

Principles of One Health for a better planet

EDITED BY

Barbara Häslér
Asta Tvarijonavičiute
Sara Savić



**Network
for Ecohealth
and One Health**



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Editors' Foreword

We have written this book thinking about our beautiful planet and what we can contribute to preserve it for present and future generations.

The world is facing an unprecedented set of challenges on a planet that is sustaining a huge number of people and domestic animals with rapidly dwindling wildlife populations and alarming reductions in biodiversity. Every day we hear stories about disease, violence, pollution, climate change, inequality, skewed power distribution, and lack of agency of the most affected, the most vulnerable and the most marginalized – including the populations that cannot speak for themselves and require human stewardship.

The challenges that we face are often interconnected and occur in complex systems where an action can have a multitude of effects – both intended and unintended. But too often still we try to fix complex problems in complex systems with simple solutions. The linear and siloed thinking that is so common nowadays is the result of increasing specialization and reward systems that incentivize silver bullet solutions with clear cause and effect messages. Combined with the technological progress that has allowed many of us to disconnect from nature, many people have grown to believe that there will be technical fixes to the most pressing problems. However, if we want to disentangle and address the multifaceted and integrated drivers of the problems we are seeing, we need to act and think differently.

We know that tinkering is not enough and business as usual has failed and continues to fail us. Many before us have said that we need to embrace holistic and interdisciplinary approaches that recognize the intricate web of interactions in our socio-ecological systems. But how do we break free from the many silos and structures that hold us back and impede the innovations, adaptations and changes that we need? One Health is one of the several approaches available that is supporting systemic solutions, collaborations, thinking and acting in interconnected ways, and seeing ourselves as integral parts of natural systems where each one has a role to play and consequently a responsibility. One Health can help us to break down silos, expand our minds, reach out to others and embrace the complexity, variable perspectives and uncertainty that comes with letting go of the safety of one's comfort zone. We are mindful of the fact that One Health is not a panacea, but we believe that it can help us achieve solutions for better health for all.

This book is about opening your mind to new possibilities that come with One Health. We have written it to facilitate the acquisition of competences that help you connect with others, learn together, question and critique, reflect, be emotional, and link up efforts systematically so that we can make progress. It is led by the Network for Ecohealth and One Health, NEOH (formerly the COST-funded Action Network for Evaluation of One Health), and created by many NEOH members, collaborators and friends.

Our entry-level book aims to contribute to your One Health literacy and to encourage you to look at problems in a different way, embracing the untapped potential stored in collaboration and thinking in systems. We have put it together as multi-author teams with diverse people who have varying skills, knowledge, experience and expertise. This not only allowed us to create a book for people who would like to learn more about One Health, but also gave us all an opportunity for reflection and our own learning. You find in this book a richness of different perspectives that we encourage you to explore even if it may feel uncomfortable at first. We hope that our book helps you to complement your existing skills and knowledge with new competences that unlock new pathways for you to do things differently and that it empowers you to facilitate collective action, foster resilience, and promote sustainable practices that benefit both present and future generations.

Barbara Häslér, Asta Tvarijonaviciute, Sara Savić

Quality Assurance

Here is an overview of the quality assurance process followed for this textbook:

