Title of PhD project / theme	**Multivariate statistical analysis of serological data to inform malaria control and surveillance**
Supervisory team	Nuno Sepúlveda & Chris Drakeley (LSHTM) Satoshi Kaneko & Akira Kaneko (Nagasaki University)
Brief description of project / theme	Malaria elimination is currently on the agenda of more than 30 countries worldwide. This agenda brings unprecedented epidemiological challenges, such as how to measure ongoing transmission and the impact of future disease interventions when an extremely small number of infected individuals are expected to be found over time. Epidemiological metrics based on antibody data are gaining general interest because they aim to quantify exposure rather than infection. The utility of these metrics is, however, determined by the total number of antibody responses under analysis. Recently, microarray or multi-bead platforms for antibody quantification have been developed with the potential of generating antibody data for large numbers of malaria antigens. The respective analysis is not simple and calls for more advanced methods than repeating univariate analysis of each antibody, as is the current practice. This project aims to develop multivariate statistical methods for the analysis of multi-antibody data. These methods are expected to consolidate epidemiological evidence of individual antibody data, thus, increasing the precision and interpretation of the findings in malaria elimination settings. These methods will be relevant to other infectious diseases.
Particular *prior* educational requirements for a student undertaking this project	Some knowledge of R language and multivariate methods will be helpful but not essential.
Skills we expect a student to develop/acquire whilst pursuing this project	Wide programming skills including data processing and data analysis. Work with large data sets. Work in a multidisciplinary team. Critical thinking of epidemiology, immunity, disease elimination and quantitative methods