

Global One Health and Infectious Diseases

An Interdisciplinary Practitioner's Guide

Edited by
William E. Sander

First published 2025

ISBN: 9781032140674 (pbk)

ISBN: 9781003232223 (ebk)

Chapter 13

One Health Education, Training, and Capacity Building

*Jane Blake, Leah Goodman, Elsie Kiguli-Malwadde,
Cheryl Stroud, and Deborah Thomson*

(CC BY-NC-ND 4.0)

DOI: 10.1201/9781003232223-13



CRC Press

Taylor & Francis Group

Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

13 One Health Education, Training, and Capacity Building

*Jane Blake, Leah Goodman,
Elsie Kiguli-Malwadde, Cheryl Stroud,
and Deborah Thomson*

INTRODUCTION TO ONE HEALTH EDUCATION, TRAINING, AND CAPACITY BUILDING

In 2010, a group of students from ecology, medicine, veterinary medicine, and global public health concluded that education would play a particularly important role in realizing the One Health concept but that a shortage of collaborative student programs, insufficient environmental training for health professionals, and a lack of institutional support were impeding progress (Barrett et al., 2011).

Today, as noted in previous chapters, One Health awareness has grown exponentially over the past few decades and is being embraced all over the world (One Health Commission, 2023). This trend applies to One Health-related research and to One Health framed education, training, and capacity building (ETC). ETC programs are expanding to provide One Health degree-granting undergraduate and graduate curricula, certificate-based training programs, and capacity building initiatives (One Health Commission, 2024h; Togami et al., 2018; Von Borries et al., 2020).

The interdisciplinary nature of the One Health approach is applicable to all forms and levels of ETC. One Health experts advocate for involvement of One Health concepts early in education (primary school and beyond) to ensure the general population has a core knowledge base regarding health (Von Borries et al., 2020). This multidisciplinary concept of “oneness,” the interconnectedness of all life, must emphasize the value of biodiversity and potential consequence of zoonotic diseases when biodiversity is lost. Reaching beyond academia, the One Health concept must be incorporated in public messaging and become the default approach to government, industry, policy, and research. One Health education, not only in academia but for the general public, is needed from cradle to grave. This chapter will focus on the incorporation of One Health education in “academic” settings.

The veterinary sector first recognized the One Health concept and has been the most active participant in One Health ETC although traditional silos do still exist. However, additional professional sectors are increasingly beginning

to incorporate One Health into educational curricula. As early as 2008, Kahn, Kaplan, Monath, and Steele suggested that schools of medicine and schools of veterinary medicine should provide their students the opportunities to learn about how animal and human health can impact each other. The expansion of One Health ETC programs has since escalated as revealed by the seminal work of the One Health Commission and colleagues beginning in 2015 (McKenzie et al., 2016; One Health Commission, 2016b, 2023, 2024h, 2024e; Reid et al., 2016; Rwego et al., 2016; Sikkema & Koopmans, 2016; Stroud et al., 2016; Wu et al., 2016), lending to a notable upward trend in One Health education since the early 2000s.

In this chapter, we discuss various international ETC programs that expand global One Health Workforce capacity, explore their design, identify their approach to monitoring and evaluating student outcomes, and identify potential gaps. We conclude this chapter with a discussion of future directions in One Health ETC. The programs we discuss represent a sample and may not be all inclusive; our intent is to provide an overview rather than a full literature review and to potentially spur revelation of additional programs not yet compiled. While One Health research plays a significant role in capacity building and education and ensures that human, animal, and environmental health questions are evaluated in an integrated and holistic manner (Lebov et al., 2017), the scope of this chapter is limited to ETC programs that may or may not include a research component. Further, this chapter focuses on the formal One Health ETC programs for which information was available and may not include grassroots or less formal efforts conducted by One Health advocates across the world.

ONE HEALTH EDUCATION

In this discussion, the term “One Health education” will refer to primary-secondary school education (Von Borries et al., 2020) as well as undergraduate or graduate programs in academic, degree-granting institutions and related One Health education associated with non-profit organizations. Examples of formal university programs include a PhD, a master’s, or bachelor’s degree in One Health or Global Health, a Master of Public Health (MPH) with One Health concentrations, and One Health components of a medical or veterinary program. While additional academic programs exist covering planetary health and environmental health related to the intersection of human impact on the environment and vice versa, in this chapter we focus on One Health education that addresses the full spectrum of issues included under the One Health purview, such as comparative medicine, translational research, antimicrobial resistance, and the human-animal bond, that would not likely be included in planetary health curricula (Devinsky et al., 2018). Examples of specific education programs include the One Health undergraduate minor at Berry College (2015), the undergraduate class “One Health: Human, Animal, and Environment” at the Federal University of Minas Gerais in Brazil (Pettan-Brewer et al., 2021), the One Health undergraduate major offered at Fontbonne University (2024), various degrees offered at the University

of Edinburgh School of Veterinary Studies (The Royal (Dick) School of Veterinary Studies, 2024), and the Master's in Global Health Delivery (MGHD) provided at the University of Global Health Equity (2024). Additional programs and details are described in Section "Program Design for One Health Education, Training and Capacity Building." We also include educational programs overseen by non-governmental organizations (NGOs) and certificates, both free-standing or earned, as a part of a formal degree program.

ONE HEALTH TRAINING

We define training as programs that provide discrete exercise on specific One Health skills. Existing training programs may include free lectures, self-paced modules, such as the online One Health Training Course for working professionals provided by the One Health Workforce Academies (OHWA) (One Health Workforce Academies, 2024a), and free lectures and non-degree certificates, such as the One Health Course Series provided by the World Health Organization (WHO) (OpenWHO, 2024) and the World Small Animal Veterinary Association's One Health Certificate program (dvm360, 2020). Additional training programs and details are described in Section "Program Design for One Health Education, Training and Capacity Building."

ONE HEALTH CAPACITY BUILDING

We utilize the United Nations (UN) definition of capacity building: "the process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world" (United Nations, n.d.). The UN links this definition to Sustainable Development Goal 17: Revitalizing the Global Partnership for Sustainable Development and notes that capacity building should be transformational and sustained over time. Capacity building aims to empower people and/or institutions to maintain and sustain key skills.

For One Health, capacity building efforts take various forms such as train-the-trainer (ToT) programs, curriculum twinning projects between universities, and network collaborations. Specific examples include Ethiopia's One Health – Zoonotic Disease: A Training of Trainers Course (Ethiopian Agriculture Training Portal, 2021), the ToT program called the Certified Lesson Leaders Program provided by One Health Lessons for adults to educate the public (children and adults) about One Health (One Health Lessons, 2023), and One Health curriculum twinning projects such as the collaboration between Ethiopia's University of Gondar veterinary school and the Ohio State University's Global One Health Initiative since 2016 (Office of International Affairs, The Ohio State University, 2024). Additionally, we consider continuing medical or veterinary education to be capacity building, as they are ingrained in system-wide accreditation requirements, thus strengthening overall sustainable development. Capacity building endeavors can be performed by academic institutions, government programs, NGOs, or by

TABLE 13.1
Definitions of One Health Education, Training, and Capacity Building

Type	Definition	Examples
Education	Formal learning in primary, secondary, and higher academic institutions	<ul style="list-style-type: none"> • Primary and secondary school education • Undergraduate or graduate degrees • Certificates in degree-granting programs
Training	Part of capacity building, discrete education on specific One Health skills	<ul style="list-style-type: none"> • Lectures • Self-paced online modules • Non-degree certificates • Ad hoc One Health trainings and workshops
Capacity Building	Process of developing and strengthening the skills, instincts, abilities, processes, and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world	<ul style="list-style-type: none"> • Train the Trainer (ToT) • Twinning • Continuing Medical Education (CME) • Continuing Education (CE) • Continuing Professional Development (CPD) • Nursing Continued Professional Development (NCPD) • Certified Health Education Specialists (CHES) • Master Certified Health Education Specialists (MCHES)

any grassroots organization focused in One Health. Additional details on these, and more capacity building programs, are described in Section “Program Design for One Health Education, Training and Capacity Building.”

Table 13.1 summarizes our definitions of One Health education, capacity building, and training.

EXAMPLES OF EXISTING PROGRAMS AND/OR CURRICULA

One Health ETC programs are growing in number but are still somewhat nascent. That said, the education sector is arguably seeing the most growth in number of One Health learning opportunities, especially within degree-granting programs.

EXISTING ONE HEALTH EDUCATION PROGRAMS

As of this writing, there are hundreds of institutions around the world offering either primary and secondary school curricula, undergraduate minors and majors, masters degrees, certificates, or PhDs focused on the One Health approach (Berg & Olsen, 2016). Many universities were highlighted in a 2016 special issue of *Infection Ecology and Epidemiology* highlighting One Health Training, Research, and Outreach around the world (One Health Commission, 2016a). More recently, a 2022 review of organizations embracing and working to

further One Health identified 289 organizations, including 126 civil society organizations, 133 academic institutions, and 30 governmental organizations (Laaser et al., 2022).

For this chapter, we reviewed universities, colleges, non-profit organizations, and associations, offering in-person, online, and summer field work. The reviewed programs are located in Australia, Africa, Canada, the Caribbean, Central and South America, Europe, Asia, and the United States. In the United States alone, over 50 One Health educational programs were identified at more than 35 institutions; this represents an approximate 3-fold increase since 2016 (Stroud et al., 2016). Many One Health “activities” at universities have expanded into full degree-granting programs as detailed in an overview of One Health education and activities in Brazil, Chile, and Colombia (Pettan-Brewer et al., 2021). For example, in 2020, a One Health course for non-biology undergraduate students (law, psychology, journalism, and engineering) was given at the Adolfo Ibáñez University in Chile (Cianfagna et al., 2021). On the primary-secondary school education front, notable resources include One Health Lessons, a non-profit organization (Barrett et al., 2011) that provides high-quality age-appropriate lessons about One Health to primary and secondary school students as well as to adults in the community and at universities and (One Health Commission, 2023) trains adults of various disciplines and backgrounds to teach One Health in classrooms around the world.

Additional notable programs include the One Health Commission’s One Health Education – United States working group (One Health Commission, 2024f) that explores ways to take One Health to primary and secondary school educators. This latter group compiles One Health educational resources for teachers (One Health Commission, 2024i) and students and has a One Health survey for primary/secondary teachers currently in the field that not only assesses teacher familiarity with One Health but also informs teachers about the concept and why it is important for their students. Other existing programs include the Kansas State Olathe Campus K-12 One Health educational program (Kansas State University, 2024) and the St. Louis Zoo Institute for Conservation Medicine’s (ICM) One Health education program built around local box turtles that teaches children about One Health while getting them outdoors to look for and work with turtles (Saint Louis Zoo, 2021). One Health Colombia at the University of Cordoba takes learning material about One Health into primary/secondary classrooms (Pettan-Brewer et al., 2021) while One Health Cares, Inc. does similar work in Fukuoka, Japan (FAVA OneHealth Fukuoka Office, 2023).

**HIGHLIGHT: SAINT LOUIS ZOO ICM’S CHILDREN’S
ONE HEALTH TRAINING (SAINT LOUIS ZOO, 2021)**

The Saint Louis Zoo ICM takes a holistic approach to wildlife conservation, public health, and sustainable ecosystems to ensure healthy animals and healthy people. In 2012, the ICM team and partners developed the St.

Louis Box Turtle Project. The project received National Science Foundation funding to develop teacher workshops and field trip opportunities to take students into nature to track box turtles in rural and urban research sites. This program is now a flagship STEM (Science, Technology, Engineering and Mathematics) program for the Saint Louis Zoo.

The Saint Louis Box Turtle Project includes a classroom visit to introduce conservation issues that box turtles face and to prepare students for their field experience. To date, the team has taken over 1,500 students into natural areas to track box turtles using radio telemetry. Many of the students are from underserved, urban schools near Forest Park. For many students, this is their first-time exploring nature and seeing a turtle in the wild. Students not only gain experience using scientific equipment alongside a field biologist, but they also gain a better understanding of their connection to nature, a fundamental part of One Health and the foundation for developing conservation mindfulness.

In 2016, the Ferguson-Florissant School District asked ICM to expand the project to include their site, Little Creek Nature Area. This 98-acre natural area is owned and managed by the school district. This expansion has allowed the team to collaborate with teachers and administrators to use the Saint Louis Box Turtle Project as a part of the district's STEM curriculum and experiential learning opportunity.

Based on our review of One Health education, veterinary schools are more likely to incorporate One Health into their curriculum while medical schools continue to lag behind. As surveyed by Georgetown University in 2021, only 56% of 133 U.S. medical schools include One Health-related subject matter in the curriculum (Docherty & Foley, 2021). Of note, the University of Hawaii at Manoa's medical school offers a Certificate of Distinction in One Health (University of Hawai'i, 2024) and its undergraduate sector also has a One Health Interdisciplinary Undergraduate Certificate (University of Hawai'i, 2024). A list of education programs reviewed for this chapter is included in Table 13.2.

HIGHLIGHT: MEDICAL SCHOOLS AND SCHOOLS OF PUBLIC HEALTH – MAKING ONE HEALTH A REQUIREMENT

While the One Health concept has been highlighted at many fora and is endorsed by a number of major medical and public health organizations such as the Association of American Medical Colleges (AAMC) and the American Public Health Association (APHA) (American Public Health Association, 2017), many medical and public health educators may not yet be familiar (Rabinowitz et al., 2017). One Health awareness has increased in human health circles in the past few years in light of recent emerging

zoonotic disease outbreaks including West Nile virus (1999), zoonotic avian influenza A (2003), Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2, 2003), pandemic H1N1 influenza (2009), Middle East Respiratory Syndrome (MERS, 2012), Ebola virus (2014), Zika virus (2015), and SARS-CoV-2-causing COVID-19 (2019) (Allen-Scott et al., 2015; Boyle, 2019; Holmes, 2022; Institute of Medicine, 2009; Taylor et al., 2001). The World Medical Association along with the World Veterinary Association held their first joint conference on One Health in 2015 in Spain (World Medical Association, 2015). Yet, as zoonotic disease outbreaks become more frequent, threatening global health security and economic stability, early detection and mitigation are imperative. Veterinarians are critical for early recognition of zoonotic diseases that might initially show up in animals. But human health and public health practitioners are the first line of defense to detect and alert when they present in humans. Therefore, physicians and public health workers must be able to recognize and diagnose emerging zoonotic diseases that may appear in their exam rooms or communities. It is important that medical educators, in both schools of medicine and public health (One Health Commission, 2024b), include the full scope of One Health in their curricula to prepare human health professionals for future outbreaks, ensuring they know what questions to ask their patients and which signs to recognize. Medical students, along with other health-focused students, have publicly expressed interest in learning more about One Health (Elmahi et al., 2022).