- 1. Conceptual outline development:** Initially, all editors and authors collaborated to create a conceptual outline tailored to the target audience, outlining objectives and predicted content.
- 2. Publisher review:** The book proposal underwent a review by the publisher to assess its viability and alignment with market needs.
- 3. Feedback integration:** Feedback from the publisher and any other initial reviews was incorporated, and the conceptual outline was refined accordingly.
- 4. Chapter alignment:** Regular meetings were held among the editors and authors to ensure that individual chapters were cohesive, complementary, and aligned with the nine core competencies defined for the book.
- 5. Author teams, first draft and editorial review:** Authors prepared the first draft of their chapters. Chapters benefited from multi-author inputs based on the authors' expertise and knowledge; an effort was made to be inclusive. The draft chapters underwent an in-depth editorial review conducted by at least two of the three editors. This step focused on content accuracy, consistency, adherence to the outlined objectives and chapter alignment.
- 6. Author revisions:** Review comments were communicated to the authors, who made necessary revisions to adjust the content based on the editorial feedback.
- 7. External and internal review:** The revised version was sent to external reviewers from the target audience to gather unbiased feedback. We made sure to select people from different fields, regions of the world, gender, and level of seniority. The external reviewers were asked to judge the following:
 - Is the chapter accessible for an entry-level learner? If there are sections that appear not accessible, please mark them in the file/add a note.
 - Does the flow work (is it logical)? If not, please point that out in the file.
 - Is learning made easy? If not, what could be improved?
 - Does it allow you to achieve learning on the competencies that have been ticked?
 - Is the content comprehensive and accurate as far as you can judge given your current knowledge?

Additionally, at least one internal reviewer from the author group provided feedback. The internal reviewers were instructed to comment on the following:

- Is the content comprehensive, accessible and accurate?
- Does the chapter align with your own chapter and are the messages consistent?
- Are cross-references included correctly?
- Does the chapter explicitly facilitate learning of the competences that have been ticked at the beginning of the chapter?

Authors were encouraged to connect for these cross-chapter reviews to align messaging and facilitate exchange and learning. An additional editorial high-level check was performed concurrently at this stage, and further comments were provided as needed. For Chapter 1, a review was invited from a senior One Health expert to ensure accuracy of the content.

Chapters that ticked the competency ‘social, cultural and gender equity and inclusiveness’ were further reviewed by the gender group of the Network for Ecohealth and One Health to ensure consistency across the book.

8. Final version preparation: Authors incorporated the feedback from both internal and external reviewers (and editors where relevant) to prepare a final version of their chapters.

9. Final editorial check and submission: A final editorial check was conducted to ensure that revisions were done appropriately and final files were submitted to the publisher for editing and typesetting.

10. Proofreading: All chapters were subjected to careful proofreading by the chapter authors and the editors.

Artificial Intelligence (AI) use and statement

No generative AI was used in the writing of this book for the majority of the chapters, apart from Chapters 1, 10 and 13 where AI was used to suggest a few short paragraphs that were then reviewed and manually revised by the authors and for the creation of images in Chapter 16.

For the majority of chapters, AI-based tools like Microsoft Editor, Grammarly or Deele were used in order to check grammar and spelling. Two chapters also made use of Google Translate to check certain sentences where the authors were unsure if they had captured the meaning as intended. The authors reviewed and revised all content as needed and take full responsibility for the content of their chapter.

The authors of Chapters 5, 8 and 12 expressly prohibit any entity from using their chapter for purposes of training AI technologies. The authors of the other chapters reserve all rights to license uses of this work for generative AI training.

Acknowledgements

We would never have been able to bring this book to the light of day, if it wasn't for the people believing in One Health and supporting it. Thus, we are most grateful to the very many lead authors and co-authors who provided their skill, expertise and enthusiasm to this book in-kind.

It was important for us to publish this book as an open resource to help facilitate wide access. This was made possible through the generous financial support provided by the Interlab-UMU Research Group at the University of Murcia for the publication fee and smaller contributions made by the Network for Ecohealth and One Health (NEOH) and the Royal Veterinary College for the cover and icon design. We thank Martin Dudek (Not a Binary World, <https://notabinaryworld.com>) for the beautiful designs of the cover and icons and Jeanne Peter (University of Zürich, Switzerland) for the skilful creation of the One Health implementation cycle figure.

We would also like to thank CABI who provided a discount for their open access as part of their commitment to One Health.

Moreover, we are greatly indebted to our external reviewers and contributors who agreed to support our book by sharing with us their skill, insights and time, and providing valuable feedback – at times within a very short time window! They were selected and approached to have a good geographic distribution and cover different backgrounds and expertise. The majority of them also represented the target audience.

