewitness reports, expert-curated discussions and validated official reports, to achieve a unified and comprehensive view of the current global state of infectious diseases and their effect on human and animal health.

Divide students into small groups and have them explore HealthMap. They should select a zoonotic disease of interest, with more than 10 reports, for their project. These reports can be found on the surveillance websites explored in the previous session (WHO, CDC, etc.). They should look at surveillance data on HealthMap for their chosen disease and collect the following information:

- Disease
- Species of host affected
- Total reports of the disease for the year
- Total cases of diseases in affected species

Mock Health Department Report

Each group will deliver a presentation, in the form of a mock scientific report given to a local health department concerned about the disease. Using the surveillance data collected from HealthMap, students should perform the following analysis:

- Provide background & overview information on the disease
- Create a global/regional/country level map to display the outbreaks for the year.
- Create a chart to display the number of cases or outbreaks reported by week or month.
- Analyze data in the reports to determine sources and numbers of disease reports.
- Analyze data in the disease reports to determine sources of the disease & transmission routes.
- Create a map, system diagram or visual aids to show transmission & risk factors gathered from the disease surveillance data.
- Form a conclusion from the surveillance data about the current status of the disease.

ONE HEALTH TEAM ROLE-PLAYING ACTIVITY A Management and Surveillance Plan	
Learning Objective	• Developing skills in collaboration and partnership and understanding of how to select members of an OH team • Developing an OH action approach for disease investigation and control • Developing part of a plan to control disease through appropriate diagnosis, disease prevention and public awareness

Introduce students to a role-playing exercise that will be based on an infectious disease scenario. You can use the following H5N1 case scenario or draft a new scenario relevant Vietnam. Have the team consider the following questions individually:

- What is your role in this scenario? What is the role of each stakeholder in this scenario?
- How does the scenario affect the stakeholder that you are representing?
- How can each stakeholder's response to the infectious disease in this scenario influence the management of the disease?
- Who are the other stakeholders you will need to deal with in order to manage a particular infectious disease?

After the reflection, students conduct the role play for 20 minutes by working in a group with all stakeholders to address the questions above together. The end goal is to have the students act as a One Health team, with involvement of all stakeholders.

H5N1 Scenario *Retrieved from: www.internationalssos.com*

The first reports

Rumors of an outbreak of unusually severe respiratory illness in two villages in a remote province prompted the WHO to dispatch a team to investigate. The team found that people in the villages had been falling sick for about a month and that the number of individuals with acute infection ("cases") had increased each day. The team was able to identify at least 50 cases over the previous month; all age groups had been affected. Twenty patients are currently in the provincial hospital. Five people have already died of pneumonia and acute respiratory failure.

Specimens sent to the laboratory

Disease surveillance in surrounding areas was enhanced, and new cases are identified throughout the province. Respiratory specimens collected from several patients were tested at the national laboratory and found to be positive for type A influenza virus. The isolates are sent to the WHO Reference Centre and the laboratory identified an influenza A (H5N1) subtype never isolated from humans before. Gene sequencing studies further indicate that most of the viral genes are from a bird influenza virus, with the remaining genes derived from a human strain. More cases appeared in surrounding towns and villages.

Spread to neighboring countries and attempts at quarantine

The new influenza virus begins to make headlines in every major newspaper, and becomes the lead story on news networks. Countries are asked by WHO to intensify influenza surveillance and control activities. Key government officials throughout the region are briefed on a daily basis, while surveillance is intensified. Over the next two months, outbreaks began to take place in neighboring countries. Although cases are reported in all age groups, young adults seem to be the most severely affected. One in every 20 patients dies. The rate of spread is rapid, and countries initiate travel restrictions and quarantine measures.

Social effects

Educational institutions are closed. Widespread panic begins because supplies of antiviral drugs are severely limited and a suitable vaccine is not yet available. One week later, there are reports that the H5N1 virus has been isolated from airline passengers with respiratory symptoms arriving from affected countries.

Other continents affected

A few weeks later, the first local outbreaks are reported from other continents. Rates of absenteeism in schools and businesses begin to rise. Phones at health departments ring constantly. The spread of the new virus continues to be the major news item in print and electronic media. Citizens start to clamor for vaccines, but they are still not available. Antiviral drugs cannot be obtained. Police departments, local utility companies and mass transit authorities experience significant personnel shortages that result in severe disruption of routine services. Soon, hospitals and outpatient clinics are critically short-staffed as doctors, nurses and other healthcare workers themselves become ill or are afraid to come to work.

Assignments - Roles and Possible Discussion Points

Villagers of Villages 1 and 2 Villagers will act to show first how you can get the virus from birds, and then after contact with infected birds, villagers will get sick. Some of the villagers will go to see a doctor at the hospital.

Healthcare Workers (Doctors, Nurses, Technicians etc.)

At the hospital, doctors and nurses will meet villagers who become sick. In this case, doctors and nurses will do their jobs as following:

- Interview the villagers about history
- Physical examination
- Collect specimens (such as throat swab) from each patient
- Give information to WHO team about the disease
- Discuss need for training and proper use of personal protective equipment (PPE), including masks, gowns, gloves and eye protection for staff interacting with case-patients
- Discuss need for respiratory isolation unit to provide safe location for infected case-patients to be treated, prevent transmission to other patients or staff

WHO Team	WHO team will come to investigate the disease in the villages 1 and 2 by interviewing villagers and also health care workers and surveying villages to collect the data for disease investigation.
Laboratory Workers	At the laboratory, lab workers will get the specimens from the hospital and do the assay. After that, lab workers will report to the doctors, WHO reference center and national CDC.
Government Officials	Government human and animal health staff will receive the information about the disease situation from the WHO team and other resources. Then they will evaluate the situation to make decisions and a plan to manage the situation. Consider discussing: • Disease prevention • Guidelines for PPE for hospital/clinical staff, or field investigators • Disease surveillance • Vaccine development

Transportation Security Administrator

Transportation security administrator will receive information from the government about the situation and then respond to provide information for travelers and apply the regulations for the emergency situation.

With the entire class, debrief the exercise and share experiences about the following:

- How effective was the One Health team in developing the management plan for the disease scenario?
- What were the problems encountered from the perspective of each stakeholder?
- What subtle skills are needed to ensure a highly functional One Health team?

MODULE 4

EPIDEMIOLOGY AND RISK ANALYSIS

Course Overview

Module Description and Learning Outcomes	Epidemiology, epizootiology and population health describe the study of health and disease in populations. Risk analysis is a systematic approach to evaluating the likelihood of occurrence and the magnitude of impact if a particular adverse event occurs, and taking steps to mitigate those risks while communicating with key stakeholders and populations. Epidemiology and risk analysis are crucial to the One Health approach, as professional health science programs incorporate these topics into their curricula. Recognizing that an OH approach is broad and includes many disciplines distinct from health sciences. This module will introduce students to the history, concepts, theories, terminology and practices of epidemiology. Key outcomes include • Defining epidemiology and basic terminologies and concepts • Explaining critical components of the practice of epidemiology • Explaining major components of disease risk analysis, its process, and how disease risk analysis links science to policy.
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Module Overview

Competency #1	Learning Objectives to Develop Competency
Define epidemiology and basic epidemiology terminology/concepts	Explain epidemiological terms and concepts by being able to: • Define epidemiology and public health • List the core human and veterinary public health functions • Explain the concept of causal webs and the interactions among host, environment and agent

Competency #2	Learning Objectives to Develop Competency
Explain critical components of epidemiology	Explain critical components in the practice of epidemiology, including being able to: • Describe how epidemiology used by human, animal, and environmental health professionals • Identify some of the diverse specialities in the field of epidemiology • List the different types of epidemiological studies and the advantages and disadvantages of each • List the steps to follow in a disease outbreak investigation • Explain the general principles of surveillance and the challenges associated with collecting and interpreting data
Competency #3	Learning Objectives to Develop Competency
Explain the major components in and the process of disease risk analysis and how disease risk analysis links science to policy	• Understand the purpose and basic terminology of risk analysis • Describe the components of the risk analysis process • Use examples of risk analysis for selected zoonotic infectious diseases • Explain how some of the more commonly recognized risk analysis frameworks are used

Introduction to Epidemiology



Epidemiology and risk analysis are crucial in the One Health approach. This module is designed to introduce individuals with little or no epidemiological background to its history, concepts, theories, terminology and practices. It will enhance students' understanding of public health problems and improve capacities to collaborating with epidemiologists. Key outcomes include:

1. Definition of epidemiology, basic terminology, and key concepts.
2. Explain critical components of the practice of epidemiology.
3. Explain major components in and the process of disease risk analysis, and how disease risk analysis links science to health policies.

EPIDEMIOLOGY IS A BASIC PUBLIC HEALTH SCIENCE

Learning Objective	• Define epidemiology • Give examples of useful applications of epidemiological principles • List the core functions of human public health and veterinary public health activities
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Introduce students to the background information on epidemiology and its relationship to human and veterinary public health. This module will explain that the practice of epidemiology asks and seeks to answer simple questions about disease causation and risk. This includes the who/which, when, how, where, and why? Reinforce the similarities and overlaps between human and veterinary public health, and the common methods that epidemiology creates.

Vocabulary includes:

- Agent
- Enzootic
- Index Case
- Parasite
- Reservoir
- Transmission
- Zoonosis
- Bacteria
- Epizootic
- Infective
- Pathogen
- Resistant
- Vector
- Endemic
- Host
- Outbreak
- Recovered
- Susceptible
- Virus

EPIDEMIOLOGICAL TOOLS AND METHODS

Learning Objective	• List methods that can be used for the epidemiological assessment of a health problem • Identify ways that public health laboratories carry out epidemiological functions • Identify data collection methods to use in an epidemiological investigation
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Ask students to look for various types of images that display infectious disease surveillance data and to bring examples with them to class. Then explore core epidemiological methods and the relationships between human and veterinary public health laboratories, disease surveillance systems and public health decision-making. Core to this session is the understanding that disease surveillance is defined as the ongoing, systematic collection, analysis and interpretation of data to support decision-making and improved management of health programs. Ask students to share examples of different ways to display disease surveillance data, or the instructor may share pre-selected images.

EPIDEMIOLOGY PARTNERS AND RESOURCES

Learning Objective	• Identify allied health and community partners in the practice of epidemiology • List ways in which epidemiologists work with the media and the five components of the HWO Outbreak Communication Guidelines • Describe how the WHO, OIE, FAO, and CDC serve as resources for training, technical support, and surveillance and reporting of epidemiological data
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Ask students to look for various types of reports, preferably in the local and national media (print, television, radio), related to health and disease, in Vietnam. Alternatively, the instructor may choose to bring recent examples to share and discuss. Show examples of both effective and ineffective communications. Have students to share their thoughts on if the WHO Guidelines are being met (or not) - see *below*

WHO Guidelines on Risk Communication:

- 1 Trust** - The overriding goal for outbreak communication is to communicate with the public in ways that build, maintain or restore trust. This is true across cultures, political systems and level of country development.
- 2 Announcing early** - The parameters of trust are established in the outbreak's first official announcement. This message's timing, honesty and comprehensiveness may make it the most important of all outbreak communications.
- 3 Transparency** - Maintaining the public's trust throughout an outbreak requires transparency (i.e., communication that is candid, easily understood, accurate) and characterizes the relationship between the outbreak managers and public. It allows the public to "view" the information-gathering, risk-assessing and decision-making processes.
- 4 The public** - Understanding the public is critical to effective communication. It is difficult to change pre-existing beliefs unless those beliefs are explicitly addressed.
- 5 Planning** - The decisions and actions of public health officials have more effect on trust and public risk perception than communication. There is risk communication impact in everything outbreak control managers do. Risk communication is most effective when it is integrated with risk analysis and management.

DESCRIPTIVE EPIDEMIOLOGY	
Learning Objective	• Define descriptive epidemiology • List of two major descriptive epidemiological study designs • List examples of the use of descriptive data

Examine the differences between descriptive epidemiology and analytic epidemiology. Descriptive epidemiology answers the simple questions - who/which, what, when, where, and how much. Ask students to come up with examples of diseases illustrating the following characteristics of descriptive epidemiology:

- Diseases that have different temporal/seasonal patterns of occurrence (for example, malaria and other mosquito-borne diseases during rainy seasons, influenza and so on)
- Diseases with different spatial patterns of occurrence
- Diseases with different patterns of occurrence by age (young, old) and sex (male, female)
- Brainstorm about lists of diseases that the students consider epidemic. Are there both recent and historical examples (SARS vs. MERS coronavirus, canine rabies, “Spanish flu” and avian influenza, etc.)

Analytic epidemiology strives to answer the why and how questions of disease occurrence. The major difference between descriptive and analytic observational studies is that there are COMPARISON groups in analytic studies. The three main types of analytic study designs are:

1. Cross-sectional
2. Case-control
3. Cohort

Ask the students to discuss the following types of zoonotic diseases, and decide which type of observational study is best suited to investigation of:

- A newly emerged zoonosis.
- A zoonosis with a long incubation period.
- Disease prevalence and incidence.
- A zoonosis in a remote/inaccessible area.

1

Case studies - Descriptive, detailed study of a limited number of cases, good for rare diseases, no control (i.e., comparison) group, not usually representative of the general population, may help to generate hypotheses about causation of disease. An example would be a description of a rare disease such as human with illness (“case”) due to highly pathogenic avian influenza (HPAI), describing the case and the factors associated with the case in detail.

2

Cross-sectional studies - Groups of animals or humans are selected at one point in time as a (random) cross-section of the population. Prevalence of disease is recorded from data collected during surveys.

- **Advantages:** Cross-sectional studies are relatively quick to conduct and their cost is moderate, compared with other study designs. This type of study is good for high prevalence diseases, and the findings are generally designed to be representative of the population being studied.
- **Disadvantages:** Cross-sectional studies can only estimate prevalence of disease, not incidence. They provide little information on cause and effect, or the outcome of disease control programs.

3

Case-control studies (retrospective in Vietnam) - Animals or humans are selected and grouped according to the presence (case) or absence (control) of disease, which may be “clinical” disease, or may also be confirmed by laboratory diagnostics. Data about exposure to risk factors are acquired retrospectively (records, memory) after selection, usually by using standardized questionnaires, and exposures are compared in the two groups.

- **Advantages:** This method is good for studying rare diseases or diseases with a long incubation period. They can be quicker and cheaper to run than the other study types.
- **Disadvantages:** They do not provide information about incidence or prevalence of disease. The study relies on collected data, and bias is often a problem.

4

Cohort Studies - Animals or humans are followed over time, grouped according to exposure to a risk factor. The outcome of interest (Disease: Yes or No) is noted, and the rate of disease is compared in the two groups (exposed vs. unexposed).

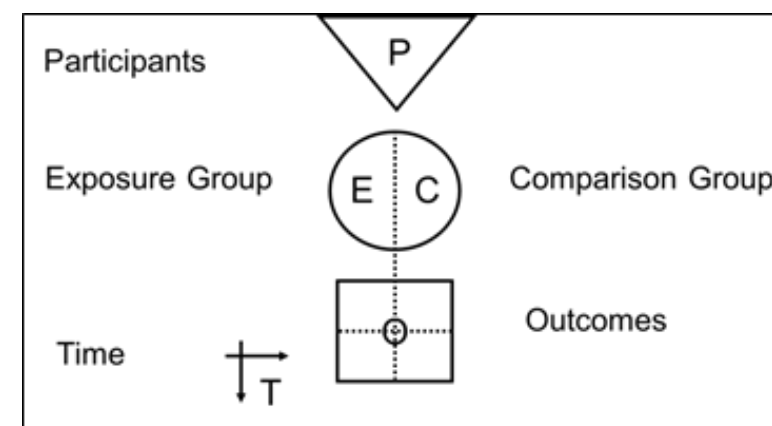
- **Advantages:** Cohort studies measure disease incidence and may be useful for determining the outcome of disease control programs, as well as estimating rates of disease based on exposure.
- **Disadvantages:** Unfortunately, they are expensive and may require a long follow-up period. Large groups are necessary for investigating rare diseases. Losses to follow-up can become an important problem.

Criteria	Cross-Sectional	Case-Control	Cohort
Sampling	Random sample of study population	Separate samples of diseased and non-diseased individuals	Separates samples of exposed and non-exposed individuals
Time	Single point	Usually retrospective	Usually prospective (but may be retrospective)
Causality	Associated between disease and risk factor	Preliminary causal hypothesis	Causality through evidence of temporality
Risk	Prevalence	None	Incidence density, cumulative incidence
Comparison of risks	Relative risks, odds ratio	Odds ratio	Relative risk, odds ratio

PECOT Teaching Critical Appraisal of Published Epidemiology Literature	
Learning Objective	- Explain the basic components of observational epidemiological studies from publishes peer-reviewed articles - Optional: Use the PECOT method to assess completeness and accuracy of popular press reports of epidemiological studies

Introduce the critical appraisal of a published article using the PECOT method and show examples of articles on different epidemiological study design. For this exercise, divide students into small groups of four to six. In 30-minute increments, ask students to read and apply PECOT to various types of observational studies. Depending upon available time, each group of students may read and interpret one or more than one study.

Key reference: Scurr, J. H., Machin, S. J., Bailey-King, S., Mackie, I. J., McDonald, S., and Smith, P. D. C. (2001). Frequency and prevention of symptomless deep-vein thrombosis in long-haul flights: a randomised trial. *The Lancet*, 357(9267), 1485-1489.



Possible references:

- Prospective Cohort: Khuntirat, B. P., et. al. (2011). Evidence for subclinical avian influenza virus infections among rural Thai villagers. *Clinical Infectious Diseases*, 53(8), e107–e116.
- Retrospective and Prospective Cohort: Moen, A. R., Wouda, W., Mul, M. F., Graat, E. A. M., and Van Werven, T. (1998). Increased risk of abortion following *Neospora caninum* abortion outbreaks: a retrospective and prospective cohort study in four dairy herds. *Theriogenology*, 49(7), 1301–1309.

INTRODUCTION TO DISEASE SURVEILLANCE	
Learning Objective	- Explain the surveillance “feedback loop” of data and information flow through local, state and federal channels - Describe characteristics of three different methods of surveillance: Active, passive, and syndromic - List five applications of public health surveillance

We will revisit the concept of surveillance, learning about the major surveillance methods (active, passive and syndromic) and global systems, as well as discussing some of the limitations and challenges of collecting, analyzing and interpreting surveillance data. Students will be challenged to apply the concepts reviewed to examine existing global surveillance systems and design their own SMART surveillance plans.

Divide students into groups and assign each group a disease surveillance website to explore.

- US CDC** – <http://www.cdc.gov/surveillancepractice/>
- WHO Global Influenza Surveillance and Response System** - http://www.who.int/influenza/gisrs_laboratory/en/

- **WHO Global Outbreak Alert and Response Network (GOARN)** - <http://www.who.int/csr/outbreaknetwork/en/>
- **OIE – World Animal Health Information System** - <http://www.oie.int/animal-health-in-the-world/the-world-animal-health-information-system/the-oie-data-system/>
- **FAO – EMPRES -I** - <http://empres-i.fao.org/eipws3g/#h=0>
- **European CDC** - <http://www.ecdc.europa.eu/en/activities/surveillance/Pages/index.aspx>
- **HealthMap** - <http://healthmap.org/en/>

Have students examine the surveillance system based on the basic concepts of surveillance evaluation and determine if the surveillance websites have a well-organized plan for surveillance data collection, procedures and methods to ensure the validity and reliability of data. Students should choose a zoonotic disease and create a plan for data collection, including procedures and techniques. As a large group, discuss the similarities and differences among the plans in terms of the evaluation criteria: *simplicity, flexibility, acceptability, sensitivity, specificity, accuracy, positive predictive value, negative predictive value, representativeness, sustainability and timeliness*. Have the large group debrief on the SMART surveillance system for zoonotic diseases by asking the following questions, “How did each group’s plan include the aspects of SMART?”

