Summary of the Handbook

Chapter 1 evaluates integrated approaches to health with a focus on One Health.

One Health is a relatively novel term rooted in long held understandings of the link between diseases shared between humans and animals (zoonoses), and that underlying biological and physiological processes are found across species. Despite these understandings, health provision and research have increasingly become separated into areas of human, animal and environmental health. However, recent emergence of diseases such as BSE, SARs and highly pathogenic avian influenza has raised the need to look at health in a more holistic manner and apply principles of transdisciplinarity to difficult health problems. In some circumstances One Health has come to the fore with the understanding that addressing the health of species and the environment with an intersectoral and transdisciplinary approach will provide additional benefits. The frameworks to assess One Health programmes and projects are not well developed, and the guide this chapter introduces outlines an evaluation framework for One Health activities such as the provision of services, research and education.

Chapter 2 develops the theoretical foundations for health solutions to shift from sectoral to integrated systems.

The current fragmented framework of health governance for humans, animals and environment, together with the conventional linear approach to solving current health problems, is failing to meet today's complex health challenges and is proving unsustainable. Advances in healthcare depend increasingly on intensive interventions, technological developments and expensive pharmaceuticals. The disconnect grows between human health, animal health and environmental and ecosystems health. Human development gains have come with often unrecognised negative externalities affecting ecosystems, notably loss of resilience, mostly through biodiversity loss and land degradation. Reduced capacity of the ecosystem to serve humanity threatens to reverse the health gains of the last century. A paradigm shift is urgently required to de-sectoralise human, animal, plant and ecosystem health and to take a more integrated approach to health, One Health (OH). The sustainable development goals (SDGs) offer a framework and unique opportunity for this and we argue the need of an OH approach towards achieving them. Feasibility assessments and outcome evaluations are often constrained by sectoral politics within a national framework, historic possession of expertise, as well as tried and tested metrics. OH calls for a better understanding, acceptance and use of a broader and transdisciplinary set of evaluation approaches and associated metrics, which is a key objective of NEOH. We need to shift our current sectoralised, linear focus to a more visible balanced health investment with more global benefits to all species. This is encapsulated in the movements for OH, EcoHealth, Planetary Health and Ecological Public Health, which are essentially converging towards a paradigm shift for a more integrated approach to health. (See CABI Reviews Roadmap to a One Health Agenda 2030)

Chapter 3 explains the One Health evaluation framework

Challenges calling for integrated approaches to health, such as the One Health (OH) approach, typically arise from the intertwined spheres of humans and animals, and the ecosystems constituting their environment. Initiatives addressing such wicked problems commonly consist of complex structures and dynamics. The Network for Evaluation of One Health (NEOH) proposes an evaluation framework anchored in systems theory to address the intrinsic complexity of OH initiatives and regards them as subsystems of the context within which they operate. Typically, they intend to influence a system with a view to improve human, animal, and environmental health. The NEOH evaluation framework consists of four overarching elements, namely: (1) the definition of the OH initiative and its context; (2) the description of its theory of change with an assessment of expected and unexpected outcomes; (3) the process evaluation of operational and supporting infrastructures (the 'OH- ness'); and (4) an assessment of the association(s) between the process evaluation and the outcomes produced. It relies on a mixed-methods approach by combining a descriptive and qualitative assessment with a semi-quantitative scoring for the evaluation of the degree and structural balance of 'OH-ness' (summarised in an OH-index and OH-ratio, respectively) and conventional metrics for different outcomes in a multi-criteria-decision analysis. We provide the methodology for all elements, including ready-to-use Microsoft Excel spread-sheets for the assessment of the 'OH-ness' (Element 3) and further helpful worksheets as electronic supplements. Element 4 connects the results from the assessment of the 'OH-ness' to the methods and metrics described in Chapters 4 to 6 in this handbook. Finally, we offer some guidance on how to produce recommendations based on the results. The presented approach helps researchers, practitioners, policy makers and evaluators to conceptualise and conduct evaluations of integrated approaches to health and enables comparison and learning across different OH activities, thereby facilitating decisions on strategy and resource allocation. Examples of the application of this framework have been described in eight case studies, published in a dedicated Frontiers Research Topic (https://www.frontiersin.org/research- topics/5479).

Chapter 4 shows ways to evaluate the contributions of One Health initiatives to social sustainability.

One Health integrates perspectives from human, animal and environmental health to address health challenges. As the idea of One Health is grounded in achieving sustainable outcomes, an important aspect is the contribution of One Health to social sustainability. In this chapter we ask, what social sustainability is, what the indicators of social sustainability related to One Health are, and, through what measures we can evaluate the contributions of One Health to social sustainability, in terms of its operations, its supporting infrastructures and outcomes. We adopt a wider conceptualization of social sustainability and propose an approach based on basic needs, capabilities and emancipation, environmental justice, solidarity and social cohesion. First, we identify indicators used in literature to capture social sustainability in human, animal and environmental health and propose ways to integrate them into a framework for the evaluation of One Health initiatives. Second, we formulate questions that can be used to evaluate the social sustainability of One Health initiatives. Third, we discuss the viability of operationalising the indicators, the trade-offs that might arise and identify how they can be minimised. We then discuss methodological issues and highlight the importance of transdisciplinary deliberative approaches for adapting the framework to specific contexts.