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- Evelyn Segredo (Uruguay)
- Sean Sum (Singapore)

We are also very grateful to all the chapter (lead) authors who engaged in cross-chapter review and provided useful comments and suggestions.

Lastly, we express our gratitude to everyone practicing and advancing One Health, providing inspiration and valuable examples in pursuit of more sustainability and a better planet.

Introduction

1 Why and How to Use This Book

Welcome to ‘Principles of One Health for a Better Planet’!

We have designed this textbook as an entry-level resource for a diverse audience encompassing undergraduates, postgraduates and professionals who possess a foundational knowledge and understanding of relevant disciplines or fields such as public health, human health, animal health, environment health, medicine, and are interested in exploring the intersection of these disciplines with wider integrative aspects. Whether you are a researcher, clinician, practitioner or policy maker, this book provides an entry point to the holistic and interconnected world of One Health.

Understanding the complexity of One Health and its intersection with policy requires a thoughtful and accessible approach. We recognize that our readers bring diverse backgrounds, experiences and levels of expertise. Therefore, we aimed to make this book accessible to a wide and mixed audience who have tertiary education or equivalent experience or knowledge, but do not (yet) know much about One Health. With this book, we are aiming to give you an opportunity to gain essential competencies related to the principles, practices and **policy** dimensions of One Health so that you can complement your existing skills, values and knowledge.

To guide your learning, we have structured this book around nine key competencies elaborated in the Network for Ecohealth and One Health (whose members have led the creation of this book) and detailed in Laing *et al.* (2023). These competencies serve as a roadmap for your learning, ensuring that you develop essential skills for navigating the dynamic landscape of One Health.

In this book, we focus particularly on connective and underlying competencies that can be useful for any One Health initiative, e.g. surveillance, education, research or interventions targeted at any type of specific problem, such as infectious disease, pollution, biodiversity loss or antimicrobial resistance. They can complement or be complemented by technical skills in alignment with your professional needs (e.g. epidemiology, microbiology, sociology, computational or other skills). We offer a structured learning approach based on pedagogical principles to help you gain a One Health foundation upon which you can build in the future should you be motivated to continue your One Health journey.

We have pulled together the different chapters in multi-author teams to make use of the rich experience and expertise available in the One Health community. Because the book has been led by members of the Network for Ecohealth and One Health, which is mainly a European network with global links, we have a predominance of European authors with the corresponding cultural, societal and worldview influences. Wherever possible, however, we made a conscious effort to collaborate with colleagues from around the world to bring in broader perspectives, interpretations and examples. Because of the multitude of authors, you will find different writing styles in this book, but all chapters follow the same basic principles to guide your learning as explained below.

2 Core Competencies Covered

The foundational or core competencies covered in this book are shown in Fig. 1 (Laing *et al.*, 2023). You might learn about them now to see how the book is structured and make a note of how you understand them. Each competency is briefly described below based on the

