COHESA

Capacitating One Health in Eastern and Southern Africa

Mainstreaming One Health competencies into higher education institutions

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Cover photo: Participants at a Net Mapping Workshop defining entry points, influencers, and priorities for Integrating One Health Approaches into Research and Education (photo credit: COHESA/ Fistum Limenh)

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Acronyms

AFROHUN	**Africa One Health University Network**
AMR	**Antimicrobial Resistance**
CBE	Community Based Education
CBTP	Community Based Training Program
COHESA	Capacitating One Health in eastern and southern Africa
DTTP	Developmental Team Training Program
DVM	Doctor of Veterinary Medicine
ESOHIC	Ethiopian Students One Health Innovation Club
GHSA	Global Health Security Agenda
HEIs	Higher Education Institutions
ILRI	International Livestock Research Institute
IPC	Infection Prevention and Control
IUCEA	Inter-University Council for East Africa
NEOH	Network for Ecohealth and One Health
OACPS	Organization of African, Caribbean and Pacific states
OH	One Health
OHCs	One Health Clubs
SDGs	Sustainable Development Goals

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Preamble

Over the past decade, the world has faced severe public health threats including zoonotic diseases, food insecurity, antimicrobial resistance and other emerging pandemic threats. This has been attributed to factors such as climate change, globalization, agricultural intensification, increased human population, leading to pressure on land resources, increased global trade and travel and increased use of antimicrobials in animal production and food preservation. One Health, an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems has been identified as an effective way to fight these threats at the human–animal–environment interface. One Health education creates a workforce, equipped with knowledge, skills and positive attitude to prevent, detect and respond to infectious disease threats, capable of fostering cross sectoral and interdisciplinary collaboration.

The Capacitating One Health in eastern and southern Africa (COHESA) project aims to support the creation of a One Health workforce by integrating One Health core and technical competencies into the existing curricula (preservice education) to produce professionals that can effectively and efficiently respond to challenges that require a One Health approach.

This document provides guidelines on integrating One Health competencies into Higher Education Institutes in Ethiopia (HEIs). Specifically, it offers guidelines and strategies for i) mainstreaming One Health concepts in the education curricula as a course; ii) integrating selected One Health competencies into course content, chapters or units; iii) strengthening One Health student clubs in HEIs; iv) designing tailormade summer schools for preservice and inservice professionals; and (v) implementing short courses on zoonoses, emerging diseases and emerging health related problems as well as systems' approaches for effective managing emerging challenges using the One Health approach.

1 Introduction

Over the past decade, the world has faced severe public health threats including zoonotic diseases, food insecurity, antimicrobial resistance and other emerging pandemic threats. This has been attributed to factors such as climate change, globalization, agricultural intensification, increased human populations leading to pressure on land resources, increased global trade and travel and increased use of antimicrobial substances in animal production and food preservation (Rahman et al. 2020). The One Health approach mobilizes multiple sectors, disciplines and communities at varying levels to address threats to human, animal and ecosystem health, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change and contributing to sustainable development. The approach is therefore considered an effective way to fight the above threats at the human–animal–environment interface. It has also been adopted as a core method to strengthen the world's ability to prevent, detect and respond to infectious diseases threats by the Global Health Security Agenda (GHSA) (Bakiika et al. 2023). The One Health approach is also considered to be critical for achieving several of the United Nations' 2030 Sustainable Development Goals (SDGs), as health is both a prerequisite and an indicator of sustainable development.

Importance of One Health

The One Health concept is vital because it addresses the complex and interrelated health challenges our world faces. With the increase in global travel, urbanization and environmental changes, zoonotic diseases, antimicrobial resistance and other related challenges can spread more quickly and easily among humans, animals and ecosystems like, leading to new and potentially devastating health threats. The One Health holistic approach helps to prevent, detect and respond to these threats more effectively by considering all the factors involved. This approach can lead to better health for people, animals and the environment, mitigate the impact of diseases and contribute to sustainable development. The One Health approach plays the following roles:

1. Disease control: several infectious diseases can be transmitted between animals and humans (zoonoses), highlighting the need for holistic approaches that consider disease in humans and animals.
2. Environmental conservation: human activities, such as deforestation and pollution, can impact both animal and human health. By considering environmental factors, the One Health approach promotes sustainable practices that benefit all species.
3. Addressing antimicrobial resistance, which arises from the misuse of antibiotics. One Health promotes responsible use of antibiotics in humans, animals and the environment.
4. The One Health approach promotes early detection, surveillance and response to emerging infectious diseases resulting from rapid urbanization, globalization and climate change.
5. Climate change and Health: climate change affects the health of ecosystems and results in increased spread of diseases. Integrating climate science into the One Health approach promotes better understanding of how changing weather patterns influence zoonotic disease dynamics and environmental health, leading to more effective adaptation and mitigation strategies.
6. Food safety: ensuring food safety involves managing risks from farm to table. One Health approaches recognize the interconnections between the health of soil, plants, animals and people, addressing factors like pesticide use, microbial contamination and food handling practices to prevent foodborne illnesses and promote public health.