THE CONTAGIOUS CLASSROOM: An Outbreak Investigation	
Learning Objective	• Experience a disease outbreak and investigation • List the typical steps followed in a disease outbreak investigation

Simulating an Epidemic

From bubonic plague to malaria to leptospirosis, scientists and public health officials have struggled to understand and contain the spread of infectious diseases. Using simple reagents, participants will simulate the spread of an imaginary disease in Vietnam to explore factors that affect the rate of infection, the challenges of epidemiology, and methods to investigate and describe disease outbreaks.

Prepare the containers prior to the activity: Fill one container halfway with 0.1 molar NaOH and fill the rest of the containers halfway with distilled water. Number each container for clarity and to illustrate “confidentiality” of data collection as the exercise unfolds.

If you have a large group (30–35 or more) you may want to begin with two test tubes containing NaOH. The final number of “infected” test tubes will vary, depending on (1) the number of trades and (2) how many trades occur between two already infected tubes. Let participants know they are going to model the transmission of a disease by exchanging some of their containers’ contents with that of other participants. Mention that one of the containers is “infected” with an imaginary infectious disease.

- **CAUTION:** NaOH and phenolphthalein can irritate the eyes and skin. Alert participants to avoid spilling and warn them to NEVER drink what is in the containers. Also, instruct them to be careful NOT to touch the other person’s fluid when exchanging drops. Distribute prepared containers and droppers randomly to the class. Make a mental note of who receives the test tube(s) containing NaOH.

Have participants walk around the room with their test tubes. When you say “Stop!” each participant should use a dropper/pipette to trade fluid (several drops, half a pipette – be specific) with the person nearest them. Repeat until at least three trades have occurred. Instruct the participants to record in order the IDs of the people with whom they traded fluid. Now it’s time to test for the imaginary infection. Put a drop of phenolphthalein in each container. If the fluid turns pink, the container is “infected” with NaOH. How many participants are now “infected”?

Tracing the Source of Infection

- Now that some of the group has been “infected,” identify who will be the epidemiologists. Their challenge is to collect data that will help them trace the path of the epidemic, locate the original carriers and describe the outbreak using appropriate terms. As a group, use the data to try to deduce which individual was the original carrier of the disease.
- Why might it be important to locate the source of infection?
- What difficulties arise in collecting and interpreting data? Note that the simulated disease has a 100% rate of infection that appears immediately under testing.
- How might each of these factors affect the spread of disease and the ability to identify carriers?
- A possible method to find “patient zero” is to have each participant write his or her container number or name on the board and underneath it the names or numbers of participants. They might exchanged fluids as a form of exchange. As a group, highlight the names of the currently “infected.”
- This visual representation can clarify which participants may have infected one another, and in what order. Participants who “test positive” and find that

everyone with whom they traded also tested positive may be original carriers of the disease. It is likely that there will be several candidates for “patient zero.” Cross-checking the history of each contact can narrow the field, but probably not to fewer than two candidates.

- If participants are unable to reach a clear conclusion, the exercise will raise useful questions about the challenges facing real epidemiologists as they try to trace the sources of an infection.

To conclude the Contagious exercise, ask the students to list the steps that they followed in the outbreak investigation. Then ask them to review the list and decide if any critical steps are missing. Ask students to list the major objectives of a disease outbreak investigation.

Steps to follow:

1. Verify the outbreak.
 - What is the disease (initial case definition, eventual diagnosis), how severe is it and is it a true excess of disease?
2. Identify and review potentially zoonotic incidents, looking at acute clusters or outbreaks, increasing trends of known infections or syndromes, or new infections or undiagnosed syndromes.
3. Describe the clinical signs of the disease.
 - Identify characteristics common to all the affected members and how these diseased individuals can be distinguished from unaffected individuals.
4. Define the problem in terms of time, place and population affected.
 - Assess the risk to human and animal health and whether it is a possible zoonotic risk.
5. Enhance surveillance of humans and animals in the affected area and surrounding area. This helps identify additional cases.
6. Describe the outbreak.
 - Collect historical data and compare affected and unaffected individuals. Plot an epidemic curve to determine source, incubation and spread of the disease agent. Map the data, human and animal movement, barriers to movement, etc.
7. Develop hypotheses about the cause.
8. Perform analytical studies on collected data to identify risk factors.
9. Disease Control
 - Using the above information a control strategy can be implemented even if the infectious agent has not been positively identified. Further investigation into the cause of the disease may be necessary.

10. Prevention strategies (communication, education, etc.)

11. Adjust surveillance and monitoring programs.

INTRODUCTION TO DISEASE RISK ANALYSIS	
Learning Objective	• Understand the purpose and basic terminology of risk analysis • Describe the components of the risk analysis process • Give applications of risk analysis for zoonotic infectious diseases • Explain some of the commonly recognized and used risk analysis frameworks

Risk analysis is iterative and involves identifying risks, framing a question, developing a model and adding data to that model (qualitative and quantitative), then running the model. The findings and results of the analysis are normally interpreted cautiously; for example, these are reviewed in relation to such issues as biological plausibility, evidence of any dose-response effect(s), temporality (i.e., assuring the implicated exposure occurred prior to disease onset) and consistency with the current literature to assure that the hypothesis about disease causation being proposed is logical and based on “good” scientific principles or best practices, etc. This helps highlight gaps in data, critical points in the risk pathway and risk mitigation. There are multiple internationally recognized frameworks for completing risk analyses. You have a research article that applies Disease Risk Analysis.

Results may be shared and compared among groups or presented back to the class and discussed, depending upon instructor preference, available time and class size. Please read it and answer questions below:

- What is the framing question?
- What is/are the hazard/hazards identified?
- Who will be informed of the results?
- What are risks?
- Is the risk analysis qualitative or quantitative?
- Who are the stakeholders identified?
- How could result be applied?



Possible References:

- de Man, H., Bouwknegt, M., van Heijnsbergen, E., Leenen, E. J. T. M., van Knapen, F. and de Roda Husman, A. M. (2014). Health risk assessment for splash parks that use rainwater as source water. *Water Research*.
- Dom, N. C., Ahmad, A. H., Latif, Z. A., Ismail, R. and Pradhan, B. (2013). Coupling of remote sensing data and environmental-related parameters for dengue transmission risk assessment in Subang Jaya, Malaysia. *Geocarto International*, 28(3), 258–272.
- <http://www.ncbi.nlm.nih.gov/pubmed/16900498>.

DISEASE RISK ANALYSIS: A FIELD EXERCISE FOR RISK ASSESSMENT**Learning Objective**

- Complete a basic risk assessment for a zoonotic disease in a local community
- Ensure that all necessary human and animal subjects protection approvals are in place
- Ensure that appropriate contact with and permission from community leaders and local officials have been organized

Provide an overview of the field trip:

- Purpose of the field trip and how to interact with the community
- Details on culture, traditions, human and animal population in and around the local community the students will visit
- Known risk factors of zoonotic diseases
- Livestock and wildlife known to be present in and around the community
- Any known livestock, wildlife, zoonotic diseases present in populations
- How zoonotic diseases have influenced local culture or practices

Field Trip

Students participate in the field trip to a local community or animal farms. Have students take notes on practices observed and all factors that may influence transmission of zoonotic diseases that could impact human health, animal health and/or environmental health.

- Have any zoonotic diseases outbreaks occurred in the community? If yes, focus on this disease.
- What can you observe in the community (jobs, agriculture, livestock kept, food consumed, food and water supply, food preservation, environmental sanitation, waste management, trade and tourism, and so on).

- What animals are present? Management systems, environment, animal waste management?
- What ecosystem or ecosystems have been noted? Are any known diseases associated with those ecosystems?
- What factors related to the humans, animals and their environment may impact zoonotic disease transmission?
- Is there access to human and animal health care?

Option 1:

As a large group, collaboratively complete a basic risk assessment. It may be qualitative, quantitative or semi-quantitative, depending upon the time available for students to conduct a literature search to gather data. Also depending upon time, risk management and risk communication portions may also be completed.

Option 2:

Have the students remain in their small groups to complete the basic risk assessment (and optional risk management and risk communication, as above). Have each group report back in plenary.

Key Vocabulary

- **Agent:** A factor (e.g. a micro-organism or chemical substance) or form of energy whose presence, excessive presence or, in the case of deficiency diseases, relative absence is essential for the occurrence of a disease or other adverse health outcomes
- **Bacteria:** A member of a large group of unicellular micro-organisms lacking organelles and an organized nucleus, including some that can cause disease
- **Carrier:** An individual who is infected and may serve as a reservoir to transmit infection to others. The term may apply to an individual who is convalescing and may have some symptoms, but remains infectious. Duration of the carrier status may be brief (days) or may last for a prolonged period. They may also apply to an individual with a genetic condition who does not personally manifest disease, but who may still transmit the gene to offspring.
- **Endemic/Enzootic:** The normal frequency of disease in a population. There are predictable patterns, e.g., seasonal outbreaks of mosquito-borne diseases such as malaria or seasonal influenza. Endemic disease indicates that the agent and host have adapted to each other over time, and the disease is maintained in a population (without migration or new inputs of the pathogen).

- **Epidemic/ Epizootic:** An increased occurrence of disease compared to what is expected. It indicates an imbalance among the host, the agent and the environment and implies a clustering of cases in time and space. Epidemics may arise from the introduction of a novel pathogen (or strain) to a previously unexposed (naive) population or as a result of the regrowth of susceptible numbers some time after a previous epidemic due to the same infectious agent.
- **Fomite/Vehicle:** An inanimate object, including bedding, utensils or hospital equipment capable of carrying a pathogen and serving as a means for disease transmission.
- **Host:** The host in which a parasite reproduces sexually or asexually. A living organism that is susceptible to or harbors an infectious agent under natural conditions.
- **Incubation Period:** The time that elapses between initial infection and the appearance of symptoms of a disease. Not the same as the latent period.
- **Infective:** Capable of transmitting infection to another host.
- **Immune:** 1) A state in which a host is not susceptible to infection or disease, or 2) the mechanisms by which this is achieved. Immunity is achieved by an individual through one of three routes:
 - *Natural or innate immunity* is inherited or acquired through maternal antibody. Innate immunity may also refer to physiological barriers to infection (e.g., skin, mucous) or protective mechanisms, such as phagocytosis of bacteria or viruses by white blood cells, or enzymatic proteins (e.g., lysozymes).
 - *Acquired immunity* is conferred after contact with an infectious agent or antigen; this process involves two types of lymphocytes: “cell-mediated” immunity (involving T-cells) or “humoral” immunity (B-cells).
 - *Artificial immunity* is a term that may be used to describe immunity after vaccination (e.g., “natural” immunity following infection vs. “artificial” following vaccination.). The term “artificial” may also be used when passive immunity is transferred (e.g., when human immunoglobulin is used to treat infant botulism or immunoglobulin is used with vaccine to prevent rabies).
- **Outbreak:** Occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. Used more commonly for smaller events and may apply to a single case of a high priority infectious disease
- **Outbreak curve** (or epidemic curve): A graphical representation, in the form of a histogram, showing the number of incidents of illness over time.
- **Pandemic:** A widespread epidemic affecting populations in different countries or continents.

- **Parasite:** Any disease-causing organism Different types include:
 - **Macroparasites:** Parasitic helminths and arthropods. In general, parasites that do not multiply within their definitive hosts, but instead produce transmission stages (eggs and larvae) that pass into the external environment.
 - **Microparasites:** Viruses, bacteria, fungi and protozoa. More generally, parasites that multiply within their definitive hosts. Microparasites are characterized by small size, short generation times and a tendency to induce immunity to reinfection in those hosts that survive.
- **Pathogen:** Infectious, biological agent that causes disease or illness to its host.
- **Recovered:** An individual who has contracted an infection, developed symptoms and, after a period of time, is no longer suffering symptoms.
- **Reservoir:** Any person, other animal, plant, soil or substance in which an infectious agent normally lives and multiplies. The reservoir typically harbors the infectious agent without injury to itself and serves as a source from which other individuals can be infected. The infectious agent primarily depends on the reservoir for its survival. It is from the reservoir that the infectious substance is transmitted to another susceptible host.
- **Resistant:** Inaccessible to infection by a pathogen and may refer to antimicrobial resistance among bacteria.
- **Transmission:** The process by which a pathogen passes from a source of infection to a new host. Direct transmission refers to disease-causing microorganisms spread from the infected person to the healthy person via direct physical contact with blood or body fluids. The two major types of transmission are:
 - **Horizontal Transmission:** Transmission occurring generally within a population, but not including vertical transmission.
 - **Vertical Transmission:** Conveyance of an infection from a parent to its unborn offspring. Perinatal infection is a special form of vertical transmission.
- **Vector:** A living vehicle by which infections are transmitted from one host to another (for example, a mosquito or tick).
- **Virus:** An infectious agent that typically is noncellular, consists of a nucleic acid molecule (RNA or DNA) in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host
- **Zoonosis/Zoonoses:** Disease(s) that (are) naturally transmitted between non-human and human animals.

Pop Quiz Idea: Select 10 terms and have students define them.

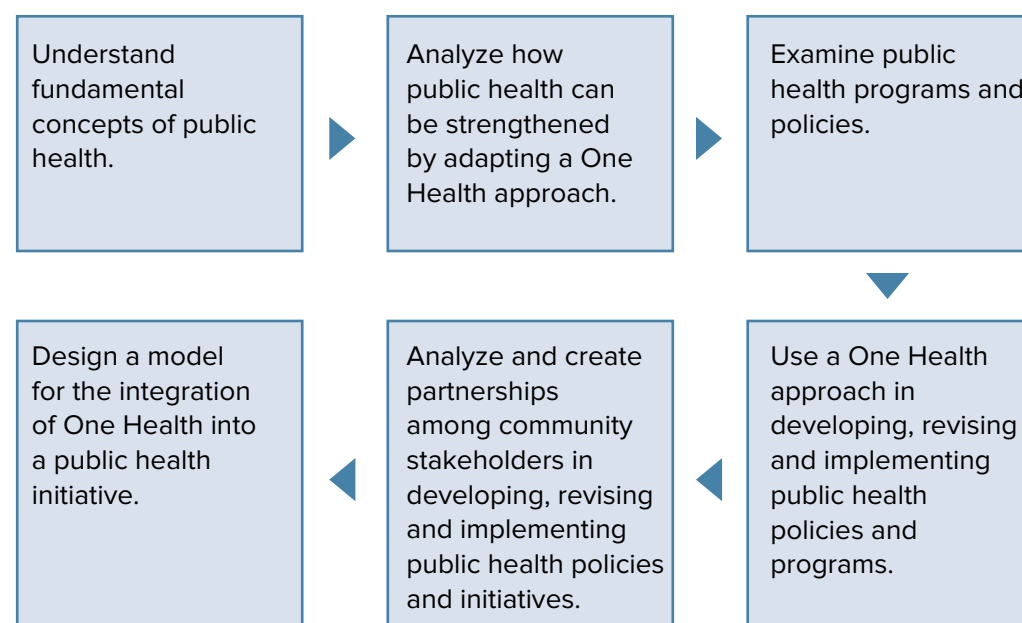
MODULE 5

FUNDAMENTALS OF PUBLIC HEALTH

Course Overview

Module Description and Learning Outcomes	This module fosters an understanding of the basic principles of public health as they relate to the One Health context and approach. By the end of this module, students should have a sufficient understanding of public health to be able to contribute to the development a One Health policy
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Understand public health practice and its relationship to One Health	Understand the breadth and scope of public health practice in a student's country as related to One Health, including: • Environment and public health • Animals, infectious diseases and public health • Domestic animals and public health • Food safety and hygiene • Community health monitoring, disease surveillance, disease investigation and outbreak response
Competency #2	Learning Objectives to Develop Competency
Understand the relationship between government authorities, policymakers, industry and researchers related to implementation of public health programs	Explain how public health programs are developed and implemented for water, food, wildlife, domestic animals, wildlife, etc.
Competency #3	Learning Objectives to Develop Competency
Analyze national or local public health policies	Examine existing national and local public health policies and consider the following questions: • Do policymakers and agencies responsible for public health use OH approaches? Which do and which do not? • Is a OH approach appropriate for the topic or context • Why has a OH approach not been used? • Are there impediments to using a OH approach for the topic or context?
Competency #4	Learning Objectives to Develop Competency
Using systems thinking to analyze/create a public health policy	Use system thinking to develop a new model for regional public health policies and regulations that would promote a OH approach to public health issues: • Who are the stakeholders? • What are the push-pull factors in engaging stakeholders and getting their acceptance?

DISEASE RISK ANALYSIS: A FIELD EXERCISE FOR RISK ASSESSMENT

Learning Objective	Articulate the role and position of public health in a One Health approach
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Design of the Module

This module is designed to present core public health concepts and relate them to the practice of One Health (zoonotic, ecosystems, food and water). The Disease Monitoring & Surveillance and Community Health sessions of this document, which was developed by SEAOHUN, applies and integrates public health concepts into an OH approach. Depending on the skills and experience, a guest lecturer can facilitate the discussion of policy and program development.

Core Competencies for Public Health

- Understand public health practice and its relationship to One Health
- Understand the interrelationships among government authorities, policy makers, industry and researchers related to improving public health and the implementation of public health programs
- Analyze national or local public health policies and activities
- Use system thinking to analyze/create a policy

Interaction to Public Health

Deliver the opening presentation on public health. The lecture will cover the points outline below:

- What is public health?
- What is veterinary public health?
- Who are public health professionals?
- What is eco-health?
- What is One Health?
- What is the history of One Health?
- What is a One Health approach?

ECO-SYSTEM HEALTH, CLIMATE CHANGE AND PUBLIC HEALTH

Learning Objective	- Define the term ecosystem and understand the importance of the relationship between ecosystems and human and animal health - Describe examples of ecological and social changes and their impacts on global health - Explain why and how environmental changes (such as climate change) affect global health
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Introduction to Ecosystem Health, Climate Change and Public Health

Deliver an introductory lecture that covers the topic outlined below. Topics include:

- Overview of ecosystem, its health, & its services
- Ecosystems of South East Asia and Vietnam
- Ecosystem disruptors and stressors
- Ecosystem services and public health
- Climate change effects on environment and public health

Public Health and Climate Change

As a class, discuss the readings about landscape change and climate change. Explore how these changes can impact public health. Then, pose the following question for group discussions, “Why is a OH approach required to effectively address the impact of landscape and climate change on emerging and re-emerging pandemic threats?”

**ANIMALS AND PUBLIC HEALTH
Human/Wildlife Interactions (Zoonoses)**

Learning Objective	- Define the terms ‘zoonoses’ and ‘emerging diseases’ - Explain the importance of zoonoses in One Health and public health - Discuss the key reasons for disease emergence and re-emergence - Provide examples of selected zoonoses pertinent to the region
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Wildlife and Public Health

- Defining the terms - zoonoses, host, agent, vector, reservoir, emerging and re-emerging disease
- Modes of transmission
- History of disease emergence
- Factors associated with disease emergence
- Zoonoses in Southeast Asia (and Vietnam) and its impacts

Rats, Bats, and Primates: Preparation

Divide the class into three teams: Rat, Bats and Primates. You can divide the class randomly by having students select a card, or ask students if they would like to be a certain animal. Before starting the activity, direct students to read the disease overviews included in the reference section of the module. They should identify the following information relating to viruses transmitted in their tax:

- The history of the zoonotic disease
- The reservoirs of zoonotic disease
- Modes of transmission
- Disease characteristics

Taxa	Virus 1
Bats	Nipah, SARS, Hendra
Rats	Leptospirosis, Plague, Hantavirus
Primates	Yellow fever

Students should get in their assigned group and prepare a 10-minute presentation to teach the class about their assigned animal. Each presentation should address the following:

- Common zoonotic viruses found in the taxonomic group (as many as they can cover in the allotted time)
- Transmission routes
- Health effects in humans

Rats, Bats and Primates: Group Presentations

After the presentations, debrief with the following questions:

- What did all the zoonotic disease have in common?
- What made each disease unique?
- How could adopting an OH approach help control an emerging or re-emerging pandemic threat of the diseases?