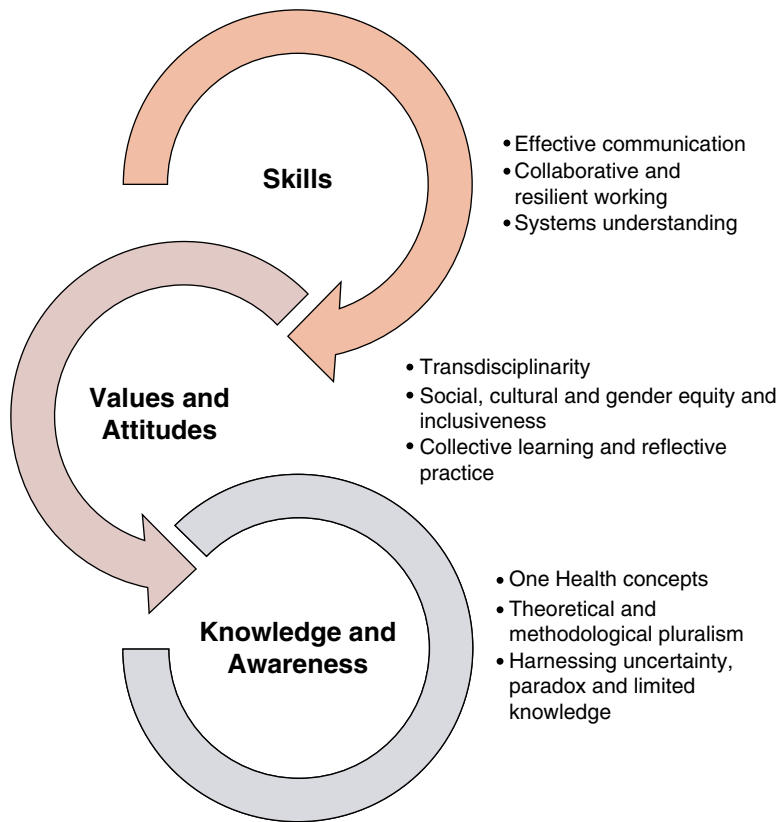


Fig. 1. Nine core competencies covered in this book grouped by skills, values and attitudes, and knowledge and awareness. From Laing *et al.* (2023), unchanged (CC4 BY 4.0 DEED; <https://creativecommons.org/licenses/by/4.0/>).

details provided in Laing *et al.* (2023). We appreciate that at this stage you may not yet grasp the full meaning of these competencies, but the content of the different chapters will cover these topics in depth. Later on, once you have engaged with the content of this book, it might be helpful to return to this chapter and see whether and how your understanding of the competencies might have evolved.

2.1 Effective communication

Effective communication is pivotal in One Health, where collaboration spans diverse *sectors* and societal groups. Different communication models exist that are helpful for One Health, including the transaction model that highlights that communicators are both senders and receivers, integrating social, relational and cultural contexts into dialogues. In One Health, this is crucial for seamless transdisciplinary collaboration, where co-generating and negotiating meaning is essential.

Communication barriers, including language, physical, emotional, cultural, interpersonal and gender barriers, are common in One Health. For instance, sectoral and disciplinary cultures create communication gaps, while gender and cultural differences shape power dynamics.

A One Health competent individual is acutely aware of these barriers and possesses skills such as public speaking, cultural and gender awareness, active listening, and media training. These skills are indispensable for overcoming communication challenges, fostering collaboration and effectively conveying complex One Health concepts. Effective communication is the linchpin for successful collaboration and the advancement of One Health in a globally interconnected and multidisciplinary landscape.

2.2 Collaborative and resilient working

Effective One Health practitioners demonstrate the ability to collaborate seamlessly with diverse partners,

fostering a common understanding and shared goals. Treating others with courtesy, sensitivity and respect is paramount in navigating the innate diversity of approaches, people and perspectives in One Health.

The dynamic nature of One Health challenges demands rapid adaptation to new information, changing conditions and unexpected obstacles. Competence in conflict management and quick recovery is often essential. When working together, we ideally manage differences rather than eliminate or ignore them, allowing collaborators to choose forms of collaboration relevant to their needs. Establishing common goals and defined responsibilities enables network success in specific outcome-driven scenarios.

Resilient approaches to One Health challenges involve adaptive capacities and collaborative governance. Literature indicates that increased adaptive capacity, coupled with collaborative governance, enhances resilience to interlinked and multiscale changes. Emotional resilience is imperative when working across disciplines and sectors, and requires acknowledging and working through a range of emotions that might arise when differing perspectives are coming together and potentially clash. This includes negative feelings, emphasizing the ability to adapt under challenging circumstances and recover from adverse emotions.

2.3 Systems understanding

One Health competent persons comprehend the intricate interconnections between humans, animals, plants and ecosystems. They study these dynamic influences, managing boundaries across scales and identifying stakeholders within complex adaptive systems.

