Guidance for One Health field epidemiology curriculum development

A supplemental manual to the *Competencies for One Health field epidemiology (COHFE) framework*

Food and Agriculture Organization of the United Nations

World Health Organization

World Organisation for Animal Health
Founded as OIE

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Contents

Foreword

Infectious diseases are emerging at a rapid rate and pose a severe threat to health security, the global economy, and food safety. Novel infectious diseases have been increasingly reported in the past 50 years, including severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), Ebola virus disease, avian influenza H5N1, pandemic influenza A (H1N1), Zika virus and COVID-19. As demonstrated by the COVID-19 pandemic, emerging infectious diseases can cause massive health and socio-economic impacts.

More than 60% of emerging infectious diseases are of animal origin.[1] Diseases emerge from a confluence of several drivers, including rapid population growth and urbanization, land-use change, encroachment on wild habitats, and changing global and local weather patterns. As the world population has grown from about 1.6 billion in the 1900s to 7.8 billion today, the demand for food and housing has increased concurrently. To meet this demand, we have resorted to intensive farming and clearing forests at the rate of 10 million hectares per annum. As a result, humans and domestic animals are coming into closer contact with wild animals, increasing the chances for spillover of pathogens from wildlife to domestic animals and humans. The risk is further exacerbated by climate change, antimicrobial resistance, and cross-border trade of livestock and wildlife.

The challenges to address emerging infectious diseases are multifactorial. The traditional siloed approach of working in isolation in the public health, animal health and environment sectors is not adequate to tackle them. Instead, we need a workforce that can function across all of these sectors using the One Health approach, defined recently as "an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems. It recognises the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent."[2]

The current field epidemiology workforce is not yet sufficiently prepared to work across the human-animal-environment interface. Field epidemiology training programmes (FETPs) are crucial for preparing the health workforce to prevent, detect and contain infectious diseases. Still, most programmes currently train either public health or animal health epidemiologists, with very few programmes working across both sectors and even fewer that include the environment sector or wildlife. It is only with this kind of collaboration and the ability of professionals in various sectors to work together that the emergence of new infections can be limited, preventing negative health outcomes and socio-economic disruptions.

The *Competencies for One Health field epidemiology (COHFE) framework* addresses the increasing and urgent need to strengthen collaboration among the public health, animal health and environment sectors to tackle health threats at the human-animal-environment interface*.* Developed jointly by the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH), the *COHFE framework* defines the core One Health, optional One Health, and sector-specific knowledge, skills, and competencies for field epidemiologists. The framework can be used by existing public health and veterinary field epidemiology training programmes to design and update their curriculum, or by countries or regions to set up new One Health field epidemiology training programmes. A specifically designed prioritization tool allows programmes to rank optional One Health and sector-specific knowledge, skills, and competencies and create a framework to suit their context and needs. The adoption of this framework will ensure that training participants are able to work across multiple sectors to tackle emerging infectious diseases and other evolving challenges and apply the necessary systems thinking of the One Health approach.

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1 Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, Daszak P. Global trends in emerging infectious diseases. Nature. 2008 Feb 21;451(7181):990-3. doi: 10.1038/nature06536. PMID: 18288193; PMCID: PMC5960580.

2 One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, Bukachi SA, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLoS Pathog 18(6): e1010537. https://doi.org/10.1371/journal.ppat.1010537
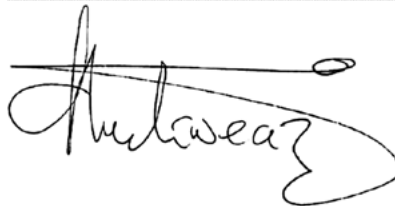
The *COHFE framework* is accompanied by four supplemental manuals:
- *Guidance for One Health field epidemiology curriculum development*
- *Guidance for One Health field epidemiology mentorship*
- *Guidance for One Health field epidemiology learning evaluation and certification*
- *Guidance for One Health field epidemiology continuing education programmes*

These manuals are meant to assist countries with implementation of the *COHFE framework*. We believe the framework and guidance documents present an innovative approach to strengthening field epidemiology capacity and health security. Together with other resources and tools, the *COHFE framework* and supplemental guidance will help governments and international organizations to effectively prevent and manage emerging infectious diseases and other evolving health challenges at the human-animal-environment interface.

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Acknowledgements

Acronyms

AMR	Antimicrobial Resistance
AMU	Antimicrobial usage
CBRN	Chemical, biological, radiological and nuclear threats
FAO	Food and Agriculture Organization of the United Nations
IHR	International Health Regulations
IPC	Infection prevention and control
PPE	Personal protective equipment
SOP(s)	Standard operating procedure(s)
WHO	World Health Organization
WOAH	World Organisation for Animal Health

Introduction
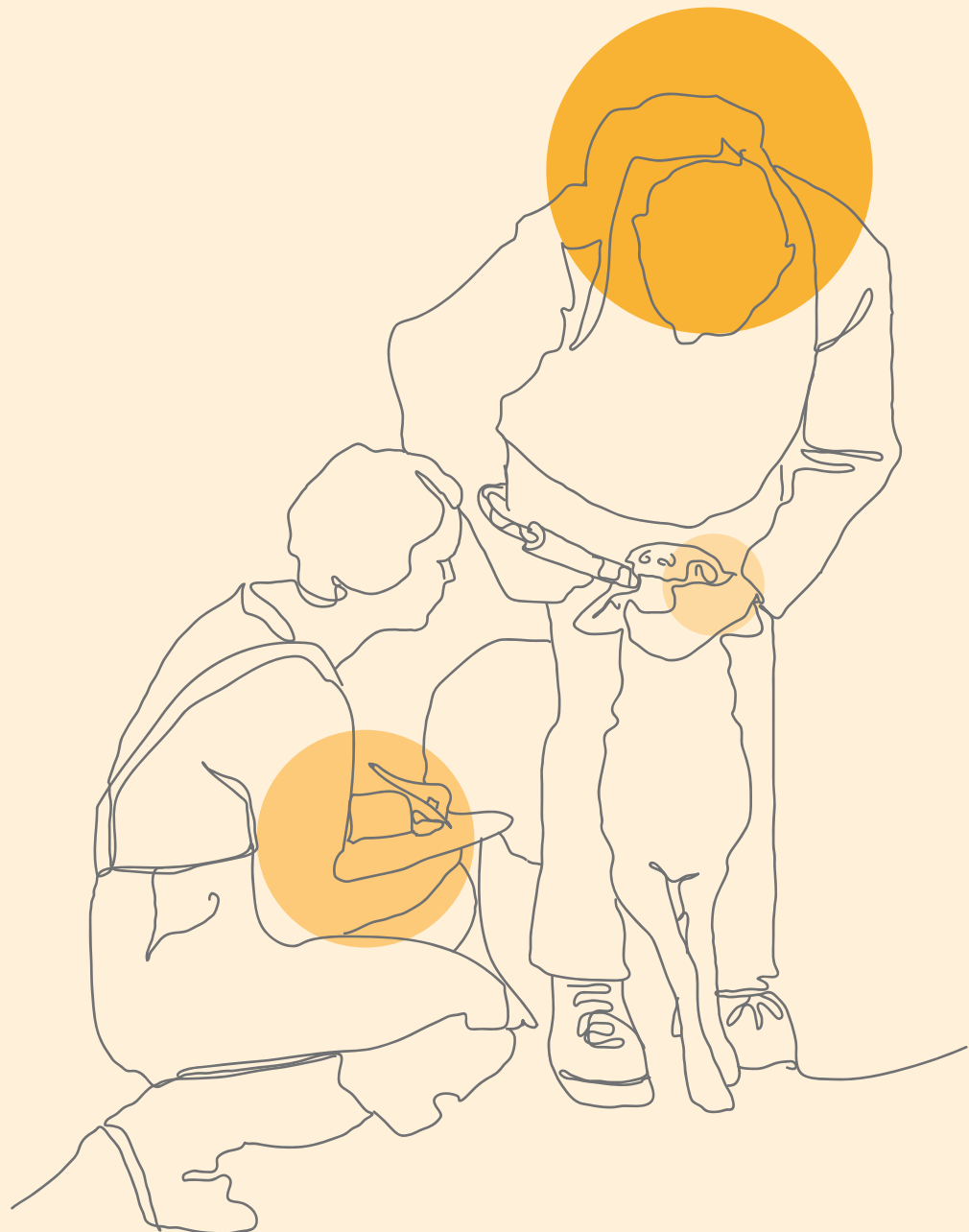
Background

The need for properly trained epidemiologists to strengthen country capabilities in disease surveillance, epidemiological investigations, and outbreak response is a requirement recognized by the global public health community. Veterinary epidemiology is also recognized as a priority by the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (WOAH). The presence of an applied epidemiology training programme has been included in the World Health Organization (WHO) Joint External Evaluation (JEE) tool since 2016, further motivating countries to develop and strengthen these capabilities. Although organizations such as the Centers for Disease Control and Prevention (CDC), WHO, FAO, WOAH, and the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) have established relevant curricula and accreditations, no internationally accepted One Health competencies exist for epidemiologists nor are there standardized curricula, evaluation and certification, or continuing education requirements for graduates. This results in graduates with varying competence and the dilution of the reputation of Field Epidemiology Training Program (FETP) or Field Epidemiology Training Program for Veterinarians (FETPV) certificate. To fill this gap, FAO, WHO and WOAH developed the *Competencies for One Health field epidemiology (COHFE) framework* to define the knowledge, skills and competencies recommended for graduates of field epidemiology training programs at the frontline, intermediate and advanced levels. Field epidemiology training programmes globally, irrespective of the sector, should endeavour to establish curriculum guidance that link to the 14 Domains of learning described in the *COHFE framework*. This will help to ensure that participants completing a field epidemiology training programme possess the desired competencies within a One Health context. Recommendations for the curricula needed to meet these competencies are presented in this document as a companion to the *COHFE framework*.

How the guidance was developed

A global analysis of curricula from existing field epidemiology training programmes informed the development of this *Guidance for One Health Field Epidemiology Curriculum Development*. Curricula from 18 advanced, two intermediate and three frontline field epidemiology training programmes were assessed by a multisectoral team of subject matter experts from FAO, WHO and WOAH. The team defined higher level competencies to summarize the One Health competencies outlined in the 14 Domains of the *COHFE Framework*. Higher-level competencies were proposed for each subdomain at the frontline, intermediate and advanced training levels. Curriculum topics were then proposed based on higher level competencies, and recommended learning objectives were defined for each topic at each relevant training level based on the One Health knowledge, skills and competencies outlined in the competency framework. The draft curriculum guidance presented to a technical advisory group of global field epidemiology and One Health experts for feedback and validation (Annex 1).

Scope of work

This document details higher order One Health competencies at the subdomain level based on competencies defined in the 14 domains of the *COHFE Framework*. The subdomain level higher order competencies are defined in Table X.1 for each domain (numbered by domain) at three training levels (frontline, intermediate and advanced), with each level building on the previous level so that demonstration of the previous level's competencies is required in addition to those indicated at the given level. The guidance also recommends and describes curriculum topics and provides example learning objectives for all three training levels (Table X.2 for each domain).

Since each sector has different requirements for recognizing academic and vocational training models (e.g., certificate, diploma, or degree) and has different registration and licensing requirements, the specific type of qualification gained after completing a programme is not reflected in this guidance. That determination should be made at the country level, based on the certification and licensing requirements within each sector. The *Guidance for One Health Field Epidemiology Curriculum Development* clarifies the curricula topics needed to effectively train field epidemiologists globally

and to fulfill the competency needs identified in the *COHFE Framework*. New training programmes may utilize both documents to guide curriculum development, while existing programmes may use them to strengthen their One Health curriculum.

How to use this document

This document is intended to be used by authorities in member countries and regions and by education or continuing education providers when planning or reviewing an existing curriculum for a field epidemiology training programme. Countries should develop curriculum according to their needs, the different priorities of each sector, and the diverse range of sector specific training programmes currently available in the country. There is no single approach that will fit the needs and priorities of all countries. However, it is recommended that each country should work to harmonize training programmes (governmental, nongovernmental, and academic) to allow for better cross sectoral linkages amongst participants within programmes. The overall objective is to develop a skilled global workforce that can work across sectoral lines to address today's significant global health challenges.