The COHESA project aims to generate an inclusive research and innovation ecosystem, facilitating rapid uptake, adapting and adopting solutions to issues that can be dealt with using a One Health approach. In 2023, COHESA engaged the Inter-University Council for East Africa (IUCEA 2023) to establish benchmarks for One Health curricula. These benchmarks made recommendations for including One Health in Masters' programs in East Africa. However, Ethiopia is not a member of IUCEA, therefore COHESA has encouraged alternative pathways for harmonizing One Health education in HEIs in the country.

The need for this guide arose from discussions among national One Health stakeholders during a net mapping exercise where deliberations and debates were held on integrating One Health into education and research. At the end of the exercise, a technical working group was established to guide the integration process. With guidance and technical contribution from the COHESA project lead in Ethiopia (Addis Ababa University), the subteam composed of multiple universities drafted this guide to facilitate integrating One Health approaches and principles into courses of higher educational institutions (HEIs) thereby producing a cadre of One Health ambassadors in Ethiopia.

This document was informed by several activities including:

1) Cross sectional survey to assess current status of integration of One Health in HEIs
2) Literature review to identify One Health competencies
3) Mapping of competencies to existing curricula
4) Desk review of international experience in integrating One Health in curricula.

Based on the findings, the team made recommendations to integrate One Health into HEIs. The recommendations are in varying states of implementation across the represented institutions and form the basis of the recommendations in this guide.

2 Integrating One Health into HEIs in Ethiopia: Current status

At the onset of the COHESA project, a cross sectional survey was conducted involving 120 individuals working with institutions of higher learning, government and NGOs sectors in Ethiopia, to assess the current status of One Health in higher education. The online survey was conducted from 10 to 20 September 2023, using a Google survey tool (Google Forms), attached as Annex 1. In addition, key experts, department heads and the Africa One Health University Network (AFROHUN 2021) formerly One Health Central and Eastern Africa (OHCEA) thematic and activity leads were consulted to understand the status of One Health integration into university curricula in Ethiopia.

The survey revealed that One Health had been implemented in Ethiopia's HEIs using a variety of approaches, including:

1. One Health as an academic program
    - MSc in One Health in tropical and infectious disease at Jigjiga university
    - One Health as a course within an academic program
    - One Health (harmonized BSc program in Environmental Health implemented at Jimma, Hawassa, Gondar, Haramaya, Debre Markos, Bule Hora, Mekele, Arba Minch universities)
    - Advanced One Health and Emerging Zoonoses—PhD in Veterinary Public Health program at Addis Ababa university
    - One Health and Biosecurity at university of Gondar
    - Integrated into the existing courses as a chapter or unit
    - Epidemiology—MPH in Epidemiology or General Public Health
    - Advanced Ecology—MSc in Environmental Sciences and Technology
    - Health Service Management—MSc in Health Service Management
    - Veterinary Public health—MSc in Veterinary Public health
        - Veterinary Epidemiology—MSc in Veterinary Epidemiology
        - Community Based Education

2. Summer school in collaboration with the Ohio State University

    - Advanced Molecular Epidemiology
    - International Trade and Introduction to risk Analysis
    - Diagnosis and Management of Infectious Diseases
    - Environmental and Occupational Health
    - Research Methods and Ethics

