Title: Quantifying the Burden of Air Pollution on Lung Cancer Incidence and Mortality in China

Supervisor/s: Dr Yuming Guo, Professor Gail Williams and Professor Rachel Huxley

Funding: "student scholarship required"

Student Objectives:

1. Understanding the associations between air pollutants and lung cancer incidence and mortality in China;
2. Learn and apply a variety of quantitative analysis techniques, for example, spatial analysis and Bayesian analysis;
3. Learn and apply GIS skills to map the spatial distribution of the lung cancer incidence and mortality;
4. Provide regular research updates through oral and written presentations;
5. Attend international and national conferences to present the research outcomes.

Project Outline:

China has been experiencing a surge in cancer incidence and mortality in recent years, with about 3.12 million new cases developing annually, according to a 2012 report from the National Central Cancer Registry of China. Lung cancer rates in particular have skyrocketed, making China the home to about 32% of the world's lung cancer patients. Determining the potential risk factors is crucial for cancer prevention and control. The established risk factors for lung cancer include smoking and air pollution. Especially, ambient air pollution is the most widespread environmental carcinogen. It is estimated that 12.8% of global lung cancer death can be attributed to exposure of the fine particulate matter alone. In 2010, 223,000 deaths from lung cancer worldwide were attributed to air pollution.

With the fast economic growth and increased urbanization of the country, China is experiencing very high concentrations of air pollutants. The average concentrations of fine particulate matter in densely populated regions of China exceed $100ug/m^3$. However, studies on ambient air pollution and lung cancer have never been investigated on a national level in China. This project is planned to investigate lung cancer incidence and mortality in relation to long-term exposure to ambient air pollutants, for example, fine particulate matter ($PM_{2.5}$) and ozone (O_3).

Specific Aims:

1. To model the spatiotemporal trend of lung cancer in the past decades in China;
2. To assess the associations between air pollution and lung cancer;

3. To develop novel statistical models in the assessment of burden of air pollution on lung cancer.

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.