Generally, when One Health is presented in medical schools, it is taught in a siloed manner scattered through microbiology, internal medicine, public health, etc., and is usually only included by faculty who are familiar with the concept, which can be limiting (Hilliard, 2015). The ideal would be to expose medical students to a dedicated One Health course in their first year and for medical and public health school faculty to be keenly aware of incorporating the One Health way of thinking into all subjects so it is deliberately applied across the full training experience. Consistently incorporating One Health into all subjects will instill in future clinicians this holistic way of approaching patients.

Overall, One Health education in medical schools is in its infancy and lags behind veterinary schools; many veterinary schools have already incorporated One Health as a central part of their curricula (Linder et al., 2020; Rabinowitz et al., 2017). Adoption of the One Health concept and its application to clinical care requires educating and training of health professionals; therefore, core competencies for One Health training have been proposed (One Health Commission, 2024m; Rabinowitz et al., 2017). We acknowledge the challenge of revising medical curriculum due to the magnitude of information already required; however, medical school faculty can incorporate One Health examples within the material already presented

without a huge effort. Similarly, requiring students to complete an online Intro to One Health for Human Health Clinicians lecture or course in their first year would not add much burden to the curriculum and can be achieved through online and asynchronous approaches. The emphasis must shift from solely curative care to incorporate prevention with a public health approach (One Health Commission, 2024b).

Progress is ongoing in Europe, the Americas, Africa, and Asia along with recommendations on the next steps for improving One Health thinking in medicine (Iatridou et al., 2021; One Health Commission, 2016a; Rwego et al., 2016). Both academic and non-academic institutions are creating networks to do research, conduct trainings, and hold conferences on the One Health concept. Innovative approaches such as interprofessional electives, school clubs, working groups, and research networks are being adopted to increase awareness. Though the work is in its early stages globally, awareness is expanding and slowly translating into concrete One Health education and research activities.

TABLE 13.2
MPH with Specialization in Global Environmental Sustainability and Health Competencies at Johns Hopkins University

Competency	Course Number(s) and Name(s)
GESH1. Define climate change and describe multiple ways climate change will have an impact on public health	180.611 The Global Environment, Climate Change and Public Health
GESH2. Define behaviors related to climate change and environmental sustainability, identify factors that affect them, and design a behavior change intervention to address either climate change or environmental sustainability	224.689 Health Behavior Change at the Individual, Community and Household Levels
GESH3. Effectively communicate a position/opinion on a climate and/or sustainability topic	188.688 Global Environmental Sustainability and Health
GESH4. Characterize the role of food systems in sustainability and the environment	180.620 Introduction to Food Systems and Public Health OR 180.606 Case Studies in Food Production and Public Health OR 180.655 Baltimore Food Systems: A Case Study of Urban Food Environments
GESH5. Apply principles of systems thinking to understand the various causes and effects of climate change on the environment and public health	180.611 The Global Environment, Climate Change and Public Health

Source: Johns Hopkins Bloomberg School of Public Health, 2024

ONE HEALTH TRAINING

While training is a subset of capacity building, the authors chose to discuss discrete training programs separately, as many are provided for free, often for no educational credit, and are not always a component of an overall capacity building approach (One Health Commission, 2024h). However, these training programs provide a large impact in building awareness and inspiring actions by One Health advocates. Additionally, while most of the programs listed in Table 13.2 do not provide official credit, they often provide certificates and can be used to study for certification exams and other such efforts.

Like overall capacity building, One Health trainings are provided by governments, NGOs, One Health networks, and academic institutions. For example, the Africa One Health University Network (AFROHUN) provides One Health Training Modules to assist in workforce development; Kerala Veterinary and Animal Sciences University, Centre for One Health Education Advocacy Research & Training (COHEART) provides adult workshops in India (Kerala Veterinary and Animal Sciences University, 2023); and OHWA provides an online One Health Training Course for working professionals (One Health Workforce Academies, 2024b).

HIGHLIGHT: UNIVERSITY OF GENEVA GLOBAL HEALTH AT THE HUMAN-ANIMAL-ECOSYSTEM INTERFACE COURSERA COURSE (UNIVERSITY OF GENEVA, 2024)

The University of Geneva, Institute Pasteur, University of Montreal, and Centre Virchow-Villermé/University Paris Descartes have an 8-week course where students explore and learn about past and current Global Health Challenges at the Human-Animal-Ecosystem Interface: zoonotic emerging infections (e.g., Ebola, Nipah, MERS, Avian Influenza), antimicrobial resistance, neglected tropical diseases (e.g., rabies, leishmaniasis, zoonotic TB), snakebites, and other human-animal conflicts, etc. The course covers epidemiology, social anthropology, disease ecology, veterinary sciences, global health policy, etc., and approaches such as One Health, EcoHealth, and Planetary Health. It also covers innovative tools and frameworks used to study and address Global Health challenges of the UN Sustainable Development Goals.

The course involves more than 30 experts from over 20 academic and research institutions and international organizations including the WHO, clinicians from the University Hospitals of Geneva, and epidemiologists

from Institute Pasteur. The format utilizes video lectures filmed in different parts of the world and settings (from the field to the lab and office) combined with the latest open readings and interactive activities in the discussion forum and video conferences.

The development of this course was led by Dr. Rafael Ruiz de Castañeda, Dr. Isabelle Bolon, and Prof. Antoine Flahault from the Institute of Global Health of the University of Geneva.

ONE HEALTH CAPACITY BUILDING

As noted above, capacity building is a broad field that includes developing skills, instincts, abilities, processes, and resources to implement and sustain One Health approaches. As such, capacity building can be implemented by multiple public, private, and academic institutions. Capacity building programs focus on providing a wide range of training resources, from e-learning online modules, continuing education credits, internships/fellowships, curriculum twinning, and other learning resources for existing or future One Health practitioners to gain knowledge and maintain skills (One Health Commission, 2024h).

Although this chapter cannot cover all capacity building efforts, there are at least 25 large One Health capacity building programs and organizations across the world, many of which are run by governments, non-governmental or non-profit organizations such as the U.S. Centers for Disease Control and Prevention, the WHO, the Food and Agriculture Organization (FAO), the World Organisation for Animal Health (WOAH), One Health Lessons, the One Health Commission, and others (One Health Commission, 2024h).

One Health networks and academic institutions play a large role in providing capacity building resources across the world, often on a regional basis (Streichert et al., 2022). Example networks include AFROHUN, the Southeast Asia One Health University Network (SEAOHUN), the One Health Regional Network for the Horn of Africa, the New England Public Health Training Center, the Task Force for Global Health, the Network for EcoHealth and One Health (NEOH), the One Health Commission's Global One Health Community (One Health Commission, 2024a), and the Capacity Development Support Facility (CDSF) in Ethiopia and others (Khan et al., 2018). Universities involved in capacity building may also provide degrees in One Health or simply have research, workshops, or committees related to One Health, such as the International Veterinary Student Association's (IVSA) Standing Committee on One Health (SCOH), a student-led One Health committee that hosts events to connect disciplines. A list of example programs is included in Table 13.2.

HIGHLIGHT: ONE HEALTH CENTRAL AND EASTERN AFRICA (OHCEA) (AFROHUN, 2023)

OHCEA is a network of 14 Public Health and Veterinary Higher Education Institutions that are located in six countries in the Eastern and Central Africa region (Democratic Republic of Congo (DRC), Ethiopia, Kenya, Rwanda, Tanzania, and Uganda), a region that includes the Congo Basin that is considered to be a hot spot for emerging and re-emerging infectious diseases. OHCEA is funded by the U.S. Agency for International Development (USAID) through RESPOND component of the Emerging Pandemic Threats Program. The collaborating institutions include University of Minnesota and Tufts University. This initiative was spearheaded by Makerere University School of Public Health (MakSPH) in Uganda, in collaboration with Muhimbili University of Health and Allied Sciences (MUHAS), School of Public Health in Tanzania since 2005. This has been expanded and has become a continental initiative; responding to this continental shift, the network leadership agreed to change the name of the network from OHCEA to AFROHUN in 2019. The network is working to transform the training environment and approaches in universities, in a bid to develop a workforce without disciplinary barriers.

PROGRAM DESIGN FOR ONE HEALTH ETC

One Health ETC programs range widely in their design and implementation. Between 2008 and 2011, One Health core competencies were developed by separate groups and were synthesized in Rome in 2012 to a key set of domains: management, communication and informatics, values and ethics, leadership, team and collaboration, roles and responsibilities, and systems thinking (AFROHUN, 2020; Allen-Scott et al., 2015; Binot et al., 2015; Fenwick, 2016; Frankson et al., 2016, 2016; Larsen, 2021; Lee & Global OHCC Working Group, 2013; Lucey et al., 2017; Mor et al., 2018; Rabinowitz et al., 2017; Togami et al., 2018). Despite the existence of such core competencies, a literature review of One Health degree-granting programs in the United States in 2018 found that while One Health education programs were on the rise, competency-based education models were not widely practiced or used by educational institutions and several key areas were underrepresented, as noted in Figure 13.1 (Togami et al., 2018).

However, there are several efforts underway to institutionalize One Health core competencies which will benefit students and improve monitoring and evaluation (M&E). First, in October 2016, the Council on Education for Public Health, the accrediting body for U.S. public health schools, added One Health to its accreditation criteria (CEPH, 2024). This core addition was to be incorporated by the end of 2018. In 2021, an informal survey of schools of public health was conducted to assess how well this criterion was being met and if a collection of One Health resources for public health educators would be useful. In response to the informal

UNDERREPRESENTED		WELL REPRESENTED	
<p>Key areas identified in less than 25% of total programs</p> <ul style="list-style-type: none"> • Plant biology • Antimicrobial resistance • Law 	<p>Identified in 25% to <50%</p> <ul style="list-style-type: none"> • Zoonoses • Geography / GIS • Emerging infectious diseases • Economics • Toxicology • Conservation / wildlife 	<p>Identified in 50% to <75%</p> <ul style="list-style-type: none"> • Food safety / food security • Agriculture / livestock • Policy • Vector-borne diseases / entomology • Social and behavioral sciences 	<p>Identified in 75% or more</p> <ul style="list-style-type: none"> • Epidemiology • Environmental health / ecology

FIGURE 13.1 Representation of One Health-related competencies across educational institutions. (Adapted from Togami et al., 2018.)

recommendations, a compilation of One Health education resources for public health (and other) educators was created and made freely available (One Health Commission, 2024b). In addition, physicians are increasingly advocating for the inclusion of One Health in medical school education, especially post-COVID-19 (Lucey et al., 2017; Machalaba et al., 2021).

In 2019, Steel et al. explored opinions and insights into desired knowledge, attitudes, and practices of effective One Health clinical practitioners and concluded that educational interventions that foster interprofessional communication and collaboration will be necessary to successfully bring about the cultural change required to achieve effective One Health practice [in Australia], and thus expedite improved human, animal, and environmental health outcomes (Steele et al., 2019).

Laing et al. (2023), affiliated with the NEOH, has updated core competencies for all institutions that are building or expanding their One Health programs (Laing et al., 2023). Competencies include nontraditional topics such as gender inclusion and public speaking to allow the next generation of One Health professionals to better communicate with various audiences and to achieve community buy-in for One Health activities.

Finally, as noted in Figure 13.2, in 2018 Togami et al. (2018). recommended several improvements: (i) making clearly stated core competencies, (ii) including proficiency in at least one health science, (iii) educating future professionals in the One Health arena in both represented and underrepresented disciplines, and (iv) continuing to focus on practical and applied training. These recommendations constitute important foundational elements for updated future One Health core competencies being brought forward by Laing et al. (2023).

PROGRAM DESIGN: EDUCATION

Broadly speaking, undergraduate majors and minors, certificates, and courses in One Health cover human, animal, and ecosystem health and include curricula in One Health concepts, biological sciences, infectious diseases, environmental sciences, global health, ecology, chemistry, epidemiology, food and agriculture, data collection and analysis, communications, ethics, policy, culture, social justice, and more. It should be noted that most U.S. bachelor’s programs require four

RECOMMENDED CORE COMPETENCIES FOR ONE HEALTH EDUCATION

Health Knowledge	Global & Local Issues in Humans, Animals, Plants, & the Environment	Professional Characteristics
<p>Objective</p> <p>To demonstrate knowledge of established and evolving transdisciplinary One Health sciences, including those relevant to public health, animal health, environmental sciences, and modern agriculture</p>	<p>Objective</p> <p>To demonstrate an understanding of historical, cultural, political, economic, and scientific aspects of complex and emerging health problems that are amenable to the One Health approach</p>	<p>Objective</p> <p>To demonstrate the ability to understand and apply principles of research and evaluation methods to policy and health program implementation, as well as apply scientific findings to real-life situations</p>
<ul style="list-style-type: none"> • Characterized the etiology, evolution, and ecology of infectious disease agents of people, animals, and plants that are of importance to health. • Describe the main transmission routes for toxins, pathogens, and resistance genes, including human-animal-plant-environmental exposures, as well as vector-borne, waterborne, and airborne cycles. • Explain epidemiological principles used to characterize problems that involve human, animal, plant, and environmental components. • Understand scientific principles such as biological complexity, genetic diversity, and interactions of systems from individuals to ecosystems that influence modern complex challenges in human, animal, plant, and environmental health. • Identify common cultural and socioeconomic determinants and effects of illness, including poverty, residential geography, cultural practices, education, nutrition, and resource security. • Explain how biosurveillance diagnostics, and therapeutic countermeasures are deployed. • Describe interventions used to prevent disease and improve human, animal, and environmental health at the individual, community, and population levels. 	<ul style="list-style-type: none"> • Describe the biological principles, scope, and complexity of disease in people, animals, plants, and the environment. • Understand the effects of global change on health and how both local and global factors affect disease transmission within and between countries. • Identify and understand the origins and determinants of health (human, animal, plant, and the environment) as related to disease. • Compare and contrast health and non-health consequences of diseases and exposures, including social and behavioral, economic, and political effects across global regions. • Recognize major challenges and opportunities to improve health in a global and local context through practical and applied training. • Demonstrate a basic understanding of pre- and post-production food safety. • Understand the structure and responsibilities of the public health system, including the local, state, and national levels of government. • Describe the relationship among various key One Health stakeholders locally and globally. 	<ul style="list-style-type: none"> • Describe the benefits and challenges of a multidisciplinary, integrative approach when implementing studies regarding health concerns at the human-animal-plant-environment interface. • Effectively communicate, both orally and in writing, scientific findings to the scientific community, non-health-related academics, public audiences, media, and policy makers. • Demonstrate scientific quantitative skills, such as the ability to evaluate experimental design, interpret scientific findings, and develop discussions, as well as provide implementable recommendations. • Demonstrate the ability to build and manage a transdisciplinary team and apply principles to conduct ethical, scientifically sound research that will inform policy. • Develop a plan to translate research findings and new discoveries into health policies, community programs, interventions, and public education in a manner that is sustainable, culturally relevant, and economically feasible.