ANIMALS AND PUBLIC HEALTH Human/Domestic Animal Interactions	
Learning Objective	• Discuss how interactions between humans and domestic animals can affect both human and animal health

Prior to class, have students read the following article and consider the questions outlined below:

- “The origin of human pathogens: evaluating the role of agriculture and domestic animals in the evolution of human disease,” by Jessica M. C. Pearce-Duvet

Guiding Questions:

- How much evidence is there that human pathogens originated from humans?
- What role does animal domestication play in pathogen transmission to humans?
- Do you agree with the author’s conclusion? Why or why not?

Observing Human/Domestic Animal Interaction (Group Activity)

In preparation for the next activity, introduce the concept of photovoice to the students. Photovoice is a method mostly used in the field of community development, public health and education, which combines photography with grassroots social action. Participants are asked to represent their community or point of view by taking photographs, discussing them together, developing narratives to go with their photos, and conducting outreach or other action. What the students will be doing is a modified version of photovoice.

As the facilitator, look for the following answers:

- Workers lacking protective clothing or opportunities for personal hygiene or decontamination on-site
- Inadequate management of animal biosolids, often applied to land without treatment
- Flies and other insects that carry pathogens in and out of facilities through ventilation systems and small openings
- Ventilation with high-volume fans resulting in considerable movement of materials into the external environment
- Show students a series of images that depict human/animal interactions. Ask students for comments on what they see and what they can infer from the images. Divide them into small groups and have them use the internet to create a photoessay that illustrates the following:

- Diseases that have historically been transmitted from animals (pets and livestock) to humans
- If the disease outlines have been sporadic or become pandemics/epidemics
- Common methods of transmission for each disease
- The characteristics of the type(s) of transmission that are most likely to result in large epidemic or even pandemic
- Potential methods of preventing transmission
- In closing the activity, ask the following questions:
- Consider the presentations. What would you modify (add, change, or remove) from your presentations? Why?
- How does understanding human/domestic animal interaction strengthen an understanding of human health?

FOODBORNE DISEASES, FOOD SAFETY AND FOOD PRODUCTION

Learning Objective

- Identify causative agents, sources, habitat and risk factors, and disease burden of food borne illnesses
- Describe good hygienic practices and food safety measures
- Define hazards and critical control points on the food production process

Food-borne Disease and Food Safety - From the Farm to the Fork

- Food-borne illness, common causative disease agents; sources and habitat and risk factors for food-borne illnesses
- Food production (chain and factors) that are associated with microbial growth
- Details on good hygienic practices and Hazard Analysis and Critical Control Point (HACCP) from purchase to table

****Note:** The Module includes a video on “Introduction to Food Safety” (<http://www.youtube.com/watch?v=HqFPFsJo9zA>)

Assessing Hygiene and Sanitation

Divide the class into three groups and assign one of the following food industries to each group:

- Slaughterhouses/abattoirs (chicken, cattle, sheep, pig)
- Food industry (milk, meat, egg)
- Market (many foodstuffs)

Have each group brainstorm how they would assess the hygiene and sanitation of the industry and then create a list of practical steps or actions. Collect the lists and post them on the wall. Have each group explain their hygiene and sanitation lists and ask clarifying questions or offer suggestions.

Food Safety and Sanitation: Good Manufacturing Practices (GMPs) Checklists

As you review the items:

- Explain why each item is important
- Give examples
- Share experiences from inspections that you have made or read about, giving examples of the criteria used and situations faced in the field

*****Note:** Food and safety checklists are often established by national governments so you should research checklists that are used for your country. GMP checklists are often found on the websites of ministries/bureaus of agriculture, food, rural development, and/or health

A sample checklist is provided below

Food Safety and Sanitation

Checklist for Good Manufacturing Practices (GMPs): Building and Facilities

Criteria	Good	Needs Work
Is the area around your firm clear of litter, weeds, grass and brush?		
Is there any standing water on your grounds (which also attract pests)?		
Are floors, wall, ceiling, windows and screens properly maintained and cleaned?		
Do production area doors and windows to the outside have fine mesh screens to keep out insects? If not are they tightly sealed?		
Is there any evidence of the presence of domestic animals, such as cats or dogs?		
Are restrooms cleaned regularly? Are there hand washing stations with soap and paper or hand dryers?		
Are there any leaks in the roof, skylights, windows, screens or overhead piping?		

Total Checked:

Checklist for GMPs: Production and Process Control**Criteria****Good****Needs Work**

- Are products and stocks stored on the first-in/first-out basis to reduce contamination and/or spoilage?
- Are all incoming products dated to ensure a proper rotation of stocks and for internal tracking purpose
- Are items overstocked?
- Are incoming vehicles inspected?
- Are dusty, faded or discolored containers checked regularly?
- Are such quarantined items disposed of quickly to prevent the development of pest breeding places
- Are incoming materials inspected so that damaged or contaminated items can be rejected?
- Are unused materials properly resealed to prevent contamination?
- Are materials stored in a safe manner?
- Do you have an effective recall procedure in place?

Total Checked:**Checklist for GMPs: Equipment****Criteria****Good****Needs Work**

- Is all equipment that comes in contact with food cleaned and sanitized as often as necessary to prevent contamination of the product?
- Is there a build-up of food or other material on the equipment?
- Is the equipment hard to disassemble for clean-up and inspection?
- Is there a lot of “dead space” in or around the machinery where food and other debris can collect as a nest for insects and bacteria?
- Can the surface of the equipment be sanitized?

Total Checked:**Checklist for GMPs: Personal Hygiene****Criteria****Good****Needs Work**

- Are the employees well-trained in what they do?
- In handling food products, do your employees wear the proper hair covering, breast covering, disposable gloves and clean uniform?
- Are your employees wearing jewelry, rings, watches, fingernail polish or bandages?
- Do your employees have any illness, infections or injuries that could contaminate the production area?
- Do your employees wash and sanitize their hands after each visit to the toilet?
- Do your employees maintain clean personal habits?
- Do visitors wear proper outfits and helmets?

Total Checked:**Checklist for GMPs: Sanitation Operations - Pest Control****Criteria****Good****Needs Work**

- Do you have professional pest control services?
- Do you check regularly on what the pest control operator is doing?
- Do you have documentation on what chemicals are being used?
- Are mites, weevils or roaches apparent in the plant?
- Are the pest control logs and documentation readily available?
- Are pesticides or application equipment stored safely?
- Are products stored on a pallet and at least 18 inches away from the walls?
- Is your facility well maintained?

Total Checked:

Checklist for GMPs: Sanitation Facilities and Control

Criteria	Good	Needs Work
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- | | | |
|---|--|--|
| • Are trash, debris and clutter picked up, both inside and outside the plant\? | | |
| • Do employees eat, drink and use tobacco products in designated areas and not in production areas or warehouses? | | |
| • Is the food spilled or uneaten by employees cleaned up quickly so as not to attract pests or bacteria? | | |
| • Is the garbage quickly removed and dumped in appropriate bins? | | |
| • Is the garbage kept covered? | | |
| • Is the water used in your firm from an approved source? | | |

Total Checked:**Checklist for GMPs: Sanitary Procedures for Cleaning and Sanitizing**

Criteria	Good	Need Work
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- | | | |
|--|--|--|
| • Is the equipment disassembled? | | |
| • Is product debris removed? | | |
| • Is the equipment sanitized with an approved sanitizer and rinsed with potable water, if required | | |
| • Are facilities cleaned with an approved cleaner, according to the manufacturers' directions/instructions? | | |
| • Are facilities rinsed with potable water, as necessary? | | |
| • Do the employees clean hands, arms, gloves, aprons, boots, etc. as often as necessary during the handling procedures? | | |
| • Do the employees clean and then sanitize any equipment as often as necessary during handling procedures to prevent contamination of food or packaging materials? | | |

Total Checked**Checklist for GMPs: Hazard Analysis and Hazard Plans**

Criteria	Good	Needs Work
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- | | | |
|--|--|--|
| • Does the hazard analysis include food safety hazards? | | |
| • Does the hazard analysis include a flow chart that describes (diagrams) the steps of each process and product flow in the establishment? | | |
| • Does the hazard analysis identify the intended use or consumers of finished product(s)? | | |
| • Does the Hazard Analysis and Critical Control Point (HACCP) plan list the food safety hazard(s) identified in the hazard analysis? | | |
| • Does the HACCP plan list critical control points (CCPs) to each food safety hazard? | | |
| • Does the HACCP plan list critical limits to be met at each CCP? | | |
| • Does the HACCP plan list the procedures to be used to monitor each CCP and the frequency with which these procedures will be performed? | | |
| • Does the HACCP plan identify the corrective action to be followed in response to a deviation from a critical limit at a CCP? | | |

Total Checked:

Conclude the session by discussing the following questions:

- How can good hygiene and sanitation in the food industry positively impact human health?
- How is HACCP related to public health?
- What zoonotic diseases are of animal origin and can be transmitted through foods?
- Should hygiene and sanitation be regularly monitored, or is a single inspection or evaluation adequate?

WATER QUALITY, SANITATION AND WATERBORNE DISEASE**Learning Objective**

- Describe the importance of water quality and sanitation in relation to human health
- Describe water sources, uses, infrastructure and threats to water quality
- Explain the global status of drinking water and sanitation
- Discuss the relationship between water and health
- Give examples of water borne disease and their associated pathogens

Introduction to Water Quality, Sanitation and Waterborne Disease

In this lecture, you will cover the following topics:

- Water sources and uses
- Water cycle and its role in health
- Water as a human right
- Drinking water – global perspective
- Sanitation – global perspective
- Water infrastructure and threats to water quality
- Threats to water quality
- Waterborne diseases and pathogens

Prior to the class, select one of the exercises below to conduct as part of the lecture. Select the activity based on the experience level of your class.

Option 1 – Novice Level

Tell students to explore the following two questions:

- What is the burden of disease associated with waterborne diseases that occur in your area? Direct students to the following website for research: <http://apps.who.int/gho/data/node.main.168?lang=e>.
- What are some of the most prevalent/important waterborne diseases in the region? Direct students to ProMed-Mail or the country's epidemiological website.

Option 2 – Intermediate Level

Divide the class into two groups and distribute a different waterborne disease fact sheet to each group. Ask the group to become familiar with how the pathogen is transmitted and then discuss how the government regulates the transmission pathways.

Assign one of the following questions to each student in the group and have them share their findings with the class. Have them conduct research on the internet:

- What regulatory control measures exist for the pathogen where it naturally resides?
- What control measures are in place to prevent the pathogen from entering water bodies or the food supply chain?

- Are there measures to effectively prevent the pathogen's transmission if it enters the food supply chain?
- Are there measures to prevent transmission of the pathogen in the water supply?
- Are there measures to prevent the pathogen from causing infection when you go out to eat?
- What happens if there is an outbreak?

DISEASE MONITORING AND SURVEILLANCE: Basic Epidemiological Terms/Disease Investigation	
Learning Objective	• Describe the principles of basic epidemiology and discuss its application in disease surveillance and monitoring

In preparation for the Contagious Classroom exercise, gather the materials outlined below:

- Test tube/cups and dropper/transfer pipette for each participant.
- Distilled water. You will need enough distilled water to fill each student's container about half full; volume depends upon the size of the container you use.
 - o molar sodium hydroxide (NaOH).
- Phenolphthalein solution, dissolved in alcohol and diluted in water (pH indicator).

Prior to the start of the class, complete the following steps:

- Fill one container halfway with 0.1 molar NaOH and fill the rest of the containers halfway with distilled water.
- You may number each container for clarity and to illustrate "confidentiality" of data collection as the exercise unfolds.
- If you have a large group (30 to 35 or more) you may want to begin with two test tubes containing NaOH. The final number of "infected" test tubes will vary depending on (1) the number of trades and (2) how many trades occur between two already infected tubes.

Epidemiological Definitions

- **Epidemiology:** The study of how disease is distributed in populations and of the factors that influence or determine this distribution.
- **Endemic:** The habitual presence of a disease within a given geographic area.
- **Epidemic:** The occurrence in a community or region of illnesses or similar nature, clearly in excess of "normal" or "expected" rates, and derived from a common or a propagated source.

- **Incidence:** The number of new cases of a disease that occur during a specific period of time in a population at risk for developing the disease.
- **Prevalence:** The number of affected persons present in the population at a specific time divided by the number of persons in the population at that time.
- **Passive Surveillance:** Routine reporting of cases of disease.
- **Notifiable Diseases:** Every country has a list of diseases that must be reported to health departments.
- **Active Surveillance:** Proactively seeking out cases of a specific disease in an area; this could be through door-to-door surveys or by contacting health care providers or health facilities.

The Contagious Classroom: Simulating an Epidemic/Outbreak

In this activity, participants will model the transmission of a disease. They will exchange some of their containers' contents with that of the other participants. Mention that one of the containers is 'infected' with an imaginary infectious disease.

Before starting the activity be sure to give students the following warning:

*Sodium hydroxide (NaOH) and phenolphthalein can irritate the eyes and skin. Avoid spilling and **NEVER** drink what is in the containers. Be careful **NOT** to touch the other person's fluid when exchanging drops.*

Distribute pre-prepared containers and droppers to the class. Make a mental note of who receives the test tube containing the NaOH. Have participants walk around the room with their containers and test tubes. When you say "Stop!", each participant should use a dropper/pipette to trade fluid (several drops, half a pipette—be specific) with the person nearest to them. Repeat until at least three trades have occurred. Then test the imaginary infection. Put a drop of phenolphthalein in each container. If the fluid turns pink, the container is "infected" with NaOH. How many participants are now "infected"?

The Contagious Classroom: Tracing the Source of Infection

Now that a portion of the group has been "infected," put participants in the role of epidemiologists. Their challenge is to collect data that will help them trace the path, locate the original carriers and describe the outbreak using appropriate terms. Use the data to try to deduce which individual was the original carrier of the disease. Have the class consider the following questions:

- Why might it be important to locate the source of infection?

- What difficulties arise in trying to collect and interpret data? Note that the simulated disease has a 100% rate of infection that appears immediately under testing. Some infections, such as HIV and chicken pox, can remain dormant in the body for a long time. Others, such as Ebola, kill the host rapidly.
- How might each of these factors affect the spread of disease and the ability to identify carriers?

A possible method to find "patient zero" is to have each participant write his or her container number or name on the board and underneath it the names or numbers of participants with whom he or she exchanged fluids in the order in which the exchanges occurred. Then, as a group, highlight the names of the currently "infected" (shown in bold in sample).

This visual representation can help clarify which participants may have infected one another, and in what order. Participants who "test positive" and find that everyone with whom they traded also tested positive may be original carriers of the disease. There will be several candidates for "patient zero." Cross-checking the history of each contact can narrow the field, but probably not to fewer than two candidates. If participants are unable to reach a clear conclusion, the exercise will raise useful questions about the challenges facing real epidemiologists and tracing the sources of an infection.

The data gathered on the classroom "outbreak" can be used in a variety of ways. Examples include:

- Have students calculate incidence (for example, number of cases per round of contact divided by the total number of persons participating in the round; you may imagine that each round represents a day, a week, etc.)
- Have students calculate prevalence (total number of cases [all rounds] divided by total number of participants).

DISEASE MONITORING AND SURVEILLANCE: Local and Global Disease Surveillance	
Learning Objective	• Build the skills and knowledge necessary to critically analyze available disease surveillance information (local and global) and resources to determine the key issues and stakeholders involved in disease trends, and outbreaks or epidemics

Prior to the class, ask students to explore the following disease surveillance websites and have students consider the following questions:

- What is the purpose of the website?

- Is the website considered a primary source? Where does the website get its data/information from?
- Do you think it is a source to reference if you are trying to determine if there has been an outbreak?
- Who might access the website? When would they access it?

Disease Surveillance Websites

- World Health Organization (WHO) – Global Health Observatory: http://www.who.int/gho/publications/world_health_statistics/2013/en/
- U.S. Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report: <http://www.cdc.gov/mmwr/>
- Promed: <http://www.promedmail.org/>
- Health Map: <http://healthmap.org/en/>
- Global alert and response: <http://www.who.int/csr/en/>
- Google flu: <http://www.google.org/flutrends/about/how.html>
- Mekong Basin Disease Surveillance: http://www.mbdsoffice.com/index_vn.php

Local and Global Disease Surveillance Research

Ask students to report on what they found during their homework exercise. The objectives of this exercise are for them to build a library of resources for themselves and have them understand the limitations of each website. Make sure that students understand the different primary sources of the information they are viewing on the websites.

COMMUNITY HEALTH	
Learning Objective	• Examine community health from an OH perspective

Class Preparation for Community Observations

There are many ways to perform an assessment of community health. Students will focus on investigating the One Health aspects of community health within their community (i.e., their campus or training facility, etc.). It will be a combination of knowledge, observations and checklists to investigate the following:

- The community
- Domestic animals
- Their relation to the environment
- Wildlife

As a large group, have students brainstorm a checklist to use during the community health assessment. The checklist should be used to evaluate how and where the community is vulnerable to exposure from environmental and zoonotic pathogens. Refer students to the example checklists (see below). Ask students to keep the following questions in mind during the assessment.

- What is the relationship of the on-campus community with the environment?
- What is the relationship of the on-campus community with wildlife and domestic animals?

Campus Assessment - Sample Checklist

COMMUNITY HEALTH - Sample Checklist
• Are pest control/management measures in place to minimize interaction with wildlife or to prevent wildlife from accessing the facilities? • Do on-site features exist that could attract wildlife (food storage, food waste storage, waste accumulation, open water sources, agricultural production, livestock, pets)? Do they address: • Food storage protection provisions • Food waste storage and disposal • Housing protection • Safe removal of animal droppings and nests • Controls at disposal areas • Food crop protection • Livestock protection Are specific measures in place to address the following: • Rodents • Bats • Non-human primates • Other species of concern: _____

ON-SITE INFRASTRUCTURE

ON-SITE HOUSING

- Pests can reside in housing. In addition, inadequate space, food storage, sanitation, etc. can amplify any disease incident.
- Are student housed on-site?
- Are there adequate beds for the number of students?
- Are washing facilities adequate?
- Are sanitation facilities adequate?
- Are waste disposal facilities sufficient?

FOOD

- Are students fed on campus?
- Is a Hazard Analysis Critical Control Point (HACCP) system or comparable food safety program in place? (See: <http://www.fda.gov/food/guidanceregulation/haccp/ucm2006800.htm>)
- Are WHO's Five Keys to Safer Food implemented? (See: <http://www.who.int/foodsafety/consumer/5keys/en/>)
- Is food stored in rodent-proof locations or containers?
- Are measures in place to ensure that meat is bought only from vendors who do not sell bushmeat?
- Are measures in place to inspect fruits and vegetables to prevent serving food that has been contaminated by animals (presence of feces, bite marks)?

WATER

- Is the site checked regularly for standing/stagnant water, structures, or debris that can act as insect breeding areas?
- Do workers have access to an adequate and convenient supply of free potable water, and is it always available to workers?
- Does drinking water meet national/local or WHO drinking water standards?
- Is drinking water quality monitored or treated regularly?
- Are water storage tanks that are used for drinking water covered to prevent the water from becoming polluted or contaminated?

SOLID WASTE

- Are wastewater, sewage, food and any other waste materials disposed of according to local or World Bank standards?
- Are containers for trash collection provided and emptied on a regular basis?
- Is pest/vector control and disinfection conducted throughout the living facilities?

TERRESTRIAL BIOLOGICAL RESOURCES

- Loss of vegetation/habitat and creation of edge effect
- Are measures in place to minimize additional loss of wildlife habitat/fragmentation?
- Are measures in place to re-vegetate areas disturbed by construction or maintenance using native vegetation?
- Are plans in place to manage natural vegetation in areas adjacent to cleared areas/the project site?

Biodiversity Monitoring

- Are measures in place to minimize wildlife disturbance (e.g., migration)?
- Is a biodiversity monitoring plan in place?
- If yes, has it been integrated with operations to ensure the appropriate best management practices (BMPs) are in place?
- Are measures in place to address biodiversity loss?

