

## Research Project

# Systems epidemiology of human schistosomiasis and livestock fascioliasis in sub-Saharan Africa

### Third-party funded project

**Project title** Systems epidemiology of human schistosomiasis and livestock fascioliasis in sub-Saharan Africa

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**Organisation / Research unit**

Swiss Tropical and Public Health Institute (Swiss TPH) / Health Impact Assessment (Utzinger)

**Department**

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Background: Faced with complex issues of global change, the inextricable interconnection of humans, pet animals, livestock and wildlife is evident and requires integrated approaches to maintain and further improve human and animal health. In 1984, Calvin Schwabe reintroduced the concept of “one medicine”, which has its conceptual roots two centuries ago. “One medicine” recognizes that there is no difference of paradigm between human and veterinary medicine and both disciplines can contribute to the development of each other. The close interdependence of humans and animals in their social and ecological context relates to the concept of “human-environmental systems”, more recently phrased “social-ecological systems”. A systemic approach to health in social-ecological systems requires inter- and transdisciplinary inquiry to further our understanding of complex interactions in health-related fields. Ecosystems and the services they provide are threatened by demographic, environmental and social transformations and economic activities. In turn, disrupted and depleted ecosystem services may negatively affect human and animal health. We enter thus into a negotiation on the trade-off between health, socio-economic wellbeing and the maintenance of ecosystem services. This requires a deeper understanding than heretofore of the dynamics of environmental and social systems and their intimate connection with human and animal health and wellbeing. Goal and specific objectives: The goal of this project is to deepen our understanding of a selected human disease (i.e. schistosomiasis) and livestock disease (i.e. fascioliasis) in their social-ecological systems, and to assess the mutual interdependence of human and animal health as a quantitative and qualitative interaction and outcome process in given social-ecological contexts. Specifically, we will (i) determine the frequency and transmission dynamics of human schistosomiasis and livestock fascioliasis; (ii) employ an integrated risk profiling approach to identify behavioural, demographic, environmental and socio-economic determinants of disease risk and reinfection patterns; and (iii) engage communities and other stakeholders to develop disease control interventions that are tailored to the prevailing social-ecological systems. Methods: Human schistosomiasis and livestock fascioliasis will be assessed in their systemic interaction with demographic, environmental and social systems in the Lake Chad area (western Chad) and the Korhogo region (northern Côte d'Ivoire). The dynamics of the hydrological systems (seasonal extend of water surface) and environmental data (e.g. land surface temperature, vegetation indices and land use patterns) will be obtained by readily available high-resolution remote sensing sources. Social systems assessments will include demographic composition of humans and their livestock, whereas socio-economic status will be determined by a household-based asset approach. The spatio-temporal dynamics of schistosomiasis and fascioliasis will be compared between western Chad and northern Côte d'Ivoire aiming at identifying generic and specific trends and interactions. Specifically the mutual predictive potential of schistosomi-

asis prevalence in humans for fascioliasis in animals and vice versa will be examined. Such an in-depth understanding will serve as the basis for the planning of setting-specific interventions. Interventions will be developed as part of a participatory transdisciplinary process involving local communities and other stakeholders. Expected outcome and innovations: Research proposed here will result in (i) a deeper understanding of social-ecological systems that govern selected human and animal parasitic diseases; (ii) an integrated approach for risk profiling of human and animal diseases, which might have mutual predictive potential; and (iii) community- and other stakeholder-led interventions that are tailored to the prevailing social-ecological systems to improve health of humans and animals, alleviating poverty and maintaining ecosystem services.

**Keywords** One health, Cattle, Transdisciplinarity, Land use, Epidemiology, Geographical information system, Fasciola spp., Parasitology, Schistosoma spp., Hydrology, Risk profiling, Human, Social-ecological systems

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**Add publication**

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**Specify cooperation partners**