We Are Facing National and Global Health Challenges

Humans, animals, plants, and the environment are inextricably linked with the health of one affecting the health of all. What can the University of Tennessee (UT) do to ensure that the circle of life remains healthy and balanced?

The One Health concept recognizes that health issues must be addressed cohesively instead of independently. This convergence approach is essential when considering that approximately 70% of emerging infectious disease cases in humans and livestock are a consequence of spillover events from wildlife. Similarly, humans play a role in animal disease emergence by facilitating global transfer of infectious agents, altering landscape conditions, and adding environmental disturbances. Losses due to plant diseases can reduce global agricultural productivity by up to 40% for the five major food crops, thus undermining our ability to safeguard national and global food security. In response, state, national and international governmental agencies have initiated programs directed at developing One Health solutions to address the rapidly emerging national and global health challenges that we face.

One Health Challenges in Tennessee ~ Real Life Problems Need Real Life Solutions

Tennessee is ground zero for many emerging infectious and non-communicable diseases where human, animal, plant, and environmental health intersect. Our farmers, veterinarians, and public health officials often see the ravages of disease firsthand and need innovative strategies to cope with these threats. For example, chronic wasting disease (CWD) was detected in 2018 and is now confirmed in several western Tennessee counties with projected economic losses of up to $100 million annually. The periodic occurrence of livestock diseases continues to erode the profitability of farmers in Tennessee and beyond, such as the 2016 high pathogenic avian influenza (HPAI) outbreak that resulted in the death toll of tens of thousands of chickens in our state (~50 million animals and $3 billion loss nationwide in 2015). The number of Lyme disease cases and other tick-associated syndromes are on the increase in Tennessee. Our researchers continue to be alarmed by the rise of antimicrobial resistant (AMR) pathogens across human and animal health ecosystems.

There are also numerous health issues in Tennessee that are not infectious in nature, but require a One Health approach to mitigate potential disasters. Pollinators, necessary for plants and crops to grow and flourish, are disappearing worldwide in numbers not seen before. The wonderous biodiversity that makes up the Great Smoky Mountains National Park is rapidly declining due to eroding soil fertility, air and water quality, and invasive insects. These changes have and will reduce natural resources and recreational benefits available to Tennesseans and the more than 11 million annual visitors to the most-visited national park. In already distressed rural communities of Tennessee, the impacts of the opioid crisis on the health of families, pets, livestock, crops and ecosystems are escalating, but have been under-investigated.

These real-life examples, coupled with numerous reports of declining populations of environmentally crucial species, many of which are unique to Tennessee, make it imperative to develop innovative and collaborative approaches to discover and implement long-term solutions to maintaining and enhancing our quality of life in Tennessee and beyond. **It is based on this rationale that we are launching the strategic University of Tennessee One Health Initiative (UTOHI).**
UTOHI Is Poised to Make a Difference

UT has a long history of being engaged in and leading One Health studies before it was called One Health. The Center for Wildlife Health and National Institute for Mathematical & Biological Synthesis both provide multidisciplinary environments for the study of health issues arising from the interaction of wildlife, livestock, humans, and the environment. The most recent issue (Fall/Winter 2019) of Land, Life & Sciences magazine, published by the University of Tennessee Institute of Agriculture (UTIA), highlights a few transdisciplinary One-Health research and outreach endeavors at UT.

Efforts began in 2019 with the first One Health planning meeting held at UTIA with over 50 interested faculty and scientists participating from across numerous departments and colleges. Based on the vast interests across campus, a taskforce committee was formed to develop a white paper outlining the mission and vision as well as expand awareness of One Health activities across UT, Oak Ridge National Laboratory (ORNL) and our State Partners.

Central to the purpose and expected outcomes of the UTK-UTIA reunification are increased collaborations across different disciplines, greater impacts on the economic prosperity of our state, and elevated academic prominence of UT. Launching of UTOHI is a timely and strategic step toward attaining these goals. This Initiative will be supported by a substantial internal financial investment, strong commitments of current faculty members from various colleges/disciplines, designation of One Health as a priority area for future faculty hires, and appointment of an interim director – Dr. Debra Miller. Dr. Miller is an internationally recognized scholar in the One Health arena and holds a split appointment between the UT College of Veterinary Medicine and the Department of Forestry, Wildlife and Fisheries. Working with Dr. Miller is a faculty leadership team comprised of prominent UT faculty members who will help implementing the UTOHI. An Advisory Board consisting of key internal and external stakeholders will provide guidance and support in identification of programmatic priorities, development of strategic partnerships, and pursuit of external funding opportunities. Our goal is to transform UTOHI to The Tennessee Center for Global Health (TCGH) by 2024.

The initial investment of resources is jointly provided by UT AgResearch, UT Office of the Vice President for Research, UTK Office of Research and Engagement, UTK Office of the Provost, Joint Institute of Biological Sciences of ORNL, UT College of Veterinary Medicine as well as faculty commitment support from the Deans of the Tickle College of Engineering, College of Arts and Sciences, College of Education, Health and Human Sciences, College of Nursing, College of Social Work, College of Law, and Herbert College of Agriculture.

Vision of UTOHI/TCGH

A clearinghouse for transformational discoveries that aim to improve animal, human, plant, and environment health, and serve as a global incubator for future generations of One Health experts.

Characteristics and Expected Outcomes/Impacts of UTOHI/TCGH

1) Build on and converge the current UT expertise and research strengths in animal science, biological sciences, data science, mathematical sciences, engineering, environmental science, plant sciences, public health, social science, and veterinary science to investigate infectious and non-infectious factors impacting the health of humans, animals, plants and the environment.

2) Create new strategic partnerships/synergies among academia, state and federal agencies, industries, NGOs and other stakeholders.

3) Enhance UT One Health expertise by making it a priority in future strategic faculty/staff hires.

4) Communicate One Health strategies and activities across the state, the nation, and the globe.

5) Deliver novel solutions to amplify the health and well-being of humans, animals, plants, and the environment in Tennessee and beyond.

The time to act is now to become a leader in the One Health grand challenge area. We are excited about this strategic initiative and the impacts it will bring about to the state of Tennessee, the United States, and the world. For more information contact Dr. Deb Miller: dmille42@utk.edu.