

One Health

Connecting Human, Animal, and Environmental Health



One Health is a holistic approach for collaboration across disciplines and sectors, working to attain the best possible health outcomes for humans, animals, and the environment. Though not a new concept, this approach is increasingly used to address health issues, including emerging infectious diseases, food safety and security, environmental hazards, and chronic diseases. Operationalizing One Health involves systems thinking, the ability to build successful multidisciplinary teams, and leadership to coordinate effectively with stakeholders from varied disciplines and sectors.

Overview

Multiple interrelated global factors have changed the way that humans and animals coexist in—and interact with—the environment, including exponential human and livestock population growth, urbanization, climate change, and the globalization of trade and travel. These changes have contributed to emergence and reemergence of infectious diseases, including Ebola virus disease, West Nile Virus encephalitis, severe acute respiratory syndrome (SARS), and antibiotic resistant strains of *Salmonella* and other foodborne and waterborne pathogens. In addition to infectious diseases, other emerging health issues at the human-animal-environmental nexus include shared human and animal exposure to chemical environmental pollutants, acute and long-term impacts of contaminated food supplies, and chronic diseases (such as some cancers) of humans and animals.

Areas of Expertise

RTI International possesses a breadth and depth of subject matter expertise across human, animal, and environmental health disciplines, including the following:

- Epidemiology
- Public health

- Food safety
- Risk analysis
- Biostatistics and health modeling
- Environmental sciences and engineering
- Human and veterinary medicine

With offices around the world and an extensive global network, we build interdisciplinary teams experienced in addressing domestic and international health challenges through a system-wide One Health approach. As a nonprofit research institute, RTI prioritizes scientific rigor, impartiality, and strong relationships with academic, government, and other partners. Our teams successfully integrate data collection, analysis, and outreach in different geographical and cultural settings. We are a partner in implementation of the Global Health Security Agenda.

Research Capabilities and Selected Project Highlights

Antimicrobial Resistance

Antimicrobial resistance (AMR) is the ability of microbes to resist the effects of drugs. This global health threat is the result of systematic misuse and overuse of antimicrobial

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drugs in human and animal medicine. AMR has clear links to the domains of human, animal, and environmental health and is a priority area of the Global Health Security Agenda.

Molecular Surveillance of AMR, Nepal. RTI is working with multisectoral, in-country partners in Nepal to compare phenotypic resistance and patterns of molecular markers for resistance among humans, live poultry, poultry products, and poultry farm environments. The research team for the project includes epidemiologists, laboratorians, physicians, and veterinarians. Through this One Health approach, RTI works to demonstrate the effectiveness of molecular surveillance in developing countries and toward implementation of the World Health Organization's Global Antimicrobial Resistance Surveillance System (GLASS) in low-resources settings.

Food Safety and Risk Analysis

Foodborne illness is a common and preventable health threat. RTI's experts prevent foodborne illness by improving the safety of the food supply domestically and internationally. This team of epidemiologists, veterinarians, microbiologists, economists, environmental engineers, and geographic information system experts works on a range of experimental modeling, complex dataset analysis, and policy evaluation topics. Our team partners with governments, private industries, and foundations. Recent projects include building models that predict the risk of pathogen contamination on farms in relation to surrounding land use, developing approaches to rank biological and chemical risks in human and animal foods, developing decision tools for risk prioritization, and assessing public health impacts of different microbiological standards for *Salmonella* in poultry.

Vector-borne Diseases

Mosquitoes, ticks, and other vectors can transmit infectious diseases—including viral, parasitic, and bacterial diseases—between humans or from animals to humans. These vector-borne diseases can be difficult to prevent and control because of the complex environmental and social factors that determine their distribution.

Unmanned Aerial Vehicles (UAVs) to Enhance Integrated Mosquito Management, Guatemala. Zika virus is transmitted primarily by infected *Aedes* species mosquitoes. These mosquitoes prefer to live near humans and typically lay eggs in and near standing water. RTI epidemiologists, biologists, and engineers are working to reduce the risk of Zika virus infection in Guatemala. Through collaborations with entomologists, as well as local and national Guatemalan health officials, RTI developed maps of potential mosquito breeding sites in select Guatemalan villages using UAVs, also known as drones. In contrast to the hand-drawn village maps typically used in this setting, UAV-generated maps provide health officials with information for enhanced integrated mosquito management. Municipal vector control teams use the UAV-generated maps to direct insecticide spraying and vector-borne disease prevention education for populations at increased risk of Zika virus infection.

Environmental Risk Assessments

For more than 30 years, RTI has been conducting environmental risk assessments, including the development of integrated methods and models for performing multimedia, multi-pathway, human, and ecological risk assessments. These assessments evaluate potential chemical releases to the environment from the management of industrial and municipal by-products, the fate and transport of these releases, and the subsequent impacts to humans and animals through direct (e.g., soil and water) and indirect (e.g., food chain) exposures. For example, the RTI team used a One Health approach to evaluate the human, animal, and environmental health impacts of applying biosolids—or recycled and treated sewage sludge—to agricultural soil.

More Information

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