Approaching situations with systems thinking, it is possible to identify relevant elements, relationships and interactions. This involves recognizing patterns and conducting analyses across scales, allowing a nuanced understanding of problems as they emerge. One Health explicitly addresses the multiple interconnections between the health of all living beings within shared environments, viewing health as a dynamic property emerging from interactions within complex adaptive systems.

One Health competent individuals can uncover underlying structures and mechanisms by identifying temporal and spatial patterns in various contexts. They adapt to perpetual changes in complex systems by continuously shifting boundaries and perspectives,

ensuring a comprehensive understanding of evolving issues. The systems thinking mindset extends to teams and projects, where embracing a dynamic approach is encouraged.

2.4 Transdisciplinarity

In transdisciplinarity we transcend disciplinary and sectoral confines to engage in seamless collaboration across diverse societal groups. This competency is rooted in the collective pursuit of solutions, emphasizing the synthesis of many forms of knowledge from different groups and transformative social engagement.

Multiple key characteristics of transdisciplinarity have been described that underscore the interplay between knowledge integration and social transformations. At its core, transdisciplinarity requires individuals to navigate the complex interplay of different perspectives, knowledge forms and problem conceptualizations as they are presented from different groups that are affected by a problem or interested in understanding or tackling it.

In essence, transdisciplinarity calls for a re-evaluation of the way we work, urging professionals to embrace collaborative efficiency over isolated achievement. It encourages a shift towards collective, holistic problem solving in pursuit of meaningful societal impact.

2.5 Social, cultural and gender equity and inclusiveness

Understanding and fostering equity and inclusiveness in multiple health contexts is another core competency in One Health. This involves acknowledging and incorporating considerations of gender, culture and the inherent interconnectedness between human, animal, plants and the environment.

Equity and inclusiveness, within the One Health framework, extend beyond human realms to encompass all living beings. An inclusive and biocentric perspective helps overcome barriers in the One Health space, such as a human-centred view contributing to ecological crises and gender and cultural discrimination leading to health disparities.

This competency challenges a human-centric perspective on nature and health, gender discrimination, cultural biases, societal homogeneity, and the reliance solely on technological solutions. It underscores the interconnectedness of social, environmental and health

crises, and highlights the need for an inclusive approach rooted in justice, integrity and the recognition that humanity is an integral part of nature.

2.6 Collective learning and reflective practice

Demonstrating collective learning and reflective practice involves a commitment to continuous self-assessment, recognizing personal values, and maintaining a humble and active stance as a continual learner.

In One Health, reflective practices underscore the importance of incremental learning from each new experience. Lifelong learning is emphasized, acknowledging ambiguities and uncertainties that come up when dealing with complex problems. Some One Health projects have institutionalized self-reflective processes (e.g. as part of project evaluations) to drive changes in collective learning and practice. Even experiences that yield small learning opportunities can provoke incremental changes in behaviour and foster adaptability to different circumstances.

Reflective practice encompasses a detailed understanding of situations, emotional responses, critical review and future insights, and helps to have an improved awareness of how to integrate one's knowledge into One Health practices. The active acquisition of competencies by individuals is facilitated by a community ethos of self-reflection, promoting a culture of continual learning within the One Health community.

2.7 One Health concepts

A One Health competent individual possesses a deep understanding of various One Health theories, frameworks and methods. The concept of One Health has evolved from a mere mindset to a comprehensive approach, underpinned by diverse theories such as collaboration, communication, transdisciplinarity, collective learning and systems thinking. The continuous expansion of knowledge in this field reflects the dynamic nature of complex health problems and emerging perspectives.

As the definition of One Health has evolved, so has the body of literature, including economic considerations and evaluation methods relevant to issues occurring at the human–animal–plant–environment interface or in socio-ecological systems. A One Health practitioner equipped with knowledge of these evolving definitions,

theories, frameworks and methods can navigate the diverse landscape of One Health activities. Informed choices grounded in nuanced understanding and evidence-based justifications become possible, aligning actions with the ever-expanding body of One Health knowledge.