FIGURE 13.2 Recommended core competencies for One Health education. (Adapted from Togami et al., 2018.)

years of study whereas in South America, Europe, Africa, the United Kingdom, and Asia, veterinary and medical school is considered a bachelor's degree and requires five to six years of study.

Master's programs focused on One Health are most often in the form of an MPH and Master of Science (MS) and vary from one to five years to complete (One Health Commission, 2024g, 2024h). For example, the Masters in One Health at the University of Alaska at Fairbanks provides students an option of two possible concentrations: Community Advocacy Concentration (Social Sciences focus) or Biomedical Concentration (Veterinary Medicine and Biology focus) (University of Florida, 2024a). Existing One Health-specific MPH degrees require core MPH courses, such as Epidemiology, Public Health Policy and Management, Environmental Health, Biostatistics, Sociocultural Aspects of Public Health, but focus the bulk of studies on One Health courses. MPH degrees that have a One Health specialization or track vary in requirements as noted in Table 13.2, but usually require completion of the MPH Core Curriculum and at least 18 One Health credits for the specialization. Specific examples include the full-time MPH International Program at Hanoi Medical University specialization in One Health and Public Health and the Johns Hopkins University MPH concentration in Global Environmental Sustainability and Health (Johns Hopkins Bloomberg School of Public Health, 2024).

Doctoral degrees with One Health concentrations, courses, or requirements include PhDs, DVMs, and MDs (University of Florida, 2024b). PhD programs range in the number of post-baccalaureate credit hours required and focus on research or applied learning (One Health Commission, 2024j). The first PhD with a concentration in One Health was created at the University of Florida in its School of Public Health (University of Florida, 2024b); this is a research-oriented degree that emphasizes working across public health, veterinary health, and environmental health disciplines. The program requires 90 total credit hours, 24 of which are One Health concentration courses, with the rest being core public health courses such as quantitative methods and statistics courses; professional issues and teaching courses; supervised research; and dissertation research plus student-chosen and advisor-approved electives (University of Florida, 2024c).

As noted previously, when One Health is included in medical education, it tends to be as an elective, sometimes created by the students themselves (Hilliard, 2015) including those at Georgetown University (Docherty & Foley, 2021), the University of Hawaii, and Western University (Western University, 2024). Conversely, the World Veterinary Association released a position statement in 2023 (World Veterinary Association, 2023) that conveys the overall wish for One Health education in veterinary medicine. The position statement is divided into several sections pertaining to the stages of one's veterinary career: before veterinary school, during veterinary school, at continuing education events used to maintain a veterinary license, and a message to accreditation bodies. The ultimate aims of the position statement are to (i) accept One Health-minded people into the profession through acceptance at veterinary school and (ii) encourage more veterinarians to practice medicine with a One Health mindset and to

participate in transdisciplinary, multisectoral work and learning events (e.g., conferences) (World Veterinary Association, 2023).

HIGHLIGHT: UNIVERSITY OF ALASKA AT FAIRBANKS (UAF) (UNIVERSITY OF ALASKA – FAIRBANKS, 2024)

The One Health Master's Degree (OHM) at the UAF emphasizes community-centered problem solving through training and practice. This interdisciplinary degree cultivates skills in communication, epidemiology, conflict resolution, cultural awareness, and data collection. The OHM targets those seeking to work in the community to address One Health and those seeking to pursue a medical or veterinary degree through two concentrations: a Community Advocacy Concentration and a Biomedical Concentration. The degree is comprised of 19 core credits with an additional 12 credits per concentration.

This hands-on approach allows students to engage with key stakeholders and community members to develop and implement realistic management plans for communities across the Circumpolar North. Through the array of courses offered, this program acknowledges that a successful One Health professional requires knowledge of the social, cultural, governmental, historical, and scientific realities that influence One Health issues and their solutions. In addition, UAF requires students to take environmental economics regardless of their concentration. The OHM does not rely on student's in-depth scientific knowledge but instead their ability to communicate effectively and utilize a diverse, multidisciplinary perspective.

PROGRAM DESIGN: TRAINING

Most One Health training opportunities are not affiliated with larger capacity building programs but are run out of universities or One Health networks (One Health Commission, 2024h). Many are free or minimal cost lectures designed to introduce One Health concepts; however, content and topic areas tend to be more general, not based on core competencies. Formats vary, ranging from basic lectures, to introductory courses/seminars provided online, to field work for working professionals during university vacation periods (One Health Commission, 2024k).

Several online and in-person One Health courses have been developed around the globe (One Health Commission, 2024d, 2024c); for example, Hanoi Medical School's Global Health seminar series provides a general One Health overview lecture (Hanoi University, 2022). Notable online coursera-type series include Kahn's Bats, Ducks, and Pandemics course, University of Geneva's Global Health at the Human-Animal-Ecosystem Interface course (University of Geneva, 2024), and University of Basel's One Health: Connecting Humans, Animals, and the Environment course (FutureLearn, 2023). While similar in topic areas, these offerings range in course design and learning objectives, as noted in Table 13.3.

In addition, there are several notable fields or hybrid short courses offered during university vacation periods (One Health Commission, 2024k). For example, the Center for One Health Education, Advocacy, Research, and Training (COHEART), Kerala Veterinary and Animal Sciences University, hosts a winter training entitled “Application of One Health Concepts for Control of Emerging Zoonoses and Health Threats,” a 21-day program for professionals focused on assimilating the concept of One Health and how to approach health threats especially during outbreak of emerging zoonoses. The course includes theory sessions, hands-on training on disease diagnosis and field visits, and interactive sessions on the One Health approach and economic impact (Kerala Veterinary and Animal Sciences University, 2023).

TABLE 13.3
Online Training Courses

Week	Bats, Ducks, and Pandemics (Kahn)	Global Health at the Human-Animal-Ecosystem Interface (Geneva)	One Health: Connecting Humans, Animals, and the Environment (Basel)
1	Getting Started. One Health, Public Health, Basic Epidemiology	Global Health at the Human-Animal-Ecosystem Interface: The Need for Intersectoral Approaches	Theoretical foundations of One Health
2	Public Policy, Environmental and Ecosystem Health, National Governments, International Organizations	Emerging Infectious Diseases	One Health quantitative methods
3	Human Nutrition, Basic Microbiology, Food Safety, Food Security	Antimicrobial Resistance & Zoonotic Foodborne Infectious Diseases	One Health case studies I: One Health in practice
4	Examining Leadership, Corruption, Communication, and Healthcare Access	Zoonotic Neglected Infectious Diseases	One Health qualitative and mixed methods
5	Antimicrobials: Antibiotics, Antimicrobial Resistance, Bacteriophages, Vaccines and Antivirals	Conflicts & Injuries Innovation & Opportunities	One Health case studies II
6	Containing Disease Outbreaks, Prion Diseases, Bacterial Diseases, and Viral Diseases	Health Benefits at the Human-Animal-Ecosystem Interface	Beyond One Health: ecosystem approaches to health and summary of course
7		Management of Ecosystems under Global Changes: Implications for Human Health	

HIGHLIGHT: RX ONE HEALTH PROGRAM DESIGN (UNIVERSITY OF CALIFORNIA – DAVIS, 2024B)

The Rx One Health Field Institute from the University of California – Davis, is a summer, field-based experiential learning course focused on One Health core competencies for graduate students and early career professionals from all disciplines. Rx One Health participants develop skills in laboratory and research methods, ecosystem dynamics, biodiversity conservation, epidemiology, infectious disease surveillance, biosafety, biosecurity, food safety, agriculture, food security, hydrology, marine ecology, communications, community and stakeholder engagement, ethics, teamwork, and leadership. Through hands-on experiences, case studies, group discussions, and field exercises, Rx One Health develops participants' skills for addressing complex challenges using the One Health approach, which recognizes that the health of people, animals, and their environments are interconnected, and that problem solving to address complex challenges is best achieved through transdisciplinary collaboration. Thematic modules include: One Health Foundations & Leadership; Zoonotic Disease & Biosecurity; Human Health & Health Equity; Food Security, Agriculture, & Nutrition; Wildlife Conservation; Environmental Health & Conservation; Research Methods & Implementation.

PROGRAM DESIGN: CAPACITY BUILDING

One Health capacity building resources and program designs range from international initiatives with specific targets and desired competencies, such as the Global Health Security Agenda (GHSA) Workforce Development and Zoonotic Disease Action Packages, to networks that utilize existing or design future One Health competencies, such as SEAOHUN and AFROHUN One Health academies. Additionally, many government-sponsored capacity building programs are designed with specific agency or department goals in mind, such as global health security capacity building efforts by the United States, UK, Australia, and others. Other capacity building approaches include workshops designed around specific topic areas; ToT programs that teach individuals how to educate others in One Health concepts; internships (One Health Lessons, 2023); and twinning programs where people are mentored on One Health concepts by established institutions. Though many capacity building programs are designed around the 2012 core competencies synthesized in Rome (Frankson et al., 2016), they can vary widely in design and subject matter.

To partially address this wide variability in design, the One Health Quadripartite One Health Joint Plan of Action (OH JPA) aims to strengthen capacity building through an integrated framework. This effort was launched by the Quadripartite (the United Nations Environment Programme (UNEP), FAO, WHO, and WOA) in October 2022. Action track 1 of the OH JPA, "Enhancing

One Health capacities to strengthen health systems,” requires establishing the foundations of One Health capacities and competencies, an analysis of existing gaps and the ability to design, plan, and implement leadership, decision-making, strategies, and governance; sustainable frameworks, infrastructures, and competencies; affordable economic models and financial mechanisms; and M&E processes (FAO et al., 2022). Activity 1.1.2 is focused on defining the One Health institutional and workforce capacities, developing methodologies and tools to assess national One Health performances, and identifying needs. The plan has several capacity-related deliverables expected over the next three years, including:

- Definition of One Health competencies and capacities at institutional and individual levels;
- Mapping and integration of existing methodologies and tools, and new methodologies and tools and pilot tests for:
 - National capacities for One Health and the performance of systems at the human-animal-plant-environment interface
 - One Health competencies
 - Workforce learning needs assessment
- Support for the application of tools and assessments provided
- Identified learning needs
- Identified opportunities to strengthen One Health coordination

A salient example of international cooperation in capacity building is the GHSA, an effort by nations, international organizations, and civil society to accelerate progress toward a world safe and secure from infectious disease threats; to promote global health security as an international priority; and to spur progress toward full implementation of the WHO International Health Regulations (IHR) 2005, WOAHP Performance of Veterinary Services (PVS) pathway, and other relevant global health security frameworks (CDC, 2024). An innovative idea borne of the U.S. CDC, GHSA was launched in 2014 by a group of 44 countries and organizations and utilized action packages to target specific outcomes for preventing, detecting, and responding to infectious diseases (Global Health Security Agenda, 2016). While all action packages within the GHSA aim to take a One Health approach, two packages are of relevance to One Health capacity building:

- **Zoonotic Disease Action Package:** Requires implementation of joint IHR and PVS training programs for human and animal health services. Monitors activities through implementation of WHO’s IHR Monitoring Framework and the OIE’s PVS Pathway.
- **Workforce Development:** The Workforce Development Action Package is targeted for one trained field epidemiologist per 200,000 population, and one trained veterinarian per 400,000 animal units (or per 500,000 population), who can systematically cooperate to meet relevant IHR and PVS core competencies in the countries. This action package prioritizes building field epidemiology capacity using a One Health approach.

Another excellent example of an international capacity building effort designed around existing core competencies is the activities undertaken by SEAOHUN and AFROHUN, both associated with the One Health Workforce – Next Generation (OHW-NG) project currently led by the University of California at Berkeley. Both SEAOHUN and AFROHUN have been working over the past decade to build teams and training content that incorporate a One Health approach to problem solving and capacity building. They provide training modules in the seven existing core competencies: (i) Collaboration and Partnership; (ii) Communication and Informatics; (iii) Culture, Beliefs, Values, and Ethics; (iv) Leadership; (v) Management; (vi) Policy, Advocacy, and Regulation; and (vii) Systems Thinking. In addition, their modules include seven One Health technical areas: (i) One Health Concepts and Knowledge; (ii) Fundamentals of Infectious Disease; (iii) Infectious Disease Management; (iv) Epidemiology and Risk Analysis; (v) Fundamentals of Public Health; (vi) Ecosystem Health; and (vii) Behavior Change (One Health Workforce Academies, 2024a).

Additionally, part of USAID-sponsored OHW-NG project (2019–2024) (University of California – Davis, 2024a), SEAOHUN and AFROHUN are part of a Global Consortium of world-renowned partners based across North America, Africa, and Southeast Asia. Regional training is implemented using a hub and spokes model in which AFROHUN Secretariat links out to Country Chapters and the SEAOHUN Secretariat links out to Country One Health University Networks (OHUNs). According to their Year 1 report, during its first year, the OHW-NG project achieved the following:

- Curricula survey instruments were developed with 13 categories of One Health training activities and 26 variables (338 item matrix). A glossary of 33 One Health training-related terms and phrases was produced.
- A table of training activities that capture 18 One Health competency domains was produced and distributed to country managers and national coordinators to record specific exemplar training activities in specific academic units.
- A survey questionnaire was developed for self-assessment of progress toward institutionalization of One Health training activities at the national and regional levels, according to the CLASS (Calibrated, Lifelong, Adaptable, Scalable, and Sustainable) schematic scores.

CALL OUT: ONE HEALTH LESSONS PROGRAM DESIGN

One Health Lessons, established in 2020, is a successful One Health educational grassroots non-profit organization designed to educate children and adults about One Health and has created a global One Health educational movement. Within 2 years, it has educated over 25,000 students, including children as young as 3 years, about One Health. Multiple age-appropriate

lessons are taught in-person and online and are available in over 30 languages. Lessons have been taught in-person and online at primary, secondary, and tertiary schools, community events, religious institutions, youth gatherings, and more in Europe, Africa, Middle East, Asia, Oceania, North America, South America, and the Caribbean.

In addition, over 150 adults from over 80 countries have completed the organization's systematic ToT program (One Health Lessons, 2023) (known as the Certified Lesson Leader Program) to (i) improve their One Health communication skills, (ii) serve as One Health influencers in their communities, and (iii) educate vulnerable populations about vaccines and public health risks in relation to the environment, plants, and animals. The trainees in this program develop their communication skills by teaching children and other community members about One Health, thereby sensitizing communities about One Health challenges that may arise in the future. The organization has also trained over 60 interns from various disciplines including law, international relations, veterinary medicine, global health, medicine, microbiology, dentistry, environmental health sciences, public health, American Sign Language, and more. The One Health Lessons' Internship Program was designed to improve the leadership, communication, and networking skills of promising future leaders in One Health.