Local Relationship with Wildlife

Yes

No

N/A

1. Are local wildlife possible carriers of zoonotic diseases?
2. Is bushmeat used as a source of protein?
 - A) What species are hunted?
 - B) What's their definition of bushmeat?
3. How are bushmeat/domestic animals harvested?
4. How are bushmeat/domestic animals transported?
5. How are bushmeat/domestic animals prepared?

Community Health Campus Assessment Debrief

After the assessment is complete, have students share and compare their observations. As a class, come to an agreement on three top issues that the campus needs to address to become more “One Health” inclusive. Follow up with a list of recommendations to address these issues.

POLICIES AND PROGRAMS	
Learning Objective	Understand the relationships among government ministries, local organizations, policies, and programs

Policies and Programs

Students work in pairs to complete the table, identifying the different governmental organizations in the local country that have policies on the following topics:

- Water consumption/ use
- Grains/fruits/vegetables
- Cow/pig/poultry
- Cat/dog/exotic animals
- Bats/primates
- Rodents

Then, student-pairs should identify sources/information for each topic area:

- Public health policy or policies
- Implementing agency or agencies
- Program(s)
- Stakeholders

Fill in the table with an example of a program and policy for each category. Aside from the government organizations, brainstorm with students about who the likely stakeholders are that would take an interest in potential policy about the topic.

*** Note: This table is meant to serve as an example, but will have to be modified for different countries because the names and jurisdictions may differ. If you do not feel comfortable discussing policy and program development, invite someone in the government or in the public policy branch of the university to act as a guest facilitator/lecturer. The guest lecturer who has experience in policy and program development should facilitate the discussion or contribute to the discussion to ensure that it is relevant to the country. The discussion should touch on the traditional way(s) that public health policies and programs are developed. What is a policy? What is a program? The facilitator should ensure that students know the differences between a policy and a program and what it takes to develop each.

Presentation

Have the headers and row labels for the table below on a whiteboard. As the pairs of students present their findings, add to the table.

Resource	Topic	Ministry	Policy	Implementing Agency	Program	Stakeholders
Water Sanitation	Consumption/ Use	Ministries of Natural Resources, Agriculture				Municipal users, farmers, industry
	Quality	Ministries of Health, Environment				Municipal and rural users, farmers, fishermen
	Quantity	Ministry of Natural Resources				All users, developers
Fruits and Vegetables	Production	Ministry of Agriculture				Farmers, wholesalers, distributors, consumers
	Pesticide or fertilizer use	Ministries of Agriculture, Environment				Farmers; pesticide producers, distributors; fertilizer producers, distributors; consumers
	Runoff/ Wastewater	Ministry of the Environment, Municipalities				River users, ocean users
	Water use	Ministry of Environment				Farmers
Cows and Pigs	Production	Ministry of Agriculture				Ministry of Agriculture
	Water use	Ministries of Environment, Natural Resources				Ministries of Environment, Natural Resources
	Runoff/ Wastewater	Ministries of Environment, Agriculture				Ministries of Environment, Agriculture
	Waste disposal	Ministries of Environment, Natural Resources				Ministries of Environment, Natural Resources

Cats and Dogs	Sale	Ministry of Commerce				Pet owners, pet wholesalers
	Feral	Ministry of Health, local animal control offices				Citizens in areas where feral animals are present
	Waste	Local Sanitation Department				
Rodents	Rodent-control urban	Ministry of Health				Urban residents
	Rodent-control in agricultural areas	Ministry of Agriculture				Farmers
	Rodent-borne diseases	Ministry of Health				People in areas where bats are present.
Bats	Conservation	Ministry of Natural Resources				Environmentalists
	Bats as pests	Ministry of Agriculture				Fruit farmers, residents in areas with bats
	Bat-borne disease	Ministry of Health				Residents in areas with bats

TAKING A ONE HEALTH						
Learning Objective	Understand the relationships among government ministries, local organizations, policies, and programs					

Using the table from the previous session, examine the public health policies and programs listed, and for each, review the following questions:

- Did the policymakers use an OH approach? Which do? Which do not?
- Is an OH approach appropriate for updating this policy?
- If an OH approach hasn't been used to date, what are the reasons?
- Are there obstacles to using an OH approach for this policy?

After all policies and programs are reviewed, have the students identify three of the most critical public health policies (or programs) that would benefit from an OH approach. Have the students develop a plan to implement an OH approach for one

of the policies they feel should be pursued using an OH approach. The final paper should be 10-12 pages and should:

- Describe an existing program that would benefit from an OH approach, including who is responsible to implement and who are the recipients of the program.
- Describe the success and failures of the current program.
- Describe any gaps in coverage of the program.
- Outline how this program could be improved using an OH approach and how that could be realized.

SYSTEMS THINKING	
Building Stakeholder Consensus Using an OH Approach to a Public Health Issue	
Learning Objective	Apply systems thinking to analyze a public health issue using an One Health approach

Stakeholder Consensus Building Role Play: Preparation

Explain to students that they will engage in a role play on developing a bat conservation/management/control policy. Assign students into the following groups:

- Environmental Non-Governmental Organization (Bat Conservation International, World Wildlife Fund)
- Ministry of Agriculture/ Fruit Crop Growers
- Ministry of Health
- Indigenous Population/Guano Harvesters
- Ministry of Commerce and Tourism
- University Department of Wildlife/National Research Center
- Ministry of Natural Resources

For the next 15 minutes, individuals will read the appropriate scenario and consider their position on bat conservation/ management/control. They should consider the following questions:

- In an ideal world, what would you like the policy to be?
- What issues are you willing to compromise on?
- What issues are you not willing to compromise on?
- After the period of individual reflection, have students spend 15 minutes in their stakeholder groups planning how they will proceed with the scenario.

Atangua Nipah Virus – Case Study

Atangua is an island nation that is located 20 miles offshore of Malindo and known for its natural beauty because it is covered with rainforests and encircled by mangroves. It has several indigenous groups that subsist on forest and sea products. There are two urban centers that are growing. Industries on the island include tourism, fisheries, flower production, mango production and guano mining. A developer is proposing to build a high-end luxury resort within the rainforest. As a result of fires in the tropical rainforest, some bats have begun to eat mangos in the mango orchards. Angry farmers have begun shooting at the bats to discourage them from eating the mangos. Bats are protected species and only indigenous populations are allowed to hunt them for rituals and for eating. Bats play an important role in pollinating and seed dispersal for rainforest trees. Among the indigenous population, fruit bats are considered sacred. They also harvest guano as a source of income.

An outbreak of Nipah has occurred on the mainland among people who harvest date palm sap. Date palm sap is consumed widely among the population of Atangua. The tourism bureau of the country is afraid that the fear of Nipah virus will discourage tourists from coming to the island. The resort developer is threatening not to build the resort unless bats are removed from a 10-square-mile radius from the resort area. The Governor has assembled a group of committees to address the bat conservation management issue with the mandate that, by the end of the session, they must have a framework for the bat policy. Each person must assume a role and advocate on his/her behalf.

The Governor will hear the positions of each group for 3 minutes. The facilitator will write on flipcharts the position of each group and their proposal. The facilitator will have groups with opposing policies or views to meet, to arrive at a consensus, and to cooperatively develop a bat policy that will be implemented on the island.

Role Play

Take 30 minutes to conduct the following role playing scenario. Please note that there are not correct answers in this scenario. The purpose is to help students understand the stakeholders involved in developing a policy if an OH approach was taken and to help them understand how the various views and objectives of various stakeholders can play out. Debrief the session with the following questions:

- What happened during the meeting?
- What are the results of the meeting?
- Are you satisfied with the outcome? If, yes, why? If not, why?
- Were you able to successfully reach consensus and create a One Health policy?
- What do you feel are the strengths of the policy?
- What areas do you feel still need to be strengthened?

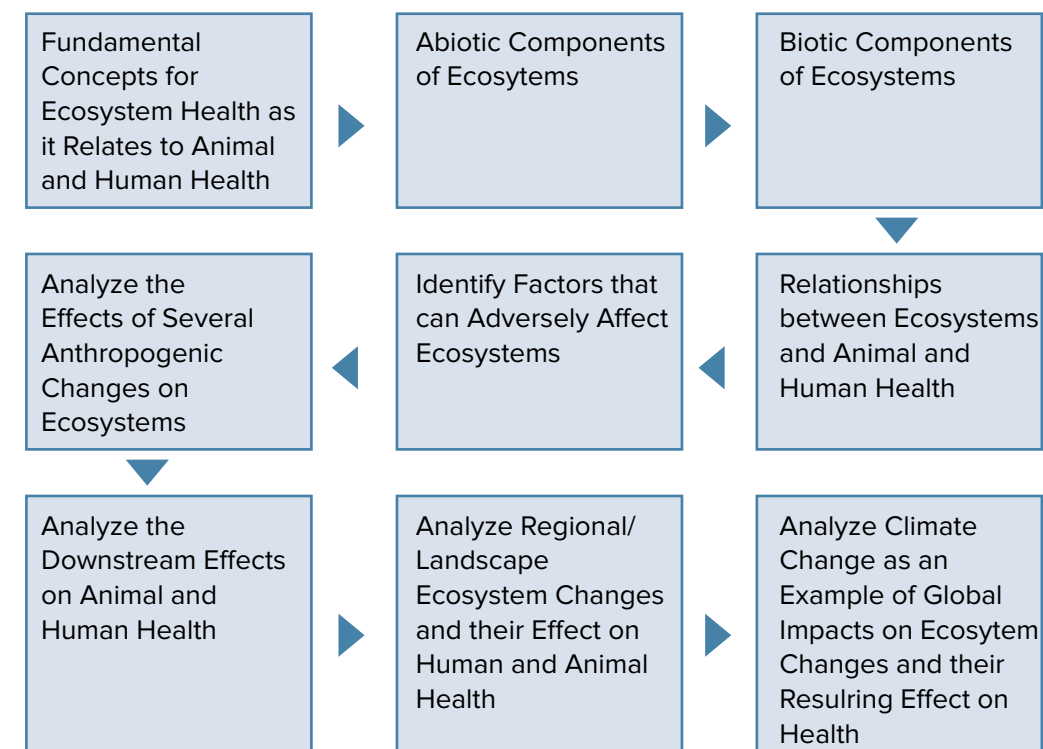
MODULE 6 ECOSYSTEM HEALTH

Course Overview

Module Description and Learning Outcomes

This module fosters an understanding of the basic principles of ecosystem health in the context of OH. At the end of the course, students should have a sufficient understanding of ecosystems dynamics so that they can work with environmental professionals to analyze how natural and anthropogenic changes to the environment that can affect animal and human health, locally, regionally, and nationally. At the end of the class, the student should know how to look for the answers, when to call in a professional and have the vocabulary and sufficient background knowledge to be able to work with professionals.

Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Understand fundamental ecological/ecosystem principles	Understand basic ecological and ecosystem principles related to human health by being able to describe: • Abiotic components of an ecosystem: water, carbon and nitrogen • Biotic components of an ecosystem such as trophic levels, including primary and secondary producers, and consumers
Competency #2	Learning Objectives to Develop Competency
Recognize interrelationships among ecosystems, animal health and human health	Be able to explain how ecosystem health affects animal and human health. • Air quality • Water equality • Soil • Habitat • Biodiversity • Role of underdeveloped areas in cultural, spiritual wellbeing
Competency #3	Learning Objectives to Develop Competency
Analyze the effects of direct impacts on the environment	Analyze how anthropogenic and natural changes directly affect ecosystems and that can affect animal and human health: • Forest conversion • Industrial and urban development • Natural disasters

INTRODUCTION TO ECOSYSTEM HEALTH

Learning Objective	• Describe the basic principles of ecosystems • Present the scope and objectives of the class
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Prior to class, have students read the following article. The article will likely be difficult to understand, but it covers most of the critical concepts and overarching themes of this module. It will give students an excellent overview and they should be able to fully grasp it by the end of the course.

- “Assessing Ecosystem Health,” by D.J. Rapport, R. Constanza, and A.J. McMichael. TREE v. 13, no. 10 October 1998

Ask the class the following questions and record their answers on a flip chart or whiteboard:

- What do you think a healthy ecosystem looks like?
- What are some examples from the article of things that can affect ecosystem health?

Introduction to Ecosystem Health

Give a brief introduction to ecosystems, ecosystem health and the relationship of ecosystems and One Health. In this lecture, you will cover the following topics:

- Definition of an Ecosystems, Ecosystem Health and Biodiversity
- Primary Attributes of an Ecosystem
- Components, Structures and Functions of an Ecosystem
- Ecosystems and One Health

Ask the class to respond to the following questions:

- What are the ecosystems in the area around this university?
- How do you derive benefits from these ecosystems?
- How does your health depend on ecosystems?

Ecosystem Health Module Core Competencies

- Understand fundamental ecological/ecosystem principles
- Recognize interrelationships among ecosystems, animal health and human health
- Analyze the effects of direct impacts on the environment

Abiotic Cycles Homework Groups

Divide students into three groups and assign each group one of the three abiotic cycles: water, carbon, or nitrogen. Each group is required to review the topic and deliver a presentation to the class on the subject. They can use the Abiotic Cycles in the Module PowerPoint as a starting point. Each group should be prepared to discuss the importance of the cycles and the effects that disruptions in the cycles can have on human and animal health.

ABIOTIC CYCLES

Learning Objective

- Describe abiotic cycles of an ecosystem: water, carbon and nitrogen

Read: "Deforestation and Malaria: Revising the Human Ecology Perspective" (Pattanayak, Subhrendu K., and Yasuoka, Junko)

Introduction to Abiotic Cycles

Begin the session by outlining the concepts that will be covered in this session:

1. Ecology, ecosystem, and ecosystem ecology
2. Abiotic cycles (water, carbon, and nitrogen)
3. How physical and chemical factors make up its non-living or abiotic environment

Abiotic Cycles: Water, Carbon and Nitrogen

Following the introduction, give students a few minutes to meet with their homework groups and prepare their presentations. Each group will present on their assigned topic and, following each presentation, the class will discuss the importance of each cycle and how disruptions to the cycle can affect human and animal health.



***Note: As the facilitator, you should review the notes section of the Module PowerPoint, prior to class and make sure that the student presentations cover each critical topic and that their facts are accurate. At a minimum, the presentation must cover the terms and concepts outlined below.

Abiotic Cycle: Water

- The different forms of precipitation
- Surface water
- Springs

Abiotic Cycle: Carbon

- Infiltration/percolation
- Groundwater
- Glaciers

Abiotic Cycle: Nitrogen

- Interception
- Transpiration
- Pool/reservoir
- Sources
- Denitrification
- Nitrification
- Plant Update/Crop Removal
- Evaporation
- Aquifer
- Carbon dioxide (CO₂)
- Sinks
- Fixation
- Leaching

BIOTIC CYCLES, FOOD WEBS AND SOUTHEAST ASIAN ECOSYSTEMS

Learning Objective

- Explain the concept of biotic cycles and food webs
- Demonstrate how those apply to the major South East Asian ecosystems
- Discuss the basic dynamics of mangroves, tropical rainforests, and coral reefs

Overview of Biotic Cycles, Food Webs and Southeast Asian Ecosystems

Deliver a lecture on biotic cycles that cover the following topics:

- Ecosystem components: Abiotic and Biotic cycles
- The energy cycle
- Trophic levels
- Food chains and food webs
- Southeast Asian ecosystems
- Ecosystem services
- Ecosystem value

Ecosystem Food Web Presentations Assignment

After the lecture, divide students into three teams and tell them that each team will take on the role of one of the Southeast Asian ecosystems - mangroves, tropical rainforests, and coral reefs. They are responsible for becoming experts on the ecosystem and must understand the following aspect:

- Nutrient cycling
- Status in their country (as applicable)
- The food web
- The threats to the ecosystem

- Services that the ecosystem provides
- Disruptions in ecosystems
- How the ecosystem interacts with animal and human health

For the next class, each team must present to the class a food web for their ecosystem. Students should conduct research in a library or online and ensure that all information is correct. Often, overviews of an ecosystem found online or in a book can include animals and plants that are not located in Southeast Asia. Students must make sure the food web is accurate for their area in Vietnam. Students should visit the following sites to conduct their research:

- Food and Agriculture Organization of the United Nations (FAO) – www.fao.org
- Science Direct – www.sciencedirect.com
- World Resources Institute (WRI) – www.wri.org

ECOSYSTEMS OF SOUTHEAST ASIA Values and Services	
Learning Objective	• Identify and compare values and services of ecosystems in Southeast Asia • Appreciate the differences in values and services of each country in Southeast Asia

In addition to preparing the Ecosystem Food Web Presentations, students should review the following documents:

- Skim Reading – Ecosystems and human well-being: health synthesis. World Health Organization (2005)
- Skim Reading – The value of the world's ecosystem services and natural capital, Costanza, R., d'Arge, R., de Groot, R. (1997)
- Skim Reading – Ecosystem functions and services in Sodhi, N.S. and Ehrlich P.R. Conservation Biology for All.

Ecosystem Food Web Presentations

Have students deliver their presentations assigned as homework in the previous session. Take time after each presentation to allow the audience to ask questions.

The History of Environmental Movements and Increasing Focus on Environmental Issues

In the U.S., it was catalyzed by Earth Day - April 22, 1970. The environmental movement has varied throughout the world and has reflected country-specific issues, such

as dams, deforestation, industrial contamination, air pollution, oil and gas drilling, mining, and nuclear power. As more attention has been brought to environmental issues, more funding has been spent to provide scientific evidence of the value of ecosystem services

As result of the Exxon Valdez disaster in Alaska in 1989, there has been a focus on providing an economic value on the services that ecosystems provide as well as providing the value of an animal. This is done in a field called environmental economics. Aside from the economic value, the various components of ecosystems play roles within ecosystems that can be critical to their functioning as we discussed in the class on abiotic and biotic cycles.

Current programs to value ecosystems services include REDD and REDD+. Both are UN-sponsored programs that are gaining support world-wide. Below is a description of them.

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (UN REDD Programme 2013. About REDD+. Accessed from <http://www.un-redd.org/AboutREDD/tabid/102614/Default.aspx>)

REDD+ Deforestation and forest degradation, through agricultural expansion, conversion to pastureland, infrastructure development, destructive logging, fires etc., account for nearly 20% of global greenhouse gas emissions, more than the entire global transportation sector and second only to the energy sector. It is now clear that in order to constrain the impacts of climate change within limits that society will reasonably be able to tolerate, the global average temperatures must be stabilized within two degrees Celsius. This will be practically impossible to achieve without reducing emissions from the forest sector, in addition to other mitigation actions. (UN REDD Programme 2013. About REDD+. Accessed from <http://www.un-redd.org/AboutREDD/tabid/102614/Default.aspx>)

These programs aim to mainstream the value of ecosystem services. Ecosystem services contribute to environmental and human health, and human well-being by providing benefits, such as clean air, water, and fertile soil for crop production, pollination, and flood control.

Ecosystem Services	
Fresh Water	The hydrological cycle is regulated by the natural functions of ecosystems and associated geophysical processes (e.g., evaporation and the climate system). For example, wetlands filter fresh water by removing pollutants such as chemicals and toxic elements. Water availability is important and if scarce, jeopardizes food production, human health, economic development and geopolitical stability.
Food	Terrestrial and marine ecosystems, both wild and managed, are sources of food and therefore provide a healthy life for humans. In rural areas, human populations rely on locally productive ecosystems that provide sources for basic nutrition. In urban areas, humans rely on local, regional and global productive ecosystems.
Timber, Fiber, Fuel	Over half of the world's population relies on solid fuels that are direct products of ecosystems for cooking and heating. Fuels include wood, crop stubble and animal dung.
Biological Products	Many products found in ecosystems contain medicinal properties that are used for human health care. Medical and pharmacological discoveries continue, especially in areas of high biodiversity.
Regulation of Infectious Disease	Intact ecosystems constrain viruses, bacteria, and other microbes and parasites geographically and seasonally.
Nutrient and Waste Management	Ecosystems recycle and redistribute nutrients, which helps maintain healthy flora and fauna.
Climate Regulation	Regional climate conditions are specific to the type of ecosystem present. Ecosystem services are sensitive to climatic conditions.

