Repeated evolution of drug resistance in the Plasmodium falciparum malaria parasite is a profound threat to the successful control of the disease. Artemisinin-resistant malaria has emerged in South-East Asia and most recently in Africa, where the majority of global malaria deaths occur. This represents a major challenge in combating malaria in the near future. Mathematical models can be used to analyse how different epidemiological and pharmacodynamic factors interact with parasite population dynamics to drive spread or extinction of resistant parasites. Such models have given key insights into the role of various factors such as the drug elimination half-life and human immunity to malaria. However, there remains much potential for further modelling analysis to inform international policies combatting antimalarial drug resistance.

The aim of this project is to investigate key drivers of antimalarial drug resistance and provide insights into strategies which could slow or prevent spread of resistant parasites. The student will extend existing individual-based models of malaria transmission to track the spread of different parasite variants using genetic barcodes. The analysis will involve extensive simulation of a variety of different scenarios of antimalarial drug use, transmission intensity and other factors that may affect resistance. The student will be part of a team working on a large new National Institutes of Health-funded project tracking artemisinin resistance in East Africa. The model will be calibrated and validated against these new datasets from East Africa, as well as a wealth of historical data on the spread of previous drug-resistant malaria strains. The model will be used to identify areas that may be vulnerable to artemisinin resistance in future, and to contrast which control measures may be most effective at reducing artemisinin resistance spread.

The student will be based in the MRC Centre for Global Infectious Disease Analysis, Department of Infectious Disease Epidemiology, Imperial College London. We are one of the largest academic departments specialising in infectious disease epidemiology in Europe and a World Health Organization Collaborating Centre. Our highly interdisciplinary research focuses on the transmission, evolution and control of infectious diseases in human and animal populations. We have particular strengths in epidemiological and mathematical modelling, backed by focussed field and experimental research. The student will also collaborate regularly with supervisors at LSHTM and the NIH-funded team, including partners in East Africa.
Applicants should have a background in a subject within the quantitative or life sciences – including mathematics, physics, statistics, biology, zoology, genetics, biochemistry, biomedical sciences, economics.

For more information on how to apply to us please visit: [https://www.imperial.ac.uk/grantham/education](https://www.imperial.ac.uk/grantham/education)