3. Extracurricular activities

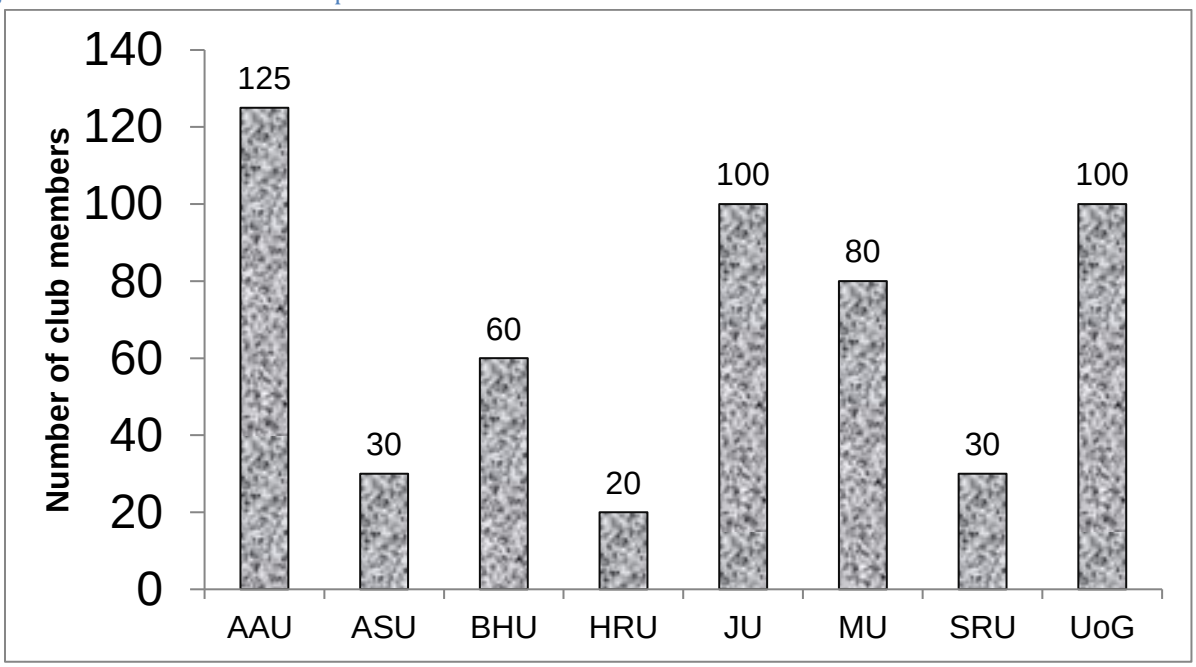
    - One Health student club
    - Field demonstration sites—at Jimma and Mekele universities

While the above educational offerings demonstrate that integrating One Health is well underway in HEIs in Ethiopia, these initiatives have largely been undertaken in isolation. Moving forward we propose that more universities endeavour to integrate One Health using harmonized approaches, as detailed in this guide.

University students' One Health clubs

Some universities have in the past established One Health Clubs (OHCs) with the aim of deepening understanding of One Health as an approach and principle. In a few cases, the clubs have been expanded to include high school students. Figure 1 shows the status of OHCs in HEIs in Ethiopia.

Figure 1. Status of OHCs in Ethiopian HEIs.



The clubs were also established to support engagement between students and professionals in the planning and implementing One Health activities, projects and opportunities. Nonetheless, this was inconsistent and not standardized in its approaches. There were no clearly defined deliverables.

OHCs within universities and high schools are an important mechanism to roll out different initiatives aimed at deepening One Health as an approach and principle.
To improve the organization and function of OHCs, below we offer guidance to universities that intend to develop or revitalize such clubs to support integrating One Health into HEIs:

Objectives of students' OHCs

- Provide an extracurricular environment for, community engagement outreach activities and practical team based learning exercises such as case competitions
- Provide students the knowledge and applied skills to work across disciplines on complex One Health challenges
- Promote experiential learning and breakdown disciplinary silos among students and to prepare them as One Health champions in their future education and workplace settings.

3 Gaps identified

Although One Health activities were implemented in different modalities by various institutions/initiatives, there has been misunderstanding in One Health concepts and principles and there was lack of institutionalization and sustainability.

- **Misunderstanding of One Health concepts and principles**: One Health has been considered as discipline and few undergraduate, MSc and PhD programs were launched in some universities which are against the principle of One Health that recognizes One Health as an approach that promotes integrating various disciplines to addresses complex challenges at human, animal and environmental interface.
- **Sustainability challenges:** Most of the One Health activities were not aligned with the existing systems and dependent on projects. Hence, most of the activities were discontinued when projects were phased-out. (e.g. Field based experiential learning/demonstration sites at Jimma and Mekele universities).

4 One Health competencies

Competencies are the core knowledge, attitudes and skills required of professionals to undertake their respective roles. The fundamental knowledge, skills and abilities required to handle complex health challenges at the intersection of environmental, animal and human health are reflected in One Health's core competences (Laing et al. 2023). These competencies are designed to foster collaboration, understanding and effective action across disciplines. These competencies form the foundation for professionals and practitioners to effectively address complex health challenges at the interface of human, animal and environmental health, contributing to the advancement of One Health initiatives and the overall wellbeing of populations and ecosystems. These updated One Health competencies were proposed by the Network for Ecohealth and One Health (NEOH). NEOH proposed updated One Health core competencies to reflect the evolving narratives in One Health, from the former anthropocentric view of disease avoidance at the human–animal–environment interface, to a more holistic approach that strives to sustainably balance the health of people, animals, plants and ecosystems. It has nine core competencies falling across three broader categories of skills, values and attitudes and knowledge and awareness (Laing et al. 2023):

i. **Effective communication**: Effective communication skills to engage and educate diverse stakeholders, including the public, policymakers and professionals, about interconnected health issues and the importance of collaborative action. Engages effectively in respectful and reciprocal communication and partnerships with people from different backgrounds, disciplines, groups in society and sectors.