M&E OF ONE HEALTH ETC

The NEOH (COST Action, 2015), a 2014–2018 European cooperation in science and technology (COST) action, developed an evaluation framework to assess the “One Health-ness” of a health initiative based on the dimensions that can affect the outcomes (Rüegg et al., 2018). Elements include:

1. Defining and describing the One Health initiative and its context (i.e., the system, its boundaries, and the One Health initiative as a subsystem), providing information for the further Elements.
2. Assessing expected outcomes based on the theory of change (TOC) of the initiative, and collecting unexpected outcomes emerging in the context of the initiative.
3. Assessing the “One Health-ness,” i.e., the implementation of operations and infrastructure contributing to the One Health initiative.
4. Comparing the degree of “One Health-ness” and the outcomes produced.

While the NEOH framework is useful for measuring One Health overarching programs and initiatives, it is not designed to monitor and evaluate student learning outcomes from ETC. Similarly, the GHSA measures capacity building progress by each country according to each action package, using the WHO's Joint External Evaluation (JEE) tool indicators.

According to the European University Association's 2018 trends study, the implementation of learning outcomes has progressed steadily in the past decade. According to the report, 76% of responding higher education institutions had developed learning outcomes for all courses and respondents suggested more positive attitudes toward curricula based on learning outcomes than in earlier years (One Health Commission, 2024f). That said, learning outcomes for One Health across ETC education and academic sectors rely on traditional M&E approaches such as student retention rates, university rankings, exams, surveys, and pre/post-testing of One Health knowledge.

Here, we highlight examples of program-specific approaches to M&E across the ETC domains. First, the One Health Commission aligns its "Guide to Developing One Health Lessons for K-12" (Gabel & Zhang, 2018), which notes that the One Health organizing framework supports many of the U.S. Next Generation Science Standards (NGSS), and can easily be included in developing curriculum that meets state and Common Core requirements (One Health Commission, 2022). The One Health Commission also provides a free conference survey developed by its One Health Education Task Force (One Health Commission, 2024m) on its website. A One Health Veterinarians without Borders project in Southeast Asia, entitled "Building EcoHealth Capacity in Asia" (Hall & Le, 2015), utilized progress markers (pre- and post-workshop), online questionnaires, interviews, small group discussions, gap analysis, performance indicators, and SWOT (Strength-Weakness-Opportunity-Threat) analyses (The Community Tool Box, 2024).

In 2021, Cianfagna et al. used One Health education programs as a starting point to collect a global list of institutions potentially carrying out education in the links between biodiversity and health and then analyzed the offerings from these institutions to determine the degree of integration of biodiversity and health interlinkages (Cianfagna et al., 2021).

Finally, the Vietnam One Health University Network (VOHUN, part of SEAHOHUN as previously mentioned) conducted a cross-sectional survey in early 2019 to assess the effectiveness of their trainings. Out of 188 health and veterinary professionals from 55 provinces, more than 80% of participants reported they did not know what One Health was before attending the training, but 89.9% of them have since shared One Health knowledge with their colleagues. The same survey noted that the three most valuable One Health core competencies for health and veterinary professionals were "Communication and Informatics" (80%), "Collaboration and Partnership" (75%), and "System Thinking" (44%) (Tb et al., 2022).

CALL OUT: ONE HEALTH LESSONS M&E (ONE HEALTH LESSONS, 2023)

One Health Lessons has a M&E system that is based on surveys from full-time teachers, interns, and trainees. For each of its components as described in the previous call out box, there are surveys to evaluate the impact of the training at the individual and group levels.

All interns are individually mentored to improve their communication, networking, and leadership skills. In order to do this accurately, all interns complete pre-internship surveys to help their mentor tailor the style of mentorship to meet the needs of the individual intern. The survey evaluates their comfort levels pertaining to different aspects of their specific role as an intern. For instance, all interns must speak in public and explain One Health in less than eight seconds during their internship (i.e., improve communication skills) because they are responsible for increasing One Health awareness to new audiences. If an intern notes that they are very uncomfortable with public speaking, then their mentor will focus on this area when individually mentoring the intern. Once the internship is completed, all interns complete a post-intern survey with similar questions to help the mentor gauge the overall improvement and confidence of the intern.

Another survey system is utilized with the ToT program, known as the Certified Lesson Leaders Program, as mentioned in a previous call out box. For the first two years of the Program, volunteers who want to teach lessons about One Health and improve their own communication skills undergo a 4-hour training program. The first hour is spent at an orientation session that teaches the participant how to communicate One Health to different ages. The second hour is to watch a recording of a lesson and pass a quiz that evaluates teaching and communication techniques of the observed teacher. The third hour is to observe a live lesson and the fourth hour is to have the volunteer teach the lesson with another volunteer observing and assisting when needed. Each individual volunteer is invited by a full-time supervisor (e.g., teacher, scout leader) to speak as a guest scientist to their students. The full-time supervisor completes a survey evaluating the impact of the volunteer and the learning material covered at the classroom level. Of special note, the full-time supervisors are asked about the level of interest and engagement by the students and if the supervisors want to continue teaching about One Health in their own time.

Through such surveys, the impact on individual interns and entire classrooms is evaluated and future mentorship and lessons are adjusted to meet the needs of those various audiences.

CONCLUSION

As noted throughout this chapter, One Health ETC programs and awareness have grown exponentially over the past two decades (One Health Commission, 2023). Indeed, the COVID-19 pandemic shed even further light onto the connection between human, animal, and planetary health. We expect that more One Health ETC programs will emerge to protect the health and well-being of people, animals, plants, and their shared environment.

To capitalize on the momentum surrounding COVID-19 and its One Health implications, we have several recommendations for consideration for the future of ETC programs. First, medical and osteopathic and chiropractic schools, physician's assistant, nursing, pharmacy, microbiology, and occupational therapy programs should prioritize incorporating One Health into their educational curricula. Additionally, public health academic institutions should increase their involvement in One Health training and capacity building efforts. Other academic disciplines, such as the social sciences, engineering, ecology, pharmacology, economics, and chemistry, should include One Health in their curriculum. Finally, we recommend mainstreaming One Health by promoting the teaching of One Health in all primary and secondary schools; this will prepare youth to become "global citizens," teaching them that every action they take, every moment of every day, has an impact on the Earth and its ecosystems. This reframing of attitudes about the place of humans in relation to the planet starts at a young age and can have long-lasting positive effects on the Earth and its people.

The future directions of One Health ETC will be dictated by the needs of communities as determined by community leaders and policymakers, but require a multidisciplinary approach that incorporates human, animal, and environmental factors. This will require the One Health community with increase education and awareness not just in the academic sector, but also to the public and policymakers. Only by utilizing such a multi-pronged, top-down (from policy) and bottom-up (from grassroots) approach will we be able to fully implement One Health and realize all of its benefits to the health and well-being of all living things on the planet. Through institutionalization of One Health in academic and political systems (One Health Commission, 2024i), more One Health actions are expected to become solidified to protect the health and well-being of people, animals, plants, and their shared environment.

REPRESENTATIVE TABLE OF ONE HEALTH PROGRAMS

To prepare this chapter, the authors reviewed a sampling of One Health ETC programs and literature reviews. While this table does not cover all existing programs nor does it represent a comprehensive literature review, we share it here to provide a starting point for students and One Health practitioners to find additional information. Indeed, a follow-on literature review to Cianfagna et al.'s (2021) examination of programs concentrated on biodiversity and human health interlinkages in higher education offerings (Cianfagna et al., 2021) will focus on One Health programs in Latin America and will uncover many mission programs that this chapter simply could not detail. Readers are urged to visit the online One Health Opportunities webpage to submit any programs that are not yet represented (One Health Commission, 2024h). Please excuse any inconsistencies or missing programs as this is an evolving landscape and we will continue to update our live database (Table 13.4).

TABLE 13.4
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Africa One Health Network (AfOHNET)	One Health Network Workshop	Africa	https://afohnet.org/conference2022	Training	
Africa One Health University Network (AFROHUN)	One Health Training Modules	Africa	https://afrohun.org/course/onehealthmodules/	Capacity Building	
Africa One Health University Network (AFROHUN)	One Health Competency-Based Education Workshops	International	https://icap.columbia.edu/news-events/in-africa-and-southeast-asia-icap-trains-one-health-educators-in-competency-based-education-methods/	Capacity Building	
American Society of Tropical Medicine and Hygiene	Clinical Tropical Medicine and Travelers' Health	United States	https://www.astmh.org/education-resources/update-course	Capacity Building	
American Veterinary Medicine Association (AVMA)	One Health Training Modules	United States	https://axon.avma.org/page/one-health-courses	Capacity Building	
Animal and Plant Health Agency (APHA)	One Health Capacity Building	United Kingdom	https://improve-ohcb.com/home/	Training	
Association of American Veterinary Medical Colleges (AAVMC)/ Association for Prevention Teaching and Research (APTR)	One Health Interprofessional Education	United States	https://www.aptrweb.org/page/OneHealth	Capacity Building	https://www.aavmc.org/programs/one-health/

(Continued)

TABLE 13.4 (Continued)

Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Auburn University College of Forestry, Wildlife and Environment	Online One Health certificate	United States	https://cfwe.auburn.edu/online-professional-graduate-certificate-programs/one-health/	Education	
Baltic University	Ecosystem Health and Sustainable Agriculture	Sweden	http://www2.balticuniv.uu.se/index.php/ecosystem-health-a-sustainable-development	Education	
Berry College	One Health undergraduate minor	United States	https://catalog.berry.edu/preview_program.php?catoid=4&pooid=459	Education	
Boise State	Vertically Integrated One Health Projects	United States	https://www.boisestate.edu/vip/one-health/	Education	
Capacity Development Support Facility (CDSF)	One Health – Zoonotic Disease ToT Course	Ethiopia	https://agri-training-et.org/zoonotic-e-learning-course/	Capacity Building	
CDC TRAIN	An Introduction to One Health	United States	https://www.train.org/cdctrain/course/1095553/?activeTab=certificates	Capacity Building	
Centre for One Health Education, Advocacy, Research and Training (COHEART)	PG Diploma in One Health, PG Certificate courses in One Health Surveillance, and PG Certificate in Community-Based Disaster Management	Kerala, India	https://coheart.ac.in/	Capacity Building	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
City University of Hong Kong	One Health Seminars	Asia	https://www.cityu.edu.hk/ohrp/one-health-seminars	Capacity Building	
City University of New York	PhD in Environmental and Planetary Health Sciences	United States	https://sph.cuny.edu/academics/degrees-and-programs/doctoral-programs/phd-in-environmental-and-planetary-health-sciences/#1548194101710-5203d426-acc7	Education	
Colorado State University	World Small Animal Veterinary Association One Health Certificate Course	United States	https://vetmedbiosci.colostate.edu/vth/	Capacity Building	
Colorado State University	Summer program credit	United States	https://onehealth.colostate.edu/summer-program/	Education	Summer program credit
Colorado State University	Capacity Building	United States	https://onehealth.colostate.edu/seminars/	Capacity Building	Capacity Building
Cornell University	Conservation Medicine: A Veterinary Perspective Summer Course	United States	https://courses.cornell.edu/preview_course_nopop.php?catoid=31&coid=495375	Education	
Delaware Valley University	One Health Seminar Series	United States	https://delval.edu/search-results?search_api_fulltext=one+health	Capacity Building	One Health Seminar Series

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Duke University	One Health Graduate Training Program	United States	https://www.onehealthcommission.org/index.cfm/83391/72449/duke_university_one_health_graduate_training_program	Education	
Duke University	One Health Course: From Philosophy to Practice	United States	https://nicholas.duke.edu/academics/courses/one-health-philosophy-practice	Education	One Health Course: From Philosophy to Practice
Dundalk Institute of Technology School of Health and Science	One Health Seminar Series	Ireland	https://www.dkit.ie/about-dkit/academic-schools/school-of-health-and-science/one-health-at-dkit.html	Capacity Building	One Health Seminar Series
Ecohealth Alliance	EcoHealthNet Workshop	United States	https://www.ecohealthalliance.org/program/ecohealthnet	Capacity Building	
Erasmus Mundus	Joint Master's Degree in Infectious Diseases and One Health	Europe	https://erasmus-plus.ec.europa.eu/projects/search/details/610556-EPP-1-2019-1-FR-EPPKA1-JMD-MOB	Education	
Ferrum College	Undergraduate Minor in One Health	United States	http://catalog.ferrum.edu/preview_program.php?catoid=7&poid=1026&returno=414	Education	
Fontbonne University	One Health undergraduate major	United States	https://www.fontbonne.edu/academics/college-arts-sciences/biological-behavioral-sciences-department/bachelor-of-science-in-one-health/	Education	***Use for highlight?