Ecosystem Values

Conclude the lecture with a review of ecosystem values. Inform the class that humans and communities attain many benefits from ecosystems, which relates to health. A good ecosystem can improve mental health, provide a subjective sense of culture and place, and enhance knowledge of natural and social sciences. Ecosystems provide value to humans through:

- Aesthetic appreciation
- Recreation
- Genetic resources
- Tourism
- Education
- Culture and spirituality

Ask the class to consider community, nation, and region. How do ecosystems provide us value in the areas above? Take a few responses for each category and write them down.

Services of Southeast Asian Ecosystems

Divide the class into teams of about five students. Distribute a set of the following articles to each team and give them 20 minutes to identify at least five ecosystem services provided by each ecosystem of Southeast Asia. They should write the services on a flip chart or white board.

Handout Resources

- Chapter 2: Services Provided by Forests. In Ecotourism and Other Services Derived From Forests in The Asia-Pacific Region: Outlook to 2010, Lindberg, K.
- Economic Values of Coral Reefs, Mangroves, and Seagrasses: A Global Compilation, 2008. Conservation International, The Ocean Foundation. ICRI and NOAA.
- Ecosystem service values for mangroves in Southeast Asia: A meta-analysis and value transfer application. Ecosystem Services. Brander, L., Wagtendon, A., Hussain, S.

Large Group Presentation Format

For each ecosystem - mangroves, tropical rainforests, and coral reefs - have each group share their response. Make sure the following points are covered:

	Mangroves	Tropical Rainforests	Coral Reefs
Fisheries/Food webs			
Water Quality			
Coastal Protection			
Fuel Wood			
Material: Wood			
Carbon Sequestration			
Biodiversity			
Air Quality			
Raw Materials			
Tourism Recreation			

FACTORS THAT DISRUPT ECOSYSTEMS Natural and Man-Made

Learning Objective

- List common factors (both natural and man-made) that disrupt ecosystems
- Identify impacts of those factors to human and animal health

Prior to class, students should review a few of the resources below (not all) and look for factors that disrupt each type of ecosystem found in Southeast Asia.

1. Mangroves

- Southeast Asian Biodiversity in Crisis (Associate Professor Navjot Sodhi, National University of Singapore)
 - The Present State of Mangrove Ecosystems in Southeast Asia (Food and Agriculture Organization of the United Nations)
2. Tropical Rainforests
- The Forests of Southeast Asia (United Nations Environmental Program)
3. Coral Reefs
- Reefs at Risk in Southeast Asia (Burke, L.E., and M. Spalding)
 - Ecosystems: Coral Reefs (National Oceanic and Atmospheric Administration)

Large Group Discussion

To introduce the factors that can disrupt an ecosystem, ask the class the following questions:

- What ecosystems have you experienced and what are the factors that can cause those to change?
- What is biodiversity?
- Why is biodiversity important?
- What would happen if we logged all the forests of Vietnam?
- Why do we need natural areas?
- We all know that it would be bad to removal the forests, but what are the preasons why?
- How would human health be affected?

Factors that can Disrupt Ecosystems

Introduce the lecture on factors that disrupt ecosystems by discussing how most environmental problems can be traced back to population growth and affluence. With affluence comes an increase in resource use, which increases production and consumption of foods. Overpopulation, overconsumption, development and industrialization are intertwined.

The outline below highlights the key concepts that should be covered in this lecture:

1. Biodiversity - the diversity in living things in an ecosystem
2. Factors that directly drive change to ecosystems include:
 - Changes in local land use and cover
 - Changes in climate
 - Species introduction or removal
 - Fishing
 - Nutrient loading from fertilizer, pest control, irrigation
 - Modification of rivers
 - Water withdrawals
 - Pollution
3. Indirect drivers to change in ecosystems include:
 - Population growth
 - Economic (e.g. globalization, trade, market and policy framework)
 - Sociopolitical (e.g. governance, institutional and legal framework)
 - Science and technology
 - Cultural and religious (e.g. beliefs, consumption)
4. Five major impacts to the biodiversity of ecosystems include:
 - Habitat destruction/alteration
 - Over harvesting/over exploitation
 - Pollution
 - Introduction of exotic species
 - Climate change
5. The critical changes in ecosystems that affect human health and their examples

Factors Disrupting My Ecosystems

Have the students return to their ecosystem teams: Mangrove, Tropical Rainforests and Coral Reefs. Based on their research and homework readings, each team should develop a list of factors that are disrupting the ecosystem. They should be prepared to explain their list.

Once the lists are developed, the other teams will evaluate the lists and identify times that are missing. Each team will get a point for each factor they mention and a point for any new factors that they identify other teams are missing. Bonus points will be given to teams that can identify the factors that disrupt biodiversity.

	Mangroves	Tropical Rainforests	Coral Reefs
Pollution (industrial discharge, sediment loading, chemical from mining, heavy metal)			
Sedimentation			
Organic Waste			
Agricultural runoff (Nitrogen and phosphorus loading, pesticides)			
Salt Production			
Oil Spills			
Deforestation			
Urban Expansion			
Cattle Ranching			
Mining			
Tropical storms			
Biodiversity			
Overfishing			
Destructive Fishing Techniques			
Dredging			
Mining of Sand and Coral			
Coastal Construction			
Sedimentation			
Forest Conversion			
Forest Fires			
Wildlife Trade			
Climate Change			

Keep students in the same groups, but reassign the ecosystems. Each group should meet before the next class to prepare a presentation that addresses the questions below. Encourage students to be creative and tell the story using various forms of media.

- What is the current status of your ecosystem in a province, region, country, and in Southeast Asia? Discuss the historical changes that have occurred.
- What function(s) does your ecosystem serve that affect(s) animal and human health?
- What are the factors disrupting your ecosystem? What functions are being disrupted and how do they affect health locally, regionally and nationally?
- What actions should be taken to address the health consequences of ecosystem change?
- What can be done?

EFFECT OF DISRUPTION OF ECOSYSTEMS AND THE IMPACTS ON HUMAN AND ANIMAL HEALTH

Learning Objective	• Explore impacts of ecosystem disruption on human and animal health • Explain what can happen as a result of ecosystem disruptions on local, regional, and national scales
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Prior to class, students should meet with their assigned groups and prepare a presentation that answers the questions outlined below. Encourage students to be creative and tell the story using various forms of media.

- What is the current status of your ecosystem in a province, region, country, and in Southeast Asia? Discuss the historical changes that have occurred.
- What function(s) does your ecosystem serve that affects animal and human health?
- What are the factors disrupting your ecosystem? What functions are being disrupted and how do they affect health locally, regionally and nationally?
- What actions should be taken to address the health consequences of ecosystem change?
- Is there hope? What can be done?

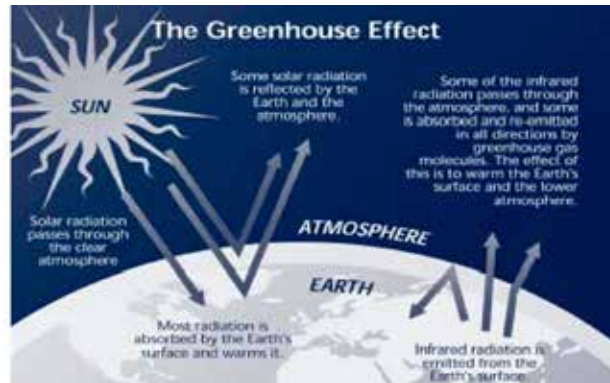
Have each group deliver their presentation and give the audience time for questions, answers and comments. As the facilitator, ensure that the discussion addresses the challenge at the local, national and regional scales

CLIMATE CHANGE, ECOSYSTEMS, HUMAN AND ANIMAL HEALTH

Learning Objective	• Be able to analyze regional climate changes and their resulting effects on ecosystem health.
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As the facilitator, select one or more of the following papers on the impacts of climate change for students to read before this session. Students should read the assigned paper(s) and prepare a presentation on how climate changes affect ecosystem health.

- “Climate Change Impacts on Streamflow and Subbasin-Scale Hydrology in the Upper Colorado River Basin” (Ficklin, D.L., I.T. Stewart, and E.P. Maurer)
- “Cumulative Impacts of Human Interventions and Climate Change on Mangrove Ecosystems of South and Southeast Asia: An Overview” (DasGupta, R. and R. Shaw)
- “Climate Change and Agricultural Development: Adapting Polish Agriculture to Reduce Future Nutrient Loads in a Coastal Watershed” (Piniewski, M. et al.)
- “Climate Change and Ecosystems” (United States Environmental Protection Agency)



The Climate Change Situation

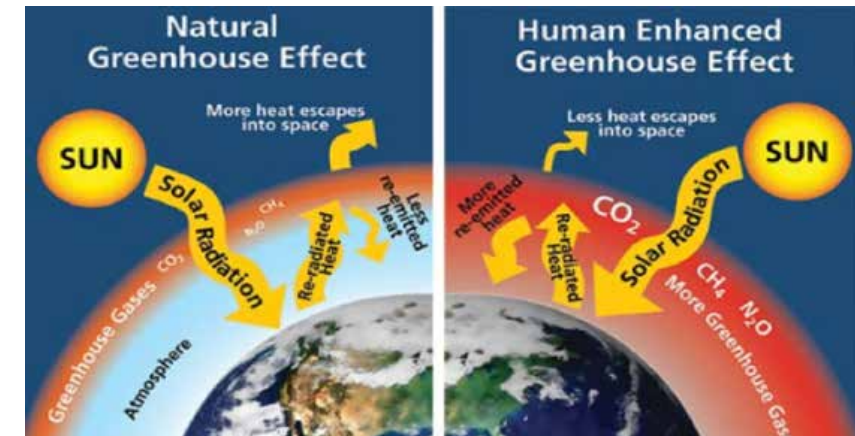
Ask the following questions on the concept of climate change”

- What is climate?
- Is it the same as weather?
- What is climate change?
- What is climate variability?

Key Terms:

- **Climate** is the average state of the atmosphere and the underlying land or water in a particular region over a specific time period.
- **Weather** is the day-to-day manifestation of climate in a particular place at a particular time.
- **Climate change** is a statistically significant variation in either the mean state of the climate or in its variability, persisting over an extended period (typically decades or longer).
- **Climate variability** refers to variations around the mean state, including the occurrence of extreme weather events.

Ask your class the following question, “Why does climate change occur?” List the responses then give a summary on greenhouse gas and the carbon cycle.



***Make sure to discuss the impact of green house gases, particularly those enhanced by humans

More information at: <http://tunza.eco-generation.org/resourcesView.jsp?boardID=climateChange&viewID=827>

The Current Climate Change Situation

Tell the students that you have presented some of the foundational concepts with of climate change. Give an overview of the signs of global climate change including:

- Historic global warming
- Weather extremes
- Increases in sea levels

Climate Changes and Ecosystem Health

Divide students into small groups and have them review the assigned homework readings. They should discuss how climate changes affect ecosystem health - focusing on how climate change might affect ecosystems in their country. Topics include:

- Climate and infectious disease
- Climate change and impact on animal health
- Climate change and impact on human health
- Climate change and impact on ecosystems
- Addressing the impact of climate change on human and animal health

Conclude the lecture by asking the class, “What public health adaptation strategies are applicable in your country?”

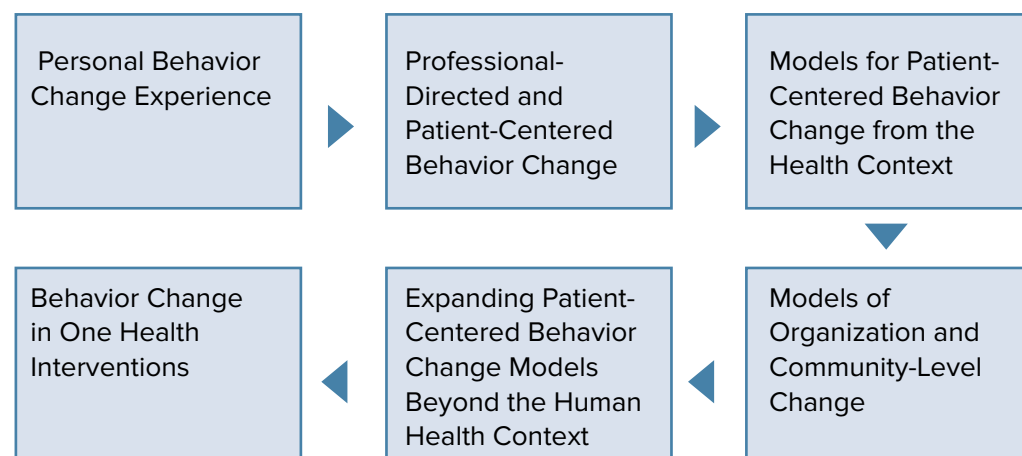
MODULE 7

BEHAVIOURAL CHANGE

Course Overview

Module Description and Learning Outcomes	This module will teach students about the models of behavioural changes at individual, organizational, and community levels. Students will evaluate models used, then discuss behavioural change approaches for a One Health context. Key outcomes of this module are: • Understand the behaviour modification concepts of change management theories • Create behaviour modification/organization and community change strategies for OH interventions
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Explain behaviour change theories and change management concepts	Understand principles, concepts, and theories of behaviour change by: • Defining behaviour in observable, measurable terms • Explaining individual, organizational and community level behaviour change theories • Reviewing stages of the change process
Competency #2	Learning Objectives to Develop Competency
Adapt and apply models for individual behaviour change to One Health contexts	• Evaluate different models of behaviour change and adapt the models for One Health • Evaluate different models of organizational and community change and adapt the models for One Health
Competency #3	Learning Objectives to Develop Competency
Demonstrate cultural competency and professionalism in leading change	Demonstrating sensitivity to context and professional integrity in adapting and implementing behaviour change models by: • Assessing the impact of culture, beliefs, and values on behaviour change • Recognizing and responding appropriately to ethical issues in behaviour change
Competency #4	Learning Objectives to Develop Competency
Design behaviour change strategies for One Health interventions in communities	Create behaviour change strategies for One Health interventions by: • Adapting and expanding behaviour change strategies for human health to address the human, animal and ecological health interface • Defining an individual or community readiness to change score • Describing the complexity of behaviour change in One Health context

PERSONAL BEHAVIOUR CHANGE

Learning Objective	• Personal behaviour change experience pre-work
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Welcome Note and First Assignment

At least one week before the class begins, send a welcome letter to students and include the following pre-work assignments:

One week before you start this class, select a personal health or wellness behaviour that you would like to change. For example, you may want to take at least 15- minute break for lunch to de-stress or you may want to cut down on the number of cups of coffee that you drink each day or you may want to make sure to follow your doctor's advice to limit your salt intake.

Write down the personal health or wellness behaviour that you would like to change, then list three positive steps that you will take over the next seven days to accomplish this goal. Then write down some initial reflections on how you feel about making the change. Be prepared to share your experience on the first day of class.

For the next seven days, I am going to: _____

I will take the following steps:

1. _____

2. _____

3. _____

Behaviour Change Journal

	How well did I do? <i>On a scale from 1 to 10 with 1=Not Well and 10=Very Well</i>	What made it easy to do?	What made it hard to do?	Do I need to modify my three steps to be successful tomorrow?	How confident am I that I can succeed? <i>On a scale from 1 to 10 with 1=Not Confident and 10=Very Confident</i>
Day 1					
Day 2					
Day 3					
Day 4					
Day 5					
Day 6					
Day 7					

INTRODUCTION TO BEHAVIOUR CHANGE

Learning Objective

- Analyze attempt to change a personal behaviour
- Understand the role of behaviour change in One Health responses

Personal Behaviour Change Experience Debrief

Divide the students into small groups to share their pre-work assignment. Ask each group to prepare a summary about what the people in their group found helpful in changing their behavior (enablers) and what people found difficult when working to change their behavior (barriers). Write responses to the following questions:

- What made your attempt at behavior change easy?
- What made your attempt at behavior change difficult?

Ask the students, “What can you do to help the individuals you work with change their behavior?” Provide them with the following prompts:

- If you are a nurse and you want people to take their medicine three times a day before a meal, how can you help them make the change?
- If you are a veterinarian and you want people to wash their hands after handling their chickens, what can you do?
- If you are a public health worker and you want people to dispose of their waste in a central location, what can you do?

Behaviour Change Module Competencies:

- Explain behaviour change theories and change management concepts
- Adapt and apply models for individual behaviour change to One Health contexts
- Demonstrate cultural competency and professionalism in leading change
- Design behaviour change strategies for One Health Interventions in communities

Explain that behavior change is crucial for OH practitioners as much of the work requires getting individuals, communities and institutions to behave differently. This requires acknowledging knowledge, attitudes and practices of the community and using indirect means to promote sustainable change. To address One Health challenges, individuals are required to change how they keep themselves and their families safe from infectious agents. Communities might have to change how they care for diseased livestock. Rule-makers might have to change their regulatory approach to confinement of livestock suspected of exposure to an infectious disease. OH practitioners must be adept in identifying root causes while engaging individuals and communities throughout the behavioural change process.

PROFESSIONAL DIRECTED AND PATIENT CENTERED BEHAVIOUR CHANGE APPROACHES

Learning Objective	- Understand principles, concepts and theories of behaviour change - Discover elements of patient-centered and professional-directed behaviour change
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Change Agents Role Play

Introduce this activity as an exercise in facilitating individual behavior change. There are three roles in the activity: *Patient*, *Change Agent 1*, *Change Agent 2*. Have students get into groups of three and randomly hand each person in the group a role play card: *Patient*, *Change Agent 1* or *Change Agent 2*. Tell the students that there will be two rounds in the activity with each round lasting 10 minutes.

Round I – Patient & Change Agent 1

In this round, Patient & Change Agent 1 will follow should follow the instructions on their cards. After the 10 minutes, stop the activity and ask the Patient to reflect on the following question and write his/her answer on a piece of paper: “On a scale from 1 to 10, how likely are you to change your behavior based on your conversation with Change Agent 1?”

Round II – Patient & Change Agent 2

In the second round, the Patient and Change Agent 2 should follow the instructions on their cards. After 10 minutes, stop the activity and ask the Patient to reflect on the following question and write his/her answers on a piece of paper: “On a scale from 1 to 10, how likely are you to change your behaviour based on your conversation with Change Agent 2?”

Trio Discussion

Have the Patient share with each Change Agent:

- How likely he/she is on a scale of 1 to 10 to change the behaviour.
- The effective elements of the Change Agent’s approach.
- The ineffective elements of the Change Agent’s approach.

Change Agent Activity Debrief

Debrief the activity with the class by:

- Asking the Patients to share how they felt interacting with Change Agent 1 & Change Agent 2.
- Asking the Change Agents which style, 1 or 2, is the one that most reflects their own work style or is the one they are most comfortable with.
- Ask the entire group the following series of questions:
 - What required skills do both approaches have in common?
 - What skills did you see Change Agent 1 using?
 - What skills did you see Change Agent 2 using?
 - From a patient’s point of view, which method is most effective?

Concluding Remarks

Change Agent 1 is typical professional-directed approach while Change Agent 2 a patient centered approach.

- In a **professional centered approach**, medical professionals take full responsibility for the ongoing care of the patient. S/he is responsible for reviewing the patient’s conditions, encouraging compliance and preventative measures, making recommendations for additional referrals, and resolving possible conflicts in treatment recommendations from other medical professionals.
- A **patient-centered approach** seeks to focus medical attention on the individual patient’s needs or concerns. Results are achieved through a comprehensive system of positive education where patients and health care professionals collaborate as a team, share knowledge and work towards the common goals of optimum healing and recovery. The patient does not simply comply with health directives, but is fully engaged in the care and treatment process. S/he is involved in a process of harmonizing professional advice with his or her wants, needs and preferences.