The *COHFE framework* and the *Guidance for One Health Field Epidemiology Curriculum Development* recommend competencies and curricula for professionals in One Health (public health, animal health, and environmental professionals). This guidance is designed to allow for incremental development of competencies at each level and for flexibility to adapt to the country context and conditions. The *COHFE framework* and the *Guidance for One Health Field Epidemiology Curriculum Development* can be used together by countries at the institutional or individual level for:

- Programme development;

- Curriculum development;

- Programme needs' assessment, as guidance with which existing programmes can compare their current competencies and curricula; or

- Self-assessment, as guidance for individual field epidemiologists at each level to assess their current level of knowledge, skills and abilities or identify areas of improvement for career advancement.

As in the *COHFE framework*, competencies are provided for three training levels (frontline, intermediate, and advanced) by domain and subdomains. Domains refer to the principal job focus for the One Health field epidemiologist and cover technical and functional knowledge, skills and competencies needed at all administrative levels (district, regional, and national/international). Each domain includes subdomains for which a higher order competency (see Definitions) statement is provided. These broad statements link the *Guidance for One Health Field Epidemiology Curriculum Development* with the *COHFE framework*. Curricula should incorporate the higher order competencies to achieve the knowledge, skills and competencies outlined in the framework.

The topics and descriptions in this *Guidance for One Health Field Epidemiology Curriculum Development* correspond to domains identified in the *COHFE framework*. The curriculum is framed around topics. Each topic includes a description and example learning objectives at each training level. A learning objective describes what a graduate from a programme will know and be able to do upon completion of the curriculum. The topics also specify the corresponding core competencies from the *COHFE framework*. Core competencies are defined using a numeric code **D.S.C.L.** where **D** is the domain number, **S** is the subdomain number, **C** is the statement number and **L** is the training level (**f**=frontline, **i**=intermediate and **a**=advanced). Countries may choose to organize topics into a training programme structure best adapted to their needs and addressing further optional competencies and corresponding learning objectives. Optional competencies may be selected for inclusion in the curriculum based on a prioritization tool available with the framework.

The duration, sequencing and format of the curriculum may vary by country and programme. In countries with already established programmes and sufficient resources and personnel, this guidance can be used for curriculum enhancement, with emphasis on practical skills and theoretical knowledge. In circumstances where there is an immediate need for competent trained field epidemiologists (e.g., emergency outbreak situations, countries with field epidemiology training programmes, countries with identified workforce needs and gaps for field epidemiologists), a country may select a smaller number of topics deemed most relevant and deliver a shorter curriculum with an emphasis on practical applied skills and the understanding that theoretical knowledge could be provided at a later stage.

Some flexible approaches for how to apply the *COHFE Framework* and the *Guidance for One Health Field Epidemiology Curriculum Development* could include:

Cross checking a country programme's existing core competencies and curricula and selecting competencies and curricular guidance at specific levels only;

- Cross checking a country programme's existing core competencies and curricula and selecting specific domains only (e.g., ecosystems only or ecosystems along with other technical domains identified as gaps); or

- Cross checking a country programme's existing core competencies and curricula and selecting specific domains only (e.g., ecosystems only or ecosystems plus other technical domains identified as gaps), along with expanding to prioritized optional competencies under these domains selected through using the *COHFE Framework* prioritization tool.

The *COHFE framework* and *Guidance for One Health field epidemiology curriculum development* are accompanied by three additional supplemental manuals:

- Guidance for One Health field epidemiology mentorship

- Guidance for One Health field epidemiology learning evaluation and certification

- Guidance for One Health field epidemiology continuing education programmes

Definitions

The following definitions were specifically developed for use in the *Competencies for One Health field epidemiology (COHFE) framework* and supplemental guidance manuals. The terms may be used differently in other contexts or publications. Additional terms are defined in the One Health glossary in Annex 1 of the *COHFE framework*.

Domain: A broad topic or subject area from the *Competencies for One Health field epidemiology (COHFE) framework* that is divided into subdomains

Subdomain: In the *COHFE framework*, a narrower topic or subject area than a domain. Subdomains consist of knowledge, skills, and competencies.

Knowledge (K): Assimilation of information through learning. Knowledge is the body of facts, principles, theories, and practices related to a field of work or study. It is described as theoretical and factual.

Skill (S): Ability to apply knowledge and to complete tasks and solve problems. Skills are described as cognitive (involving the use of logical, intuitive, and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools, and instruments).

Competency (C): Proven ability to apply knowledge, skills and personal, social and methodological abilities (attitudes and behaviours), in work or study situations and in professional and personal development in terms of responsibility and autonomy. It is not limited to cognitive elements (involving the use of theory, concepts, or knowledge), as it also requires the use of interpersonal skills (e.g., social or organizational skills) and ethical values where relevant. A core competency is the minimum level of competency expected to be achieved by the participants in a training programme.

Core: A required knowledge, skill or competency for a specific level of training (Frontline, Intermediate or Advanced) for One Health field epidemiologists

Optional: A knowledge, skill, or competency that a country programme can choose to include in their Frontline, Intermediate or Advanced programmes based on a country needs assessment but which is not considered a required core competency for One Health field epidemiologists

Training levels

Frontline[3]: A 3–4 month mentored in-service applied training programme for field staff from human, animal or environmental health sectors to strengthen epidemiologic capacity at the community to the district level. It aims at improving competencies to conduct data collection, disease monitoring, and investigation and response to health events across the One Health spectrum.

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3 The term Frontline with regards to health workers is controversial because its meaning is unclear, may be unintentionally divisive or militaristic, and translates poorly in some languages. However, we use this term to align with structures and practices of existing training programmes.

Intermediate: A 9–12 month mentored in-service or fulltime applied training programme for staff from human, animal or environmental health sectors who provide epidemiologic services, usually at the district to provincial levels. It includes additional training in surveillance, data analysis and interpretation, and management of investigations and responses to health events, across the One Health spectrum.

Advanced: A two-year mentored fulltime intensive training programme for experienced staff from human, animal or environmental health sectors to prepare them for applied epidemiology leadership roles at provincial and national levels. It includes advanced training in designing and managing surveillance programmes, complex epidemiologic methods and management of investigations and responses to health events, across the One Health spectrum.

Additional definitions

Topic description: A brief synopsis of the contents in a topic

Learning objective(s): A list of concepts, skills, or competencies which students should be able to know or do at the end of the programme

Higher order competency: An overarching One Health competency statement that summarizes at the subdomain level the more specific and detailed competencies in the *COHFE Framework*.

Section I
Technical domains

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Domain 1
Foundational knowledge

Experts working in field epidemiology come from very diverse backgrounds and have different professional trajectories. To establish a common foundational knowledge relevant to human, animal, and environmental health, a set of topics have been identified that should provide a theoretical basis upon which subsequent domains are developed to build the skills and competencies necessary to work in the field. In a global context, theoretical knowledge of all these topics/subdomains constitutes a valuable foundation that enable the applied epidemiologist to fully engage in addressing local and global health priorities.

Table 1.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
1.1 History of epidemiology	Define epidemiology and field epidemiology	Describe the historical developments of epidemiology and its main concepts, culminating with the origins of the One Health concept	Explain causality viewpoints, linked to scenarios
1.2 Epidemiology of infectious diseases	Define basic infectious disease epidemiology terms and explain mechanisms of disease transmission	Describe factors driving the emergence and re-emergence of infectious diseases and how to break the chain of transmission	Assess the societal impact of (anthropo-) zoonotic diseases
1.3 Epidemiology of noncommunicable diseases	Provide examples of noncommunicable diseases impacting human and animal health	List the most important noncommunicable disease impacting human and animal health and describe their associated risk factors	Describe the relationship between environmental conditions and noncommunicable diseases, elaborate on at least one example
1.4 Prioritization of disease and disease burden		Describe the concept of burden of disease and how it can be used to prioritize interventions	
1.5 Policy and standards	Guide One Health coordination efforts at local level	Explain national legislation for human, animal, and environmental public health surveillance activities in the country and relevant international regulations, like PVS and IHR	Outline the standard operating procedures for human, animal, and environmental public health in the country and describe how One Health is coordinated at national level
1.6 Maternal and child health	Describe the local maternal and child health practices	Describe risk factors for diseases, including zoonotic diseases, that are specific to pregnant or nursing women and children	

Table 1.1. (cont.)
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
1.7 Demographic data and population dynamics	Identify sources of information for local human and animal populations and describe the gaps and limitations	Describe factors that affect demographics and population movements, including environmental factors, and use demographic information to guide planning decisions	List sources for national and subnational population estimates for humans, domestic animals and wildlife, describe how the data is collected, and identify gaps and limitations
1.8 Key indicators of health Services			Describe performance indicators for delivery of health services
1.9 Systems thinking	Explain interaction between ecosystems changes and how these impact on human and animal health outcomes	Advocate to integrate multisectoral systems thinking into daily routine	Apply systems based thinking to surveillance, outbreak investigation, design of epidemiological studies, and disease prevention and control practices

Table 1.1. (cont.)
Higher order competencies by training level

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Table 1.2
Curriculum topic names, descriptions and learning objectives for Domain 1

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Basics of epidemiology *This topic provides a basic understanding of epidemiology, its history and how its methods, concepts, and thinking have evolved, culminating with the origin of the One Health concept.* *It includes the concept of burden of disease, how this is measured, and how it can be used to assess the societal impact of communicable diseases, with a focus on (anthropo-) zoonotic diseases, and noncommunicable diseases, as well as prioritize and assess the cost-effectiveness of interventions.*	• Define epidemiology and field epidemiology, and describe their use in health sciences	• Describe how the science of epidemiology and its main concepts have evolved and what major discoveries spurred its development • Describe how assessing the burden of disease in animals and humans can be used to prioritize interventions • Explain the added value of adopting a One Health approach and give examples of its application	• Describe how to apply the viewpoints on causality to epidemiological thinking using scenarios; elaborate on their usefulness and applicability in modern epidemiology
Core competencies	1.1.1.f	1.1.1.i–1.1.2.i 1.4.1.i–1.4.3.i	1.1.1.a–1.2.1.a
Epidemiology of infectious diseases *It is important to master the basic concepts of infection, incubation period, latency, mechanisms of disease transmission, convalescence, vector, immunity, fomite, infectiousness, susceptibility, risk factors, exposure, reservoir, etc. Trainees will also be able to define zoonosis and anthroponotic disease and list important zoonoses with epidemic potential as well as factors driving emergence and re-emergence of infectious diseases, including environmental and social economic factors.*	• Define basic infectious disease epidemiology terms and explain mechanisms of disease transmission	• Describe factors driving the emergence and re-emergence of infectious diseases and elaborate on suitable interventions to break the chain of transmission	• Assess the societal impact of (anthropo-zoonotic diseases)
Core competencies	1.2.1.f–1.2.3.f	1.2.1.i–1.2.3.i 10.5.1.i–10.5.2i	1.2.1.a 10.5.1.a–10.5.4.a

Table 1.2 (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 1

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Epidemiology of noncommunicable diseases *Given the importance of environmental factors in the development of noncommunicable diseases and health conditions in animals and humans, this topic aims to make trainees aware of the connection between environmental factors and the health of humans and animals, and how these can be monitored.*	• Provide examples of noncommunicable diseases and conditions impacting human and animal health	• List the most important noncommunicable diseases impacting human and animal health and describe their associated environmental risk factors	• Describe the relationship between environmental conditions and noncommunicable diseases, providing at least one example • Elaborate on the importance of noncommunicable disease surveillance in humans and animals and how it can relate to surveillance of environmental factors
Core competencies			1.3.1.a–1.3.3.a
Policies and standards *When working within any public health system, it is paramount to be aware of the national legislation for public health and surveillance activities in the country, as well as international treaties, conventions, protocols, and regulations applicable to their field of work.*	• Give examples of how to guide One Health coordination efforts at local level	• Be aware of national legislation for human, animal, and environmental public health surveillance activities in the country • Describe relevant international regulations, like PVS and IHR	• Explain the standard operating procedures for human, animal, and environmental public health in the country • Describe how One Health is coordinated at national level
Core competencies	1.5.1.f	1.5.1.i	1.5.1.a–1.5.2.a
Maternal and child health *Basic maternal and child health outcomes are used as indicators for health and health systems' performance, especially in low- and middle-income countries. In this topic, trainees learn why it is important to identify risk factors for diseases specific to pregnant and nursing women and children.*	• Describe the local maternal and child health practices • Identify barriers to health access	• Describe risk factors for diseases, including zoonotic diseases, that are specific to pregnant or nursing women and children	
Core competencies	1.6.1.f–1.6.2.f		

