

# Title: Global Climate Change and Infectious Diseases

**Supervisor/s:** Dr Yuming Guo and Professor Gail Williams

**Funding:** “student scholarship required”

## **Student Objectives:**

1. Understanding the role of climate change in the transmission of infectious diseases;
2. Learn and apply a variety of quantitative analysis techniques, for example, spatial analysis, time series model;
3. Learn and apply GIS skills to map the spatial distribution of the infectious diseases;
4. Provide regular research updates through oral and written presentations;
5. Attend international and national conferences to present the research outcomes.

## **Project Outline:**

It is clear that climate is changing globally. Climatic factors are risk factors for the emergence and re-emergence of infectious diseases, in addition to multiple biological, human and ecological determinants. One concern is that whether climate change impacts the introduction and dissemination of many serious infectious diseases, for example, the incidence of mosquito-borne diseases (dengue and malaria) which are very sensitive to climate. Climate change would directly affect disease transmission by shifting the vector's geographic range and increasing reproductive and biting rates and by shortening the pathogen incubation period. Human migration and damage to health infrastructures from the projected increase in climate variability could indirectly contribute to disease transmission. Human's susceptibility to infections might be further compounded by malnutrition due to climate stress on agriculture and potential alterations in the human immune system caused by increased flux of ultraviolet radiation. Therefore, understanding how climate change impacts the emergence and distribution of infectious diseases will ultimately help optimize preventive strategies.

In this project, a global dataset including infectious diseases and climatic factors will be used. The PhD student will map the spatial and time distribution of dengue fever, examine the associations between climatic factors and infectious diseases (dengue and malaria), and project future transmission of infectious diseases under several climate scenarios. All analyses and maps will be conducted using R software.

## **Specific Aims:**

1. To model the global spatiotemporal trend of infectious diseases in the past decades;

2. To assess the associations between climatic factors and infectious diseases;
3. To develop novel statistical models in the assessment of climate change and infectious diseases;
4. To project future infectious disease transmission under several scenarios of climate change.

**Achievable Outcomes:**

1. PhD degree in Epidemiology or Public Health;
2. Several scientific papers in high quality journals;
3. Present research findings at international and national conferences;
4. Proficient in using R software or other statistical software.