MODELS FOR PATIENT CENTERED BEHAVIOUR CHANGE The Health Belief Model

Learning Objective	Understand principles, concepts and theories of a patient entered behaviour change approach
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Models for Patient-Centered Behavior Change: Health Belief Model

Deliver the brief lecture on the Health Belief Model reviews the background and core principles of the model. Give the following introduction to the class:

In the previous session, we experienced two different approaches of changing health behavior: a professional-directed approach and a patient-centered approach. In this session, we will review the principles, concepts and theories behind the patient-centered approach and explore the Health Belief Model, or HBM, for health behavior change.

The HBM is a psychological health behavior change model developed to explain and predict health-related behaviors, particularly in regard to the uptake of health services. It was developed in the 1950s by social psychologists at the U.S. Public Health Service in order to better understand the widespread failure of screening programs for tuberculosis. The model was originally designed to predict behavioral responses to treatment received by acutely or chronically ill patients, but in more recent years, the model has been used to predict more general health behaviors. The HBM suggests that your belief in susceptibility and severity of the threat, combined with your belief in the effectiveness and ease of the proposed behavior change, will predict the likelihood of you adopting the new behavior.

Health Belief Model

The HBM suggests that for a patient to change behaviours, the patient must:

- Known that they are susceptible to or have a particular health condition
- Believe that having the condition is serious and harmful
- Perceive that the benefits of changing their behaviours outweigh the challenges
- Feel that there are treatment options
- Feels a “call to action” to spark the change
- Perceives that s/he can successfully perform the behaviour

Factors Impacting Likelihood for Change in the Health Belief Model

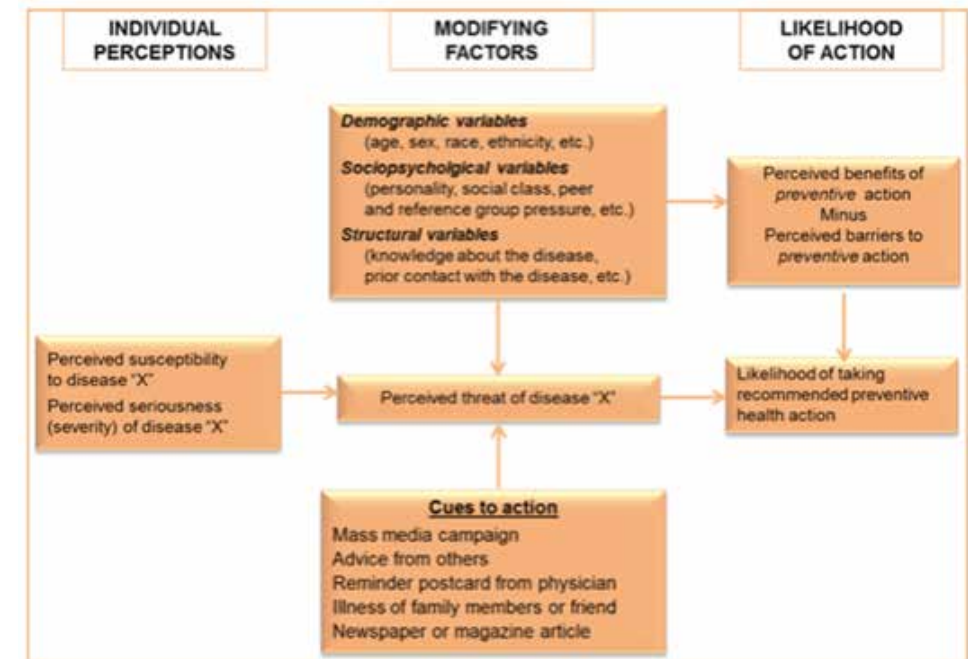


Diagram retrieved from the National Institute of Neurological Disorders and Stroke, United States National Institutes of Health, www.ninds.nih.gov

Strengths and Weaknesses of the Health Belief Model

Ask the students, “What do you see as the strengths of the HBM?” and have them write their answers labeled, “Health Belief Model Strengths.” Sample responses include:

- It is a common sense approach that is easy for health practitioners, professionals and partners to apply.
- It is evidence-based from research on behavior change theory.
- It weighs benefits against costs so that a patient can decide if the advantages outweigh the disadvantages of the change.

Ask the students this follow-on question, “What do you see as the limitations of the HBM?” Sample responses might include:

- Does not account for a person’s attitudes, beliefs or other individual that dictate the acceptance of a health behavior.
- Does not account for habitual health-related behaviors (e.g., smoking, seatbelt buckling) that are independent of conscious health-related decision-making

processes.

- Neglects behaviors that are performed for non-health-related reasons such as social acceptability
- Does not account for environmental or economic factors that may prohibit or promote the recommended actions.
- Does not consider the impact of emotions, particularly fear, on health-related behaviour.
- Assumes that everyone has equal access to equal amounts of information on the illness or diseases.
- Assumes that cues to action are widely prevalent in encouraging people to act and that 'health' actions are the main goal in the decision-making process.

Concluding Remarks

There is no 'one best way' or 'magic bullet' to encourage an individual to change a behaviour. While a patient-centered approach might have a high success rate with certain individuals or in certain cultures, some patients will simply want their health care provider to tell them what to do. The HBM presumes a level of knowledge and understanding that in real-world applications is quite variable across individuals and cultures. An understanding of health threats and risks is necessary and can be impacted by cultural norms, misinformation, and other factors. The One Health perspective is important and useful in bridging this information gap by establishing a basic threshold of recognition about the interconnectivity of human, animal and environmental health.

As we move from discussing individual behaviour change to discussing the interactions of human, animal and environmental health, the patient becomes an increasingly critical partner in driving and creating change.

MODELS FOR PATIENT CENTERED CHANGE Readiness to Change and Motivational Interviewing

Learning Objective

- Understand principles, concepts and theories of a patient centered behaviour change approach

Read

- Read – Facilitating Behavior Change, American Society on Aging and American Society of Consultant Pharmacists Foundation
- Read – “Readiness to Change” instructions and tool (ruler) handout, Adult Education

Assessing Readiness to Change

Provide the following introduction to the exercise: *Thinking back to the behavior change you attempted as pre-work for this module, how would you assess your readiness to change on a scale of 1 to 10?*

Asking people about their readiness to change on a scale of 1 to 10 is a common method for quantitatively assessing their readiness to adopt a new behaviour. Variations of this method include asking people how important they feel the change is on a scale of 1 to 10, how confident they are that they can make the change on a scale of 1 to 10, etc. The readiness-to-change rule is used to assess a person's willingness or readiness to determine

The readiness-to-change ruler is used to assess a person's willingness or readiness to change, to determine where they are on the continuum between 'not prepared to change' and 'already changing,' and to promote identification and discussion of perceived barriers to change. The rulers can be used as an assessment of a person's present motivational state relative to changing a specific behavior, and can serve as the basis for motivation-based interventions to elicit behavior change.

Motivational Interviewing

Ask the learners, “Given what you read about Motivational Interviewing...”

- How can asking about readiness, importance or confidence help an individual in the behaviour change process?
- In what scenario might you use these rulers?

Give the following short introduction on Motivational Interviewing to students, then deliver the corresponding lecture: *Motivational Interviewing is a set of specific behaviors directed by a guiding philosophy that emphasizes partnership and eliciting patients' internal motivations. It is used to determine a person's readiness to engage in a target behavior and to identify a plan of action based on a person's skills, strategies, wants and needs. Motivational Interviewing seeks to engage the patient and enhance their motivation to change by exploring and resolving ambivalence and resistance to the change. The principles of Motivational Interviewing can be remembered through the “ACE” and “RULE” mnemonics.*

Spirit of Motivational Interviewing: ACE	
A	Autonomy
Physicians demonstrate respect for patients' ability to make their own decisions and adopt new behaviors. Simply telling people why and how to behave is not effective in helping them change. Acknowledging a person's right NOT to change and freedom to choose how to change can limit defensiveness and encourage an open mind.	
C	Collaboration
Physicians and patients should work together as partners to reach a common goal. Clinicians view patients as experts in their own lives and create safe and collaborative environments. They encourage/facilitate joint decision-making and problem-solving.	
E	Evocation
Clinicians can draw out patients' own ideas and motivations for change. Patients are more likely to change when they express their own perspectives and uncover personal values and goals that support health behavior change.	
Guiding Principles of Motivational Interviewing: RULE	
R	Resist the Righting Reflex
There is a tendency for health professionals to advise patients about the right path for good health. Motivational Interviewing requires clinicians to suppress this initial righting reflex so that they can explore a patient's motivations for change. People often believe what they hear and say themselves, and can react in opposition to what others insist that they do.	
U	Understand your Patient's Motivations
A patient's own reasons for change will ultimately result in behavior change. By approaching a patient's interest, concerns and values with curiosity and openly exploring the patient's motivations for change, the practitioner gain a better understanding of the patient's motivations and potential barriers to change.	
L	Listen to your Patient
Effective listening skills are essential for identifying what motivates a patient, as well as what barriers an individual might face. Many answers lie within the patient.	
E	Empower the Patient
Patient outcomes improve when they actively participate in their treatment. Empowering patients involves exploring their own ideas about how they can make changes to improve their health and drawing on the patient's personal knowledge about what has succeeded in the past.	

The key skills captured in the ACE and RULE are critical to Motivational Interviewing. These skills are:

- Empathizing
- Listening
- Asking Questions
- Informing

Bring out the flip charts from the "Introduction" session on which you recorded students' responses to the question, "*What can you do to help the individuals you work with change their behaviour?*" Empathy, the ability to ask questions, listening and knowing when to provide information are core skills for both Motivational Interviewing and Readiness-to-Change assessments. Remember to:

- Use open-ended questions to explore patients' feelings.
- Affirm comments and behaviors that show signs of increased interest in change.
- Explore the benefits and drawbacks of making the change.
- Have the patient envision a future and ask what needs to happen to achieve that future.

MODELS OF ORGANIZATION AND COMMUNITY CHANGE	
Kotter and Lewin	
Learning Objective	• Research two leading theories on organizational change

Models of Organization and Community Change

Give the following introduction to the Models of Organization and Community Change lecture. See the notes section of the Module PowerPoint for the full lecture notes and the Facilitator Quick Notes section of this guide (pages 25–32) for additional background on the models presented by John Kotter and Kurt Lewin. Let us look at two of the leading models of change management, one proposed by John Kotter, a business professor at Harvard University, and the second by Kurt Lewin, a leading psychologist.

John Kotter proposed eight essential steps for leading change:

1. Establishing a Sense of Urgency
2. Creating a Guiding Coalition
3. Developing a Vision and Strategy
4. Communicating the Change Vision
5. Empowering Board-Based Action
6. Generating Short-Term Wins
7. Consolidating Gains and Producing More Change
8. Anchoring New Approaches in the Culture

Ask students to select the model, Kotter or Lewin, that they would like to learn more about. Then divide them into groups based on their interests. Tell the students that they have 90 minutes to research their assigned model and prepare a 20-minute presentation to teach the model to the class.

Suggested References - John Kotter

- John Kotter's website, www.kotterinternational.com
- John Kotter, "Leading Change: Why Transformation Efforts Fail," <http://hbr.org/2007/01/leading-change-why-transformation-efforts-fail/ar/1>
- John Kotter Explains the 8 Steps to Create Successful Change, <http://hbr.org/web/tools/2008/12/kotter-8-steps>

Kurt Lewin

- Bernard Burnes, "Kurt Lewin and a Planned Approach to Change," <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-6486.2004.00463.x/pdf>
- Lewin's 3-Stage Model of Change: Unfreezing, Changing and Refreezing. <http://education-portal.com/academy/lesson/lewins-3-stage-model-of-change-unfreezing-changing-refreezing.html>

Have each group give their presentation and explore the following questions with the class:

- What did you like about each model?
- What more do you need to learn about each model?
- Are the models exclusive of one another? Complementary?

John Kotter is a professor at Harvard Business School and world-renowned change expert. Kotter introduced his eight-step change process in his 1995 book, "Leading Change." We look at his eight steps for leading change below.

Step 1: Create Urgency

For change to happen, it helps if the whole company or organization really wants it. Develop a sense of urgency around the need for change. This may help you spark the initial motivation to get things moving. This isn't simply a matter of showing people poor sales statistics or talking about increased competition. Open an honest and convincing dialogue about what's happening in the marketplace and with your competition. If many people start talking about the change you propose, the urgency can build and feed on itself.

What you can do:

- Identify potential threats and develop scenarios showing what could happen in the future.
- Examine opportunities that should be, or could be, exploited.
- Start honest discussions and give dynamic and convincing reasons to get people talking and thinking.
- Request support from customers, outside stakeholders and industry people to strengthen your argument.

Step 2: Form a Powerful Coalition

Convince people that change is necessary. This takes strong leadership and visible support from key people within your organization. Managing change isn't enough; you have to lead it. You can find effective change leaders throughout your organization. To lead change, you need to bring together a coalition, or team, of influential people whose power comes from a variety of sources, including job title, status, expertise and political importance. Once formed, your "change coalition" needs to work as a team, continuing to build urgency and momentum around the need for change.

What you can do:

- Identify the true leaders in your organization.
- Ask for an emotional commitment from these key people.
- Work on team-building within your change coalition.
- Check your team for weak areas, and ensure that you have a good mix of people from different departments and different levels within your company.

Step 3: Create a Vision for Change

When you start thinking about change, many great ideas and solutions will probably be suggested. A clear vision can help everyone understand why you're asking them to do something. When people see for themselves what you're trying to achieve, the directives they're given tend to make more sense.

What you can do:

- Determine the values that are central to the change.
- Develop a short summary (one or two sentences) that captures what you "see" as the future of your organization.
- Create a strategy to execute that vision.
- Ensure that your change coalition can describe the vision in 5 minutes or less.
- Practice your "vision speech" often.

Step 4: Communicate the Vision

What you do with your vision after you create it will determine your success. Your message will probably have strong competition from other day-to-day communications within the company, so you need to communicate it frequently and powerfully, and embed it within everything that you do.

Don't just call special meetings to communicate your vision. Instead, talk about it every chance you get. Use the vision daily to make decisions and solve problems. When you keep it fresh on everyone's minds, they'll remember it and respond to it. It's also important to "walk the talk." What you do is far more important—and believable—than what you say. Demonstrate the kind of behavior that you want from others.

What you can do:

- Talk often about your change vision.
- Openly and honestly address people's concerns and anxieties.
- Apply your vision to all aspects of operations, from training to performance reviews. Tie everything back to the vision.
- Lead by example.

Step 5: Remove Obstacles

If you follow these steps and reach this point in the change process, you've been talking about your vision and building buy-in from all levels of the organization. Hopefully, your staff wants to get busy and achieve the benefits you've been promoting. But is anyone resisting the change? And are there processes or structures that are getting in its way?

Put in place the structure for change, and continually check for barriers to it. Removing obstacles can empower the people you need to execute your vision, and it can help the change move forward.

What you can do:

- Identify, or hire, change leaders whose main roles are to deliver the change.
- Look at your organizational structure, job descriptions, and performance and compensation systems to ensure they're in line with your vision.
- Recognize and reward people for making change happen.
- Identify people who are resisting the change, and help them see what's needed.
- Take action to quickly remove barriers (human or otherwise).

Step 6: Create Short-Term Wins

Nothing motivates more than success. Give your company a taste of victory early in the change process. Within a short timeframe (this could be a month or a year, depending on the type of change), you'll want to have results that your staff can see. Without this, critics and negative thinkers might hurt your progress.

Create short-term targets, not just one long-term goal. You want each smaller target to be achievable, with little room for failure. Your change team may have to work very hard to come up with these targets, but each "win" that you produce can further motivate the entire staff.

What you can do:

- Look for sure-fire projects that you can implement without help from any strong critics of the change.
- Don't choose early targets that are expensive. You want to be able to justify the investment in each project.
- Thoroughly analyze the potential pros and cons of your targets. If you don't succeed with an early goal, it can hurt your entire change initiative.
- Reward the people who help you meet the targets.

Step 7: Build on the Change

Kotter argues that many change projects fail because victory is declared too early. Real change runs deep. Quick wins are only the beginning of what needs to be done to achieve long-term change.

Launching one new product using a new system is great. But if you can launch 10 products, that means the new system is working. To reach that 10th success, you need to keep looking for improvements.

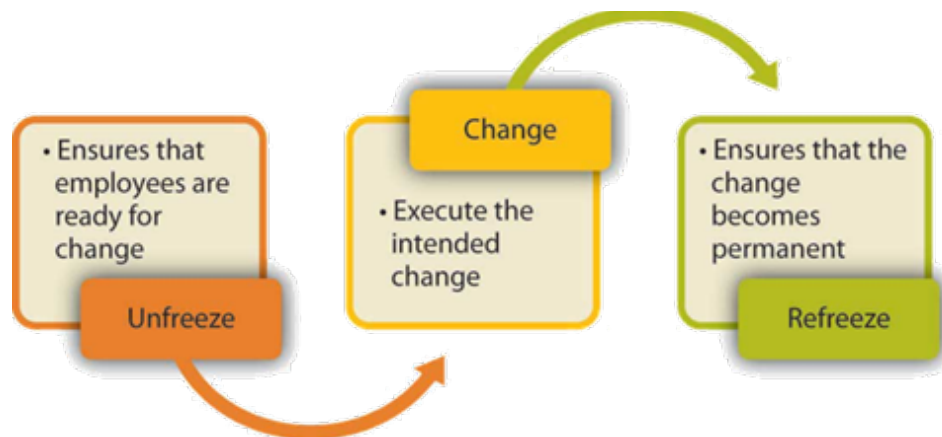
Each success provides an opportunity to build on what went right and identify what you can improve. What you can do:

- After every win, analyze what went right and what needs improving.
- Set goals to continue building on the momentum you've achieved.
- Learn about kaizen, the idea of continuous improvement.
- Keep ideas fresh by bringing in new change agents and leaders for your change coalition.

Key Points

- You have to work hard to change an organization successfully. When you plan carefully and build the proper foundation, implementing change can be much easier, and you'll improve the chances of success. If you're impatient, and if you expect too many results too soon, your plans for change are more likely to fail.
- Create a sense of urgency, recruit powerful change leaders, build a vision and effectively communicate it, remove obstacles, create quick wins, and build on your momentum.

Lewin's Change Management Tool



Understanding the Three Stages of Change

Change is a common thread that runs through all businesses, regardless of size, industry and age. Our world is changing fast and, as such, organizations must change quickly too. The concept of “change management” is a familiar one in most businesses today. But, how businesses manage change (and how successful they are at it) varies enormously depending on the nature of the change business, the change and the people involved. A key part of this depends on how far people within it understand the change process.

Understanding Lewin's Model

If you have a large cube of ice, but realize that what you want is a cone of ice, what do you do? First, you must melt the ice to make it amenable to change (unfreeze). Then you must mold the iced water into the shape you want (change). Finally, you must solidify the new shape (refreeze).

By looking at change as a process with distinct stages, you can prepare yourself for what is coming and make a plan to manage the transition—looking before you leap, so to speak. All too often, people go into change blindly, causing much unnecessary turmoil and chaos.

To begin any successful change process, you must first start by understanding why the change must take place. As Lewin put it, “Motivation for change must be generated before change can occur. One must be helped to re-examine many cherished assumptions about oneself and one's relations to others.” This is the unfreezing stage from which change begins.

Unfreeze

This first stage of change involves preparing the organization to accept that change is necessary, which involves breaking down the existing status quo before you can build up a new way of operating. The key to this is developing a compelling message that shows why the existing way of doing things cannot continue.

To prepare the organization successfully, you need to start at its core; you need to challenge the beliefs, values, attitudes and behaviors that currently define it. Using the analogy of a building, you must examine and be prepared to change the existing foundation as it might not support add-on stories; unless this is done, the whole building may risk collapse. This first part of the change process is usually the most difficult and stressful. When you start cutting down the “way things are done,” you put everyone and everything off balance. You may evoke strong reactions in people, and that's exactly what needs to be done.