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Table 1.2 (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 1

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Demographics and population dynamics *This topic deals with how fluctuations in the demographic composition of a population can affect disease incidence, transmission, and burden and, conversely, how disease and environmental factors may affect population dynamics. Trainees will learn how to identify reliable sources of information to assess animal and human population numbers.*	• Identify sources of information for local human and animal populations and describe the gaps and limitations	• Describe environmental and other factors that affect demographics and population movements • Use demographic information to guide planning decisions	• List sources for national and subnational population estimates for humans, domestic animals, and wildlife • Describe how the data are collected, and identify gaps and limitations
Core competencies	1.7.1.f	1.7.1.i, 10.1.4.i	1.7.1.i, 10.1.4.i
Systems thinking and One Health *Effective and sustainable One Health policy design and development require systems thinking. This topic aims to demonstrate the added value of a One Health approach and including performance indicators for delivery of One Health services.*	• Explain the interaction between ecosystems change and human and animal health outcomes	• Give examples of how to integrate multisectoral systems thinking into current work practice	• Describe performance indicators for the delivery of health services • Explain how to incorporate systems thinking into policy design • Demonstrate the application of systems thinking to the design of surveillance systems, epidemiological studies, and disease prevention and control practice
Core competencies	1.9.1.f	1.9.1.i	1.8.1.a–1.9.1.a

Domain 2
Surveillance systems

Surveillance is the systematic process of collection, monitoring, analysis, and interpretation of structured or unstructured data. Surveillance is a key principle of epidemic intelligence to detect, verify, assess, and investigate events and health risks. One of the key tasks for field epidemiologists at all levels is to develop, apply, monitor, and evaluate surveillance systems.

Trainees should understand the various data types and sources that can be used for surveillance, the signals-alerts-events logic, the principles of alert management and alert verification, the principles of structured data analysis, the importance and measures of data quality, and how to monitor, evaluate and amend surveillance systems.

Table 2.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
2.1 **Characteristics of a functional surveillance system**	Describe the roles and objectives of surveillance in multiple sectors	Support coordination and integration of surveillance from multiple sectors	Ensure integration of surveillance from multiple sectors contributes to improved information sharing and leverages information for action
2.2 **Epidemic intelligence**	Describe and apply different surveillance types and ensure verification of events	Describe and apply different surveillance types in multiple sectors and ensure verification of events across the sectors	Evaluate and ensure that intelligence from multiple sectors contributes to risk assessments
2.3 **Detection and reporting of cases, clusters, and health threats**	Identify signals at the community level	Monitor and ensure identification of signals through surveillance at community and subnational levels	Monitor and ensure identification of signals through surveillance at the subnational and national levels using information from the human, animal and environment sectors
2.4 **Surveillance data collection, analysis and interpretation**	Demonstrate surveillance data collection, analysis and interpretation across multiple sectors	Conduct analysis of surveillance data and visually display results	Review and adapt alert thresholds
2.5 Surveillance reporting	Develop descriptive situation reports based on surveillance data findings	Develop advanced situation reports including analysis and interpretation of data	Develop multisectoral situation reports including analysis and interpretation of data
2.6 **Monitor and assess the quality of surveillance data**	Ensure timeliness and completeness of field data	Monitor and evaluate timeliness and completeness of field data and provide feedback to field level	Monitor and evaluate timeliness and completeness of field data and provide feedback to all levels
2.7 **Surveillance systems evaluation and design**	Support the design of surveillance systems using knowledge of the local context, key stakeholders, human resource availability and field logistics	Use available tools to evaluate a surveillance system	Develop, comprehensively and regularly monitor and evaluate the surveillance system at all levels and provide feedback, including for improvement of process and results for technical levels and decision-makers

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Table 2.2
Curriculum topic names, descriptions and learning objectives for Domain 2

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Characteristics of a functional surveillance system *This topic describes the roles and responsibilities of surveillance in animal, human and environmental health.*	• Describe the surveillance cycle • Define what a surveillance system is including its structural and functional components and interactions • Describe roles and responsibilities of multisectoral surveillance information and their importance for One Health	• Coordinate and integrate surveillance activities between sectors	• Synthesize the roles and findings from surveillance in the public health, animal health (including both domestic animals and wildlife), and the environmental health sectors
Core competencies	2.1.1.f	2.1.1.i	2.1.1.a
Epidemic intelligence *This topic covers surveillance as the systematic collection, analysis, and communication of any information to detect, verify, assess, and investigate signals, alerts, events and health risks from multiple sectors. It provides an overview of indicator and event based surveillance principles in multiple sectors using various information sources, applying case definitions, and the signal-alert-event logic. The same approach is used for all training levels; however, levels vary by the degree of complexity and integration required.*	• Surveillance types (indicator, event or case based, and aggregate reporting) and principles are understood and can be applied • Verify signals from various sources of information • Describe and apply the signal-alert-event logic	• Share and integrate surveillance information from multiple sectors	• Integrate surveillance and contextual information from multiple sectors • Evaluate conclusions and interpretations from multisectoral risk assessment
Core competencies	2.2.1.f–2.2.3.f		2.2.1.a

Table 2.2 (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 2

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Detection and reporting of cases, clusters and public health threats *This topic provides theory and practical examples for the application of case definitions, alert thresholds and alert management.*	• Identify health threats through community based surveillance and the media • Code surveillance data consistently • Apply case definitions • Describe and identify trends, patterns and thresholds of priority diseases • Describe and apply basic principles of data quality for reporting (data consistency, completeness and timeliness)		• Develop surveillance and outbreak case definitions, review and amend, if needed
Core competencies	2.3.1.f		2.3.1.a–2.3.2.a
Surveillance data collection, analysis and interpretation *This topic uses examples to practise data analysis and how to interpret and visualize analysis results.*	• Describe the principles of data collection for surveillance in multiple sectors • Apply routine and ad hoc data analysis and interpretation of data using descriptive epidemiological methods • Notify authorities of alerts	• Present data analysis using tables, graphs, and maps • Interpret surveillance data within an individual sector and across multiple sectors	• Perform advanced statistical and geospatial analysis using surveillance data • Perform basic Time Series Analysis
Core competencies	2.4.1.f–2.4.2.f	2.4.1.i	2.4.1.a
Surveillance reporting *This topic covers the skills and competencies of writing routine descriptive surveillance reports (e.g., weekly summary reports), and on demand situation reports, including interpretation of data analysis.*	• Prepare basic situation for potential health threats • Describe the importance of reporting surveillance findings back to communities Core competencies:	• Interpret findings from data analysis of priority conditions • Prepare advanced situation reports for potential public health threats • Provide recommendations for actions • *Core competencies:*	• Ensure report writing considers integration and interpretation of information from multiple sectors
Core competencies	2.5.1.f	2.5.1.i–2.5.2.i	

Table 2.2 (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 2

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Monitor and assess the quality of surveillance data *This topic covers key data quality principles (such as data consistency, data completeness, reporting timeliness and zero reporting).*	• Ensure the timeliness, completeness, and quality of reported data	• Monitor the timeliness, completeness and quality of data reported from different sources • Provide feedback to improve timeliness, completeness, and quality of surveillance data	
Core competencies	2.6.1 f	2.6.1 i–2.6.2.i	
Surveillance systems evaluation and design *This topic covers how to develop or enhance a surveillance system based on needs assessment and monitoring and evaluation.*	• Use knowledge of the local context, key stakeholders, human resource availability and field logistics to inform surveillance system design	• Evaluate surveillance systems using proper attributes • Recommend appropriate actions for improvements • Use available tools and guidelines (national and international) for evaluation	• Conduct full evaluation of a surveillance system against its objectives • Evaluate conclusions and interpretations from an evaluation of surveillance systems to validate key findings • Produce final evaluation report with justification and recommendations for improvement • Assess need for special analysis and studies (e.g., survival analyses, cost effectiveness, cost benefit, cost utility analyses) • Select priority conditions and relevant surveillance systems • Choose sites for surveillance • Design reporting forms and flow • Set alert thresholds • Use epidemic intelligence • Prepare reporting through electronic tools
Core competencies		2.7.1.i–2.7.2.i	2.7.1.a–2.7.7.a

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Domain 3
Field investigations

Public, animal or ecosystem health threats may be reported as early warning signals, unusual case reports, or disease outbreaks that can spread to take the form of an epidemic or pandemic. Field investigations often begin without specific hypotheses about the cause or origin of the disease. Responding to these threats requires various competencies: planning, leading, supervising and coordinating data collection, data analysis, modelling, forecasting, applying intervention methods, and post investigation monitoring and evaluation.

Although not explicitly stated in each competency or learning objective in the tables below, the One Health approach to field investigations involves coordination and collaboration with investigators from multiple sectors. Ideally, the lead agency for conducting each coordinated field investigation should be established through agreements, for example, through Memoranda of Understanding or One Health Terms of Reference.

Table 3.1
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
3.1 Prepare for field investigation	Prepare logistics for field visits, interviews, and sample collection, including personal protective equipment (PPE) and transport	Establish and coordinate a multisectoral team for conducting a field investigation	Develop and evaluate SOPs for multi-sectoral field investigations, including for infection, prevention and control (IPC)
3.2 Conduct field investigation	Apply standard operating procedures (SOPs), detect cases and collect appropriate data to support a field investigation	Lead/colead a multisectoral team in conducting field investigations	Develop and review case definitions and provide advice to the team on recommended preventative and control measures
3.3 Data collection and analysis	Collect, record and validate data using appropriate tools, conduct descriptive analyses and interpret the results	Collaborate effectively with professionals from various sectors to analyse and interpret data collected from multiple sources	Collaborate effectively with experts from multiple sectors to conduct advanced statistical and spatial analyses of data
3.4 Reporting and follow up interventions	Prepare a standard investigation report including recommendations on prevention and control measures	Review preliminary investigation reports, recommend interventions to control the disease and monitor and assess their effectiveness	Integrate findings from multiple teams and make evidence-based recommendations to national authorities

Table 3.2.
Curriculum topic names, descriptions and learning objectives for Domain 3

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Prepare for field investigation *This topic covers the development and use of SOPs in preparation for a field investigation.*	• Prepare logistics for field investigations • Use appropriate PPE in a field investigation • Implement SOPs for field investigations • Use data collection tools • Use ethical approaches for data collection • Use interview methods following professional and ethical codes of practice	• Establish and lead a field investigation team involving members from multiple sectors • Arrange the PPE required for a field investigation • Define the objectives of the field investigation and develop an investigation protocol • Develop and refine tools for data collection • Develop a communication plan and communicate with professionals involved in a multisectoral field investigation	• Design, plan, lead/colead joint field investigations • Recommend methods for field investigation • Develop and evaluate SOPs for multisectoral investigations • Develop and evaluate IPC measures for a field investigation
Core competencies	3.1.1.f–3.1.5.f	3.1.1.i–3.1.3.i	3.1.1.a–3.1.4.a
Conduct field investigation *This topic prepares the candidates for conducting field investigations.*	• Implement basic biosafety and biosecurity methods • Describe the purpose and the steps for conducting a field investigation • Detect cases by conducting trace forward and backward searches • Collect appropriate population, spatial and time data • Collect and submit specimens to a laboratory, following appropriate biosafety practices • Implement and monitor disease control intervention methods	• Coordinate a multidisciplinary team conducting a field investigation • Develop or adapt case definitions for a given outbreak • Coordinate sample submission and transportation • Coordinate the collection of population, spatial and time data	• Assess the epidemiological situation on the ground considering existing national and international legislations • Review case definitions • Make decisions about the types of samples to be collected in consultation with laboratories
Core competencies	3.2.1.f–3.2.3.f	3.2.1.i–3.2.2.i	3.2.1.a–3.2.2.a

Table 3.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 3

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Data analysis and reporting *This topic covers the analysis of data collected in a field investigation and the preparation of an investigation report.*	• Enter and validate data • Conduct descriptive analyses of collected data • Prepare and interpret an epidemic curve to describe the outbreak • Prepare a preliminary investigation report	• Apply analytical epidemiological investigation to identify the source, cause and or risk factors/determinants • Calculate and compare attack risk • between different subgroups • Generate hypotheses about cause/risk factors • Recommend and monitor interventions • Prepare and communicate the findings to relevant sectors	• Analyse and interpret data to determine the potential origin and spread of an outbreak • Integrate investigation reports from multiple agencies • Present results of a multisectoral field investigation in a technical report, scientific publication or presentation. • Prepare and adapt the communication strategy and message according to the target audience
Core competencies	3.3.1.f–3.3.2.f	3.3.1.i–3.3.2.i	3.3.1.a, 3.4.1.a–3.4.5.a

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Domain 4
Disease management

Disease management is a crucial component of an epidemiologist's role in preventing and containing infectious disease threats across the human-animal-environment sectors. It involves the normative duties of epidemiologists to understand and control these diseases. Therefore, epidemiologists trained in the One Health approach need specific knowledge, skills, and competencies in the subdomains of health systems and health service delivery, antimicrobial stewardship, immunizations, zoonotic diseases, and disease management during travel, mobility, and movement.

