

## **PhD Project: Model-based evaluation of dog rabies vaccination campaigns in Tanzania**

**Supervisor:** [Dr Olivier Restif](#)

### **Project Description**

Rabies remains endemic across large parts of the world, killing thousands of people every year. Although wildlife reservoirs contribute to the persistence and spatial spread of the virus, most victims contract rabies from bites by infected dogs. Hence dog vaccination has been a cornerstone of rabies prevention and elimination campaigns for decades. Thanks to the low reproductive number ( $R_0$ ) of dog rabies, it is theoretically sufficient to immunise 40% of dogs to prevent outbreaks. In Tanzania, despite repeated mass vaccination campaigns in dogs, sporadic rabies outbreaks continue to occur, spreading through rural communities where vaccine coverage is too low. Previous surveys have highlighted heterogeneity in coverage (proportion of dogs vaccinated), completeness (proportion of villages enrolled) and timeliness (frequency of campaigns) across the country as an ongoing concern.

The aim of this PhD project is to assess the impact of these factors on rabies control in Tanzania. The first objective will be a detailed analysis of 20 years of data on vaccine campaigns and epidemiological reports of dog bites and rabies cases at a fine spatial scale. The second objective will be the development and validation of spatial dynamic models for the circulation of dog rabies in Southern Tanzania. The third objective will be to generate actionable guidelines for future vaccination campaigns towards the goal of rabies elimination using mathematical models and insight from field studies.

This work will involve collaboration with Dr Maganga Sambo in Tanzania, Prof Caroline Trotter in Cambridge, and Prof Katie Hampson in Glasgow. There will be opportunities for training in computational and statistical methods and research trips to Tanzania.

### **Candidates should have:**

- good computational skills for data analysis or dynamic modelling
- knowledge of epidemiology or ecology of infectious diseases (from undergraduate or postgraduate courses)
- strong communication skills (oral and written)
- experience working across disciplines or sectors

Due to the competitive sources of funding, outstanding academic records and previous research experience will be highly valued.

### **Suggested reading:**

- Hampson, K., Dushoff, J., Cleaveland, S., Haydon, D. T., Kaare, M., Packer, C., & Dobson, A. P. (2009). Transmission dynamics and prospects for the elimination of canine rabies. *PLoS Biology*, 7, e1000053. <https://doi.org/10.1371/journal.pbio.1000053>
- Morders, M. K., McKinley, T. J., Horton, D. L., Cleaveland, S., Schoeman, J. P., Restif, O., Whay, H. R., Goddard, A., Fooks, A. R., Damriyasa, I. M., & Wood, J. L. N. (2014). Achieving Population-Level Immunity to Rabies in Free-Roaming Dogs in Africa and Asia. *PLoS Neglected Tropical Diseases*, 8(11). <https://doi.org/10.1371/journal.pntd.0003160>
- Sambo, M., Cleaveland, S., Ferguson, H., Lembo, T., Simon, C., Urassa, H., & Hampson, K. (2013). The Burden of Rabies in Tanzania and Its Impact on Local Communities. *PLOS Neglected Tropical Diseases*, 7(11), e2510. <https://doi.org/10.1371/journal.pntd.0002510>
- Sambo, M., Hampson, K., Johnson, P. C. D., & Johnson, O. O. (2024). Understanding and overcoming geographical barriers for scaling up dog vaccinations against rabies. *Scientific Reports*, 14(1), 30975. <https://doi.org/10.1038/s41598-024-82085-4>

**How to apply:** Contact the Supervisor to discuss the project before submitting an official application. More info on applying here: <https://www.postgraduate.study.cam.ac.uk/courses/directory/cvvtmrvet>