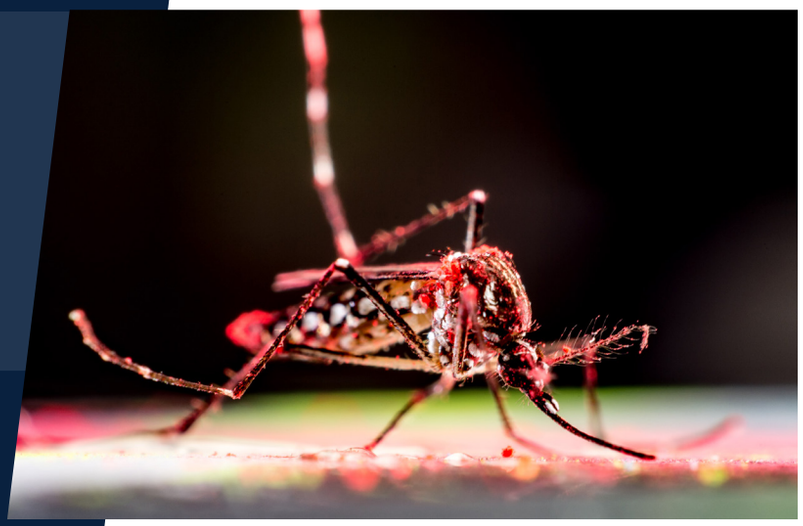
Understanding and stopping the spread of vector-borne diseases



The University of Notre Dame is one of the nation's leading forces in vector biology research, working to understand what determines the susceptibility to infection and transmission of diseases spread by mosquitoes and other vectors. In 1957, entomologist George Craig established Notre Dame's Vector Biology Laboratory with an initial focus on mapping the morphological traits of the *Aedes* genus of mosquitoes. Today, Notre Dame continues to lead the field of vector biology research, with key specialities in genomics, bioinformatics, and vector surveillance technology.

Learn More

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Strong Partnerships

Notre Dame supports interdisciplinary efforts and collaborative partnerships around the world committed to preventing, diagnosing, and treating vector-borne diseases, especially those that impact low-income and resource-poor countries. Through its partnerships with the Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), Unitaid, the United States Agency for International Development (USAID), the Midwest Center of Excellence for Vector-Borne Diseases (MCEVBD), and ministries of health in multiple nations, Notre Dame has implemented an entomological surveillance-planning model. This model helps partners understand vector-borne disease transmission dynamics and evaluate elimination methods.

Interdisciplinary Collaboration

The **Eck Institute for Global Health** (EIGH) serves as a University-wide enterprise that recognizes health as a fundamental human right and works to promote research, training, and service to advance health standards and reduce health disparities for all. The EIGH also coordinates multidisciplinary teams of undergraduate and graduate students, offering field research opportunities that engage students in addressing health challenges and promoting global health leadership.

Best-in-class Core Facilities and Field Stations

The **Genomics and Bioinformatics Core Facility** (GBCF) is a state-of-the-art facility dedicated to the comprehensive collection and analysis of genomic and bioinformatic data. The services provided by GBCF are designed to acquire information through next-generation sequencing technology, a variety of standard and custom RNA and DNA library construction methods, 10x single-cell sequencing, chain-termination (Sanger) sequencing and fragment analysis, and a range of quality control techniques.

Notre Dame's **Belize Vector and Ecology Center** (BVEC) is a field station that is committed to investigating a wide variety of ecological, animal, and public health concerns. Affiliated with the Department of Biological Sciences and the EIGH, BVEC conducts routine sample collection, preparation, and testing of vectors and vector-borne diseases. The facility is able to perform mosquito-rearing exercises to observe drug resistance traits in mosquito samples and houses advanced DNA and RNA extraction and sequencing equipment available for pathogen detection.

VECTOR BIOLOGY AT NOTRE DAME

Signature Research Areas

Vector surveillance: Notre Dame researchers are globally engaged in studying vector-borne diseases such as malaria, dengue, Chagas disease, and leishmaniasis. The Remote Emerging Disease Intelligence-NETwork (REDI-NET) is a collaborative network of domestic and international partners which address surveillance needs to effectively detect, predict, and contain potentially emergent vector-borne diseases. REDI-NET has developed a global health computing platform to optimize pathogen discovery and to provide actionable pathogen intelligence for decision-makers. Specific areas of research include genomic sequencing, population biology, the development of genomic tools for arthropod identification, and the analysis of local transmission dynamics.

Vector control strategies: Notre Dame faculty have developed a decision framework for ministries of health in Bangladesh, Mozambique, Myanmar, Namibia, and Panama. The framework uses entomological data to drive strategy and policy decisions that protect vulnerable populations from vector-borne diseases. Additionally, vector control studies have focused on the evaluation of spatial repellents, genetic control technologies, insecticide discovery, and endectocides as elimination methods.

Emergence of resistance to antimalarial drugs: Notre Dame hosts a robust program dedicated to using genetic crosses to understand drug resistance traits as they evolve. While the burden of malaria deaths has decreased by more than 50% since 2000, malaria is still responsible for up to half a million deaths annually, primarily among African children. The emergence and spread of drug-resistance *Plasmodium falciparum* poses a continual threat to global efforts to eliminate malaria. In collaboration with the National Institutes of Health, Notre Dame researchers are creating novel crosses for the rapid identification of genetic loci and genes responsible for resistance.

Vector predictive impacts: Researchers at Notre Dame are working on attaining a predictive understanding of where vector-borne diseases occur, what the impact of interventions will be in curtailing their burden, and how the distribution of these diseases will change over time as a result of changes in their underlying drivers. Vector mapping and forecasting have applications in vector disease prevention, intervention, and treatment efficacy.

Workforce Development

As concerted efforts towards the identification of novel vectors continue to advance, a demand for talented healthcare leaders who can commit to global health equity is evident. With research projects spanning over 40 countries, the EIGH offers undergraduate and graduate students the opportunity to understand the roles that ecological, societal, environmental, and political factors play in contributing to global health concerns. The undergraduate minor in global health provides foundational courses in researching and evaluating global health issues that are then reinforced by experience in a global health setting. Jointly offered by the Eck Institute for Global Health, the College of Science, and the Keough School of Global Affairs, the two-year Master of Science in Global Health program boasts a solid curriculum which concentrates on the application of survey research, laboratory research, and project management to real-world experiences, strengthening students' capacities to effectively address the complex nexus of global health, development, and poverty.