Table 4.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
4.1 **Health systems and health service delivery**	Describe the roles and responsibilities of public health, animal health and ecosystem health professionals	Coordinate and communicate with partners to prevent and detect diseases across the human-animal-environment sectors	Establish coordination mechanisms for disease prevention and control based on understanding the existing policy and regulatory frameworks inhuman, animal and environmental health sectors
4.2 **Antimicrobial stewardship**	Advocate for and implement antimicrobial stewardship at the local level and collect antimicrobial usage (AMU) and antimicrobial resistance (AMR) data	Advocate for and implement antimicrobial stewardship at the regional level and coordinate data collection, analysis and reporting for AMU and AMR across the human-animal-environment interface	Develop an AMR surveillance plan and a strategy to reduce the indiscriminate use of antimicrobials across human-animal-environment interfaces
4.3 **Immunizations**	Administer vaccines appropriately and explain their benefits and adverse effects to people	Plan and conduct an immunization campaign, including determining the most appropriate vaccination strategies and post vaccination monitoring	Develop immunization strategies and conduct cost-benefit analyses for disease control and prevention
4.4 **Infectious and zoonotic diseases**	Conduct infectious and zoonotic disease surveillance and investigations, including for food, waterborne and vector-borne diseases	Coordinate infectious and zoonotic disease surveillance and outbreak investigations, including for food, waterborne and vector-borne diseases	Develop capacities for surveillance and investigation of infectious and zoonotic diseases, including for food, waterborne and vector-borne diseases
4.5 **Disease management during travel, mobility and movement**	Implement movement restrictions and quarantine measures to mitigate the risk of disease spread due to the movement of people, animals, animal products, byproducts and equipment	Evaluate the potential risk of spreading animal diseases through movement of people, animals, and animal products	Recommend and execute policies for cross-border travel, quarantine, and movement restrictions at the national level

Table 4.2.
Curriculum topic names, descriptions and learning objectives for Domain 4

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Health systems *This topic aims to provide trainees with the necessary understanding of health systems, the role of health care professionals, and health system delivery.*	• Describe the roles and responsibilities of frontline workers in the prevention and early detection of diseases across sectors • Describe the healthcare delivery system for humans and animals in the local area	• Describe the roles, responsibilities and obligations of healthcare providers, animal health professionals and ecosystem health professionals at the regional level • Identify gaps in service delivery at the regional level	• Distinguish between the roles and responsibilities of different institutions and organizations involved in human, animal, and ecosystem health service delivery at the national level • Describe the regulatory framework within which human and animal health services are provided and funded
Core competencies	4.1.1.f–4.1.2.f		4.1.1.a
Antimicrobial stewardship *This topic aims to provide trainees with the necessary understanding about AMR, drivers of AMR emergence, and the approaches to reduce AMR across the human, animal and environment sectors.*	• Explain the importance of antimicrobial stewardship • Identify the sources of AMU and AMR data • Collect AMU and AMR data from human, animal and environment sectors using appropriate methods • Describe the process for testing antimicrobial susceptibility in the laboratory • Interpret typical laboratory results for identification of antimicrobial susceptibility	• Describe the factors related to AMR emergence and spread • Explain the impact of AMR on human, animal, and environmental health. • Implement the AMR surveillance system	• Explain the drivers for the emergence and global spread of drug resistant organisms at the global, regional, and local levels • Assemble appropriate toolkits and materials for data collection and sampling for AMU and AMR • Recommend and communicate interventions to contain the emergence of AMR
Core competencies	4.2.1.f	4.2.1.i–4.2.2.i	4.2.1.a–4.2.6.a
Immunizations *This topic aims to provide trainees with the necessary skills to conduct vaccination campaigns, implement ring vaccination and conduct post vaccination monitoring.*	• Explain the benefits of vaccines • Describe the principles and importance of vaccine quality and cold chain • Use appropriate vaccine administration and waste management procedures	• Conduct post vaccination monitoring • Explain vaccine adverse events and the causes of vaccine failure • Communicate effectively in the context of vaccine hesitancy	• Describe different types of vaccines and immunizing agents • Describe the types of vaccine preventable diseases and their transmission dynamics • Identify at risk populations and propose adjusted immunization strategies and approaches.
Core competencies	4.3.1.f–4.3.8.f	4.3.1.i	4.3.1.a–4.3.4.a

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Table 4.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 4

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Infectious and zoonotic diseases *This topic aims to provide trainees with the necessary skills to conduct surveillance, investigation, prevention, and control of infectious and zoonotic diseases.*	• Describe the natural history of infectious and zoonotic diseases • Participate in infectious and zoonotic disease surveillance • Describe prevention and control measures for infectious diseases	• Describe the impact of infectious and zoonotic diseases • Conduct surveillance for foodborne, waterborne, and vector-borne diseases • Implement measures to contain foodborne, waterborne, and vector-borne disease outbreaks	• Collaborate with partners to investigate infectious and zoonotic disease outbreaks • Implement systems to detect, control and prevent zoonotic disease outbreaks • Build capacity for surveillance and investigation of zoonotic diseases
Core competencies	4.4.1.f–4.4.5.f	4.4.1.i–4.4.2.i	4.4.1.a–4.4.3.a
Disease management during travel, mobility and movement *This topic aims to provide trainees with the necessary skills for the implementation of movement restrictions, quarantine, and other disease control measures.*	• Describe the risk of disease spread due to the movement of people, animals, animal products, byproducts and equipment • Implement movement restrictions to reduce the risk of disease spread • Implement quarantine measures according to defined SOPs	• Describe the role of social distancing and isolation in preventing disease transmission • Describe value chains and how they impact the risk of disease spread • Conduct value chain analysis to describe the movements of animals and animal products	• Describe health policies for cross-border travel, including immunizations • Develop and execute procedures for quarantine and movement restrictions at the national level • Conduct value chain analysis to identify disease transmission pathways
Core competencies	4.5.1.f	4.3.1.i	4.5.1.a–4.5.2.a

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Domain 5

Laboratory capacity

Effectively engaging with laboratories is key to conducting surveillance, outbreak investigations and other epidemiologic activities. Field epidemiologists must have the knowledge, skills, and competencies necessary for safely collecting and submitting samples appropriate for the correct fit-for-purpose analyses, coordinating and sharing data with laboratories, and analysing and communicating laboratory data. It includes subdomains that encompass sample/specimen collection, labelling, storage, and transport to the laboratory; multisectoral planning and linking of diagnostic laboratory data with field epidemiology data across sectors; multisectoral collaboration; and analysis, interpretation, and reporting of laboratory data. This domain is foundational to a One Health approach for linking across the human-animal-environment interface.

Table 5.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
5.1 **Necropsies, sample/ specimen collection, labelling, storage and transport**	Apply universal biosafety and biosecurity precautions for specimen collection, handling, labelling, storage and transportation, and sample quality control measures including indicators and targets (e.g., timeliness maintenance of cold chain)	Monitor and support the implementation of biosafety and biosecurity precautions for specimen collection, handling, labelling, storage, transportation and biological waste disposal, and sample quality control measures including indicators and targets (e.g., timeliness maintenance of cold chain)	Formulate universal biosafety and biosecurity precautions in specimen collection, handling, labelling storage, transportation and biological waste disposal, and sample quality control measures including indicators and targets (e.g., timeliness maintenance of cold chain)
5.2 **Multisectoral planning and data linking**	Consult with laboratorians and field supervisors before, during and following field investigations	Coordinate with laboratorians to carry out field investigations	Lead the planning and implementation of field investigations and coordinate with laboratories
5.3 **Multisectoral coordination**	Identify contact persons at central and local level laboratories for supplies, specimen collection, labelling, handling, submission, and testing	Coordinate with contact persons at central and local level laboratories for sample testing	Lead and facilitate collaboration among clinical, laboratory and public health institutions
5.4 **Analysis, interpretation and reporting of laboratory data**	Collaborate with laboratory experts to describe the context of data being analysed	Conduct descriptive, univariable and bivariable analysis and display laboratory data according to person or animal, place and time	Plan and conduct descriptive, univariable and multivariable analyses of laboratory data as appropriate

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Table 5.2.
Curriculum topic names, descriptions and learning objectives for Domain 5

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	Intermediate	Advanced
Biosafety and biosecurity *The topic of biosafety covers the principles and practices for prevention of exposure or spread of hazardous materials and biosecurity refers to prevention and mitigation measures that limit the spread of disease.*	• Describe and apply principles of biosafety and biosecurity in a lab or field setting • Describe and apply principles of field biosafety and biosecurity for documentation during sample collection, labelling, storage, and transport of biological hazards • Apply sample quality control measures.	• Describe and implement IPC standard operating procedures for laboratory biosafety and biosecurity • Discuss necessary documentation for specimen collection, labelling, handling, storage, cold chain, and biological waste samples for biosafety and biosecurity.	• Develop biosecurity and biosafety SOPs for lab and field setting • Develop a risk management plan for specimen collection, handling, labelling, cold chain, packaging, and transport of biological waste specimens
Core competencies	5.1.1.f–5.1.3.f	5.1.1.i–5.1.3.i	5.1.1.a–5.1.2.a
Multisectoral planning, coordination and data linking for field investigations *Multisectoral planning and coordination for field investigations covers the practices that differing sectors incorporate to address field epidemiology challenges using a One Health approach. Data linking discusses practices for different sectors to integrate field and laboratory data.*	• Discuss field investigation information with field supervisors and laboratory diagnosticians • Describe multisectoral linking of laboratory and field data • Provide a list of laboratory contact persons for supplies, specimen collection, labelling, handling, submission and testing	• Coordinate intersectoral application of best management practices for laboratory coordination • Coordinate intersectoral best management practices for linking laboratory data	• Develop the appropriate process between laboratory and field personnel to plan and implement a field investigation • Provide field investigation evaluation and assessment information with multiple sectors
Core competencies	5.2.1.f 5.3.1.f–5.3.2.f	5.2.1.i–5.2.2.i 5.3.1.i–5.3.3.i	5.2.1.a–5.2.3.a 5.3.1.a–5.3.3.a
Field data analysis and interpretation *This topic includes basic techniques in record keeping, data input, data analysis and data interpretation.*	• Use basic computer and information technology applications to collect, organize, and analyse data relevant to One Health field epidemiology applications. • Analyse field and laboratory data for reporting public health, animal health and environmental sector hazards	• Analyse field and laboratory data for reporting public health, animal health and environmental sector hazards (i.e., descriptive, univariable and bivariable analysis)	• Analyse field and laboratory data for reporting public health, animal health and environmental sector hazards (i.e., multivariable analysis) for joint risk assessments • Analyse field and laboratory data for reporting public health, animal health and environmental sector hazards (i.e., trend analysis)
Core competencies	5.4.1.f–5.4.2.f	5.4.1.i–5.4.3.i	5.4.1.a–5.4.3.a

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Domain 6
Infection prevention and control, biosafety and biosecurity

Infection prevention and control (IPC) as a term originates in the human health sector and is also considered through the terms biosafety and biosecurity, which are commonly used in animal health. IPC is essential to prevent the transmission of disease pathogens within and among humans, animals and the environment. The health and safety of human and animal health workers includes field epidemiologists and laboratory personnel. However, there may be some differences in how IPC, biosafety and biosecurity are applied in the field or laboratory. The field and laboratory worker will maintain awareness of preceding, current, and proceeding activities throughout daily activities to prevent and control unwanted human exposure and disease pathogen transmission.