By forcing the organization to reexamine its core, you effectively create a (controlled) crisis, which in turn can build a strong motivation to seek out a new equilibrium. Without this motivation, you won't get the buy-in and participation necessary to effect any meaningful change.

Change

After the uncertainty created in the unfreeze stage, the change stage is where people begin to resolve their uncertainty and look for new ways to do things. People start to believe and act in ways that support the new direction. The transition from unfreeze to change does not happen overnight; people take time to embrace the new direction and participate proactively in the change. A related change model, the Change Curve, focuses on the specific issue of personal transitions in a changing environment and is useful for understanding this specific aspect in more detail.

To accept the change and contribute to making the change successful, people need to understand how the change will benefit them. Not everyone will fall in line just because the change is necessary and will benefit the company. This is a common assumption and pitfall that should be avoided. Time and communication are the two keys to success for the change to occur. People need time to understand the change and they also need to feel highly connected to the organization throughout the transition period. When you are managing change, this can require a great deal of time and effort and hands-on management is usually the best approach.

Refreeze

When the change is taking shape and people have embraced the new ways of working, the organization is ready to refreeze. The outward signs of the refreeze are a stable organization chart, consistent job descriptions, and so on. The refreeze stage also needs to help people and the organization internalize or institutionalize the change. This means making sure that the change is used all the time and is incorporated into everyday business. With a new sense of stability, employees feel confident and comfortable with the new ways of working.

The rationale for creating a new sense of stability in our ever-changing world is often questioned. Even though change is a constant in many organizations, this refreezing stage is still important. Without it, employees get caught in a transition trap where they aren't sure how things should be done, so nothing ever gets done to full capacity. In the absence of a new frozen state, it is very difficult to tackle the next change initiative effectively. How do you go about convincing people that something needs changing if you haven't allowed the most recent change to sink in? Change will be perceived as change for change's sake, and the motivation required to implement new changes simply won't be there.

As part of the refreezing process, make sure that you celebrate the success of the change. This helps people find closure, thanks them for enduring a painful time, and helps them believe that future change will be successful.

Practice Steps for Using This Framework

1. Determine what needs to change
 - Survey the organization to understand the current state
 - Understand why change has to occur
2. Ensure there is strong support from upper management
 - Use Stakeholder Analysis and Stakeholder Management to identify, and win the support of key people within the organization
 - Frame the issue as one of organization-wide importance
3. Create the need for change
 - Create a compelling message about why change must occur
 - Use your vision and strategy as supporting evidence
 - Emphasize 'why'
4. Manage and understand the doubts and concerns
 - Remain open to employee concerns and address them in terms of the need for change

Change

1. Communicate Often
 - Plan and implement change
 - Describe the benefits
 - Prepare everyone for what is coming
2. Dispel rumours
 - Answer questions openly and honestly
 - Deal with problems immediately
 - Relate the need for change back to operational necessities
3. Empower action
 - Provide opportunities for involvement
 - Line managers provide daily directions
4. Involve people in the process
 - Generate short-term wins
 - Negotiate with external stakeholders

Refreeze

1. Anchor the changes into the culture
 - Identify what supports the change
 - Identify barriers to sustaining change
2. Develop ways to sustain the change
 - Ensure leadership support
 - Create a reward system
 - Establish feedback system
 - Adapt the organizational structure
3. Provide support and training
 - Keep everyone informed and supported
4. Celebrate success!

Key Points

Lewin’s change model is a simple and easy-to-understand framework for managing change.

By recognizing these three distinct stages of change, you can plan to implement the change required. You start by creating the motivation to change (unfreeze). You move through the change process by promoting effective communications and empowering people to embrace new ways of working (change). The process ends when you return the organization to a sense of stability (refreeze), which is necessary for creating the confidence from which to embark on the next, inevitable change.

BEHAVIOUR CHANGE IN ONE HEALTH INTERVENTIONS	
Expanding Patient-Centered Behaviour Change Models Beyond the Human Health Context	
Learning Objective	• Use concepts derived from patient entered behaviour change models to explore behaviour change in the human, animal, and environmental interface

Exploring Patient Centered Behavior Change Models in the One Health Context

Ask students to divide into groups based on region/village/culture or discipline. Have each group create a flip-chart summarizing their answers to the following questions:

- How would the Health Belief Model work in your region or culture?
- How would you modify the Motivational Interviewing and Readiness to Change approaches to work most effectively in your region or culture?

Then, divide participants into cross-disciplinary teams. Ask participants to create a flipchart showing how they would adapt the models discussed in previous sessions from a health care setting to a setting in their discipline. Some examples include:

- How would a veterinarian work with a farmer to keep his/her chickens in a pen rather than free?
- If you are a public health worker, how would you get an individual to boil their water before drinking?
- If you are an environmental professional, how would you get an Abettor owner to ensure effluent and waste products are disposed of in a manner to protect water sources and prevent access by animals?

Have each group share its model with the class and provide time for a short Q&A session.

Debrief the session by asking the large group:

- Are there any similarities in your models that we see cutting across regions/ cultures or disciplines?
- What are the differences across regions, cultures and disciplines that we need to be aware of and sensitive to when working as part of a One Health team?
- How do you think understanding these similarities and differences in approach will help you in your work?
- As a member of a One Health team, what do you feel is your role in changing people’s behaviours?

BEHAVIOUR CHANGE IN ONE HEALTH INTERVENTIONS	
Learning Objective	• Develop behaviour modification strategies for One Health interventions

One Health Intervention Models for Change

Give the following introduction to the activity:

Now it is time to put together everything that we have learned about behavior change and apply it to situations you might face as a One Health practitioner. Think of a situation you have faced or might face that involves changing individual and/or community behaviors. What is your model for change?

Spend the next 30 minutes reflecting on your ideas from the previous session in which you created your own personal model for behavior change and the two models for community change, Kotter and Lewin. Summarize your model and share them with the rest of your classmates. Post all the models on a wall and have the students do a gallery walk. Stop briefly at each model and discuss. End the session by asking each student to give one word that describes what they feel is their role in creating change. Write the responses on a flip chart.

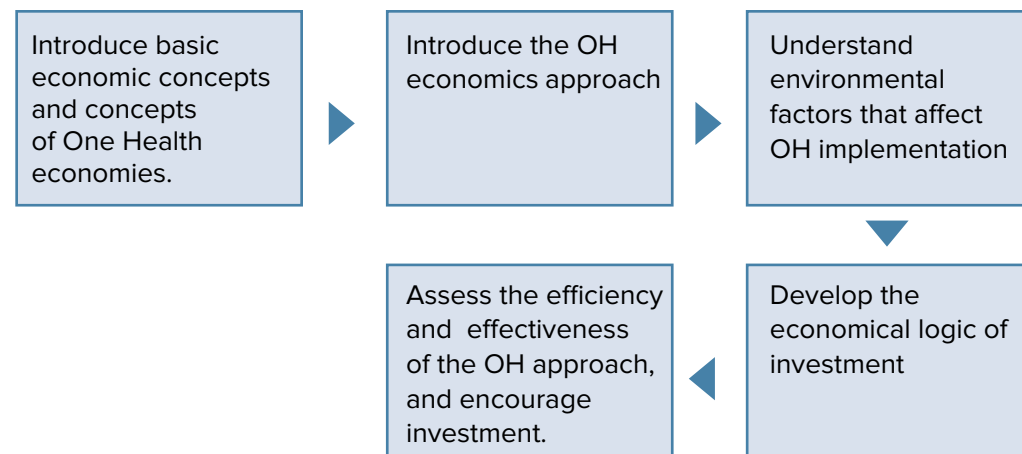
MODULE 8

ONE HEALTH ECONOMY

Course Overview

Module Description and Learning Outcomes	This module will help student understand some basic concepts in economics and the application in OH intervention assessments. Key outcomes of this module are: • Understand the behaviour modification concepts of change management theories • Create behaviour modification/organization and community change strategies for OH interventions
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Module Overview

Competency #1	Learning Objectives to Develop Competency
Understand basic concepts of economics through the OH lens	• Explain basic concepts and terminology used in relation to the One Health approach and economics • Define One Health Economics

Competency #2	Learning Objectives to Develop Competency
Understand factors that can improve or hinder the implementation of One Health Economics	• Compare and contrast individual work, group work, and team collaborative work. • Explain the typical stages in the development of a team. • Demonstrate active listening skills. • Demonstrate constructive conflict resolution skills
Competency #3	Learning Objectives to Develop Competency
Understand basic concepts of economics through the OH lens	• Explain basic concepts and terminology used in relation to the One Health approach and economics • Define One Health Economics

Topic Breakdown

INTRODUCTION TO BASIC CONCEPTS IN ECONOMICS	
Learning Objective	• Define key concepts related to economics and resource allocation • Understand how OH issues challenge economic approaches • Describe what collaboration means, and its benefits and challenges in One Health situations

Introduction to Basic Concepts in Economics

Economics is the science that studies how a society will solve the problem of limited resources, or in other words, economics is the science to study how the social need to (or should) allocate/use scarce resources in order to meet the unlimited wishes and needs of the people, to study the allocation of limited and scarce resources for a myriad of choices.

Stemming from the issues that are arising in practice relating to the elements of consumption, ownership of goods and resources; production and the exchange, those are three basic questions which are the basis for the decision of resource allocation. In economy, the allocation of scarce resources controlled by three factors:

1. **Consumers** - the allocation of resources is to maximize benefits, or in other words is the utility of each individual, family, including health.

2. **Businesses** - the allocation of resources is to maximize benefits.
3. **Society and National Economy** - the allocation is to maximize social welfare. So, economic is to research to understand the act (behavior) and decision making (with implications of resources used).

Overall, resources for health care is very limited and increasingly scarce while demand of health care is growing. Pose the following question to students and encourage them to record answers:

- *What would you define the One Health economic approach to be?*
- *Why or why not is it economic to invest in the One Health approach?*

According to the EcoHealth Alliance, **One Health Economics** considers the burden of emerging infectious diseases and the influence climate change will have on the economy, people, and the environment. Often, the burden of disease outbreaks can be felt beyond the sphere of human health. Epidemics often also have significant negative impact on agricultural production, trade, and travel for the region directly affected and may extend further still than man-made borders. It is this impact which creates a strong incentive for a whole-of-society approach to tackling disease threats.

Climate change has caused new and old diseases to return, especially those transmissible from animals to humans (e.g. rabies, salmonella infections, etc.). The question is if the treatment and prevention only placed in the medical framework, then how are resources maximized? Is this sustainable? Ask the students to think of the following question throughout the module and write down responses. Responses will be collected at the end of the lecture: *How does your definition of the One Health economic approach affect human and animal health, and the environment? To what extent?*

Record all answers then encourage a discussion regarding sustainability and cost-effectiveness. If students do not come up with any answers, ask the following question: *How do you make the OH approach cost-effective and sustainable to ensure human health, animal welfare, and the environment are all incorporated?*

Then ask the class the following question: *“Thinking about your own experience and the One Health approach, what do you anticipate to be some of the benefits and challenges of One Health economics?”* Record answers on the board. Examples of possible answers include:

Benefits:

- Opportunities to learn, adapt, and incorporate innovative solutions are established
- New resources (time, money, etc.) can be acquired

- Supports the development of new, environmentally friendly technologies and appropriates
- Encourages mindfulness over consumes
- Reducing the spread of AMR

Challenges:

- Considering new economic approaches could be more expensive → *Ask: Is this feasible for all countries? Or will individual country wealth affect success?*
- People are not willing to try new approaches, especially if they cost more money and are not proven to be successful or sustainable
- Waste of resources (time, money, medicine, information, etc.)
- Perceived danger of being linked with failure and sharing costs of failing such as loss of reputation, status and financial position

Concluding Remarks

By incorporating the OH approach, we can see that only focusing on human interventions are not sufficient or sustainable in preventing and controlling disease outbreak. In the context of scares and limited resources (such as vaccinations), considering an economic viewpoint will encourage students to pay attention to the relationship between economies and human health, along with the economic impact changing environments will have on agriculture, environment, etc. It will also encourage the development of new and innovative approaches, to save resources and incorporate more environmentally friendly responses. This will also increase the economic resilience to climate change and future health related issues.

ENVIRONMENTAL FACTORS FACILITATING THE EMERGENCE OF HEALTH PROBLEMS	
Learning Objective	• Understand different environmental factors that influence the emergence and development of Health problems. • Learn current and emerging challenges

Environmental Factors - Because the environment is a collection of all the natural and social elements surrounding humans, influencing human and impacting on the living activities of human such as air, water, moisture, biology, human society and institutions. Due to climate change, environmental factors can allow for the emergence of health problems including population and change in population scale, migration patterns, live stock and farming systems, and the human response to emerging issues.

Key Factors to Consider with an OH Approach

1. Increasing Population:

- Rising and booming populations in developing and poor countries is a prominent challenge in developing and poor countries, where socio-economic and cultural life is limited and/or outdated.
- High population density is a major risk factor, as it allows for the rapid spreading of infectious diseases
- The aging population also is more susceptible to non-communicable diseases.
- Gender imbalance is also a prominent issue, as access to appropriate services, on a frequent basis, is limited in rural and developing regions.

2. Migrant Patterns:

- The transition from migration from rural to urban areas also impacts environmental and human health.
- This migration changes farming systems and attached value relationships.

3. Livestock and Farming Systems:

- Livestock system and the values obtained is developing due to the increasing demand on food, and in relation to the cost of resources for production, transportation and food processing. There has also been an increase in the number of livestock, particularly poultry and pig, concentrated breeding by type of animal. Those changes in the livestock sector is encouraged even though risks are still hidden behind the issues relating to the poor breeding farmers (breeding farms) and negative impact on environment.
- Due to the change in livestock systems, food is exposed to numerous contamination opportunities. Additionally, animal related diseases and AMR are pressing issues.

Response to Current and Emerging Challenges

Strong response to current and emerging challenges through activities for prevention and control of animals diseases spreading across borders, success in the storage and preservation, such as the global elimination of cattle plague, elimination of the disease in the region like foot and mouth disease and classical swine fever. However, there are still major obstacles like SARs, H5N1, AMR, etc. With the change in human society and livestock sector, it is needed to monitor at various levels and manage risks to health in different ways. When the risk can be calculated, it will aim to allocate resources to destination based monitoring and management.

There are two possibilities from this situation:

1. What we are observing are not predictable because these events are random and can not be determined by the usual statistical methods
2. The current risk models are not fully ready for simulation.

ECONOMICAL LOGIC OF INVESTMENT TO ONE HEALTH	
Learning Objective	• Consider the financial burden of diseases and what an investment in the OH approach would be • Learn what prevention and disease management systems cost

The investment in One Health and One Health economics should be reviewed in two aspects:

1. Investment to One Health in considering the impact of diseases

- Consider the influence of disease(s), its impacts, and potential costs
- Look at the burden of disease, it is needed to: identify the factors that most strongly impact the burden of disease, its severity, and possibility of occurrence and spreading
- Identifying the elements that people will be willing to pay to reduce the risk of disease
- Identify the factors that people will not be willing to pay and need Government's investment. Research and determine appropriate levels of public investment for the burden of zoonotic diseases.

2. Investment in One Health in considering preventive measures

- Losses that can be avoided. This includes vaccination costs and implementing a prevention program
- The effects of the disease and it's socio-economic impact. One Health practitioners should consider if there is a need for research, education, and advocacy programming.
- Decide if monitoring and intervention should be assessed if the cost of activities/ programming is lower than the avoids losses

Classroom Discussion Questions

- *What are the costs and effects for human health when infected by diseases transferred from animals?*
- *What happens when vaccinations, such as Yellow Fever or Rabies, are limited?*
- *What is the burden of zoonotic diseases?*

To study the economical approach of One Health, three of the following aspects of resources allocated for the medical system will be reviewed:

1. Resources for specific matters on disease transmission between people and animals
2. Regions with limited resources and access
3. The flexibility of resources allocated for human and animal health

Lecture - Resource Allocation for Medical System

3. Resources for specific matters on disease transmission between people and animals

While Jonathan Ruston and colleagues propose for diseases only in humans or animals require a specialized approach while the zoonotic diseases require a general approach, some zoonotic diseases appear in some specific areas, while other diseases which considered as zoonotic diseases appear sporadically. However, these diseases generally do not tend to cause disease in humans and animals in the same time to put out the alert for health problems with combination of both human and veterinary medicine. Therefore, the cost of disease prevention or control for some diseases in livestock is very high and only by considering the cost for humans infected from non-preventive animals, it can be seen that costs for diseases transmitted from animal excess preventive expenses. That shows essential to do budgeting and resource allocation at a higher level.

4. Regions with limited resources and access

People living in difficult areas such as high mountains, steppes are totally dependent on livestock production systems. It is difficult to generate resources available for people and animals due to limited manpower as well as lack of demand for human resources. One Health approach combines demand for services on human and veterinary medicine, potential for full service provision. There are lessons learned from the experience of some countries and thus One Health services required a combination of all aspects of animal product, gene, sanitation and water and plants.

5. The flexibility of resources allocated for human and animal health

Look at the economic logic of the One Health approach, ability to use resources easily for human and animal health problems also play a very important role.

- Determine the cost of the intervention on OH approach.
- Intervention based on OH approach is broader in both humans and pathogens as in zoonotic diseases because these interventions must have cost to be implemented.

- Cost concept can be applied to calculate the cost of intervention under One Health approach.

The assessment of the cost of zoonotic diseases is complicated and need a deep understanding of the disease's ecology. Understanding disease transmission details help determining the cost factors of the disease. Control zoonotic diseases is the only effective intervention that can be done outside the medical field because transmission doesn't occurs among humans, but only from animals to humans. Economic effect is far beyond the cost of disease control because it reduces household income.

EFFICIENCY AND EFFECTIVENESS OF ONE HEALTH	
Learning Objective	• Students will be able to explain the efficiency and effectiveness of using the innovation OH approach in developed and developing countries • Explain the economic incentive to using the OH approach

Lecture - Efficiency and Effectiveness of One Health

Efficiency is defined as no waste, limited resources, production maximized with the same amount of material.

While there is no information about the scientific work and experiments related to increasing efficiency of the OH approach, comparing before and after results would showcase the success of integrating interventions. To be able to give such information, it is needed to have studies to comparing similar situations which do not happen in reality. In principle, costs for disease control are increasing (at different speed to each specific disease) due to the time laps from epidemic detection to disease appearance and to disease control. Actual data on resource savings from OH is not available in public sector because there are only a few countries implementing One Health approach. SEAOHUN is one of the few networks that encourages researching and integrating the OH approach on a local and national scale in Vietnam, Cambodia, Indonesia and Thailand. Results will be available in the upcoming years!

Ask the class the following question: *What are some benefits of investigating in the OH approach? Why do you think people are hesitant to implement the OH approach? How do you track the benefits?*

To track the benefits of integrating the OH approach relies on a qualitative assessment. So it is different in two ways:

- 1. Intensive detection and control with close coordination between health care services for people, livestock and wild animals will lead to the full and faster epidemic diagnostics.
- 2. When there is lack of information and interaction between humans, livestock and wild animals, the definition of epidemic root might be slow, leading to the increase of cost for disease control.

Divide students into groups of 3-5 and have them discuss the following question: *If you have 5 minutes with healthcare practitioners, hospitals, international donors and government agencies. They want to invest in a new health approach for 5 million dollars, how would your group sell the One Health approach to them? What are some key selling points?*

They will then provide a 3 minute presentation to the class, advocating for the integration of the OH approach on a national scale. Make sure they include an argument regarding cost-effectiveness! After all presentations, have the class discuss the best argument for the OH approach and its cost-effectiveness. Note why students would (or would not invest). Remind students that these challenges are currently present and they will be the others to advocate for change.

Remember: Investing in the One Health approach has longterm benefits, as it combats climate change, builds local and national resilience, and encourages multi-sectoral innovation with resource management.

