

## Chapter 3

# One Health Study Design

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### **ABSTRACT**

*One health is an integrated approach that considers human, animal, and environmental health components that can improve prediction. One health implies that data on man and animal health and environmental indicators are studied and interpreted together. This chapter focuses on population-based quantitative and qualitative one health study designs with an emphasis on field surveys to understand disease dynamics and how to control measures being tested. The aim is not on early diagnoses of emerging diseases but instead of that on endemic zoonosis. It first describes examples on joint monitoring and surveillance to control diseases and then practical information on planning of a field study design, and concludes on the advantages of one health study designs. Also discussed are possible constraints for their implementation. For the examples, single sector approach could not explain the main epidemiological considerations.*

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## WHAT IS A ONE HEALTH STUDY?

Human and animal health epidemiological studies done by field surveys or secondary data analyses. During different periods data is collected within human and animal health sector and interpreted and also when an identical health topic is approached, which leads to unwanted duplication of field studies. Studies on zoonoses and foodborne pathogens are mainly led by public health veterinarian. Risk assessment along the production and marketing chain of food borne pathogen in livestock sector approach allows the identification of the point of greatest leverage of control measures. Human health hazards are identified and impacts on human health are interpolated from numbers. New integrated disease surveillance systems are under evaluation (Wendt *et al.*, 2014). From separated studies it is difficult to draw coherent conclusions on linkages between human and animal health. Knowing the main source of human infection is important to achieve the greatest leverage in reduction of human infections. A One Health study implies that data on human and animal health, possibly also on ecological indicators, are analysed in an integrated way and are interpreted together. Sometimes these data are from different studies or data sources, but they should be comparable in terms of location, time, level of aggregation, details and quality, and a multidisciplinary team should publish their results together. A One Health study should lead to insights that would not be visible without intersectoral collaboration such as impacts of multi-host infections on humans, animal and ecosystem health and economics (Zinsstag *et al.*). Rabinowitz *et al.* (2013) have defined a One Health approach similarly: 'Integrated approaches that consider human, animal, and environmental health components that can improve prediction and control of certain diseases'. This is not only true for infectious diseases, but also for non-communicable diseases and health system strengthening. The aim is not necessarily improved human health or averted human burden of disease. Messenger *et al.* (2014) showed that an increasing number of reports indicate that humans are transmitting pathogens to animals. Recent examples include methicillin-resistant *Staphylococcus aureus*, influenza A virus, *Cryptosporidium parvum* and *Ascaris lumbricoides*.

A One Health study would show bi- and multidirectional relations between human and animal health and their health in relation to the health of their ecosystem (Zinsstag, 2012). Thus the aim is ideally improved human, animal and ecosystem health. The most difficult step of a One Health study remains the initiation of a process that leads to change and health improvement. To successfully control neglected zoonoses we must extend our vision outside the health sectors; for example policies may need to be focussed into poverty reduction strategies and continuous training to build health service skills and competences. Networking and regional approaches have been successfully used for zoonoses control (Parkes *et al.*, 2012). Avian influenza led to

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