ii. **Collaborative and resilient working:** Able to collaborate with One Health partners from diverse backgrounds to reach common understanding and cohesive goals. Treating others with courtesy, sensitivity and respect. Rapidly adapts to new information, changing conditions or unexpected obstacles, manages conflicts, recovers quickly.

iii. **Systems understanding:** Understands and studies the interconnections between humans, animals, plants and ecosystems and how they influence each other dynamically; manages boundaries, across scales/levels and identifies stakeholders. Approaches situations (including team management and project design) with systems thinking, i.e. identifying relevant elements, their relationships and interactions, recognizing patterns, conducting analysis across scales, to understand the problem's dynamic and relevant level of analysis according to emergent properties.

iv. **Transdisciplinarity**: Moves beyond disciplinary and sectoral boundaries, works seamlessly across different groups in society and works towards solutions collectively.

v. **Social, cultural and gender equity and inclusiveness:** Understands and is sensitive to equity and justice in human terms and across animal and plant species and the environment. Acknowledges and incorporates gender and culture considerations. Shows integrity, behaving in an honest, fair and ethical manner with inclusiveness and humility. Acknowledges that we are part of nature.

vi. **Collective learning and reflective practice:** Demonstrates reflective practice, assesses and recognizes own values and knowledge, being a humble and active continual learner.

vii. **One Health concepts and principles:** Knows and systematically and consistently uses different One Health theories, frameworks and methods.

viii. **Theoretical and methodological pluralism:** Understands, applies and combines knowledge, theories and ideas of multiple sciences. Acknowledges and can navigate across different epistemic and ontological standpoints and knowledge systems, including local and indigenous knowledge.

ix. **Harnessing uncertainty, paradox and limited knowledge:** Understands and effectively considers that One Health challenges are complex, often wicked problems, for which the knowledge base is incomplete, contains a high level of uncertainty and potential in commensurabilities. Is aware and embraces that we have limited capacity to intervene in certain processes and may act despite paradox, ambiguity and/or uncertainty.

5 Curriculum mapping against One Health competencies

5.1 Undergraduate programs

To integrate One Health into undergraduate programs at Ethiopian universities, Environmental Health, Veterinary Medicine, Public Health and Medicine programs were considered. Each curriculum was assessed to determine whether the above One Health competencies were already included. While One Health concepts and principles were part of the curriculum for the Environmental Health program as an independent course, they were not included in the curricula for Public Health, Medicine and Doctor of Veterinary Medicine (DVM) programs. Consequently, integrating One Health competencies into suitable courses within these programs was recommended. Specifically, it was recommended that competencies 6 (collective learning and reflective practice), 7 (One Health concepts and principles) and 9 (theoretical and methodological pluralism) be integrated into:

- Introduction to Public Health course for public health programs
- Veterinary Public Health I course for the DVM program
- Social determinants of health course for the medicine program

- Furthermore, it was recommended that competencies 1 (effective communication), 2 (collaborative and resilient working), 3 (systems understanding), 4 (transdisciplinarity), 5 (social, cultural and gender equity and inclusiveness) and 9 (harnessing uncertainty, paradox and limited knowledge) be integrated into Community Based Education (CBE) programs. These recommendations are summarized in Table 1.

Table 1. Undergraduate program curriculum mapping against One Health competencies

Department	**Program**	**Course and course code**	**One Health competencies**
Environmental Health Sciences and Technology (EHST)	Environmental Health	One Health ENVH 4088	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Community based training Program II (CBTP I) EnvH 3121	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
Public Health	Public Health	Introduction to Public Health PubH 1021	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Community based training Program II	• Effective communication • Systems understanding • Collaborative and resilient working

		(CBTP II) PubH 4112	• Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
School of Veterinary Medicine	Doctor of Veterinary Medicine	Introduction to Veterinary Public Health I, Vetm 4171	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Community based training Program I (CBTP, Vetm 2284	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
Medicine	Medicine	Social determinants of health PUBH 2022	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Community Health Team Training Program (CHTTP)	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge

5.2 Masters programs

To integrate One Health competencies into Masters' programs, a curriculum review was undertaken to identify the most appropriate courses in each program. Accordingly, it was recommended that competency 3 (systems understanding), 6 (collective learning and reflective practice), 7 (One Health concepts and principles), 8 (theoretical and methodological pluralism) and 9 (harnessing uncertainty, paradox and limited knowledge) be integrated into identified taught courses. In addition, it was recommended that competency 1 (effective communication), 2 (collaborative and resilient working), 4 (transdisciplinarity), 5 (social, cultural and gender equity and inclusiveness), 6 (collective learning and reflective practice), 8 (theoretical and methodological pluralism), 9 (harnessing uncertainty, paradox and limited knowledge) be incorporated into CBE courses. These recommendations are summarized in Table 2.