Table 6.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
6.1 Infection prevention and control, biosecurity and biosafety preparedness	Apply universal IPC, biosafety and biosecurity procedures in classroom and field training exercises	Monitor the availability of PPE and application of SOPs and guidelines	Conduct laboratory risk assessments for IPC, biosafety and biosecurity and lead intersectoral collaborations
6.2 Infection prevention and control, biosecurity and biosafety implementation procedures	Implement IPC, biosecurity and biosafety practices (e.g., donning, doffing, PPE inventory)	Contribute to a risk assessment and apply corrective measures	Plan and conduct an emergency risk assessment
6.3 Continuous quality improvement evaluation	Identify basic IPC, biosecurity, and biosafety monitoring and evaluation tools	Administer basic IPC, biosecurity and biosafety monitoring and evaluation tools	Lead audits of IPC, biosafety and biosecurity practices

Table 6.2.
Curriculum topic names, descriptions and learning objectives for Domain 6

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Preparedness procedures *This topic focuses on the preparedness applications to be undertaken for infection prevention and control, biosecurity and biosafety.*	• Demonstrate the steps to establish a containment zone • Describe the best field biosecurity and biosafety practices when entering, within and leaving a containment zone • Demonstrate IPC, biosafety and biosecurity procedures using field SOPs	• Monitor the implementation of SOPs and guidelines • Develop a process for inventory control of PPE • Train frontline personnel in using PPE	• Develop SOPs and guidelines for IPC, biosafety, and biosecurity. • Conduct a risk assessment related to IPC, biosafety, and biosecurity. • Develop a disease control and prevention plan.
Core competencies	6.1.1.f–6.1.10.f	6.1.1.i–6.4.1.i	6.1.1.a–6.1.6.a 6.2.1.a–6.2.2.a
Implementation procedures field and laboratory inventory management and standard operating procedures *This topic discusses inventory management processes for PPE and the development and review of field and laboratory standard operating procedures for field epidemiologists.*	• Demonstrate inventory management processes to the lab setting • Demonstrate inventory management processes to the field setting • Perform donning and doffing	• Monitor the implementation of SOPs and guidelines • Determine strengths and weaknesses for field SOPs, guideline, and plans	• Develop and apply field and lab SOPs for IPC, biosafety and biosecurity • Evaluate efficiency of control measures
Core competencies	6.2.1.f–6.2.3.f	6.2.1.i–6.2.5.i	6.2.1.a–6.2.3.a
Field and laboratory risk assessment *Field risk assessment covers the principles, applications, and steps to conduct an emergency field risk assessment. Laboratory risk assessment covers the principles to conduct a laboratory risk assessment, including providing corrective action where necessary.*	• Describe IPC • Describe field and laboratory biosafety and biosecurity assessment procedures from a multisectoral investigation in the field	• Administer and evaluate biosafety and biosecurity evaluation tools (e.g., risk assessments) from a multisectoral investigation in the field	• Perform a lab risk assessment • Determine corrective actions from a lab risk assessment • Perform a field rapid risk assessment in an emergency setting
Core competencies	6.3.1.f–6.3.2.f	6.3.1.i–6.3.3.i	6.3.1.a–6.3.2.a

Domain 7
Preparedness and response

This domain includes competencies for preparing and responding to disease threats. Some epidemics of zoonotic diseases are linked to human activities such as deforestation, agricultural intensification, urbanization, hunting, travel, and trade in wildlife. Field epidemiologists trained in the One Health approach should be able to identify emerging threats, determine priority health risks by performing a risk assessment, develop and coordinate emergency preparedness and response plans, and coordinate with cross-sector partners.

Table 7.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
7.1 Detection of health threats	Identify priority health threats for the area	Critically appraise information from surveillance systems and international health alerts to identify emerging threats	Engage with laboratories to ensure capacity and proficiency for testing pathogens of epidemic potential
7.2 Risk assessments	Identify potential hazards and contribute to identifying risk pathways for conducting a risk assessment including all sectors	Conduct a qualitative risk assessment using appropriate tools and stakeholder participation and communicate the results.	Conduct a quantitative risk assessment, communicate results and use the findings to inform risk-based surveillance
7.3 Policy development, adaptation and implementation	Describe the policies, plans, and frameworks relevant to emergency preparedness and response, including the use of movement and travel restrictions	Review the literature and synthesize scientific information to recognize implications for policy frameworks	Assess emergency response policies and communicate them to relevant stakeholders
7.4 Preparedness and response planning	Contribute to preparedness planning or emergency response as a member of a rapid response team	Coordinate the development of an emergency preparedness and response plan	Lead the development of an emergency preparedness and response plan
7.5 Cross-sectoral coordination and incident management	Communicate with response partners about key roles, responsibilities and risks in an emergency response	Facilitate communication between partners across different organizations before and during a response	Review, test and update the SOPs for establishing a multiunit task force to coordinate sectors in response operations
7.6 Emergency risk communication	Implement an emergency risk communication strategy considering economic, political, social, religious and cultural barriers to risk communication	Identify communication mechanisms trusted by the public, partners and community influencers	Use various data gathering methods to assess the effectiveness of the emergency risk communication strategy
7.7 Mass gatherings	Describe a monitoring and surveillance system for mass gathering events involving people or animals	Contribute to health preparedness planning for mass gathering events taking into confidence the stakeholders and event organizers	Work as a member of a team developing an operational plan for a mass gathering event
7.8 Humanitarian crises and natural disasters	Describe and participate in a human, animal or environmental health assessment as part of humanitarian response	Assist in the implementation of a humanitarian response and recovery plan across sectors	Contribute to development of a health sector response and recovery plan
7.9 Chemical, biological, radiological, and nuclear (CBRN) emergencies	Demonstrate an awareness and appreciation of critical CBRN threats	Coordinate and collaborate with professionals investigating a CBRN threat	Collaborate with partners, including military or armed forces, to prepare for CBRN events through desktop or simulation exercises

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Table 7.2.

Curriculum topic names, descriptions and learning objectives for Domain 7

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Emerging disease threats *This topic provides trainees with the necessary skills to detect and contain emerging health threats. To achieve this, they need to understand the microbiological and epidemiological characteristics of pathogens and disease prevention and control methods.*	• List priority emerging infectious diseases relevant to the area and their likely modes of transmission • Describe the principles of disease prevention and control	• Describe microbiological and epidemiological characteristics of pathogens of epidemic potential • Describe control strategies for emerging pathogens	• Critically appraise information from surveillance systems to identify health threats • Identify when case reports or clusters require further investigation and how to initiate field investigations
Core competencies	7.1.1.f –7.1.2.f, 7.4.1.f	7.1.1.i–7.1.4.i, 7.4.1.i	7.1.1.a–7.1.6.a
Risk assessment *This topic provides trainees with the necessary skills in risk analysis, including determining the scope of risk analysis, identifying a hazard, drawing risk pathways and determining the likelihood of risk using qualitative or quantitative methods.*	• Define risk and list the steps for conducting a risk analysis • Identify hazards for conducting a risk assessment • Describe the principles of risk communication	• Work as a member of a team conducting a risk assessment • Explain the steps for conducting a qualitative risk assessment • Draw scenario trees to identify biological pathways for risk assessment • Describe economic, political, social, religious and cultural barriers to risk communication	• Lead a team conducting a risk assessment • Estimate likelihoods for the identified risk pathways, using a qualitative or a quantitative approach • Use risk assessment results for risk communication and to inform risk-based surveillance
Core competencies	7.2.1.f	7.2.1.i–7.2.3.i	7.2.1.a–7.2.4.a
Emergency preparedness and incident management *This topic provides trainees with the necessary skills for emergency preparedness and incidence management in coordination and collaboration with multiple partners, including communication with the public in an emergency response.*	• Describe the roles and responsibilities of rapid response teams • Describe incident command structures • List relevant partners and their roles and responsibilities in an emergency response	• Describe published guidelines for emergency preparedness • Participate in the development of emergency preparedness and response plans • Identify communication mechanisms trusted by the public	• Play a leadership role in the development of an emergency preparedness and response plan • Develop and test protocols for emergency response • Use surveys, focus groups, interviews, and media/social media monitoring to evaluate the risk communication strategy
Core competencies	7.4.2.f–7.4.3.f 7.5.1.f–7.5.3.f 7.6.1.f	7.4.1.i–7.4.5.i 7.5.1.i–7.5.2.i 7.6.1.i	7.3.1.a 7.4.1.a–7.4.5.a 7.5.1.a–7.5.3.a 7.6.1.a–7.6.3.a

Table 7.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 7

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Mass gatherings and humanitarian response *This topic provides trainees with the necessary skills in planning, monitoring and surveillance of mass gathering events, humanitarian crises and natural disasters.*	• List types of mass gatherings involving people or animals • Participate in monitoring and surveillance of mass gathering events • Participate in the planning and response to humanitarian crises and natural disasters	• Describe the impact of mass gathering events on the health of humans, animals and the environment • Participate in health preparedness planning for mass gathering events • Arrange for the personal safety and security of team members during the response	• Contribute to the development of an operational plan for a mass gathering event • Use risk assessment and management to plan for mass gatherings. • Establish a health information management system during a crisis or disaster
Core competencies	7.7.1.f–7.7.3.f 7.8.1.f	7.7.1.i–7.7.2.i 7.8.1.i–7.8.2.i 7.9.1.ii	7.8.1.a–7.8.2.a 7.9.1.a

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Domain 8
Epidemiologic studies

Epidemiological studies can be conducted as part of normative public health, animal health and environmental health for observational or experimental field studies. Epidemiological studies can be transdisciplinary, systems-based, and involving mixed-methods (qualitative/quantitative) approaches that consider socioeconomic inputs in addition to mechanisms of disease.

Table 8.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
8.1 **Types of epidemiological studies**	Describe the types of epidemiological studies	Describe the types of epidemiological studies, their strengths and limitations	Determine the appropriate type of epidemiological study based on research context/ logistics and intended outcomes
8.2 **Designing and planning epidemiological studies**	Contribute to designing and planning an epidemiological study	Plan and design epidemiological observational studies, considering sources of bias	Lead the planning and implementation of epidemiological observational studies
8.3 **Conducting epidemiological field studies**	Contribute to data collection, conduct field sampling and participate in descriptive data analysis for epidemiological field studies	Collect and collate epidemiological field study data, ensure data quality is appropriate and provide interpretation from analysed results	Lead epidemiological field study implementation
8.4 **Reporting and publishing study findings**	Develop a descriptive field study report and communicate results to both technical and nontechnical audiences, including working on providing information at the community level	Develop descriptive and analytic reports for stakeholders from diverse backgrounds	Lead peer-reviewed publications of epidemiologic studies describing important findings

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Table 8.2.
Curriculum topic names, descriptions and learning objectives for Domain 8

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Epidemiological study design, field implementation and communication *This topic focuses on best practices for designing and implementing epidemiological studies.*	• Discuss different data types for primary and secondary data • Develop a descriptive report for a disease • Understand the results and explain to stakeholders • Identify key factors that impact the feasibility of the study	• Describe the types, principles and uses of epidemiological studies • Contribute to the planning, design, implementation and communication of observational studies • Implement communication over field studies to different audience types	• Lead the planning, design, implementation and communication of epidemiological studies (e.g., multivariable analysis) • Determine the most appropriate study design based on the epidemiologic study used in the field • Develop and implement a data analysis plan
Core competencies	8.1.1.f 8.4.1.f	8.1.1.i–8.1.2.i 8.2.1.i–8.2.2.i 8.4.1.i–8.4.2.i	8.2.1.a–8.2.15.a. 8.4.1.a–8.4.3.a
Practical applications of epidemiological studies *This topic focuses on specific skills necessary to conduct epidemiological studies.*	• Conduct data collection from the field (e.g., random sampling)	• Contribute to field data collection • Clean, validate, analyse and interpret epidemiological study field data	• Lead implementation and analysis of epidemiological studies • Determine the bias, effect modification and confounding from data in epidemiological studies
Core competencies	8.3.1.f	8.3.1.i–8.3.4.i	8.3.1.a–8.3.2.a

Domain 9
Data management, biostatistics, and informatics

Data collection is an important step to facilitate upstream surveillance systems, outbreak investigations, surveys and integration of contextual data from multiple sectors. It is essential that field epidemiologists at each training level understand and apply the principles to collect, check, analyse and interpret high quality data that can inform decision-makers to take appropriate action.