2.8 Theoretical and methodological pluralism

The coexistence of diverse theories and methods requires practitioners to comprehend, apply and integrate knowledge, theories and ideas from diverse forms of knowledge. One Health, by its nature, draws from a multitude of disciplines and stakeholder perspectives, necessitating a nuanced understanding of ontology, epistemology and philosophical perspectives.

The competent One Health practitioner appreciates the fundamental elements of ontology, addressing what can be known; epistemology, exploring how knowledge is created; and the influence of philosophical perspectives on action choices. The understanding of relationships between truth, models, beliefs and the legitimacy of reasoning processes is crucial. This awareness allows for the moderation and collaboration across the plurality of theories and methods, fostering their coexistence.

In practice, One Health professionals adept in methodological and theoretical pluralism facilitate the synthesis of evidence from various sources. They navigate diverse epistemic and ontological standpoints, including local and indigenous knowledge, fostering a comprehensive system understanding.

2.9 Harnessing uncertainty, paradox and limited knowledge

Effectively managing the inherent complexity of One Health demands an understanding of the incomplete and uncertain knowledge base associated with these complex problems. One Health challenges, characterized by diverse stakeholder perspectives and interlinked complexities, extend beyond technical solutions, requiring adaptive mindsets and behaviours suited for complex systems.

One Health problems are usually inherently wicked (i.e. are difficult to define, have many stakeholders with varying interests, and lack a clear solution due to their ambiguous nature and evolving characteristics), existing within unique contexts and spanning diverse domains,

making traditional technical solutions insufficient. Data limitations and time constraints further complicate decision making, necessitating a trade-off between timely action and an acceptable decision base for stakeholders. A One Health competent person navigates uncertainty and ambiguity and facilitates effective decision making.

A One Health competent individual further recognizes the incompleteness of knowledge and gains a meta-perspective on challenges, appreciating the potential for emerging solutions from diverse viewpoints while respecting that some positions may be incommensurable.

3 Where the Competencies are Covered

The One Health core competencies are addressed in different ways throughout the book, as you can see in [Table 1](#). By re-visiting the core competencies multiple times in relation to diverse topics, you can deepen your learning. It also gives you the opportunity to engage with different perspectives on the same topic and reflect on differing interpretations.

The topics covered in the book are all contemporary topics as they relate to the current understanding of One Health and are essential to the advancement of One Health. While the chapters are structured primarily with the core competencies in mind, they go beyond that to look at relevant technical, social, policy, governance, economic and evaluation aspects with the view to facilitate the design, implementation and improvement of One Health. In each chapter, apart from the theoretical

content, there are questions, thought-provoking activities and applied examples waiting for you to help you acquire the competencies in a practical way.

The introductory chapters trace the historical trajectory of One Health, Ecohealth and Planetary Health, setting the stage for an in-depth analysis. We then provide a comparative examination of One Health and Ecohealth in relation to other integrated approaches to health. The nuanced discussion provides insights into the unique strengths and contributions of these frameworks within the broader health landscape.

Inter- and transdisciplinarity in One Health takes centre stage in another section, highlighting the importance of collaborative approaches in addressing complex health challenges. Knowledge integration, both in the realms of science and decision support, emerges as a critical theme. A detailed exploration of a Data–Information–Knowledge–Wisdom framework offers a structured approach to solving intricate One Health problems, highlighting the need for a holistic perspective.

The practical aspects of One Health intervention and implementation, professional reflexivity, and reflective practice are carefully examined, providing valuable insights into the operationalization of One Health initiatives. Evaluation approaches for One Health initiatives, along with economic considerations, policy, governance and gender equality, are introduced and discussed.

The book expands its scope to encompass the intersections between One Health and Sustainable Development Goals, biodiversity conservation and ecosystem services. It further explores the social determinants of

Table 1. Overview of the nine core competencies and where they are addressed in the book.