Table 2. MSc program curriculum mapping against One Health competencies

Department	Program	Course name and code	One Health competencies
Environmental Health	Environmental Health	Principles of Environmental Health (EnvH 501)	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP), EnvH 512	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
	Environmental Sciences and Technology	Advanced Ecology, EnST 605	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP) EnST 701	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
Public Health	General Public Health	Research Methods COMH 731	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP), Pubh 703	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
	Epidemiology	Epidemiology 1 Pubh 611	• One Health concepts and principles • Collective learning and reflective practice

			• Theoretical and methodological pluralism
		Developmental team Training program (DTTP), Pubh 703	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
	Field Epidemiology	Introduction to Public Health PhFe 7011	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP) Pubh 703	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge
	Public Health	Global Health PH 805	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
	Health services management	Global Health PHSP 927	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
Veterinary Medicine	Veterinary Epidemiology	Advanced Veterinary Public Health, MIVP 722	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP), CBE 801	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity

			• Harnessing uncertainty, paradox and limited knowledge
	Veterinary Public Health	Food borne infection and intoxications, MIVP 752	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
		Developmental team Training program (DTTP), CBE 801	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge

5.3 PhD programs

Each program's curriculum was assessed to determine whether the above mentioned One Health competencies were already included. It was found that most of the competencies were not included in PhD curricula. Consequently, integrating the competencies into suitable courses within these programs was recommended. Specifically, the following were recommended for integration: competency 6 (collective learning and reflective practice), 7 (One Health concepts and principles), 8 (theoretical and methodological pluralism) and 9 (harnessing uncertainty, paradox and limited knowledge) into identified taught courses. In addition we recommend that competency 1 (effective communication), 2 (collaborative and resilient working), 3 (systems understanding), 4 (transdisciplinarity), 5 (social, cultural and gender equity and inclusiveness), 6 (collective learning and reflective practice), 8 (theoretical and methodological pluralism), 9 (harnessing uncertainty, paradox and limited knowledge) be incorporated into CBE courses. These recommendations are summarized in Table 3.

Table 3. PhD program curriculum mapping against One Health competencies

Institute/school	**Program**	**Course name and code**	**One Health competencies**
Health	All (11 programs)	Advanced Research methods Pubh 768	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge • One Health concepts and principles • Collective learning and reflective practice

			• Theoretical and methodological pluralism
Veterinary Medicine	Veterinary Public Health	One Health and Biosecurity MVPH 7252	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge • One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism
	Veterinary Epidemiology	Advanced Veterinary Public HealthMIVP 722	• Teamwork • Conflict resolution • One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism • Transdisciplinarity • System understanding
	Veterinary Microbiology	Advanced Veterinary Epidemiology CLIS 721	• Team work • Conflict resolution • One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism • Transdisciplinarity

6 Specific points of integrating One Health competencies

6.1 Undergraduate programs

Recommended points for including One Health in undergraduate curricula are shown in Table 4. At the undergraduate level, integrating One Health competencies aims to cultivate a foundational understanding of the interdependence of human, animal and environmental health among students. This approach fosters a sense of shared responsibility and nurtures a community oriented mindset among the future workforce.

Table 4. Aligning One Health competencies in undergraduate courses

S. No.	Competencies	Program	Course	Point of integration
1	One Health concepts and principles Collective learning and reflective practice • Theoretical and methodological pluralism	Environmental Health	One Health ENVH 4088	Chapter 2 (Core competencies)
		Public Health	Introduction to Public Health PubH 1021	Chapter 2 (Concepts and Core competencies)
		Veterinary Medicine	Introduction to Veterinary Public Health Vetm 4171	Chapter 2 (Concepts and Core competencies)
		Medicine	Social determinants of health PUBH 2022	Chapter 1 (Environmental Health)
2	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge	Public Health, Environmental, Medicine and DVM	Community Based Training Program (CBTP) Community Health Team Training Program CHTTP/Community attachment	Community engagement CBTPI/CTTP/Community attachment

6.2 Masters and PhD programs

Recommended points of integrating One Health competencies in masters and PhD programs are shown in Tables 5 and 6, respectively. Courses were identified for integrating One Health competencies based on existence of relevant contents and commonness of the course (taken by all or majority of tracks/speciality of the program). Depending on the nature of the identified course, One Health as a chapter, unit or section in a chapter is suggested for integration. When One Health content is not explicitly integrated into the

course, it is suggested for including as a separate chapter preferably at the beginning or as an introductory chapter to the subject matter to give a broader overview. In the meantime, concepts can be incorporated into relevant chapters of the course to highlight the interaction between human, animal and the environment.