While frontline levels need to consistently ensure completeness and timeliness of data and apply basic descriptive epidemiological principles for data analysis, intermediate and advanced levels need to continuously monitor and evaluate data quality and apply analysis, visualization and interpretation of data by applying more complex analysis techniques.

Table 9.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
9.1 Planning for data collection and analysis	Describe the planning and templates to ensure consistent data collection at the field level	Plan consistent data collection and descriptive data analysis	Develop and evaluate sampling strategies, presentation formats and infographics
9.2 Data collection	Apply consistent and high quality data collection standards at the field level	Monitor data consistency and quality, apply data checking and cleaning procedures and regularly train frontline level to these standards	Develop data collection standards and data dictionaries fostering digital data collection, applying the principles of data security and data protection
9.3. Data analysis	Apply the principles of descriptive epidemiology, describing measures of morbidity and mortality	Conduct basic data analysis supporting descriptive epidemiology and ensure that ongoing analysis of high quality data informs public health action	Apply results from complex data analysis to make best use of surveillance, outbreak investigation and survey data, including using geographic information systems for visualization and interpretation of data
9.4 Data interpretation and presentation	Describe and make use of basic tables and infographics for reporting	Identify and apply methods to minimize bias and provide regular feedback to field level	Interpret and communicate results from complex epidemiological analysis and laboratory analysis to decision-makers
9.5 Digital tools	Use available digital tools for routine data collection and feedback challenges to higher levels	Advocate for use of digital tools and train frontline level in their use	Oversee the landscape of digital tools, advocate and develop training for prioritized tools

Table 9.2.
Curriculum topic names, descriptions and learning objectives for Domain 9

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Planning for data collection and analysis *Consistent and high quality data collection involves planning steps at each level, based on context and needs for epidemiological data collection. This unit introduces the necessary planning steps at each level by referencing the high level principles of data collection.*	• Review data collection plans (questionnaires, forms, sampling strategies) before beginning data collection • Differentiate between quantitative and qualitative data • Describe the uses and limitations of aggregated data	• Develop a data analysis plan (variables, coding, dummy tables, etc.) • Explain how maps can be useful for descriptive analysis	• Develop presentation plans and templates for regular reports and infographics • Develop and evaluate sampling strategies for surveys and epidemiologic studies • Perform sample size calculations for surveys and epidemiological studies
Core competencies	9.1.1.f–9.1.3.f	9.1.1.i–9.1.2.i	9.1.1.a–9.1.3.a
Data collection *Several techniques are applicable to guarantee best quality of data during surveillance, surveys and epidemiological studies. Frontline workforce needs to apply basic standards of coding and data checks and basic data quality attributes (such as completeness, timeliness) in their daily work, while the more advanced levels need to develop, continuously monitor and evaluate standards and data quality.*	• Collect data in a consistent and standardized way, applying data quality standards for different areas of data collection (surveillance, surveys, laboratory, epidemiological studies, etc.) • Define a minimum set of variables for a line list	• Review, monitor and evaluate data quality according to attributes such as consistency, completeness, timeliness, usefulness, etc. • Apply basic data checking procedures within a data collection application: data consistency, data cleaning, removing duplicate entries and data coding (including dummy tables) • Train and supervise frontline data collectors • Perform data exchange between applications, (e.g. export and import of .csv files)	• Develop and test questionnaires for field investigations (e.g., outbreak investigations and epidemiological studies) • Create data dictionaries to explain coding, types of variables • Develop and review SOPs for data checks and data quality assurance • Describe advantages of data collection using electronic tools • Implement data security and verify that data protection requirements are met
Core competencies	9.2.1.f–9.2.3.f	9.2.1.i–9.2.4.i	9.2.1.a–9.2.5.a

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Table 9.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 9

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Data analysis *Data analysis needs to be conducted at each level. Frontline workforce should understand and apply basic descriptive analysis in their daily data collection activities for upstream reporting, while intermediate and advanced levels need to conduct more elaborate data analysis (with increasing complexity at each level), feedback analysis results to lower and higher levels and at the same time interpret for analysis results to decision-makers.*	• Apply basic principles of data consistency and data cleaning • Calculate rates to quantify incidence, prevalence, attack rates, mortality rates, etc. • Describe the epidemiological principles of unit (person/animal), place and time • Create simple tables, graphs and maps from surveillance and epidemiologic data • Calculate summary statistics including measures of central tendency and dispersion (mean and standard deviation, median and mode), and percentiles and quartiles • Use of software to manage and summarize data	• Develop regular data quality reports and feedback to frontline level • Implement a data analysis plan • Stratify data and assess for effect modification and confounding, controlling for confounding as needed • Use parametric and non-parametric statistical tests for analysis of epidemiological data • Calculate standard errors and confidence intervals	• Use geographic information systems to display geographic distribution of cases and produce maps • Perform multivariate analysis of data from surveillance and epidemiological studies • Perform time series analysis of surveillance data to calculate trends, periodicity, seasonality and moving averages, and use results to set alert thresholds
Core competencies	9.3.1.f–9.3.6.f	9.3.1.i–9.3.4.i	9.3.1.a
Data interpretation and presentation *At each level, data need to be summarized and visualized in an agreed reporting standard that also allows for comparison of data. Intermediate and advanced levels need to be able to digest and interpret findings and translate these in a way that decision-makers can understand.*	• Present data in basic tables, graphs and maps • Develop simple regular reports • Interpret descriptive data (e.g. surveillance data, line list)	• Describe bias, its effects and ways to minimize it • Develop regular reports and feedback to frontline level • Use modern methods of data visualization to display statistical results • Interpret data analysis results like measures of association, measures of impact, statistical test results and confidence intervals	• Interpret results from regression, multivariable, and time-series analyses • Interpret findings from surveillance, laboratory and epidemiological studies for decision-makers and the public • Develop a data visualization plan, including use of infographics when appropriate
Core competencies	9.4.1.f–9.4.3.f	9.4.1.i–9.4.3.i	9.4.1.a–9.4.2.a

Table 9.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 9

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Digital tools *Public Health Intelligence, surveillance, early warning, epidemiological studies and surveys need to be supported by digital tools which support, simplify and standardize the process of data collection, data analysis, data visualization, report writing and risk communication. This unit emphasizes introducing in-country available solutions and applications, their functions and how they support epidemiological data collection. It should be followed by in depth training on available applications tailored to the country needs.*	• Use available software and digital tools for data collection and reporting whenever possible • Use word processing, spreadsheets and presentation software	• Advocate for and support the implementation and training of digital tools and software	• Oversee different digital tools for surveillance and know how to choose based on needs assessment
Core competencies	9.5.1.f–9.5.2.f	9.5.1.i	9.5.1.a

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Domain 10
Ecosystem health

Ecosystem health is an integral part of the One Health approach that has developed rapidly along with the growing awareness of the impact that anthropogenic drivers have on global environmental change, ecosystem integrity and ecosystem function. Epidemiologists at all levels need to be aware of the resulting impact of these drivers on human, animal and ecosystem health and disease emergence. One of the largest barriers to our understanding and management of ecosystem health is a lack of awareness of other sectors, collaboration, communication and data sharing between health and environmental experts that occurs at all levels of governance. Newly trained field epidemiologists should have an interoperable set of competencies that encompass a good understanding of the links between the ecosystem, human and animal health sectors and disciplines.

Table 10.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
10.1 **Biodiversity and ecosystems**	Describe the importance of biodiversity and healthy ecosystems	Explain how healthy ecosystems promote health across the environment-human-animal interface	Identify drivers for biodiversity loss and advocate for ecosystem based approaches
10.2 **Plant, animal and ecosystem health**	Explain the roles and responsibilities of local agencies that manage plant, animal and ecosystem health	Contribute to the integration and analysis of plant, animal and ecosystem health data with other ongoing surveillance strategies in humans and animals	Exchange and analyse data across the public health, animal health and environment health sectors
10.3 **Air, water and soil quality**	Describe the health impacts of environmental contaminants and the agencies involved in monitoring air, water and soil quality	Relate the health impacts on humans and animals of local contaminants in the air, soil and water and propose mitigation measures	Ensure that data related to key environmental indicators and health are comparable and compatible and follow accepted standards where they exist
10.4 **Impacts of environmental degradation on ecosystem health**	Describe the impact of environmental degradation on local ecosystem health.	Describe how local weather extremes can result in health events or natural disasters impacting health	Discuss the impact of global climate change on health and contribute to environmental impact and vulnerability assessments
10.5 **Anthropogenic, environmental, and socioeconomic drivers of emerging health threats**	Discuss local examples illustrating the concept of human-animal-environment interface and risk factors for disease emergence	Describe environmental risk factors for disease emergence and the role of travel and transportation	Identify and manage environmental and socioeconomic drivers of health threats

Table 10.2.
Curriculum topic names, descriptions and learning objectives for Domain 10

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Biodiversity, wildlife and ecosystem health *Ecosystem health is a growing and changing field that encompasses environmental health, planetary health, ecology, wildlife and natural resource management. This topic teaches how the loss of biodiversity and changing interactions among humans, domestic animals, wildlife and the environment can impact ecosystem health.*	• Discuss examples illustrating the concept of human-animal-environment interfaces and interactions • Identify risks for emergence or transmission of disease • Explain the roles and responsibilities of local authorities in plant, animal and ecosystem health • Describe how local legal and illegal trade in wildlife impact health and facilitate transmission of disease • Identify local ecosystems and describe their interactions • Describe the concept of ecosystem services	• Explain how biodiversity and healthy ecosystems promote health across the environment-human-animal interface • List and describe zoonoses with an environmental component • Identify risk factors for emergence of diseases with an environmental component, including zoonoses and vector-borne diseases • Make recommendations for the integration of wildlife and ecosystem health data with other ongoing surveillance strategies, e.g., livestock health or human health programmes	• Identify drivers of temporal and spatial distribution of populations • Describe how population distributions impact biodiversity at the community and ecosystem level • Explain causes of biodiversity loss such as land cover change, poverty, landscape fragmentation, climate change and others that are impacting biodiversity at local and regional scales • Exchange and analyse data across the public health, animal health and environment health sectors • Use tools to identify and prioritize ecosystem health determinants • Describe ecosystems based approaches to health and advocate their use across sectors
Core competencies	10.1.1.f–10.1.2.f 10.2.1.f–10.2.2.f 10.5.3.f	10.1.1.i, 10.2.1.i, 10.5.2.i	10.1.1.a–10.1.3.a 10.2.1.a

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Table 10.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 10