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Fontbonne University	One Health undergraduate minor	United States	https://www.fontbonne.edu/academics/college-arts-sciences/biological-behavioral-sciences-department/one-health-minor/	Education	
George Mason University	Summer Workshop – Pandemics, Bioterrorism, and Global Health Security	United States	https://pandorareport.org/summer-workshop/	Training	
Georgetown University School of Medicine	2-week One Health elective course for third years	United States	https://www.sciencedirect.com/science/article/pii/S2352771421000215#:~:text=One%20health%20is%20the%20study,animal%20health%20and%20the%20environment.&text=The%20intersection%20between%20human%20health,good%20of%20people%20and%20environment	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Hanoi Medical University	International Master of Public Health – One Health	Vietnam	https://spmph.edu.vn/dao-tao-sau-dai-hoc/thong-bao-tuyen-sinh-lop-thac-si-y-te-cong-cong-chuong-trinh-quoc-te-nam-2020-94/ngon-ngu-tieng-anh.html?fbclid=IwAR07RFytxAWmUTlxONpZpdna63wQuInvTrEqv6gq5R3Zd1h-Ar5CWMOJCXY	Education	
Hanoi Medical University	Global Health Seminar Series	Vietnam	https://spmph.edu.vn/en-GB/article/news/global-health-seminar-series-applying-a-one-health-approach-to-tackling-the-next-pandemic%201	Training	
Hanoi University of Public Health	Master of Public Health majoring in Environmental Health	Vietnam	https://huph.edu.vn/public/english	Education	
Helmholtz Institute for One Health (HIOH)	Capacity Building	Germany	https://www.helmholtz-hzi.de/en/the-hzi/sites/helmholtz-institute-for-one-health-hioh/about-hioh/	Capacity Building	Capacity Building

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Hokkaido University	PhD in infectious diseases or veterinary medicine	Japan	https://onehealth.vetmed.hokudai.ac.jp/en/programs/courses/	Education	
Hokkaido University	One Health Ally Course	Japan	https://onehealth.vetmed.hokudai.ac.jp/en/programs/allycourse/	Education	
Ibero-American Science and Technology for Development Program (CYTED)	Finances IberoAmerican Development, including One Health Projects	South America	https://www.cyted.org/		
Indian Institute of Public Health	Capacity Building at Center for One Health Education, Research & Development (COHERD)	India	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/COHERD_Whos_Who_Resources_21102022_0CCC9948BEA59.pdf	Capacity Building	Capacity Building at Center for One Health Education, Research & Development (COHERD)
Indonesia One Health University Network (INDOHUN)	One Health University Network	Indonesia	https://www.seaohun.org/indohun	Education	
Institute of Tropical Medicine Antwerp	Master of Science in Global One Health:	Europe	https://www.itg.be/en/study/courses/msc-in-global-one-health-diseases-at-the-human-animal-interface	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
International Student One Health Alliance (ISOHA)	Serves as an umbrella for international and national student organizations, One Health Clubs, BSc, MSc, and PhD students and provides education and opportunities related to One Health, through partnerships and collaborative projects	International	https://isohaonehealth.wordpress.com/		
Iowa State University College of Veterinary Medicine	One Health Lecture Series	United States	https://vetmed.iastate.edu/research-grad-studies/centers-institutes-and-initiatives/one-health/one-health-related-programs	Training	
Iowa State University College of Veterinary Medicine	MPH for Veterinarians	United States	https://www.public-health.uiowa.edu/how-to-apply-mph/	Education	
Iowa State University College of Veterinary Medicine, Center for Food Security and Public Health	Continuing education credits in One Health	United States	https://www.cfsph.iastate.edu/courses/	Capacity Building	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
James Cook University	Intro to One Health Course	Australia	https://apps.jcu.edu.au/subjectsearch/#!/redirecting/??subject=TM5600&year=2021&transform=subjectwebview.xslt	Education	Intro to One Health Course
James Lind Institute	Online MPH in One Health and Planetary Health	Switzerland	https://jliedu.ch/courses/mph-in-one-health-and-planetary-health/	Education	
Johns Hopkins University	One Health Lab	United States	https://publichealth.jhu.edu/departments/environmental-health-and-engineering/research-and-practice/faculty-research-interests/one-health-laboratory-at-johns-hopkins-university	Networks	
Johns Hopkins University	One Health Course	United States	https://www.jhsph.edu/courses/course/29303/2019/552.612.81/essentials-of-one-health	Education	
Johns Hopkins University	Concentration in Global Environmental Sustainability & Health	United States	https://publichealth.jhu.edu/academics/mph	Education	
Kansas State University	MPH – Infectious Diseases at Kansas State University	United States	https://www.k-state.edu/mphealth/academics/areas/disease.html	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Kansas State University	K-12 Program	United States	https://olathe.k-state.edu/academics/programs-k12/programs/one-health/	Education	
Kansas State University	One Health High School Summer Online Course	United States	https://olathe.k-state.edu/academics/programs-k12/programs/one-health-summer/index.html	Education	
Kerala Veterinary and Animal Sciences University, Centre for One Health Education Advocacy Research & Training (COHEART)	Mission is to generate scientific knowledge	Hong Kong	https://coheart.ac.in/	Networks	
Kerala Veterinary and Animal Sciences University, Centre for One Health Education Advocacy Research & Training (COHEART)	Post Graduate Diploma in One Health	India	https://coheart.ac.in/education	Education	
Kerala Veterinary and Animal Sciences University, Centre for One Health Education Advocacy Research & Training (COHEART)	Multiple Certificate Programs	India	https://coheart.ac.in/training	Training	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Kerala Veterinary and Animal Sciences University, Centre for One Health Education Advocacy Research & Training (COHEART)	Post Graduate Certificate in OH Surveillance	India	https://coheart.ac.in/education	Education	
Laos One Health University Network (LAOHUN)	One Health University Network	Laos	https://www.seaohun.org/laohun	Education	
Lincoln Memorial University College of Veterinary Medicine	Curriculum is taught with the One Health philosophy	United States	https://www.lmunet.edu/college-of-veterinary-medicine/academics	Education	Entire curriculum is taught with the One Health philosophy
London School of Hygiene & Tropical Medicine (LSHTM) and the Royal Veterinary College (RVC)	Post Graduate Diploma in One Health	England	https://www.lshtm.ac.uk/study/courses/masters-degrees/one-health	Education	
London School of Hygiene & Tropical Medicine (LSHTM) and the Royal Veterinary College (RVC)	MSc One Health: ecosystems, humans, and animals	England	https://www.lshtm.ac.uk/study/courses/masters-degrees/one-health	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Makarere University	One Health Institute Field Attachment	Uganda	https://chs.mak.ac.ug/news/one-health-institute-attachment	Other	Africa One Health University Network (formerly One Health Central and Eastern Africa (OHCEA)) runs online One Health modules
Makarere University	Masters in One Health	Uganda	https://sph.mak.ac.ug/academics/masters-public-health-mp	Other	
Malaysia One Health University Network (MOHUN)	One Health University Network	Malaysia	https://www.seaohun.org/myohun	Education	
Massey University of New Zealand	Global One Health programs	New Zealand	https://www.massey.ac.nz/about/colleges-schools-and-institutes/college-of-sciences/our-research/themes-and-research-strengths/one-health/	Capacity Building	
McGill University	Summer Institute in Infectious Diseases & Global Health	Canada	https://www.mcgill.ca/summerinstitute-globalhealth/	Training	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Michigan State University	Capacity Building at Institute for Global Health	United States	https://ighealth.msu.edu/one-health/	Capacity Building	Capacity Building at Institute for Global Health
Michigan State University	Capacity Building at Canadian Studies Center One Health Initiative	United States	https://canadianstudies.isp.msu.edu/initiatives/one-health/	Capacity Building	Capacity Building at Canadian Studies Center One Health Initiative
Michigan State University	K-12 4-H Lessons	United States	https://www.canr.msu.edu/uploads/236/65684/4H1689_AnimalScienceAnywhere-OneHealth_NEW.pdf	Education	K-12 4-H Lessons
Midwestern University	Master of Public Health (MPH) – Global One Health	United States	https://www.midwestern.edu/academics/degrees-and-programs/master-of-public-health.xml	Education	
Minnesota Department of Health	Minnesota One Health Antibiotic Stewardship Collaborative Resources	United States	https://www.onehealthcommission.org/documents/filelibrary/resources/opportunities/MN_DoH_One_Health_Resources_for_pdf_6D259ABAC5B50.pdf	Other	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Murdoch University Center for Biosecurity and OH	Graduate Certificate in OH	Australia	https://www.murdoch.edu.au/course/ Postgraduate/C1145	Education	
Myanmar One Health University Network (MMOHUN)	One Health University Network	Myanmar	https://www.seaohun.org/mmohun	Education	
Nantes-Atlantic National College of Veterinary Medicine, Food Science and Engineering (ONIRIS)	Man-Imal Master's Degree : From Animal to Man	Europe	https://www.oniris-nantes.fr/formations/ les-masters/man-imal	Education	
Netherlands Centre for One Health	PhD One Health Research Program	Netherlands	https://ncoh.nl/research/ phd-research-programme/		
New England Public Health Training Center	Online Intro to One Health for public health professionals, nurses, vets, clinicians, environmental scientists	United States	https://www.nephtc.org/login/index.php	Capacity Building	
Nong Lam University in Ho Chi Minh city	Master of Veterinary Medicine, specialized in Public Health	Vietnam	https://vet.nlu.edu.vn/mvph_en	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
North Carolina State	Global One Health Academy	United States	https://provost.ncsu.edu/news/2022/09/nc-state-launches-universitywide-global-one-health-academy/	Networks	
North Carolina State University	Evolutionary Medicine Summer Institute (EMSI)	United States	https://sites.duke.edu/ems/	Training	
Ohio State University	Curriculum Twinning	Africa	https://oia.osu.edu/units/global-one-health-initiative/training/completed-projects/curriculum-twinning/	Capacity Building	
Ohio State University	Ohio State Summer One Health Institute	United States	https://oia.osu.edu/global-one-health-initiative	Capacity Building	
Ohio State University	In-person and online Global One Health certificate	United States	https://cph.osu.edu/students/graduate-certificate-global-one-health	Education	
Ohio State University	MPH – Veterinary Public Health	United States	https://vet.osu.edu/education/programs/vph	Education	
One Health & Development Initiative (Nigeria)	Resources on One Health	Africa	https://onehealthdev.org/	Networks	
One Health Aotearoa	Postgraduate Study Opportunities	New Zealand	https://onehealth.org.nz/research/postgraduates/		
One Health Brasil	One Health Network	Brazil	https://onehealthbrasil.com/		

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
One Health Brasil: Ecosistemas Aquáticos: Saúde animal, humana e Ambiental (ECOHA)	Sub-network of One Health Brasil, applies One Health to aquatic ecosystems	Brazil	https://onehealthbrasil.com/		Ask Cheryl
One Health Commission	One Health Resources for Public Health Educators	Worldwide	https://www.onehealthcommission.org/en/ resources__services/ oh_resources_for_public_health_ educators/	Networks	
One Health Commission	One Health Library	Worldwide	https://www.onehealthcommission.org/en/ resources__services/one_health_ library/	Networks	
One Health Commission	One Health Opportunities Bulletin Board	Worldwide	https://www.onehealthcommission.org/en/ resources__services/ oh_opportunities_bulletin_board/	Networks	
One Health Commission	One Health Education Program Database	Worldwide	https://www.google.com/maps/d/u/0/viewer? ll=1.2722218725854067e-14%2C44.49 44252080503&z=2&mid=1ip7y8lz8icEQ 0VhqHcAeXFBsiCjZXUP9	Networks	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
One Health Commission	One Health Education Resources for Primary, Secondary, K-12	Worldwide	https://www.onehealthcommission.org/en/resources__services/one_health_education_resources/primary_secondary_k12_oh_education_resources/	Capacity Building	https://www.onehealthcommission.org/documents/filelibrary/resources/Guide_to_Developing_K12_One_Health__AE95AD314CD45.pdf
One Health European Joint Programme (OHEJP)	Continuing Education/ Continuing Professional Development Curriculum – modules for Early Career Researchers (<5 years post-PhD)	Europe	https://onehealthejp.eu/continuing-professional-development-module/		
One Health European Joint Programme (OHEJP)	Doctoral Program	Europe	https://onehealthejp.eu/the-doctoral-programme		
One Health European Joint Programme (OHEJP)	Summer Schools (undergrad, grad, early career)	Europe	https://onehealthejp.eu/the-ohejp-summer-school		

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
One Health European Joint Programme (OHEJP)	Partnership between food, veterinary, and medical laboratories and institutes across Europe	Europe	https://onehealthjep.eu/		
One Health Lessons	One Health Education Resources for Primary, Secondary, K-12	Worldwide	https://onehealthlessons.org/	Capacity Building	Confirm CAP
One Health Network South Asia and Massey University NZ	One Health Epidemiology Fellowship Program	Afghanistan, Bangladesh, Bhutan, and Nepal	https://ww25.onehealthnetwork.asia/node/583?subid1=20241005-0633-57b0-9961-37daa6c1f000	Capacity Building	
One Health Regional Network for the Horn of Africa	One Health e-Learning Materials	Kenya, Ethiopia, Eritrea, Somalia/ Somaliland	https://onehealthhorn.net/uncategorized/new-look-horn-elearning-modules/	Capacity Building	
One Health Sweden	One Health Seminars	Sweden	https://www.slu.se/en/Collaborative-Centres-and-Projects/one-health-sweden/	Networks	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
One Health Sweden	Teaching OH to K-12 teachers	Sweden	https://www.slu.se/en/Collaborative-Centres-and-Projects/one-health-sweden/one-health-education/	Education	Teaching OH to K-12 teachers
One Health Workforce Academies (OHWA)	Online One Health Training Course for working professionals	Online	https://onehealthworkforceacademies.org/training/fundamentals-of-one-health-practice/	Capacity Building	
Oregon State University	Epidemiology & Public Health Required	United States	https://vetmed.oregonstate.edu/	Education	
Oregon State University	One Health Laboratory	United States	https://vetmed.oregonstate.edu/one-health-osu-vet-med	Other	
Penn State	One Health Minor	United States	https://agsci.psu.edu/academics/undergraduate/minors/one-health	Education	
Philippine One Health University Network (PHILOHUN)	One Health University Network	Philippines	https://www.seaohun.org/philohun	Education	
Princeton University	Bats, Ducks and Pandemics: An Introduction to One Health Policy	United States	https://www.coursera.org/learn/onehealth?action=enroll	Training	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Purdue University College of Veterinary Medicine	One Health in the DVM curriculum	United States	https://vet.purdue.edu/onehealth/ Curriculum.php	Education	One Health in the DVM curriculum
Ross University	MSc in One Health	Caribbean	https://veterinary.rossu.edu/postgraduate/ msc-one-health	Education	
Ross University School of Veterinary Medicine	One Health Electives, DVM	Caribbean	https://veterinary.rossu.edu/research/ one-health	Education	
Ross University School of Veterinary Medicine	Online Graduate certificate in One Health	Caribbean	https://veterinary.rossu.edu/postgraduate/ certificate-in-one-health	Education	
Ross University School of Veterinary Medicine	Online Graduate degree in One Health	Caribbean	https://veterinary.rossu.edu/research/ one-health	Education	
Schulich Medicine and Dentistry	One Health Specialization	Canada	https://www.schulich.uwo.ca/ oleapopelkaonehealth/one_health/index. html	Education	The Honors Specialization in One Health, leading to a Bachelor of Medical Sciences (BMSc) degree, was created in collaboration with Western University's Departments of Sociology and Geography in the Faculty of Social Science to enrich the learning experience of students.