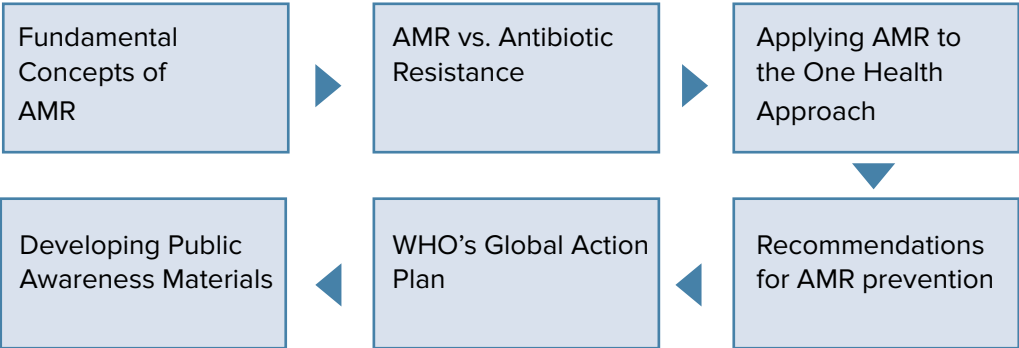
MODULE 9

ANTIMICROBIAL RESISTANCE

Course Overview

Module Description and Learning Outcomes	This module provides an understanding of the basic principles of antimicrobial resistance (AMR) in the context of OH. The modules uses an OH approach to examine various challenges associated with AMR, as it impacts the treatment of animals and humans. Students will learn basic terminologies, its local and national problems, and its impact on humans, animals, and the environment. Key outcomes of the module are the ability to: • Describe fundamental concepts of AMR • How the OH approach can offer longterm solutions to AMR at various levels • How to advocate for proper diagnosis and treatment of health related illness in humans and animals
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Learning Map



Module Overview

Competency #1	Learning Objectives to Develop Competency
Describe the fundamental concepts of Antimicrobial Resistance	- Describe the development of AMR and its key definitions - Apply fundamental concepts to develop an OH approach in the context of AMR
Competency #2	Learning Objectives to Develop Competency
Interpret fundamentals of AMR, its daily impacts and associated challenges	Use AMR fundamentals to identify and classify health related problems present in humans and animals, on a local, national, and international scale. Students will study a case study example of AMR.
Competency #3	Learning Objectives to Develop Competency
Integrate AMR concepts into present context	Understand the associated problems and challenges developing with AMR to propose possible health interventions with the OH approach. Students will look at human, environmental, and animal
Competency #4	Learning Objectives to Develop Competency
Apply communication strategies to increase general awareness	Understand communication methods to convey information about AMR and increase awareness by being able to: - Effectively communicate information about AMR to professionals and the general public - Propose possible solutions or prevention techniques - Design an advocacy campaign to increase public awareness

FUNDAMENTAL CONCEPTS OF ANTIMICROBIAL RESISTANCE

Learning Objective	
	- Describe the development of AMR, its key definitions, and why it is an OH related problem - Apply fundamental concepts to develop an OH approach in the context of AMR

Fundamentals of Antimicrobial Resistance Lecture

The World Health Organization (WHO) defines antimicrobial resistance (AMR) as a case in which microorganisms such as bacteria, viruses, fungi and parasites changes the ways that render the medications used to cure the infections they cause ineffective. When the microorganisms become resistant to most antimicrobials they are often referred to as “superbugs”. It is also important to note that this is the broader term used for resistance in different strands of microorganisms and includes resistance to antibacterial, antiviral, anti-parasitic and anti fungal drugs used to treat animal and human related illnesses. This is a major concern because a resistant infection may kill, can spread to others, and imposes huge costs to individuals, animals, ecosystems, and society as a whole. Standard health treatments can become ineffective

Why does this matter? Because AMR threatens the effective prevention and treatment of numerous infections caused by bacteria, parasites, viruses, and fungi in animals and humans. This can impact resource management, increase costs in medicine and damage ecosystems through misuse and misdiagnosis. AMR is a serious threat to global public health, with no proposed solution, and requires action across all of South East Asia. This threatens our ability to treat common diseases, resulting in prolonged illness, disability and death. Without effective antibiotics, surgeries and proposed health solutions can be compromised. Also through as an economic argument, AMR increases the cost of healthcare services. Individuals might require more medicine, intensive care, or a longer stay at a hospital.

Ask the class, *what are some examples of misusing antibiotics?* Examples include:

- Resistance in bacteria
- Going to the pharmacy without proper prescriptions from trained doctors and misusing medicines (not taking the proper amount or finishing prescribed dosage)
- Giving growth promoters to farm animals to speed use their development
- Using growth promoters to prevent diseases in healthy animals
- Treating viral infections in humans, such as the common cold or flu, with medicine
- Resistance to *staphylococcus aureus* (staph infection) in animals and humans
- In 2010, an estimated 7% of people starting antiretroviral therapy (ART) in developing countries had drug resistant HIV.

Now ask the class, *how does AMR relate to the One Health approach?*

Antimicrobial resistant-microbes are found in people, animals, food, and the in water, soil and air. They can spread between people and animals through eating, disease transmission, etc. This is including from food of animal origin, and from person to

person. Poor infection control, inadequate sanitary conditions and inappropriate food-handling encourage the spread of antimicrobial resistance, particularly in developing countries, such as Vietnam and its rapidly urbanized areas, like Hanoi or Ho Chi Minh City.

WHO has also been working closely with FAO and OIE to integrate the One Health approach in promoting the best practices to avoid the emergence and spread of antibiotic resistance, including optimal use of antibiotics in both humans and animals. There needs to be a large scaled, coordinated approach in addressing the root cause of AMR, across multiple sectors, particularly relating to human health, animal health, the environment, and agriculture.

For more information, view WHO's website: <http://www.who.int/antimicrobial-resistance/en/>

ANTIBIOTIC RESISTANCE VS. ANTIMICROBIAL RESISTANCE	
Learning Objective	• Define antibiotic resistance • Distinguish Antibiotic resistance from antimicrobial resistance

Individual Activity

Have students write out their own ideas and definitions of antimicrobial resistance in their own words. Encourage them to include 1 example related to human health, animal health, and the environment. Collect responses. Also encourage students to make an educated question at what the definition of antibiotic resistance is. If students do not have any ideas, ask them to write down what they think antibiotic resistance ISN'T.

Antibiotic Resistance - Antibiotics are medicines used to prevent and treat bacterial infections. Antibiotics resistance occurs when bacteria change in response to the use of these medicines. Bacteria, not humans or animals, become antibiotic resistant and makes it more difficult to treat.

Why is this a pressing issue? The world urgently needs to change the way it which it prescribes and uses antibiotics. Even if new medicines are developed, without behaviour change, antibiotic resistance will remain a major threat. Behaviour changes must also include actions to reduce the spread of infections through vaccination, hand washing, practicing safer sex, and good food hygiene. It is also an economic problem, as people will require more medical assistance to treat human and animal health related problems. AMR is also linked to resource management, as certain treatments soon might not be available to the public or too expensive. Disease

management should also take AMR into consideration, as AMR could undermine any proposed disease outbreak mitigation strategies.

Ask the class: *What are the differences between antibiotic resistance in comparison to antimicrobial resistance? Why is it important to know the difference?*

What is the difference between antibiotic and antimicrobial resistance?

The World Health Organization says, antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of these medicines. Bacteria, not humans, become antibiotic resistant. These bacteria may then infect humans and are harder to treat than non-resistant bacteria. Antimicrobial resistance is a broader term, encompassing resistance to drugs to treat infections caused by other microbes as well, such as parasites (e.g. malaria), viruses (e.g. HIV) and fungi (e.g. Candida).

Optional Quiz: How much do you know about Antibiotic Resistance?

1. Antibiotics are powerful medicines that help to fight:

- a. Viruses
- b. Bacteria
- c. All microbes

Answer: B. Bacteria - antibiotics are medicines that treat bacterial infections. They do not cure infections caused by viruses, such as the common cold or flu. Taking antibiotics when you do not need them can prevent them from working when you do need them.

4. Antibiotic resistance happens when my body becomes resistant to antibiotics.

- a. True
- b. False

Answer: B. False - Antibiotics target bacteria, killing or weakening them and helping you to fight off infections. Your body does not develop resistance to antibiotics; it is the bacteria which becomes resistant to antibiotics through genetic changes. This means that if you get an antibiotic-resistant bacterial infection, the usual antibiotics used to fight it will no longer be effective. A less accessible or last resort antibiotic will then need to be used, and in some cases options for potential active antibiotics could run out.

5. Antibiotic-resistant bacteria can spread to humans through:

- a. Contact with a person who has an antibiotic-resistant infection
- b. Contact with something that has been touched by an antibiotic resistant infection

- c. Contact with a live animal, food, or water, carrying antibiotic resistant bacteria
- d. All of the above

Answer: D. All of the above - Antibiotics are given to humans, animals, fish and crops. Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause. Antibiotic-resistant bacteria spread through contact with humans, animals, food or environment that are carrying them. You can help to prevent the spread of infections by regularly washing your hands, covering your nose and mouth when you cough or sneeze, and practising safer sex.

6. What can happen if I get an antibiotic-resistant infection?

- a. I may be sick for longer
- b. I may have to visit the doctor more often or be treated in a hospital
- c. I may need more expensive medicine
- d. All of the above

Answer: D. All of the above - Antibiotic resistance is happening everywhere in the world, affecting people of all ages. It is one of the biggest threats to public health today. Antibiotic resistant infections can take longer to treat, may require more frequent doctor visits, possible hospital stays, more severe side effects and expensive treatments.

7. Antibiotic resistance is currently out of control and is getting worse. There is nothing that can be done.

- a. True
- b. False

Answer: B. False - While antibiotic resistance occurs naturally over time, the misuse and over-use of antibiotics in plants, animals and humans has accelerated this process to dangerously high levels. BUT it's not too late to reduce the impact of antibiotic resistance and we all have a part to play in preserving the effectiveness of antibiotics

8. I can help tackle antibiotic resistance by:

- a. Sharing my antibiotics with friends and family members when they are ill
- b. Getting antibiotics as soon as I feel sick - either from the pharmacy or a friend
- c. Keeping my vaccinations up to date

Answer: C. Keeping my vaccinations up to date - Taking action to prevent infections, such as by getting vaccinated, will stop you from getting sick and reduce your need

for antibiotics. Even small actions can make a difference, like washing your hands regularly to prevent the spread of infection. And remember: if you do get sick, always consult your doctor about whether you need antibiotics. It is important to follow your doctor's advice, and not to share or use leftover antibiotics.

AMR IN A ONE HEALTH APPROACH	
Learning Objective	- Identify how the One Health approach will help solve AMR challenges for animal and human health. - Students will look at common AMR challenges between human, animal, and agriculture

Prior to class, have students read the following article: Singh Poonam Khetrpal. "One Health approach to tackle antimicrobial resistance in South East Asia," BMJ 2017; 358 :j3625 <https://www.bmj.com/content/358/bmj.j3625>

The One Health Approach to Antimicrobial Resistance

FAO, OIE, and WHO are the tripartite who are actively collaborating to combat AMR with the One Health approach. This is because addressing the threat of AMR requires a holistic and multi-sectoral approach to treat various infectious diseases in animals and humans. Resistant bacteria arising either in humans, animals or the environment may spread from one to the other, and from one country to another. It is important to remember that AMR does not recognize geographic or human/animal borders. It is a worldwide problem, particularly in South East Asia because this region is at a high level risk for the global emergence and spread of AMR. It jeopardizes progress on health outcomes and requires active collaboration amongst local, national, and international governments and agents. The aim is to:

- Ensure that antimicrobial agents continue to be effective and useful to cure diseases in humans and animals
- Promote prudent, responsible and proper use of antimicrobial agents.
- Ensure global access to medicines of good quality, proper diagnosis, and guidelines for proper usage.

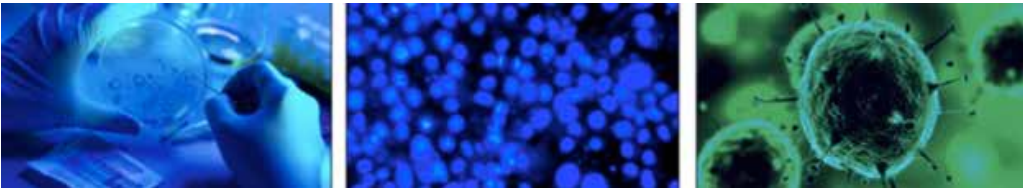
Since antimicrobials were commercially produced, initially for use in human medicine and subsequently in veterinary medicine, their use has been associated with the rise of emergence of AMR. As the world has observed accelerated emergence of resistance, the discovery and development of new antimicrobial drugs has slowed down. Globalization has led to unprecedented movements amongst people, animals, food commodities, and ecosystems, which provides opportunities for the global spread of resistant organisms. Combatting the threat of AMR requires global concerted action and commitment,

Although the region has made steady social and economic progress, a large proportion of the population continues to live in poverty. Inadequate housing and sanitation accelerate person-to-person and environmental spread of resistant pathogens and genes. There is also a lack of regulation of production and sale of antibiotics. It is very weak in South East Asia. Medicine is readily available over the counter and doesn't require a prescription (or proper guidance on how to use medicine).

Antibiotic stewardship programmes also remain underdeveloped. High use of antibiotics in hospitals and transmission of resistant pathogens between patients and to health workers accelerates spread of resistance. System-wide monitoring of measures such as infection prevention and control and awareness of healthcare workers is lacking.

Ask students, *What actions should be taken to combat the threat of AMR?* The following suggestions were provided by WHO and its tripartite effort between WHO/FAO/OIE. Possible answers include:

- Raise awareness
- Strengthen national capacities to address AMR
- Support developing countries as they establish appropriate policies, institutional and regulatory frameworks and networks
- Promote research and development of new antimicrobial agents, diagnostics and vaccines, and new approaches to AMR prevention and control
- Support efforts and innovations to fight against circulation of poor quality or counterfeit products
- Promote improved infection prevention and control measures, thereby reduce usage of antimicrobial agents



Source: http://www.who.int/foodsafety/areas_work/antimicrobial-resistance/amr_tripartite_flyer.pdf?ua=1

Before the class ends, have the students write a one page reflection regarding AMR and the One Health Approach. Propose the following questions to encourage some ideas:

- What are barriers in Vietnam to integrating AMR and the One Health approach?
- How is using the One Health approach beneficial to solving the AMR problem in Vietnam and South East Asia?

- What recommendations would you have for a National Action Policy incorporating the One Health approach and combat AMR?

RECOMMENDATIONS FOR SOLVING AMR WITH A ONE HEALTH APPROACH	
Learning Objective	• Provide AMR recommendations to present problems in Vietnam and South East Asia • Learn prevention and control measures for individuals, policy makers, health professionals, etc.

Antibiotic resistance is accelerated by the misuse and overuse of antibiotics, as well as poor infection prevention and control. Steps can be taken at all levels of society to reduce the impact and limit the spread of resistance. Below are WHO recommendations of preventive and control strategies individuals, policy makers, health professionals, healthcare industry, etc. can take to combat AMR.

Individuals	Policy Makers	Health Care Professionals
• Only use antibiotics when prescribed by a certified healthcare provider • Never demand antibiotics that you don't need • Always follow advice from healthcare workers • Never share or use leftover antibiotics • Practice proper hygiene practices, such as washing hands, preparing food hygienically, practice safe sex, and keep vaccinations up to date.	• Ensure a national action plan • Improve surveillance of antibiotic-resistant infections • Strengthen policies, programmes, and implementation of infection prevention and control measures • Regulate and promote the appropriate use and disposal of quality medicines • Make information on the impact of antibiotic resistance readily accessible	• Wash hands and instruments, and maintain a clean work environment • Inform patients on preventing infections (vaccinations, hand washing, safe sex, etc). • Inform patients on proper usage of antibiotics and dangers of misuse • Report antibiotic-resistant infections to surveillance teams

Healthcare Industry	Agriculture Sector
- Invest in research and development of new antibiotics, vaccines, diagnostics, and other tools - Ensure staff have proper and up to date training	- Only give antibiotics to animals under veterinary supervision - Don't use antibiotics for growth promotion or to prevent diseases in healthy animals - Promote and apply good practices at all steps of production and food processing - Improve biosecurity on farms and prevent infections through improved hygiene and animal welfare

Divide the class into four large groups and have them design recommendations for the following:

- Local communities
- Government
- Ministry branch (health, agriculture, labour & trade, etc.)
- Health ngos

WORLD HEALTH ORGANIZATION'S GLOBAL ACTION PLAN FOR AMR	
Learning Objective	- Review WHO's action plan for addressing AMR and learn the 5 strategic objectives and the implementation process - Students will learn how to effective communication about the emerging AMR threat

A global action plan on AMR, including antibiotic resistance, was endorsed at the World Health Assembly in May 2015. The global action plan aims to ensure prevention and treatment of infectious diseases with safe and effective medicines. The Global action plan on antimicrobial resistance has 5 strategic objectives:

- To improve awareness and understanding of antimicrobial resistance
- To strengthen surveillance and research
- To reduce the incidence of infection
- To optimize the use of antimicrobial medicines
- To ensure sustainable investment in countering AMR

Linked to the WHO's Global Action plan, there have been various media initiatives to increase the publics awareness of AMR. They are listed as the following:

- World Antibiotic Awareness Week (sometime in November)

- The Global Antimicrobial Resistance Surveillance System (GLASS)
- Global Antibiotic Research and Development Partnership (GARDP)
- Interagency Coordinator Group on Antimicrobial Resistance (IACG)

World Antibiotic Awareness Week aims to increase global awareness of AMR and to encourage best practices among the general public, healthcare workers, and governments to avoid the further emergence and spread of antibiotic resistance. Ask students, *What would be an effective plan to implement AMR awareness in Vietnam?*

Divide students into groups of 3 and have them prepare either a 5 minute presentation or a poster for the general public to learn about AMR. Alternate between groups, assigning human health and animal health equally. Presentations and posters should include recommended actions! *Bonus points will be awarded for creativity.* After presentations, set up posters throughout the school. Have students discuss what was the most effective communication strategy and why.

***If easier, have all groups design posters and put them throughout the school and local community. If feasible, have fellow students vote on which poster best informed them about AMR.

Examples of posters: <http://www.who.int/campaigns/world-antibiotic-awareness-week/2017/posters/en/>

Monitoring and Evaluation of One Health Modules

Have students complete the following learning assessment after the completion of every Module. This will allow for lessons to be learned in regard to teaching styles and monitor the success of OH lecturers and respective modules. Once the responses are complete, collect them to inform future deliveries of the module. Additional comments and feedback are encouraged!

LEARNING REFLECTIONS AND EVALUATION	
Learning Objective	- To reflect on the learning process of all related One Health competencies, concepts and knowledge - This will allow participants to provide feedbacks on what they felt were the strengths of the module and which areas in the module need improvement - Students will also be able to reflect on lecturers and related activities

Individual Learning Assessment

How would you rate your level of the following _____ Module:

Please feel free to tailor the questions in relation to the specific modules

Ask students to reflect on the following:

- You are confident in your abilities to define all One Health technical and core competencies.
- Ability to explain critical components of this particular module.
- Define One Health, its approach, and application.
- Relation of health issues with ecosystems, community health, and animal welfare.
- Design behaviour change strategies for One Health Interventions in communities
- Identify and understand the role of national agencies, NGO, and other key actors, and their policies that affect One Health issues and interventions

Note things you learned from this session and use the questions below to encourage reflections:

- What was new or surprising to you?
- What have you changed your mind about? Are you unsure about anything?
- Are there new behaviours that you will try based on this class?
- What topics from the class will you share with others outside the class?

In small groups, have students share key learnings from the module and how they will apply the concepts, knowledge, skills once they enter the workforce. Discussion keys include:

- What is one element of the module they like/felt was a strength?
- What is one element of the module that they disliked? Why?
- Do you have any suggestions for future programming/teaching?
- What is one thing in the module they suggest be changes?

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