

## **Epidemiology, Ecology and Socio-Economics of Disease Emergence in Nairobi**

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**Abstract:** Our overall objective is to understand the mechanisms leading to the introduction of pathogens into urban populations, and their subsequent spread. We focus on livestock as sources of these pathogens: emerging diseases are likely to be zoonotic in origin, and livestock pathogens, through the close interactions between livestock, their products and people, are at high of risk crossing the species barrier. It is often claimed that urbanization makes pathogen emergence more likely, but the underlying mechanisms are poorly understood. What is it, exactly, about urban environments that might predispose to an emergence event, and what is the contribution of livestock keeping to this process? We will investigate two key aspects of this. Firstly, does urban livestock keeping pre-dispose people to acquiring new or more diverse microbial flora? Is the risk compounded by poverty status or other social factors? How is the microbial flora influenced by the keeping of livestock in these areas? Secondly, we will investigate exposure to livestock products traded for food or other purposes. Do supply chains for these products bring people into contact with microbial diversity over and above what they would otherwise experience? Why do people source food from particular places, and what influences the microbial flora to which people are exposed through food? Why do supply chains exist in the way that they do, and how might they change as demand for products changes with urban growth, or as a consequence of legislation? We have created an interdisciplinary team of epidemiologists, microbiologists, urban planners, demographers, social scientists, geographers, public health specialists, ecologists and economists to address these questions, examining in detail the city of Nairobi, Kenya. We will focus on *Escherichia coli*, an exemplar of many potential emerging pathogens, which exists in a diversity of hosts, in the environment, on food, in waste. We will take a landscape genetics approach to understanding *E. coli* distribution and spread and how this is affected by environmental and socio-economic factors. Our approach, which builds on state-of-the-art methodologies across a range of disciplines, is likely to become a benchmark for future studies, and will be applicable to a wide range of situations where animals, people and the environment interact. The findings will inform development of policy on urban livestock keeping by improving knowledge of the public health risks and by putting those risks in a wider socio-economic context, including the risks associated with alternative sources of livestock products.