Table 5. Aligning One Health competencies into Master's courses

S. No.	Competencies	Program	Course name and code	Where to integrate?
1	• One Health concepts and principles • Collective learning and reflective practice Theoretical and methodological pluralism	Public Health	Research Methods COMH 731	Chapter 1 Introduction to research
		Epidemiology	Epidemiology 1	Chapter 1 Introduction to Epidemiology
		Environmental Health	Principles of Environmental Health, (EnvH 501)	Chapter 1 Current environmental health issues
		Environmental Sciences and Technology	Advanced Ecology	Chapter 3 Ecosystem Health
2	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism	Field Epidemiology	Introduction to Public Health	Under Chapter 8 One Health
		Public Health	Global Health	Chapter 1 Introduction to Global Health
		Health service management	Health service management	Chapter 1 Introduction to One Health concepts and principles
	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism	Veterinary Epidemiology	Advanced Veterinary Public Health	Chapter 1 One Health concepts and principles
		Veterinary Public Health	Food borne infection and intoxications	Chapter 2 One Health concepts and principles

		Veterinary Microbiology	Advanced Veterinary Epidemiology	Chapter 3 One Health concepts and principles
	• Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge	Environmental Health, ENST, Public Health, Veterinary medicine	DTTP	DTTP orientation and implementation

Table 6. Aligning One Health competencies in PhD courses

S. No.	**Competencies**	**Program**	**Course name and code**	**Point of integration**
1	• One Health concepts and principles • Collective learning and reflective practice • Theoretical and methodological pluralism • Effective communication • Systems understanding • Collaborative and resilient working • Social, cultural and gender equity and inclusiveness • Transdisciplinarity • Harnessing uncertainty, paradox and limited knowledge	Health Sciences	Advanced Research Pubh 768	Chapter 1 Introduction to research
		Public Health	Global Health PHSP 927	Chapter 4 Challenges to Global Health concept of One Health Approach
		Veterinary Epidemiology	Advanced Veterinary Epidemiology VEPH 721	Chapter 1 Introduction to veterinary epidemiology
		Veterinary Microbiology	Advanced Veterinary Epidemiology CLIS 721	Chapter 2 One Health Risk analysis
		Veterinary Public Health	One Health and Biosecurity MVPH 7252	Chapter 1 Introduction to History and the Concept of One Health

7 Integrating strategies

In addition to integrating One Health approaches and principles into existing curricula and syllabi, additional activities were proposed for adoption by the universities. These additional activities may deepen the understanding of One Health and its role and help to institutionalize One Health initiatives at the respective universities. Since universities in Ethiopia have different programs and experiences, implementing One Health may take different forms and different paces. Most universities already have some initiatives within the rules of One Health which may be complemented by the proposed initiatives:

7.1 Advocacy to university management

A one-day orientation could be held with the university management to sensitize them to the importance of One Health and the need for curriculum change. Suggested participants include heads of academic programs identified for One Health integration; postgraduate program directors/coordinators; CBE program directors/coordinators; student union management. The format can vary and could include a panel discussion on major One Health issues relevant to HEIs including the One Health concept, the need to produce One Health ambassadors for the future health and wellbeing of ecosystems; and integrating One Health approaches and principles into university education. We propose to pilot this approach in 9 universities including: Addis Ababa, Gondar, Haramaya, Hawassa, Jimma, Mekelle, Bule Hora, Jigjiga and Wello universities. Selecting these universities was based on steps made in integrating One Health and therefore they can serve as ambassadors to other universities in Ethiopia.

7.2 Training/orienting teaching staff

Training/orienting on One Health to be provided to all instructors of courses selected for One Health integration as well as academic quality directors/coordinators of colleges. Major components of discussion/training could include the One Health concept, One Health competencies, the need to integrate One Health into courses or university education, group discussion on One Health integration into courses (e.g. with instructors of same/similar course in one group) and group discussion on the way forward. We propose to pilot this approach in 9 universities.

7.3 Revitalizing student clubs

The students' OHCs promote experiential learning and break down disciplinary silos among students and to prepare them as One Health champions in their future education and workplace settings. The clubs will be linked to secondary school OHCs for experience sharing. The proposed activities of the club include:

- Developing guidelines on OHC formation, implementation and management
- One Health day celebrations with activities like debates on innovative One Health activities
- Developing students' skills and competences in One Health leadership, community engagement, analysis and communication.
- Public awareness creation campaigns on One Health, emerging pandemics, food safety and AMR at least once in a year
- Trainings to build student's competencies on One Health approaches and principles
- Outreach activities to undertake One Health activities

Guiding steps to sustain OHCs in the universities

- Getting a mentor from within the university to guide and support the club
- Ensuring official recognition and space from the university
- Developing strategic plan with vision, mission and objectives
- Ensuring rotation of leadership

- Constitution should clearly outline the student club membership, leadership structure and the roles of each member
- The club should have an executive committee comprised of the following:
    a) President
    b) Vice president
    c) Secretary
    d) Treasurer
    e) Publicity secretary
    f) Projects coordinator
    g) College/school/faculty representatives