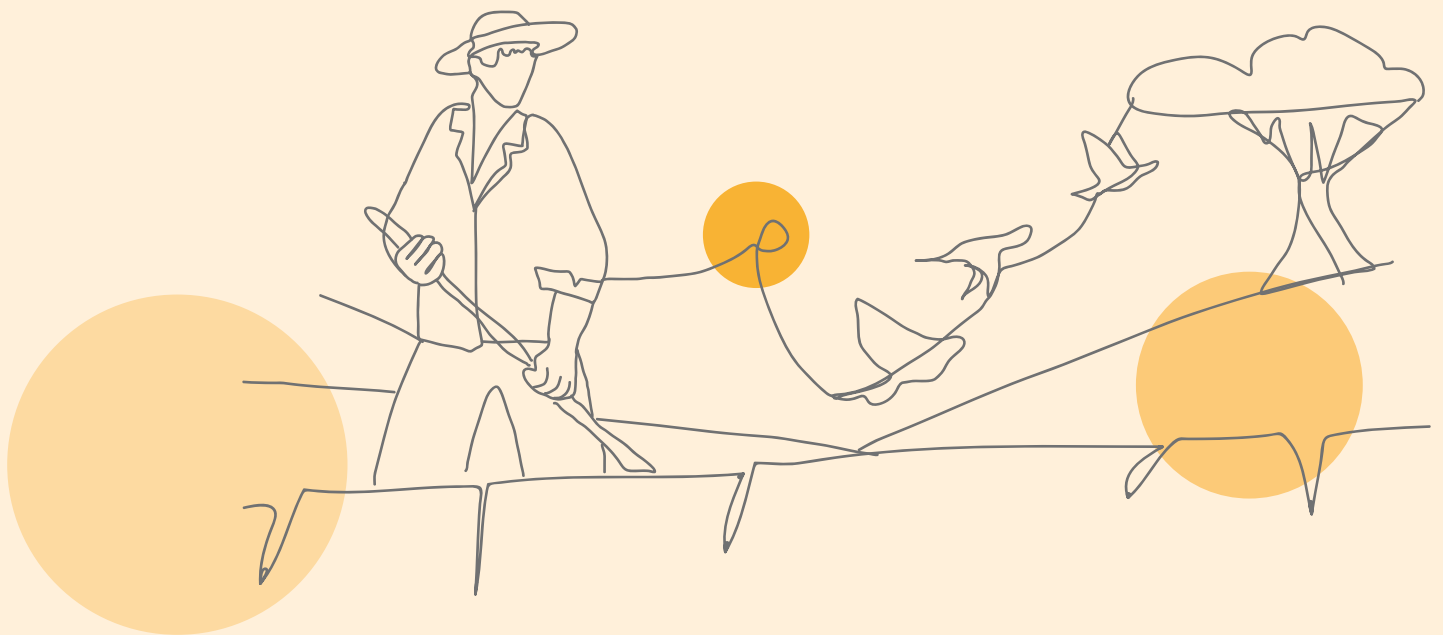| Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Anthropogenic, environmental, and socioeconomic drivers of emerging health threats *This topic introduces participants to the anthropogenic pressures that impact human, animal and ecosystem health. Programmes should incorporate how agriculture, mining or urbanization can cause pollution, disruption and degradation of the natural environments on which ecosystems depend. Participants gain experience in assessing and responding to a real or simulated environmental health emergency.*	• Describe the health impacts of local environmental contaminants on human, animal and ecosystem health • Describe the agencies involved in monitoring air, water and soil quality • Describe how habitat incursion, deforestation and changes in land use and land cover impact disease emergence and ecosystem health • Illustrate the impact of climate change on environment and health using local examples when available • Participate in a real or simulation exercise involving a local weather extreme or natural disaster impacting health	• Describe how travel and transportation increase the risk for disease emergence and transmission • In a case study or as part of a field investigation, propose mitigation measures to address the impacts of contaminants in the air, soil and water on human, animal and ecosystem health	• Describe and use data related to key environmental indicators and health • Describe the socioeconomic and anthropogenically induced environmental drivers that impact health • Identify and prioritize environmental health determinants using appropriate tools • Describe methods for mitigating the health impacts of pollutants • Propose pollution mitigation methods using a local example when available • Discuss the impact of global climate change on health and the emergence of novel diseases • Conduct a situational analysis by identifying strengths, weaknesses, opportunities, and threats (SWOT analysis)
Core competencies	10.3.1.f–10.3.2.f 10.4.1.f 10.5.1.f–10.5.2.f	10.3.1.i, 10.5.1.i	10.3.1.a, 10.4.1.a 10.5.1.a–10.5.4.a
Environmental impact assessments, vulnerability and adaptation assessments due to climate change *There is an increasing need for input from the human and animal health sectors into environmental impact assessments conducted at the local level. In addition, vulnerability and adaptation assessments at the national and subnational levels need to assess the growing impact of climate change on health. Through these practical activities, participants gain experience working with colleagues and data across sectors.*	• Define the purpose of environmental impact assessments (EIAs) • Describe contributions to EIAs from the human and animal health sectors • Contribute information to an EIA	• Describe how local weather extremes and natural disasters impact human, animal and ecosystem health • Assess the impact of environmental degradation on human, animal and ecosystem health • Participate in an EIA	• Assess the national or subnational impacts of climate change on health • Contribute to a vulnerability and adaptation assessment
Core competencies	10.4.2.f	10.4.1.i–10.4.2.i	10.4.2.a

Section II
Functional domains

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Domain 11
Leadership and management

Description: Individuals with leadership and management capabilities help organizations meet their goals and inspire team members to perform to their potential. Field epidemiologists require essential leadership and management skills to perform their functions effectively. This domain describes those competencies needed for field epidemiologists to promote One Health policies and their implementation, organizational and project management, finance and budgeting and security.

Table 11.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
11.1 Leadership and One Health	Seek, develop, and maintain interprofessional, interdisciplinary and intersectoral collaboration and communication.	Develop community based approaches for field investigation and health interventions to promote community engagement	Adapt leadership style according to the context by recognizing when different approaches are most effective
11.2 Policy development and implementation	Implement One Health policies in collaboration with partners	Propose, promote and implement One Health policies in collaboration with partners	Develop and promote the implementation of One Health policies at national level in collaboration with partners
11.3 Organizational management	Describe the local community's formal and informal organizational structures	Identify partners and establish partnerships with potential collaborators	Utilize collaborative methods, negotiation skills and conflict management across sectors
11.4 Project management	Describe the principles of project management	Establish clear and objective project goals and outcomes with input from a multisectoral team	Apply all aspects of project management, including planning, budgeting, assessing risk and monitoring outcomes
11.5 Finance and budgeting	Participate in developing budgets for One Health projects	Formulate, implement and support budget plans for One Health programmes and projects	Advocate for funding to support national One Health planning and projects across sectors
11.6 Security in the field	Demonstrate awareness of personal security risks during fieldwork and use safe practices	Ensure that team members are aware of security procedures and implement preventive measures.	Analyse the risks involved in conducting fieldwork and implement risk mitigation strategies

Table 11.2
Curriculum topic names, descriptions and learning objectives for Domain 11

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Leadership and policy development *This topic aims to provide trainees with the necessary skills in leadership and policy development. It covers approaches for collaboration, communication and One Health policy development.*	• Identify and maintain relationships with community leaders and trusted partners • Describe One Health concepts and apply ethical principle.	• Conduct and manage field projects • Apply different stakeholder techniques to map stakeholders • Propose and promote One Health policies • Implement community based approaches and interventions for field investigation	• Propose and develop a programme that can support policy decisions • Translate scientific evidence to support policy formulation • Facilitate and advocate for policy development in relation to One Health • Evaluate the implementation of One Health policies • Communicate ideas and expectations to team members • Understand One Health needs at the local level and advocate for resources to meet the needs of supervisors • Develop policy briefs and guidance on One Health policies
Core competencies	11.1.1.f–11.1.2.f	11.1.1.i–11.1.2.i 11.2.1.i	11.1.1.a 11.2.1.a
Promotion of a secure working environment for employee wellness and mental health *This topic aims to provide trainees with necessary skills to protect the well-being of staff working under stressful conditions.*	• Discuss factors which can lead to anxiety and stress for field epidemiologists in their daily work routine	• Implement protocols to minimize employee stress and promote a secure working environment	• Develop protocols to minimize employee stress and promote a secure working environment
Core competencies	11.1.1.f–11.1.2.f	11.1.1.i–11.1.2.i	11.1.1.a–11.1.2.a

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Table 11.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 11

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Project, finance and organization management *This topic aims to provide trainees with the necessary skills in managing projects, developing and monitoring budgets, and managing teams and organizations.*	• Perform effective teamwork skills as part of the project team • Fulfil project requirements according to the operational plan • Participate in development of budgets for One Health projects	• Assign roles and responsibilities of team members • Create a formal project management structure and an implementation timeline • Formulate, implement and support budget plans for programmes and projects • Document progress and produce project reports	• Develop a risk matrix and a risk mitigation strategy • Maintain the financial sustainability of project proposals and monitor project budgets • Utilize negotiation and conflict management skills to facilitate cooperation across sectors • Facilitate and participate in M&E activities to monitor One Health actions • Advocate to mainstream One Health in national and partner budgets
Core competencies	11.1.1.f–11.1.2.f	11.3.1.i–11.3.2.i 11.4.1.i	11.3.1.a–11.3.2.a 11.4.1.a 11.5.1.a
Security in the field *This topic aims to provide trainees with the necessary skills in identifying and mitigating personal security risks.*	• Identify personal security risks and demonstrate ability to implement self-security • Identify risk mitigation action plans before engaging in fieldwork	• Train professionals, paraprofessionals, and multidisciplinary teams to apply security guidelines properly • Communicate ideas and expectations with team members, stakeholders and higher level policy makers • Ensure team members are practicing security awareness and taking preventive measures • Critically analyse feedback from the field and make proposals for solutions	• Analyse the security risk implications associated with conducting fieldwork • Execute and implement risk mitigation strategies and controls
Core competencies	11.6.1.f–11.6.2.f	11.6.1.i	11.1.1.a–11.1.2.a

f=Frontline, i=Intermediate, a=Advanced

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Domain 12
Communication and community engagement

Description: Communication includes the competencies necessary for conducting exchange of information at the local, regional, and national level. Field epidemiologists should have effective oral and written communication between various audiences and be well versed in risk communication strategies in relation to human, animal and environmental health. Field epidemiologists should understand the differences in routine communication of field findings, for frontline epidemiologists, compared to emergency communication during outbreaks or pandemics, for intermediate and advanced levels.

Table 12.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
12.1 Oral communication to technical and nontechnical audiences	Understand and apply the principles of effective oral communication to various audiences	Be able to address oral communication for various audiences to efficiently deliver the message	Oversee the development of team communications to various audiences
12.2 Written communication to technical and nontechnical audiences	Draft key messages for different target audiences (e.g., press releases, briefing notes, concept notes, fact sheets, etc.), taking into account the ability to address mis- and disinformation and community engagement	Explain the concept of key messages for effective written communications	Develop effective strategies for written communications
12.3 Risk communication	Explain the role of risk communication in the risk analysis process	Select the most appropriate methods and tools to use for risk communication with various audiences	Develop communication strategies and lead the implementation of risk communication plans
12.4 Communication for events	Assist in the development of an event agenda, identifying target audiences, goals, contents, and speakers and considering organizational aspects	Coordinate the organization of events for various audiences	Oversee communications, planning and assessment for events for technical and nontechnical audiences

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Table 12.2.
Curriculum topic names, descriptions and learning objectives for Domain 12

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Planning, development and delivery of effective communication products *This topic discusses the steps for planning, delivering, and assessing written and oral communications to technical and nontechnical audiences.*	• Describe communication types and principles for effective communications, to include risk communication, misinformation and disinformation • Explain types of team communications and the importance for active listening • Demonstrate effective communication skills • Demonstrate basic ability to use different communication tools	• Describe communication needs based on audience and context, including risk communication, misinformation and disinformation and events • Develop oral presentations for target audience type • Define key messages for written communication to a target audience • Propose and develop risk communication plans	• Incorporate advanced communication methods (e.g., scientific writing and publishing in peer-reviewed publications) for technical and nontechnical audiences • Develop overall communication strategies by identifying the best fit tool combinations to be used for regular or risk communication • Oversee implementation of all types of communications
Core competencies	12.1.f–12.1.3.f	12.1.1.i–12.1.3.i 12.2.1.i 12.4.1.i	12.1.1.a–12.1.3.a 12.2.1.a 12.3.1.a 12.4.1.a–12.4.3.a
Community engagement *This topic discusses principles for active listening and communication to successfully work with a community during field investigation.*	• Participate in a community engagement plan • Demonstrate ability to build trust with the community • Understand the local customs, culture and context	• Develop a community engagement plan for use throughout a field project	• Evaluate and integrate community engagement plans and strategies at their respective administrative level • Use the most appropriate methods and tools to build trustful relationships with community stakeholders
Core competencies	12.1.f–12.1.3.f	12.1.1.i–12.1.3.i 12.2.1.i 12.4.1.i	12.1.1.a–12.1.3.a 12.2.1.a 12.3.1.a 12.4.1.a–12.4.3.a

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Domain 13
Training

Training is a fundamental component of the capacity building process that occurs both in formal and informal settings. Field epidemiologists need to interact with and manage teams at various levels, and knowledge and competency transfer is a core responsibility to facilitate an organization and its human resources growth and improvement.