Chapter 5 shows ways to assess the ecological dimension of One Health.

It provides a conceptual framework describing the main ecological components of the global ecosystem, which need to be considered when using a One Health approach, including incorporating examples of metrics which both reflect the connectedness of different environments and quantify the complex interactions between humans, domesticated and non- domesticated animals and the environment in which they live, and the direct and indirect drivers which impact them. The set of ecological components described should be used to inform the audience on how to quantify the sustainability and thus the 'One Health-ness' of any environment. It is the quantification of an array of these components which demonstrate the 'added value' of One Health, through the savings of lives, improvements in life-lived (quality of life), qualitative gains and financial savings. One Medicine recognises that there is virtually no difference in the paradigm between human and veterinary medicine and both disciplines can contribute to the development of each other; animals should thus be positioned in the social and not the environmental realm, taking a 'less speciecist' stance. It should be understood that when quantifying the health of anything, be it an organism or an ecosystem, the variables measured are all context-dependent, particularly for ecosystem and environmental health. The interpretation of resulting measurements will differ dependent upon a human, an animal and ecosystem perspective, and each of these perspectives has its own value, when thinking about 'One Health'. The environment is a major determinant of health with an estimated 25-33% of the global burden of disease attributed to environmental risk factors. Accordingly, when measuring the ecological dimension of One Health, account needs to be taken of the fitness and sustainability (including integrity) of the ecosystem and environment. This is not easy to quantify, as it results in the creation of indexes of heterogeneous variables, which do not provide an easily interpretable output of resilience. Various indices have been developed which aim to quantify environmental health, including: the long-term sustainability of different ecosystems; the state of the world's biological diversity; describing the status of ecosystem services. Metrics to measure the health status of the world include the 'One Health-ness' of water, air, soil, biodiversity, and ecosystems. They require ecosystem approaches to health to factor in ecosystem interactions in health research. Methods to quantify the health status of populations under closer management of humans also need to be mentioned including those of humans, domestic animals, plants, and aquaculture. Finally, antimicrobial resistance issues across the ecological dimension should be considered. Many of these metrics are very 'human- centric' and should therefore be interpreted with caution. A major challenge for mankind to achieving a One Health in the future is to examine the trade-off from producing food and look for synergies with food quality for both animals and humans but also related to zoonoses emergence. Contaminants, including biological such as pathogens, chemical elements or compounds need to be identified and acted upon. Balancing all ecological components (water, air, soil, biodiversity) is critically important for food security, and both food safety and food security should be interlinked for a One Health approach to sustained global food security. It is critical that a focus on food quality is not just on outcomes such as food nutrients or food safety (e.g. maximum residue levels) but also on how one-health-ness interacts with the food system at different stages of the value chain (production, processing, transport and consumption of food) to affect food quality. Given the growing human population, a set of One Health indicators which capture the link between human health, animal health and ecological health is to inform future global developments, particularly as we enter a period of unprecedented anthropogenic influence on global ecosystems.

Chapter 6 provides guidance for the economic evaluation of One Health.

This chapter gives an overview of the main methods and techniques available for the economic evaluation of One Health initiatives to introduce scientists and professionals from backgrounds other than economics to key considerations and implications of such assessments. The first part of the chapter describes the main analytical tools currently used in economic evaluations and discusses their potential and limitations when applied in a One Health context. A critical assessment is provided in particular to issues dealing with complexity of interrelations between human and animal health, and effective management of environmental resources. The second part of the chapter introduces and describes a range of pragmatic approaches to economic evaluation which have been inspired from the need to deal with and account for such complexity. It also investigates how systems approaches and methods used in One Health can enhance the capacity of economic evaluations to support informed decision making. With this chapter we are making a contribution to develop One Health economics as a scientific trans-disciplinary topic and stimulate further economic evaluations of One Health activities from a broader range of disciplines.

Chapter 7 explains how knowledge integration in One Health policy formulation, implementation and evaluation can contribute to governance.

The One Health concept covers the interrelationship between human, animal and environmental health and requires multistakeholder collaboration across many cultural, disciplinary, institutional and sectoral boundaries. Yet, the implementation of the One Health approach appears hampered by shortcomings in the global framework for health governance. Knowledge integration approaches, at all stages of policy development, could help to address these shortcomings. The identification of key objectives, the resolving of trade-offs and the creation of a common vision and a common direction can be supported by multicriteria analyses. Evidence-based decision-making and transformation of observations into narratives detailing how situations emerge and might unfold in the future can be achieved by systems thinking. Finally, transdisciplinary approaches can be used both to improve the effectiveness of existing systems and to develop novel networks for collective action. To strengthen One Health governance, we propose that knowledge integration becomes a key feature of all stages in the development of One-Health-related policies. We suggest several ways in which such integration could be promoted.