Competency	Chapter number
1. Effective communication	6, 7, 10, 11, 14, 16
2. Collaborative and resilient working	1, 2, 3, 4, 7, 9, 10, 11, 14
3. Systems understanding	2, 4, 7, 8, 9, 10, 11, 12, 13, 15
4. Transdisciplinarity	1, 3, 4, 7, 8, 9, 10, 11, 15
5. Social, cultural and gender equity, and inclusiveness	1, 7, 8, 9, 10, 11, 14, 16
6. Collective learning and reflective practice	1, 2, 3, 4, 6, 7, 9, 11, 12, 14, 15, 16
7. One Health concepts	1, 2, 7, 11, 12, 13, 16
8. Theoretical and methodological pluralism	2, 3, 4, 11
9. Harnessing uncertainty, paradox and limited knowledge	4, 5, 6, 7, 11, 13, 14

health at the human–animal–ecosystem interface, acknowledging the interconnectedness of these elements.

Closing chapters delve into the concept of bringing ‘One Health’ home, emphasizing its relevance and applicability in local contexts. Overall, the book offers theoretical insights and practical guidance for addressing contemporary health challenges from a holistic perspective.

4 Navigating the Textbook

Our structured and modular approach enables you to study at your own pace and in the way that works best for you. Each chapter is crafted to build on the previous one, ensuring a gradual and cohesive exploration of One Health concepts and competencies. Despite the gradual increase in complexity and connectivity of topics, the chapters can also be studied individually depending on your interests and experience. At the beginning of each chapter, you will find the following information that will help you to navigate the content easily:

- Elevator pitch
- Book objectives to which the chapter relates
- One Health competencies covered
- Learning outcomes
- Summary

In each chapter, you also find the following icons to help you navigate the content and facilitate your learning:



Key term: Key terms are important words or phrases highlighted within the main text of the textbook, critical to understanding the main concepts and topics discussed in the chapters. They will be in dark blue and in CAPITALS, as well as being flagged using the key term icon, e.g. **ONE HEALTH**.

Glossary terms are words or phrases with definitions and explanations for these terms that are usually specialized terms that not everyone might understand and that are used regularly throughout the book. A glossary helps you understand the content better. These words will be dark blue and bold, e.g. **wellbeing**, and you will find them explained at the end of the book. A key term that is also in the glossary will be dark blue, bold and in CAPITALS, e.g. **HEALTH**.



Key concept: A key concept refers to an essential idea, theory or principle that is critical for understanding the broader topic. These concepts provide an important foundation for acquiring the core competencies and guide your learning throughout the book.



Activity: There are several learning questions, exercises and reflexive intermissions woven throughout the text to enhance understanding and application. For each activity, an example answer is usually provided to help you see how the activity could have been conducted. However, because there are very many possible ways of answering a question or conducting an activity, these example answers are just given as guidance. They serve to provide ideas and viewpoints that you may not have considered, and they allow you to reflect on your own answer. Besides the yellow icon, activities are also marked with a yellow background highlight.



Applied example: In each chapter, you will find case studies and examples that illustrate how theoretical knowledge is applied in practical, context-specific situations. At least the first paragraph of the applied example has a green background highlight.

To bridge theory with real-world application, we provide insights from practitioners, policy makers and researchers who have successfully navigated the challenges and opportunities within the One Health landscape. This contextualization helps you envision how the principles discussed in this textbook translate into action within diverse professional settings.

Our book invites you to explore, engage and contribute to the advancement of One Health. Whether you are taking your first steps into this interdisciplinary realm or are refining or expanding your existing knowledge, we hope that this book becomes a good companion in your One Health learning journey.

Reference

Laing, G., Duffy, E., Anderson, N., Antoine-Moussiaux, N., Aragrande, M. *et al.* (2023) Advancing one health: Updating core competencies. *CABI One Health* 2023, 1–13.