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Shanghai Jiao Tong University School of Medicine, Chinese Center for Tropical Disease Research	Continuing Education – Global Health and One Health Education Teaching Seminar and Teacher Training Course	China	https://www.shsmu.edu.cn/sghen/Education/Continuing_Education.htm		
Shanghai Jiao Tong University School of Medicine, Chinese Center for Tropical Disease Research	Global Health and One Health compulsory course for undergraduates majoring in clinical medicine	China	https://www.shsmu.edu.cn/sghen/Education/Undergraduate_Education.htm	Education	Global Health and One Health compulsory course for all medical students
Soulsby Foundation	One Health Fellowship	United Kingdom	https://soulsbyfoundation.org/apply/	Capacity Building	
Southeast Asia One Health University Network (SEAOHUN)	One Health Course Modules	South East Asia	https://seaohunonehealth.wordpress.com/	Capacity Building	
Southern African Centre for Infectious Disease (SACIDS) Foundation for One Health	One Health Training	Africa	https://www.sacids.org/	Capacity Building	
Southern African Centre for Infectious Disease Surveillance	Master of Science in One Health Molecular Biology	Africa	https://www.sacids.org/news/call-application-master-science-on-e-health-molecular-biology/	Education	
St. George’s University	One Health Medicine course	Caribbean	https://online.sgu.edu/courses/SGUx/OHOM1/2014/about	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Tephinet	One Health Training workshops with CDC	International	https://www.tephinet.org/news/tephinet-and-cdc-host-training-advance-one-health-central-america	Capacity Building	
Texas A&M	Oceans and One Health undergraduate concentration	United States	https://catalog.tamu.edu/undergraduate/galveston/liberal-studies/oceans-one-health-university-studies-bs/	Education	CANT FIND
Texas A&M University	One Health Educational Programs	United States	https://onehealth.tamu.edu/education/	Education	One Health Educational Programs
Thailand One Health University Network (THOHUN)	One Health University Network	Thailand	https://www.seaohun.org/thohun	Education	
Food and Agriculture Organization (FAO)	Workshops and Resources	Italy	https://www.fao.org/one-health/en	Capacity Building	Do they have modules?
The Quadripartite (UNEP, WOA, FAO, WHO)	The Quadripartite	International	https://www.fao.org/one-health/en	Networks	
The Task Force for Global Health	Training Program in Epidemiology and Public Health Interventions Network (TEPHINET)	International	https://www.tephinet.org/our-network-fetps/about-fetp	Networks	
The University of Saskatchewan	One Health Certificate	Canada	https://programs.usask.ca/veterinary-medicine/certificate-one-health/index.php#CertificateinOneHealth12creditunits	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Tufts University	Clinical-Translational Research One Health Fellowship	United States	https://www.tuftsctsi.org/education/tl1-fellowship-programs/	Capacity Building	Clinical-Translational Research One Health Fellowship
Tufts University School of Veterinary Medicine	Human-Animal Relationships	United States	https://vet.tufts.edu/legacy-curriculum	Education	
Tufts University School of Veterinary Medicine	Masters in Conservation Medicine (MCM) One Health approach	United States	https://grad.vet.tufts.edu/ms-conservation-medicine/	Education	
U.S. Centers for Disease Control and Prevention (CDC)	ZOHU Call Continuing Education	United States	https://www.cdc.gov/onehealth/zohu/continuingeducation.html	Capacity Building	
UK Animal and Plant Health Agency (APHA)	Capacity Building Modules	International	https://improve-ohcb.com/home/	Capacity Building	
UK Health Security Agency	health education program	United Kingdom	https://e-bug.eu/	Capacity Building	
Una Europa University Network	One Health Summer School	Europe	https://www.una-europa.eu/opportunities/one-health-summer-school	Education	One Health Summer School
Universidad Peruana Cayetano Heredia	One Health Unit – School of Public Health	Peru	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/OHC_Whos_Who_Resources_Peruvian_Uni_6DC66C5A75362.pdf	Education	One Health Unit – School of Public Health

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Universitas Gadjah Mada OH Collaborating Center	Summer Course on One Health Approach for Microbiome Identification on Komodo and Wildlife	Indonesia	https://onehealthwg.web.ugm.ac.id/komodo-summer-course/	Training	
Universitat Autònoma de Barcelona, Veterinary School	Masters in Zoonoses and One Health	Spain	https://www.uab.cat/web/estudiar/official-master-s-degrees/general-information/zoonosis-and-one-health-1096480962610.html?param1=1345694246010	Education	
University of Alaska Fairbanks	One Health master's program	United States	https://www.uaf.edu/onehealth/education/master.php	Education	
University of Alaska Fairbanks	One Health Certificate (open to public) – One Health Course: A Ten-Thousand-Year-Old View into the Future	United States	https://www.uaf.edu/onehealth/education/edx.php	Education	Center for One Health Research One Health Certificate (open to public)
University of Alaska Fairbanks	Online One Health EdX courses – One Health: A Ten-Thousand-Year-Old View into the Future	United States	https://www.edx.org/learn/climate-change/university-of-alaska-fairbanks-one-health-life-interconnected	Capacity Building	Online One Health EdX courses – One Health: A Ten-Thousand-Year-Old View into the Future
University of Arizona	One Health Research Initiative	United States	https://healthsciences.arizona.edu/connect/stories/investigating-human-animal-and-environmental-connections	Capacity Building	One Health Research Initiative

(Continued)

TABLE 13.4 (Continued)

Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Arizona – Dept of Epidemiology and Biostatistics	MPH in One Health	United States	https://publichealth.arizona.edu/academics/masters/mph/one-health	Education	
University of Basel	One Health: Connecting Humans, Animals and the Environment	Switzerland	https://www.futurelearn.com/courses/one-health	Training	
University of Basel	One Health: Connecting Humans, Animals and the Environment	Switzerland	https://www.futurelearn.com/courses/one-health	Training	
University of Bern	Hidden players in the food chain Int. Bachelor and Master Summer School	Switzerland	https://edit.cms.unibe.ch/unibe/portal/microsites/micro_ircoh/content/summer_schools/bachelor_and_master_summer_schools/bachelor_summer_school_2020/scope	Training	
University of Bonn	One Health and Urban Transformation	Germany	https://www.zef.de/onehealth.html	Education	
University of Brighton	One Health Water Project Research and Education of the public	United Kingdom	https://onehealthwater.org/	Capacity Building	One Health Water Project Research and Education of the public
University of Bristol, Veterinary School	Student-led committee	United Kingdom	https://www.bristol.ac.uk/vet-school/research/inspire/onehealthbristol/	Capacity Building	
University of Calgary	One Health Training Programs	Canada	https://research.ucalgary.ca/one-health/training/one-health-trainee-chapter	Training	One Health Training Programs

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Calgary	One Health Summer Institute	Canada	https://research.ucalgary.ca/one-health/training/one-health-summer-institute	Capacity Building	Summer Institute
University of California, Davis	Rx One Health	United States	https://rxonehealth.vetmed.ucdavis.edu/	Training	
University of California, Davis	Global Disease Biology Major	United States	https://gdb.ucdavis.edu/	Education	
University of California, Davis	Global Disease Biology Major	United States	https://gdb.ucdavis.edu/	Education	Integrated, One Health-based approach to advance student understanding of the concept(s) of disease, the societal and personal impacts of past, present, and future diseases, and the science behind disease discoveries, causes, evolution, diagnosis, treatment, and prevention
University of California, Davis One Health Institute	Strengthening the One Health Workforce	United States	https://ohi.vetmed.ucdavis.edu/	Capacity Building	One Health Workforce/ Capacity Building
University of California, Davis, USA and FAO	Emerging Pandemic Threat Program (PREDICT)	International	https://p2.predict.global/	Capacity Building	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of California, San Francisco	Master of Science in Global Health	United States	https://globalhealthsciences.ucsf.edu/masters-program-sparks-ideas-and-inspires-action/	Education	
University of Copenhagen (UCPH) and Technical University of Denmark (DTU)	One Health International Summer Course	Denmark	https://healthsciences.ku.dk/education/summercourses/one-health/	Education	
University of Edinburgh	MSc One Health Online	Scotland	https://www.ed.ac.uk/studying/postgraduate/degrees/index.php?r=site/view&id=814	Education	
University of Edinburgh School of Veterinary Studies	Masters in One Health	United Kingdom	https://www.ed.ac.uk/vet/studying/postgraduate/taught-programmes/one-health	Education	
University of Edinburgh School of Veterinary Studies	Certificate in One Health	United Kingdom	https://www.ed.ac.uk/vet/studying/postgraduate/taught-programmes/one-health	Education	
University of Edinburgh School of Veterinary Studies	Diploma in One Health	United Kingdom	https://www.ed.ac.uk/vet/studying/postgraduate/taught-programmes/one-health	Education	
University of Edinburgh and Glasgow	Joint PhD Projects in One Health	Scotland	https://www.gla.ac.uk/research/ourresearchenvironment/prs/uofguofedinphdstudentships/onehealth/	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Edinburgh and Leiden	PhD in Integrated One Health Solutions	Scotland	https://edinburgh-infectious-diseases.ed.ac.uk/teaching-and-training/phd-programmes/joint-phd-programme-integrated-one-health-solutions	Education	
University of Florida	One Health Certificate	United States	https://egh.php.ufl.edu/education/degree-programs/one-health-certificate/	Education	
University of Florida	Master of Health Science in Environmental and Global Health – One Health concentration	United States	https://egh.php.ufl.edu/education/degree-programs/mhs-one-health/	Education	
University of Florida	PhD in Public Health, One Health concentration	United States	https://edinburgh-infectious-diseases.ed.ac.uk/news-and-events/latest-news/new-phd-programme-integrated-one-health-solutions	Education	
University of Florida	One Health Certificate	United States	https://egh.php.ufl.edu/education/degree-programs/one-health-certificate/	Education	
University of Geneva	Online Courses	Switzerland	https://www.coursera.org/learn/global-health-human-animal-ecosystem?utm_source=recommendations&utm_medium=email&utm_campaign=15333&sfmc_id=59064775&sfmc_key=0031U00001k0kDLQAY	Training	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Georgia College of Veterinary Medicine	In-person Undergraduate certificate in One Health	United States	https://vet.uga.edu/education/ undergraduate-programs/ undergraduate-certificate-in-one-health/	Education	
University of Glasgow	MSc in One Health	Scotland	https://www.gla.ac.uk/postgraduate/taught/ one-health-infectious-disease/	Education	
University of Glasgow	Post Graduate Certificate in OH	Scotland	https://www.gla.ac.uk/postgraduate /taught/one-health-infectious -disease/#programmestructure	Education	
University of Global Health Equity	One Health Option: Master's in Global Health Delivery (MGHD)	Africa	https://ughe.org/mghd-one-health-track	Education	
University of Guelph	Bachelors in One Health	Canada	https://onehealth.uoguelph.ca/ bachelor-of-one-health/	Education	
University of Guelph	One Health Program Brochure	Canada	https://graduatestudies.uoguelph.ca/ programs/onehealth	Education	
University of Guelph	Collaborative Specialization in One Health	Canada	https://onehealth.uoguelph.ca/collaborative -specialization-in-one-health/	Education	
University of Helsinki One Health	Helsinki One Health	Finland	https://www.helsinki.fi/en/networks/ helsinki-one-health	Capacity Building	
University of Idaho	Biology of Vector-borne Diseases Course	United States	https://www.uidaho.edu/research/entities/ ihhe/education/vector-borne-diseases	Training	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Illinois at Urbana-Champaign	DVM/MPH Joint Degree Program One Health Course	United States	https://vetmed.illinois.edu/education/dvm-mph-program/	Education	
University of Illinois College of Veterinary Medicine	Center for One Health – Illinois	United States	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/Center_OH_Illinois_Whos_Who_templat_35D107D9A4518.pdf	Capacity Building	Center for One Health – Illinois
University of Maine	Graduate training program in One Health and the Environment for masters and doctoral students (NSF Traineeship)	United States	https://elh.umaine.edu/one-health/one-health-nrt/	Education	
University of Maine	National Science Foundation Research Traineeship (NRT) – MS Students	United States	https://elh.umaine.edu/one-health/one-health-nrt/	Education	
University of Maine	Research Experience for Undergrads	United States	https://elh.umaine.edu/one-health/reu/	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Melbourne	One Health PhD Program	Australia	https://research.unimelb.edu.au/study/options/phd-programs/one-health#:~:text=The%20One%20Health%20PhD%20Program%20offers%20graduate%20researchers%3A,peers%20and%20early%20career%20researchers	Education	
University of Michigan College of Veterinary Medicine	3-week study abroad program implementing One Health in Nepal	Nepal	https://cvm.msu.edu/about/international-programs/our-programs/nepal-one-health	Education	
University of Minnesota	One Health Workforce Project (USAID)	United States	https://vetmed.umn.edu/centers-programs/global-one-health-initiative/one-health-workforce	Capacity Building	One Health Workforce Project (USAID) One Health Capacity Building
University of Missouri	Master of Public Health degree in the emphasis area of Veterinary Public Health	United States	https://healthsciences.missouri.edu/mph/	Education	
University of Nebraska	Institute of Ag and Natural Resources – Nebraska One Health Bat Activities for K-12	United States	https://nebraskaonehealth.unl.edu/bat-activities	Education	Institute of Ag and Natural Resources – Nebraska One Health Bat Activities for K-12
University of Nebraska	Nebraska One Health Science and Art Series	United States	https://nebraskaonehealth.unl.edu/art-series	Capacity Building	Nebraska One Health Science and Art Series

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of North Carolina	Graduate level One Health Course: Philosophy to Practical Application of Human, Animal and Environmental	United States	https://sph.unc.edu/courses/one-health-philosophy-to-practical-application-of-human-animal-and-environmental-health-10/	Education	Gilling School of Global Public Health Graduate level One Health Course: Philosophy to Practical Application of Human, Animal and Environmental
University of Pennsylvania	In-person One Health track	United States	https://www.publichealth.med.upenn.edu/OneHealthTrack/	Education	
University of Pretoria	Masters of Science in Global One Health	South Africa	https://www.up.ac.za/msc-global-one-health	Education	
University of Pretoria	Who's Who in One Health	South Africa	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/U_Pretoria_CVZ_Whos_Who_temp_to_pos_886E6C1850744.pdf		