- Developing annual plan of action with activities designed to introduce students to the following core competencies and skills:
    a) Networking
    b) Multidisciplinary collaboration and partnerships
    c) Communication
    d) Project management
    e) One Health leadership
    f) Gender, One Health and infectious disease management
    g) One Health policy and advocacy
    h) Research

Recruiting and orienting students

- Involve students from multiple disciplines at the university as One Health spans across many fields of interest
- Identify a core group of students who care and have a passion for One Health to spearhead the recruitment process
- Disseminate club posters/information sheets/leaflets at the university
- Use communication channels such as the university's website and social media pages such as on Facebook or X page to run recruitment campaigns
- Hold an event to raise awareness about One Health and the club in particular

Networking and partnership

OHCs should collaborate with other clubs such as:

- Ethiopian students One Health innovation club
    - Student clubs at Mekelle and Jimma universities promoted to national level club named—the Ethiopian Students One Health Innovation Club (ESOHIC)
- AFROHUN network
- International students One Health alliance
    - Create a global collaborative community of students in One Health
- Institutional support and sustainability, which include:
    - Facilitating registration within the university system
    - Guidance and mentorship by faculty
    - Support in mobilizing partners, access to university resources
    - Institute One Health champions to inspire the young generation
    - Reviewing club reports and other documents for further management

7.4 One Health summer school

It is proposed that Jimma university leads in organizing the 2024 One Health summer school supported by COHESA. The overall goal of the planned summer school is to provide knowledge, skills and competencies on One Health and its approaches and principles that support prevention and management of complex global challenges to human, animal and environmental health. The summer school will have two components, namely: (1) One Health approaches and principles in teaching and research; and (2) Infectious diseases surveillance, risk assessment and management. One Health concepts, approaches and competencies particularly on soft skills will be aligned with disease surveillance, risk assessment, prevention and control, partnership and collaboration with practical illustrations.

The summer school will include lectures, practical sessions and three days field attachment. Participants will be attached to a One Health demonstration site/community outreach for two to three days to provide an opportunity for them to work together to identify community problems at the human, animal and environment interface with suggested solutions that the university may take up to pursue as part of its routine program. The course will be designed to empower key course instructors in human, animal, environmental fields as well as engineering and social sciences drawn from senior universities in Ethiopia. We aim to work through department heads and/or deans of different programs of the senior universities to identity the right participants who will not only align lessons to their courses and/or researches but also serve as contact persons to integrate One Health in teaching and research activities of their respective universities. The summer school is expected to produce 30 One Health advocates at different universities and research institutions. The summer school will take place for two weeks between July and September 2024.

Since Jimma university has an established One Health centre of excellence, in the long-term, the university plans to sustain the summer program with support from governmental and non-governmental organizations with the eventual goal of commercializing the program.

7.5 One Health short courses

Universities can integrate One Heath into their course by developing short courses. The following are examples of short courses that could be developed:

7.5.1 Biodiversity conservation and zoonotic diseases

Objectives: Understand the role of biodiversity conservation on ecosystem services and preventing zoonotic diseases spillover

Content:

- Biodiversity conservation and ecosystem services
- Drivers of biodiversity loss (land use and climate changes)
- Loss of biodiversity and spillover of infectious/zoonotic diseases/pandemic threats

Target audiences:

- Students (undergraduate, Master and PhD)
- Faculty
- Inservice professionals

Duration: 3 hours

Platform

- E-learning
- On-campus

7.5.2 Water, Sanitation and Hygiene (WaSH) and Antimicrobial Resistance (AMR)

Objectives: Understand the role of contaminated water, wastewater and poor hygienic practices, infection prevention and control (IPC) on developing Antimicrobial Resistance.

Content:

- Role of healthcare wastewater management and IPC on the AMR
- Monitoring antibiotic resistant genes in wastewater treatment

Target audiences:

- Students (undergraduate, Master and PhD)
- Faculty
- Inservice professionals

Duration: 3 hours

Platform

- E-learning
- On-campus

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Annex 1: Online survey tool

Background and goal of the survey

COHESA aims to generate an inclusive research and innovation ecosystem, facilitating rapid uptake, adaption and adoption of solutions to issues that can be dealt with using a One Health (OH) approach, with the One Health concept embedded across society in Eastern and Southern Africa (ESA), working for healthy humans, animals and environment. Addis Ababa University as a multiplier of the COHESA project aims to assess the level of integration of One Health in HEIs in Ethiopia. Cognizant of your role in the higher education system, you are identified to provide information on the need and current status of One Health integration into your respective institutions. Please rest assured that your response will be used only for the intended purpose.

