2022_96_SPH_Basanez: Modelling the environmental suitability of the zoonotic infection taeniasis/cysticercosis

Supervisors: Professor Maria-Gloria Basáñez (mailto: m.basanez@imperial.ac.uk); Dr Mattew A. Dixon: Schistosomiasis Control Initiative (SCI) Foundation and Imperial College London; Dr Martin Walker: Royal Veterinary College (RVC) and Imperial College London; Dr Claudio Fronterre: University of Lancaster

Department: School of Public Health

The health and economic burden imposed by the zoonotic cestode, *Taenia solium*, is substantial, posing a major global health challenge across endemic countries. Taeniasis/Cysticercosis, caused by *T. solium*, is also a prime example of a One Health disease, involving humans, pigs, the environment and their interactions [1]. The World Health Organization (WHO) has proposed milestones in its 2021-2030 Neglected Tropical Disease (NTD) roadmap for 17 endemic countries to achieve intensified *T. solium* control in hyperendemic areas by 2030 (https://www.who.int/publications/i/item/9789240010352). However, a major research gap remains in understanding the spatial distribution of *T. solium*, including where the conditions are suitable to support the *T. solium* transmission cycle at finer spatial resolutions across reported endemic settings. This process will further facilitate the identification of endemi city zones to support country- and sub country-level planning of control programmes.

Environmental suitability modelling is a powerful tool that has been used for other NTDs to determine environmental suitability in areas of uncertain endemicity status to aid national programme planning and identification of priority areas for mapping surveys to support control and elimination efforts [2].

The student will undertake an interdisciplinary project to systematically identify suitable data sources (human and pig infection data along with climate/environmental and livestock covariates) to support environmental suitability modelling for *T. solium* in different endemic regions of the world (Africa, Asia and Latin America). Boosted regression tree models with optimised hyperparameter selection will then be developed to map environmental suitability in reported endemic locations, followed by defining thresholds for environmental suitability to assess the probability that potential implementation units exceed these thresholds. Other research questions will be explored associated with how pig husbandry systems in different contexts (e.g., emerging peri-urban settings) and changing husbandry systems influence environmental suitability.

The results of this project will be harnessed to support national *T. solium* control programme planning, through the existing networks of the supervisors, including CystiTeam [3] and CYSTINET-Africa.

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