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Queensland Veterinary School	Queensland Alliance of One Health Sciences	Australia	https://science.uq.edu.au/article/2021/11/queensland-alliance-one-health-sciences-launch-global-one-health-day-2021	Capacity Building	Based at UQ's School of Veterinary Science and jointly funded by The University of Queensland, industry, and government partners, QAOHS will aim to improve zoonotic disease public health policy through integrated health research that addresses local, national, and global health challenges.
University of Queensland Veterinary School	One Health: Animals, the Environment & Human Disease	Australia	https://programs-courses.uq.edu.au/course.html?course_code=vets1030	Education	
University of Sarajevo	MS in One Health	Bosnia/Herzegovina	https://cis.unsa.ba/bs/programi/magistarski/jedinstveno-zdravlje/	Education	
University of Surrey	One Health One Medicine; Research, Projects, Partnerships	United Kingdom	https://www.surrey.ac.uk/one-health-one-medicine	Capacity Building	University of Surrey One Health One Medicine
University of Tennessee	One Health Initiative	United States	https://onehealth.tennessee.edu/	Capacity Building	One Health Initiative (Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Tennessee	K-12 Educators Resources	United States	https://onehealth.tennessee.edu/k12-resources/	Education	K-12 Educators Resources
University of Tennessee	Undergrad and Graduate One Health Minor	United States	https://onehealth.tennessee.edu/one-health-minor/	Education	Undergrad and Graduate One Health Minor
University of Washington, Center for One Health Research	In-person One Health Graduate certificate	United States	https://deohs.washington.edu/cohr/graduate-certificate-one-health	Education	
University of Washington, Center for One Health Research	Clinical Elective in OH, OH tract in Occupational and Environmental Health	United States	https://deohs.washington.edu/cohr/medical-training	Education	Center for One Health Research Medical Training, Clinical Elective in OH, OH tract in Occupational and Environmental Health
University of Washington, Environmental & Occupational Health Sciences	One Health Graduate Degree Programs	United States	https://deohs.washington.edu/one-health	Education	Environmental & Occupational Health Sciences One Health Graduate Degree Programs
University of Washington, School of Public Health	MPH in One Health	United States	https://sph.washington.edu/students/graduate-programs/mp-program	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
University of Wisconsin-Madison	One Health Centers – Opportunities for faculty, staff, and students to address health and social issues related to One Health	United States	https://ghi.wisc.edu/one-health-centers/	Education	One Health Centers – Opportunities for faculty, staff, and students to address health and social issues related to One Health
University of Zambia	Master of Science in One Health Analytical Epidemiology	Zambia	https://www.unza.zm/academics/postgraduate-programmes/master-of-science-one-health-analytical-epidemiology	Education	
Utrecht University	In-person One Health program with focus on research	Western Europe	https://www.uu.nl/en/masters/one-health	Education	
US Agency for International Development (USAID)	One Health Assessment for Planning & Performance (OH APP) Resources	United States	https://ww38.onehealthapp.org/resources	Other	
US Department of Agriculture (USDA)	One Health Certified	United States	https://www.ams.usda.gov/services/auditing/one-health	Other	
Utrecht University	One Health Masters in Biomedical Science	Europe	https://www.uu.nl/en/masters/one-health	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Utrecht University	One Health Utrecht: from molecule to population	The Netherlands	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/UTRECHT_UNIVERSITY_One_Health_leaf1_BD133B01F7433.pdf		
Vietnam One Health University Network (VOHUN)	One Health University Network	Vietnam	https://www.seaohun.org/vohun	Education	
Vietnam One Health University Network (VOHUN)	One Health Training Programs	Vietnam	https://www.seaohun.org/vohun	Capacity Building	
Virginia-Maryland College of Veterinary Medicine	MPH grounded in One Health Approach	United States	https://publichealth.vt.edu/about/signature-areas/one-health.html	Education	
Wake Forest School of Medicine	Master's Program in Comparative Medicine (COMD)	United States	https://school.wakehealth.edu/education-and-training/graduate-programs/comparative-medicine-masters	Education	
Washington University, St Louis	Course – One Health: Linking the Health of Humans, Animals, and the Environment	United States	https://www.coursicle.com/wustl/courses/EnSt/250/	Education	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
Western University School of Medicine and Dentistry	One Health PhD Program	Canada	https://www.schulich.uwo.ca/pathol/gps/research_programs/programs/msc_phd/one_health.html	Education	
Western University School of Medicine and Dentistry	One Health Master Program	Canada	https://www.schulich.uwo.ca/pathol/gps/research_programs/programs/msc_phd/one_health.html	Education	
Western University School of Medicine and Dentistry	Bachelor of Medical Sciences – Honors Specialization in One Health	Canada	https://www.schulich.uwo.ca/pathol/undergraduate/bmsc/onehealth/index.html	Education	
Westminster College	One Health undergraduate major	United States	https://www.wcmo.edu/academics/programs/one-health.html	Education	https://www.wcmo.edu/academics/files/majors%20-%20program%20plan/One%20Health%20Major.pdf
Wildlife Institute	Wildlife Medicine & Conservation course	Belize	https://www.wildlife-institute.com/wmc/	Training	
World Health Organization (WHO)	Building One Health Preparedness Capacities: Implementation of the National Bridging Workshop Roadmap in Kazakhstan	International	https://www.who.int/news-room/feature-stories/detail/building-one-health-preparedness-capacities	Capacity Building	

(Continued)

TABLE 13.4 (Continued)
Sampling of One Health Education, Training, and Capacity-Building Programs

Organization	Title	Region	Links	Type	Column 1
World Health Organization (WHO)	Provides learning resources for technical staff, decision-makers, general public	International	https://openwho.org/channels/onehealth	Capacity Building	
World Organisation for Animal Health and Children Radio Foundation	Zoonosis awareness project	Africa	https://www.woah.org/en/woah-raises-community-awareness-on-zoonosis-through-rural-radio-in-western-and-central-africa/	Capacity Building	
World Organisation for Animal Health and VSF International	Project on community animal health workers	International	https://vsf-international.org/woah-vsf-project-cahws/	Capacity Building	
World Small Animal Veterinary Association	One Health Certificate Course	United States	https://vetmedbiosci.colostate.edu/vth/	Education	
Zoo New England One Health Program	Hosts OH Electives for Med Students at the Zoo	United States	https://www.zoonewengland.org/protect/inside-our-zoos/one-health-program/	Education	Hosts OH Electives for Med Students at the Zoo
Zoonoses and Emerging Livestock Systems (ZELS)	Training Program	United Kingdom	https://www.onehealthcommission.org/documents/filelibrary/resources/whos_who/62519_ZELS_for_Whos_Who_mapwebpage_CCC18FF1C72E7.pdf	Training	Training Program

REFERENCES

- AFROHUN. (2020, January 15). *One Health modules* | AFROHUN. <https://afrohun.org/course/onehealthmodules/>
- AFROHUN. (2023). *AFROHUN | Advancing One Health*. <https://afrohun.org/>
- Allen-Scott, L. K., Buntain, B., Hatfield, J. M., Meisser, A., & Thomas, C. J. (2015). Academic institutions and One Health: Building capacity for transdisciplinary research approaches to address complex health issues at the animal–human–ecosystem interface. *Academic Medicine*, *90*(7), 866–871. <https://doi.org/10.1097/ACM.0000000000000639>
- American Public Health Association. (2017). *Advancing a “One Health” approach to promote health at the human-animal-environment interface*. APHA. <https://apha.org/Policies-and-Advocacy/Public-Health-Policy-Statements/Policy-Database/2018/01/18/Advancing-a-One-Health-Approach>
- Barrett, M. A., Bouley, T. A., Stoertz, A. H., & Stoertz, R. W. (2011). Integrating a One Health approach in education to address global health and sustainability challenges. *Frontiers in Ecology and the Environment*, *9*(4), 239–245. <https://doi.org/10.1890/090159>
- Berg, L., & Olsen, B. (2016). Foreword. *Infection Ecology & Epidemiology*, *6*(1), 34094. <https://doi.org/10.3402/iee.v6.34094>
- Berry College. (2015). *Academic catalog. Program: One Health Minor*. <https://catalog.berry.edu/index.php?catoid=4>
- Binot, A., Duboz, R., Promburom, P., Phimpraphai, W., Cappelle, J., Lajaunie, C., Goutard, F. L., Pinyopummintr, T., Figuié, M., & Roger, F. L. (2015). A framework to promote collective action within the One Health community of practice: Using participatory modelling to enable interdisciplinary, cross-sectoral and multi-level integration. *One Health*, *1*, 44–48. <https://doi.org/10.1016/j.onehlt.2015.09.001>
- Boyle, P. (2019, December 10). *What medical students can learn about health from animals*. AAMC. <https://www.aamc.org/news/what-medical-students-can-learn-about-health-animals>
- CDC. (2024, May 9). *Global Health Security*. Global Health. <https://www.cdc.gov/global-health/topics-programs/global-health-security.html>
- CEPH. (2024). *Home—Council on Education for Public Health*. <https://ceph.org/>
- Cianfagna, M., Bolon, I., Babo Martins, S., Mumford, E., Romanelli, C., Deem, S. L., Pettan-Brewer, C., Figueroa, D., Velásquez, J. C. C., Stroud, C., Lueddeke, G., Stoll, B., & Ruiz De Castañeda, R. (2021). Biodiversity and human health interlinkages in higher education offerings: A first global overview. *Frontiers in Public Health*, *9*, 637901. <https://doi.org/10.3389/fpubh.2021.637901>
- COST Action. (2015). *Network for Evaluation of One Health | NEOH*. <https://neoh.onehealthglobal.net/>
- Devinsky, O., Boesch, J. M., Cerda-Gonzalez, S., Coffey, B., Davis, K., Friedman, D., Hainline, B., Houpt, K., Lieberman, D., Perry, P., Prüss, H., Samuels, M. A., Small, G. W., Volk, H., Summerfield, A., Vite, C., Wisniewski, T., & Natterson-Horowitz, B. (2018). A cross-species approach to disorders affecting brain and behaviour. *Nature Reviews Neurology*, *14*(11), 677–686. <https://doi.org/10.1038/s41582-018-0074-z>
- Docherty, L., & Foley, P. L. (2021). Survey of One Health programs in U.S. medical schools and development of a novel one health elective for medical students. *One Health*, *12*, 100231. <https://doi.org/10.1016/j.onehlt.2021.100231>
- dvm360. (2020, March 10). *New One Health certificate program focuses on companion animals*. DVM 360. <https://www.dvm360.com/view/new-one-health-certificate-program-focuses-on-companion-animals>

- Elmahi, O. K. O., Uakkas, S., Olalekan, B. Y., Damilola, I. A., Adedeji, O. J., Hasan, M. M., Dos Santos Costa, A. C., Ahmad, S., Essar, M. Y., & Thomson, D. J. (2022). Antimicrobial resistance and one health in the post COVID-19 era: What should health students learn? *Antimicrobial Resistance & Infection Control*, 11(1), 58. <https://doi.org/10.1186/s13756-022-01099-7>
- Ethiopian Agriculture Training Portal. (2021). *One Health – Zoonotic disease: A Training of Trainers (ToT) course*. Ethiopian Agriculture Training Portal. <https://agri-training-et.org/zoonotic-e-learning-course/>
- FAO, UNEP, WHO, & WOA. (2022). *One Health Joint Plan of Action (2022–2026). Working together for the health of humans, animals, plants and the environment*. FAO; UNEP; WHO; World Organisation for Animal Health (WOAH) (founded as OIE); <https://doi.org/10.4060/cc2289en>
- FAVA OneHealth Fukuoka Office. (2023, July 24). *One Health—FAVA*. <https://fof-office.com/en/one-health/>
- Fenwick, S. (2016, April 25). *CORE competencies and One health—From theory to action* [Powerpoint]. USAID - One Health Workforce, Hanoi, Vietnam. <https://bit.ly/2WwHKzZ>
- Fontbonne University. (2024). *Bachelor of Science in One Health*. <https://www.fontbonne.edu/academics/college-arts-sciences/biological-behavioral-sciences-department/bachelor-of-science-in-one-health/>
- Frankson, R., Hueston, W., Christian, K., Olson, D., Lee, M., Valeri, L., Hyatt, R., Anelli, J., & Rubin, C. (2016). One Health core competency domains. *Frontiers in Public Health*, 4. <https://doi.org/10.3389/fpubh.2016.00192>
- FutureLearn. (2023). *Understanding One Health—Online Course—University of Basel*. FutureLearn. <https://www.futurelearn.com/courses/one-health>
- Gaebel, M., & Zhang, T. (2018). *Learning and teaching in the European higher education area*. European University Association. <https://eua.eu/downloads/publications/trends-2018-learning-and-teaching-in-the-european-higher-education-area.pdf>
- Global Health Security Agenda. (2016). *Advancing the global health security agenda: Progress and early impact from U.S. Investment*. <https://www.state.gov/wp-content/uploads/2019/02/1-ghsa-annual-report-2016.pdf>
- Hall, D. C., & Le, Q. B. (2015). Monitoring and evaluation of One Health projects; lessons from Southeast Asia. *Procedia - Social and Behavioral Sciences*, 186, 681–683. <https://doi.org/10.1016/j.sbspro.2015.04.070>
- Hanoi University. (2022, April 29). *Global Health Seminar Series “Applying a One Health approach to tackling the next pandemic.”* Global Health Seminar Series “Applying a One Health Approach to Tackling the next Pandemic.” <https://spmph.edu.vn/en-GB/article/news/global-health-seminar-series-applying-a-one-health-approach-to-tackling-the-next-pandemic%201>
- Hilliard, C. A. (2015). One Health: An introduction and initial assessment. *One Health Commission*. https://www.onehealthcommission.org/documents/news/OneHealthAnIntroductionandInitialAs_52225ADCB9E25.pdf
- Holmes, E. C. (2022). COVID-19—Lessons for zoonotic disease. *Science*, 375(6585), 1114–1115. <https://doi.org/10.1126/science.abn2222>
- Iatridou, D., Bravo, A., & Saunders, J. (2021). One Health interdisciplinary collaboration in veterinary education establishments in Europe: Mapping implementation and reflecting on promotion. *Journal of Veterinary Medical Education*, 48(4), 427–440. <https://doi.org/10.3138/jvme-2020-0019>
- Institute of Medicine. (2009). *Sustaining global surveillance and response to emerging zoonotic diseases* (G. T. Keusch, M. Pappaioanou, & M. C. Gonzalez, Eds.). National Academies Press.