We sincerely appreciate your contribution

I. General information

1. Name of university Department
2. Your role in the university
   a) Doctoral school director
   b) Postgraduate coordinator
   c) Department head
   d) Academic staff
3. Your field(s) of expertise? (select all that apply)
   a) Public Health (Specify)
   b) Physician
   c) Veterinarian
   d) Environmental Health expert
   e) Wildlife Expert
   f) Biomedical sciences expert
   g) Social Sciences expert
   h) Environmental Sciences expert
   i) Other (please specify)

II. Knowledge and skills of One Health competencies

1. Have you ever received training in 'One Health'? Yes No
2. How do you rate your level of knowledge about One Health? (1 to 5 scale, 1 very poor-5 very high)
3. What competencies or skills do you think will be needed to prevent disease spill-over events from animals to humans?
4. How do you rate your level of knowledge and skills on **One Health principles and concept?**
   a) None: I am unaware or have very little knowledge and skill
   b) Aware: I have heard of, but have limited knowledge or ability to apply the skill
   c) Knowledgeable: I am comfortable with my knowledge or ability to apply the skill
   d) Proficient: I am very comfortable, am an expert or could teach this skill to others
5. How do you rate your level of knowledge and skills on **infectious disease management**?
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
6. How do you rate your level of knowledge and skills on **Ecosystem Health?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
7. How do you rate your level of knowledge and skills on **One Health Risk Analysis?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
8. How do you rate your level of knowledge and skills on **Epidemiology?**

a) None
b) Aware
c) Knowledgeable
d) Proficient

9. How do you rate your level of knowledge and skills on **Antimicrobial resistance**?
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
10. How do you rate your level of knowledge and skills on **Health and Behaviour**?
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
11. How do you rate your level of knowledge and skills on **One Health Leadership?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
12. How do you rate your level of knowledge and skills on **One Health Research?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
13. How do you rate your level of knowledge and skills on **One Health Management?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
14. How do you rate your level of knowledge and skills on **Systems thinking?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
15. How do you rate your level of knowledge and skills on **Collaboration and partnership?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
16. How do you rate your level of knowledge and skills on **Policy and advocacy?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
17. How do you rate your level of knowledge and skills on **Gender, culture and belief?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
18. How do you rate your level of knowledge and skills on **Policy and advocacy?**
   a) None
   b) Aware
   c) Knowledgeable
   d) Proficient
19. How do you rate your level of knowledge and skills on **Communication?**
   a) None
   b) Aware

c) Knowledgeable
d) Proficient

III. Integrating OH into education system

1. Does your department integrate One Health into curricula? Yes No
2. What type of integration?
   a) Curriculum b) Course chapter/units C) Short course D) Extracurricular
3. If yes for question No. 1, within which program OH has been integrated?
   a) PhD b) MSc c) BSc
4. If yes for question No. 1, name of the program Course name Credit hour
5. Which One Health technical competencies should students learn in the educational program?
   a) One Health Principles
   b) Epidemiology
   c) Risk Analysis
   d) Antimicrobial resistance (AMR)
   e) Infectious Disease Management
   f) Ecosystem health
   g) Health and Behaviour
6. Which One Health core competencies should students learn in the educational program?
   a) Management
   b) Communication
   c) Gender, culture and belief
   d) Leadership
   e) Collaboration and partnership
   f) Values and ethics
   g) Systems thinking
   h) Policy and advocacy
   i) Research
7. If One Health is given as short courses, name of the short course duration
8. If One Health is integrated into extracurricular activities, in which activities?
   a) One Health student club b) Student demonstration site
9. If there is a One Health student club at your university:
   a) Year established b) Number of club members
10. List activities of the OHC
    a) ----------
    b) ----------
    c) ----------
    d) ----------
    e) ----------
11. If there is a field demonstration site/attachment:
    a) Number of demonstration sites ----------
    b) Main One Health activities ----------

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12. What are the challenges encountered during integrating One Health in education system?
    a) Lack of One Health experts
    b) Lack of funds
    c) Overloaded curriculum
    d) Overlapping
    e) Time constraints
    f) Resistance to change
    g) Lack of resources, tools
    h) Other
13. Which resources are required to integrate One Health in education system?
    a) Training
    b) Material resources/laboratories
    c) E-learning

14. If One Health competencies are not currently integrated in the curricula, do you have an interest in integrating in the future? a) Yes b) No
15. How One Health competencies will be integrated into the education system in the future?
    a) Required curriculum b) Course chapter/unit c) Short course d) Extracurricular
16. Which program and course will integrate One Health competencies?
    a) Program(s)----------
    b) Course(s)----------
17. Which One Health competencies will be integrated into this course(s)----------
18. What contribution does a department make to integrating One Health to the curriculum?
    a) Curriculum revision
    b) Faculty training
    c) Sharing of resources
    d) Others, specify ----------
19. Which resources are required to integrate One Health in education system in the future?
    a) Faculty training
    b) E-learning
    c) Laboratory facilities
    d) Others, specify ----------