Domain 13 curriculum refers to individuals acting as trainers within a One Health Field Epidemiology Programme at country level. This domain is specific to trainers and providers who develop curriculum or e-Learning applications for face to face programming and virtual methodologies.

Table 13.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
13.1 Learning processes	Engage in individual and group learning activities that facilitate interactive approaches for different audiences	Implement individual and group learning activities that facilitate interactive approaches for different audiences	Develop and oversee individual and group interactive learning activities for different audiences
13.2 Learning needs assessment, training programme design, development and assessment	Participate in the learning needs assessment and programme design, development and evaluation process in a training programme	Implement the learning needs assessment and training programme design, development, assessment and evaluation process to assess outcomes	Develop and oversee implementation of learning needs assessment and training programme design, development and evaluation to assess outcomes
13.3 Training delivery	Support in classroom and field activities using face to face and virtual methodologies	Apply and implement in classroom and field activities using face to face and virtual methodologies	Develop and oversee the delivery of in classroom and field activities for training programmes using face to face and virtual methodologies
13.4 eLearning	Participate in the assessment, design, development and delivery of eLearning courses	Design and develop educational content and materials for eLearning courses	Lead experts in the assessment, design and development of educational content for eLearning courses and determine the maintenance required for updating course materials
13.5 Quality and risk management in training	Apply continuous quality improvement principles for trainees, trainers and mentors to maintain a minimum quality of standards	Implement risk mitigation procedures for training programmes and apply customer satisfaction measures	Promote a quality approach to the management of the training programme (e.g., International Organization for Standardization (ISO) 9001:2025 norms or Analysis, Design, Development, Implementation, and Evaluation model)

Table 13.2.
Curriculum topic names, descriptions and learning objectives for Domain 13

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Pedagogical approaches for effective training *This topic provides best training practices to engage adult learners utilizing different learning modalities. Practices are from lessons learned with different stakeholder audiences and localized to the region or area of expertise.* **Core competencies**	• Describe pedagogical approaches used for adult audiences • Discuss learner styles to provide effective training for a group audience	• Adopt pedagogical approaches and adapt education materials to different learning styles based on the training programme	• Design and deliver educational content for different learning styles • Customize learning pathways for different learners based on training programme objectives 13.1.1.a
Monitoring, evaluation and assessment of training programmes *The topic discusses the steps for evaluating and assessing programme participants, trainers and mentors and includes assessment tools to evaluate programme knowledge.* **Core competencies**	• Describe programme design and assessment tools for a training programme to the learner audience • Participate in the programme development, design and evaluation process of a training programme 13.1.1.f	• Implement programme design and assessment plans for monitoring and evaluation, including training of trainers and mentors • Develop a learning needs assessment to assess training programme plans, including needs for mentors, trainers and participants	• Develop programme assessment plans for monitoring and evaluation, including training of trainers and mentors • Prepare a logic model for programme implementation 13.2.1.a
Training programme delivery methodologies *This topic discusses types of training delivery methods (i.e., face to face, eLearning, and blended) including best practices for training types.*	• Participate in the development, delivery and evaluation of face to face training programmes • Participate in the development and delivery of eLearning applications	• Design tools to facilitate on the job training for delivery and evaluation of face to face training programmes • Design tools to facilitate eLearning applications	• Oversee tool design to facilitate on the job training for delivery and evaluation of face to face training programmes • Oversee tool design to facilitate eLearning applications
Continuous quality improvement of training programmes *This topic discusses the process for continuous quality improvement of training programmes to evaluate field level programmes.*	• Apply continuous quality improvement principles in training programmes to maintain minimum quality standards in the areas of assessment, design, evaluation and implementation	• Explain how to design and apply effective customer satisfaction measures • Implement continuous quality improvement principles in training programmes to maintain minimum quality standards in the areas of assessment, design, evaluation and implementation	• Develop and oversee continuous quality improvement principles in training programmes to maintain minimum quality standards in the areas of assessment, design, evaluation and implementation

Domain 14
Ethics

Professional ethics are based on moral, cultural and religious values, which guide human behavior governance systems. The field epidemiologist is responsible for maintaining professional ethical standards and norms to engender societal trust. This trust is prerequisite to enable field epidemiologists to perform their field duties and protect communities and populations. Ethics applies to the way field activities, including investigation, surveillance, research, data management and reporting, are conducted. In addition, ethical codes of practice include gender and discrimination issues.

Table 14.1.
Higher order competencies by training level

Subdomain	Frontline	Intermediate (= Frontline +)	Advanced (= Intermediate +)
14.1 **Ethics and its role related to health**	Describe and apply the principles of professional ethics in disciplines as they relate to One Health practice		
14.2 **Ethical issues related to field epidemiology**	Describe ethical issues related to care, safety, informed consent and duty to care, and how they apply in the concept of One Health for data collection and reporting Describe the interconnection of One Health and One Welfare		
14.3 **Moral challenges related to ethical decision-making**	Demonstrate community level conflict resolution methods by listing the stakeholders involved and their associated moral challenges	Contribute to ethical decision-making	
14.4 **Legal and regulatory ethical frameworks**	Adhere to ethics bylaws and regulations and promote ethical policymaking	Contribute to the development of ethical frameworks that ensure ethical decision-making which apply the concepts of One Health	
14.5 **The five step process for ethical decision-making**	Explain the five step process for ethical decision-making	Apply the five step process for ethical decision-making	

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Table 14.2.
Curriculum topic names, descriptions and learning objectives for Domain 14

Topics shown with a white background reflect theoretical and field-based content. Items shaded in purple are theoretical, and items shaded in green are practical (f=Frontline, i=Intermediate, a=Advanced).

Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Professionalism, ethics, and field epidemiology *This topic discusses professionalism and why it is necessary for field epidemiologists to perform their technical functions and fulfill their job duties. Professional guidelines and codes of ethics should be applied from across each of the three sectors involved in One Health. Depending on the cultural and legal frameworks in which the training takes place, varying principles or laws may apply. Programmes should develop professional guidelines for trainees to clarify expectations and emphasize the importance of ethical behaviour and decision-making.*	• Describe ethical principles and the relevant code of ethics, legal bylaws, and professional behaviour for field epidemiologists and how to apply them • Describe how codes of ethics are similar or different across public health, animal health and the environmental sector • Apply the code of ethics and professionalism in both simulated scenarios and real world conditions for different disciplines involved in One Health • Describe how to approach observed breaches in ethical conduct, including the responsibility to report • Apply ethics in relation to confidentiality, data integrity and protection, data and information sharing, and conflicts of interest • List the components that are required during the informed consent process	• Oversee the implementation of ethical practices by the team from different disciplines in One Health	• Oversee the implementation of ethical practices by the team from different disciplines in One Health
Core competencies	14.1.1.f- 14.1.4.f 14.4.1.f-14.4.3.f		

Table 14.2. (cont.)
Curriculum topic names, descriptions and learning objectives for Domain 14

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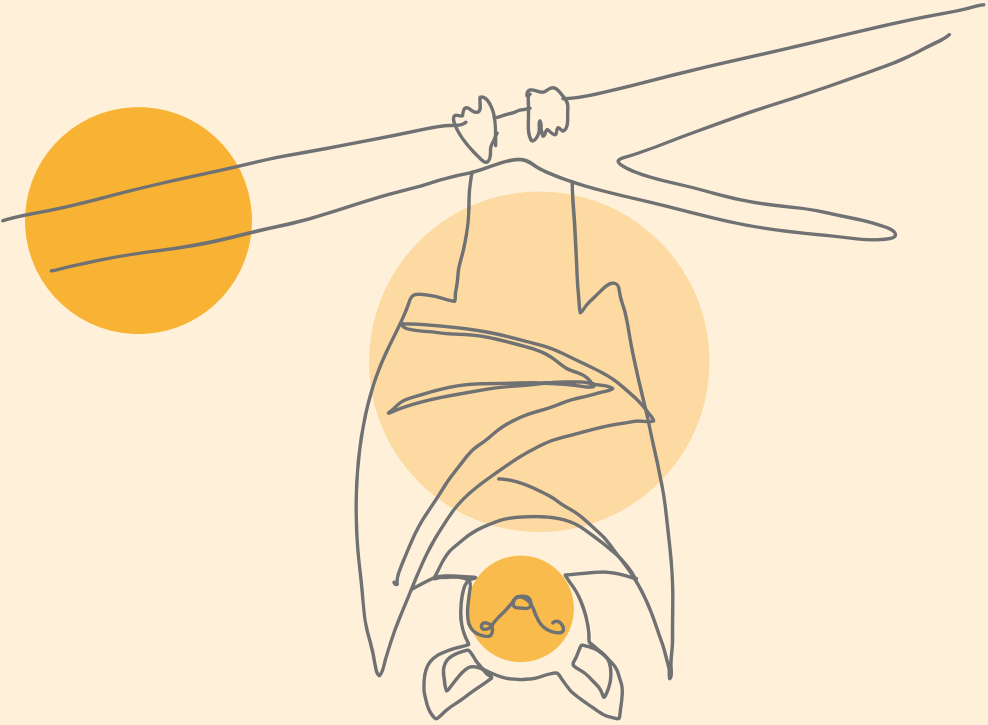| Topic name and description	Learning objectives		
	Frontline	**Intermediate**	**Advanced**
Ethical decision-making and policy development for One Health *This topic discusses how One Health practitioners make decisions and develop policies following ethical and legal principles, particularly considering social and economic disparities, animal welfare and environmental justice. Ethical and transparent decision-making helps build trust with the communities that field epidemiologists serve in their daily work. They must consider how various alternatives impact stakeholders across the three sectors and weigh these factors to develop policies that provide the greatest benefit to the system at large.*	• Explain the five step process for ethical decision-making • Describe the importance of ethical decision-making and policy development • Explain how to build and keep trust when working with communities • Describe specific considerations when working across differing cultures, special populations and disenfranchised populations • Understand how to actively promote health equity, for example, to avoid contributing to further discrimination, racism or prejudice towards other groups	• Describe and apply the legal and ethical provisions that inform One Health policy • Promote ethical decision-making while conducting fieldwork, recommending interventions and implementing disease management practices	• Contribute to the development of ethical policy framework
Core competencies	14.5.1.f	14.3.1.i	
Conflict resolution for field epidemiologists *This topic discusses conflicts of interest and misunderstandings that may develop from different sources during the practice of field epidemiology, particularly when implementing the cross-sectoral One Health approach. Successful negotiation of conflicts helps lead to mutually agreeable resolutions and builds trust. One Health field epidemiologists need to navigate these conflicts professionally and apply various approaches to managing them as they arise.*	• Discuss potential sources of conflict that may arise in the practice of One Health field epidemiology • Using a case study, determine the stakeholders involved in a conflict and describe their associated moral challenges • Describe approaches to resolving conflicts at the community level		• Apply approaches to conflict resolution as they arise • Supervise how conflicts are being resolved
Core competencies	14.3.1.f–14.3.2.f		14.3.1.a

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Annex

Annex

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