- Johns Hopkins Bloomberg School of Public Health. (2024). *Master of Public Health (MPH) Curriculum*. <https://publichealth.jhu.edu/academics/mph/curriculum>
- Kansas State University. (2024, February 21). *One Health Kansas*. <https://olathe.k-state.edu/research/one-health-newsletter/resources/>
- Kerala Veterinary and Animal Sciences University. (2023). *COHEART | Centre for One Health education advocacy research and training*. <https://coheart.ac.in/training/10>
- Khan, M. S., Rothman-Ostrow, P., Spencer, J., Hasan, N., Sabirovic, M., Rahman-Shepherd, A., Shaikh, N., Heymann, D. L., & Dar, O. (2018). The growth and strategic functioning of One Health networks: A systematic analysis. *The Lancet Planetary Health*, 2(6), e264–e273. [https://doi.org/10.1016/S2542-5196\(18\)30084-6](https://doi.org/10.1016/S2542-5196(18)30084-6)
- Laaser, U., Stroud, C., Bjegovic-Mikanovic, V., Wenzel, H., Seifman, R., Craig, C., Kaplan, B., Kahn, L., & Roopnarine, R. (2022). Exchange and coordination: Challenges of the global One Health movement. *South Eastern European Journal of Public Health (SEEJPH)*, Volume XIX, 2022. <https://doi.org/10.11576/SEEJPH-6076>
- Laing, G., Duffy, E., Anderson, N., Antoine-Moussiaux, N., Aragrande, M., Luiz Beber, C., Berezowski, J., Boriani, E., Canali, M., Pedro Carmo, L., Chantziaras, I., Cousquer, G., Meneghi, D., Gloria Rodrigues Sanches Da Fonseca, A., Garnier, J., Hitziger, M., Jaenisch, T., Keune, H., Lajaunie, C., ... Häslér, B. (2023). Advancing One Health: Updated core competencies. *CABI One Health*, ohcs20230002. <https://doi.org/10.1079/cabionehealth.2023.0002>
- Larsen, R. J. (2021). Shared curricula and competencies in One Health and health professions education. *Medical Science Educator*, 31(1), 249–252. <https://doi.org/10.1007/s40670-020-01140-7>
- Lebov, J., Grieger, K., Womack, D., Zaccaro, D., Whitehead, N., Kowalczyk, B., & MacDonald, P. D. M. (2017). A framework for One Health research. *One Health*, 3, 44–50. <https://doi.org/10.1016/j.onehlt.2017.03.004>
- Lee, M. Y., & Global OHCC Working Group. (2013). *One Health core competency domains, subdomains, and competency examples* (Institution). USAID Respond Initiative. <https://hdl.handle.net/10427/000364>
- Linder, D., Cardamone, C., Cash, S. B., Castellot, J., Kochevar, D., Dhadwal, S., & Patterson, E. (2020). Development, implementation, and evaluation of a novel multidisciplinary one health course for university undergraduates. *One Health*, 9, 100121. <https://doi.org/10.1016/j.onehlt.2019.100121>
- Lucey, D. R., Sholts, S., Donaldson, H., White, J., & Mitchell, S. R. (2017). One health education for future physicians in the pan-epidemic “Age of Humans.” *International Journal of Infectious Diseases*, 64, 1–3. <https://doi.org/10.1016/j.ijid.2017.08.007>
- Machalaba, C., Raufman, J., Anyamba, A., Berrian, A. M., Berthe, F. C. J., Gray, G. C., Jonas, O., Karesh, W. B., Larsen, M. H., Laxminarayan, R., Madoff, L. C., Martin, K., Mazet, J. A. K., Mumford, E., Parker, T., Pintea, L., Rostal, M. K., de Castañeda, R. R., Vora, N. M., ... Weiss, L. M. (2021). Applying a One Health approach in global health and medicine: Enhancing involvement of medical schools and global health centers. *Annals of Global Health*, 87(1), 30. <https://doi.org/10.5334/aogh.2647>
- McKenzie, J. S., Dahal, R., Kakkar, M., Debnath, N., Rahman, M., Dorjee, S., Naeem, K., Wijayathilaka, T., Sharma, B. K., Moidanwal, N., Halimi, A., Kim, E., Chatterjee, P., & Devleeschauwer, B. (2016). One Health research and training and government support for One Health in South Asia. *Infection Ecology & Epidemiology*, 6(1), 33842. <https://doi.org/10.3402/iee.v6.33842>
- Mor, S. M., Norris, J. M., Bosward, K. L., Toribio, J.-A. L. M. L., Ward, M. P., Gongora, J., Vost, M., Higgins, P. C., McGreevy, P. D., White, P. J., & Zaki, S. (2018). One health in our backyard: Design and evaluation of an experiential learning experience for veterinary medical students. *One Health*, 5, 57–64. <https://doi.org/10.1016/j.onehlt.2018.05.001>

- Office of International Affairs, The Ohio State University. (2024). *Curriculum twinning—Global One Health initiative*. <https://oia.osu.edu/global-one-health-initiative/training/completed-projects/curriculum-twinning>
- One Health Commission. (2016a). *One Health movement news / One Health Topics “in” the news*. <https://www.onehealthcommission.org/index.cfm?nodeID=38050&audienceID=1&action=search&tag=infection%20ecology%20epidemiology>
- One Health Commission. (2016b, November 18). *One Health education online conference*. https://www.onehealthcommission.org/en/events_since_2001/one_health_education_online_conference/
- One Health Commission. (2022). *One Health tools and toolkits*. https://www.onehealthcommission.org/en/resources__services/one_health_tools_toolkits/
- One Health Commission. (2023, April 25). *Who’s who in One Health*. <https://batchgeo.com/map/bcaa0402f3da642ed28392052ecd2152>
- One Health Commission. (2024a). *Join the OHC’s international One Health Network*. https://www.onehealthcommission.org/en/resources__services/join_the_global_oh_community_listserv/
- One Health Commission. (2024b). *OH Resources for public health educators*. https://www.onehealthcommission.org/en/resources__services/oh_resources_for_public_health_educators/
- One Health Commission. (2024c). *One Health courses (Online)*. Google Docs. https://docs.google.com/spreadsheets/d/1MRZNUh897GmzIUcOX_WjYrqIENNOAd4oXUITjoltM/edit?usp=embed_facebook
- One Health Commission. (2024d). *One Health courses (Traditional-In Person)*. Google Docs. https://docs.google.com/spreadsheets/d/1wfmH-UqsLvmapsMzoiMSaWwwBWfEeeSHPVYIvcTJMAk/edit?usp=embed_facebook
- One Health Commission. (2024e). *One Health education initiatives—Overview*. https://www.onehealthcommission.org/en/programs/one_health_education_initiatives__overview/
- One Health Commission. (2024f). *One Health education—US initiative*. https://www.onehealthcommission.org/en/programs/one_health_education_us_initiative/
- One Health Commission. (2024g). *One Health masters programs*. Google Docs. https://docs.google.com/spreadsheets/d/1yKhwwUNtCSWHA8BHmAgZ3WwZzc8wAcTlaMNiuG7Vz6s/edit?usp=embed_facebook
- One Health Commission. (2024h). *One Health opportunities bulletin board*. https://www.onehealthcommission.org/en/resources__services/oh_opportunities_bulletin_board/
- One Health Commission. (2024i). *One Health strategic action plans*. https://www.onehealthcommission.org/en/resources__services/one_health_strategic_action_plans/
- One Health Commission. (2024j). *One Health-related PhD programs*. Google Docs. https://docs.google.com/spreadsheets/d/1KYNOUI3zgES8aXXACwPPm4jwx4Itw9UecF1BwL2Oo/edit?usp=embed_facebook
- One Health Commission. (2024k). *One Health-related summer programs*. Google Docs. https://docs.google.com/spreadsheets/d/1F_VDr0hdm1cxvzIPkV4bl_IJqvsLV-XNJQnsw6bH5s/edit?usp=embed_facebook
- One Health Commission. (2024l). *Primary, secondary, K-12 OH education resources*. https://www.onehealthcommission.org/en/resources__services/one_health_education_resources/primary_secondary_k12_oh_education_resources/
- One Health Commission. (2024m). *Why One Health?* https://www.onehealthcommission.org/en/why_one_health/
- One Health Lessons. (2023). *One Health lessons*. <https://onehealthlessons.org/>
- One Health Workforce Academies. (2024a). *OHWA – One Health Workforce Academies*. OHWA. <https://onehealthworkforceacademies.org/>

- One Health Workforce Academies. (2024b). *Training*. OHWA. <https://onehealthworkforceacademies.org/training-material/>
- Open WHO. (2024). *One Health for Global Health Security*. <https://openwho.org/channels/onehealth>
- Pettan-Brewer, C., Martins, A. F., Abreu, D. P. B. D., Brandão, A. P. D., Barbosa, D. S., Figueroa, D. P., Cediél, N., Kahn, L. H., Brandespm, D. F., Velásquez, J. C. C., Carvalho, A. A. B., Takayanagui, A. M. M., Galhardo, J. A., Maia-Filho, L. F. A., Pimpão, C. T., Vicente, C. R., & Biondo, A. W. (2021). From the approach to the concept: One Health in Latin America-experiences and perspectives in Brazil, Chile, and Colombia. *Frontiers in Public Health, 9*, 687110. <https://doi.org/10.3389/fpubh.2021.687110>
- Rabinowitz, P. M., Natterson-Horowitz, B. J., Kahn, L. H., Kock, R., & Pappaioanou, M. (2017). Incorporating one health into medical education. *BMC Medical Education, 17*(1), 45, s12909-017-0883-0886. <https://doi.org/10.1186/s12909-017-0883-6>
- Reid, S. A., McKenzie, J., & Woldeyohannes, S. M. (2016). One Health research and training in Australia and New Zealand. *Infection Ecology & Epidemiology, 6*(1), 33799. <https://doi.org/10.3402/iee.v6.33799>
- Rüegg, S. R., Häslér, B., & Zinsstag, J. (Eds.). (2018). *Integrated approaches to health: A handbook for the evaluation of One Health*. Brill | Wageningen Academic. <https://doi.org/10.3920/978-90-8686-875-9>
- Rwego, I. B., Babalobi, O. O., Musotsi, P., Nzietchueng, S., Tiambo, C. K., Kabasa, J. D., Naigaga, I., Kalema-Zikusoka, G., & Pelican, K. (2016). One Health capacity building in sub-Saharan Africa. *Infection Ecology & Epidemiology, 6*(1), 34032. <https://doi.org/10.3402/iee.v6.34032>
- Saint Louis Zoo. (2021). *Saint Louis Zoo Institute for conservation medicine—10 year report*. Saint Louis Zoo Institute for Conservation Medicine. https://cdn2.assets-servd.host/maniacal-finch/production/documents/ICM_10_Year_Report.pdf?dm=1668783052
- Sikkema, R., & Koopmans, M. (2016). One Health training and research activities in Western Europe. *Infection Ecology & Epidemiology, 6*(1), 33703. <https://doi.org/10.3402/iee.v6.33703>
- Steele, S. G., Toribio, J.-A., Booy, R., & Mor, S. M. (2019). What makes an effective One Health clinical practitioner? Opinions of Australian One Health experts. *One Health, 8*, 100108. <https://doi.org/10.1016/j.onehlt.2019.100108>
- Streichert, L. C., Sepe, L. P., Jokelainen, P., Stroud, C. M., Berezowski, J., & Del Rio Vilas, V. J. (2022). Participation in One Health networks and involvement in the COVID-19 pandemic response: A global study. *Frontiers in Public Health, 10*, 830893. <https://doi.org/10.3389/fpubh.2022.830893>
- Stroud, C., Kaplan, B., Logan, J. E., & Gray, G. C. (2016). One Health training, research, and outreach in North America. *Infection Ecology & Epidemiology, 6*(1), 33680. <https://doi.org/10.3402/iee.v6.33680>
- Taylor, L. H., Latham, S. M., & Woolhouse, M. E. J. (2001). Risk factors for human disease emergence. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 356*(1411), 983–989. <https://doi.org/10.1098/rstb.2001.0888>
- Tb, T. N., Nguyen, H. T., Tk, T. T., Pham, P. M., & Pham, P. D. (2022). Effectiveness of one health training program for health and veterinary workers: Perspective from trainees and employers. *International Journal of Infectious Diseases, 116*, S68. <https://doi.org/10.1016/j.ijid.2021.12.160>

- The Community Tool Box. (2024). *Chapter 3. Assessing community needs and resources | Section 14. SWOT analysis: Strengths, weaknesses, opportunities, and threats*. University of Kansas. <https://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/swot-analysis/main>
- The Royal (Dick) School of Veterinary Studies. (2024, March 26). *One Health—MSc One Health*. The University of Edinburgh. <https://www.ed.ac.uk/vet/studying/postgraduate/taught-programmes/one-health>
- Togami, E., Gardy, J. L., Hansen, G. R., Poste, G. H., Rizzo, D. M., Wilson, M. E., & Mazet, J. A. K. (2018). Core competencies in One Health education: What are we missing? *NAM Perspectives*, 8(6). <https://doi.org/10.31478/201806a>
- United Nations. (n.d.). *Capacity-building*. United Nations. Retrieved June 6, 2024, from <https://www.un.org/en/academic-impact/capacity-building>
- University of Alaska - Fairbanks. (2024). *One Health Master's Degree (OHM) | Center for One Health Research*. <https://www.uaf.edu/onehealth/education/master.php>
- University of California - Davis. (2024a). *One Health Institute*. <https://ohi.vetmed.ucdavis.edu/>
- University of California - Davis. (2024b). *Rx One Health*. <https://rxonehealth.vetmed.ucdavis.edu/>
- University of Florida. (2024a). *MHS in Environmental and Global Health with a Concentration in One Health*. <https://egh.phphp.ufl.edu/education/degree-programs/mhs-one-health/>
- University of Florida. (2024b). *One Health Center of Excellence*. <https://onehealth.phphp.ufl.edu/homepage/academics/>
- University of Florida. (2024c). *PhD in Public Health, One Health*. <https://egh.phphp.ufl.edu/education/degree-programs/phd-in-one-health/>
- University of Geneva. (2024). *Global Health at the human-animal-ecosystem interface*. Coursera. <https://www.coursera.org/learn/global-health-human-animal-ecosystem>
- University of Global Health Equity. (2024). *One Health Option | MGHED. UGHE*. <https://ughe.org/mghed-one-health-track>
- University of Hawai'i. (2024, April 23). *One Health interdisciplinary undergraduate certificate*. <https://manoa.hawaii.edu/onehealth/>
- University of Hawai'i. (2024, May 28). *Department of tropical medicine, medical microbiology & pharmacology*. <https://manoa.hawaii.edu/tropicalmedicine/>
- Von Borries, R., Guinto, R., Thomson, D. J., Abia, W. A., & Lowe, R. (2020). Planting sustainable seeds in young minds: The need to teach planetary health to children. *The Lancet Planetary Health*, 4(11), e501–e502. [https://doi.org/10.1016/S2542-5196\(20\)30241-2](https://doi.org/10.1016/S2542-5196(20)30241-2)
- Western University. (2024). *One Health*. https://www.schulich.uwo.ca/oleapopelkaresearchgroup/one_health/index.html
- World Medical Association. (2015, May). *The World Medical Association Global Conference on One Health*. The World Medical Association Global Conference on One Health, Madrid, Spain. <https://www.wma.net/events-post/global-conference-on-one-health/015-gcoh-report-may-2015/>
- World Veterinary Association. (2023, March 29). *New WVA position statement on One Health*. <https://worldvet.org/news/new-wva-position-statement-on-one-health/>
- Wu, J., Liu, L., Wang, G., & Lu, J. (2016). One Health in China. *Infection Ecology & Epidemiology*, 6(1), 33843. <https://doi.org/10.3402/iee.v6.33843>