

MS Thesis
Department of Environmental Science and Policy
College of Science
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Title: Zoonotic Disease Exposure Risk in a Human-Wildlife-Livestock Interface: A Study of Laikipia County, Kenya

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ABSTRACT

Emerging infectious diseases (EIDs) are recognized as a significant threat to global security and human wellbeing. EIDs, such as Ebola and SARS, cause mass human and animal fatalities in addition to devastating economic impacts. A majority of diseases affecting humans are zoonotic, or originating from animals. Human risk of exposure to zoonotic pathogens is dependent on a variety of ecological and human behavioral factors, such as vector distribution and human-animal interaction. Mitigating the threat of EID spread is dependent on understanding the multifaceted drivers of disease and identifying potential outbreaks before they occur. The PREDICT project is a global effort to conduct surveillance and mitigation efforts in regions at high risk of disease emergence. Laikipia County, Kenya was selected as a PREDICT area of focus due to high rates of interaction between wildlife, humans, and livestock, which increases risk of disease spillover. Questionnaires were distributed among five communities within Laikipia. These surveys asked participants a series of questions about demographics, sanitation practices, and human-animal interactions. The objective of this thesis research was to analyze the human behavioral survey data and identify trends in behaviors that may increase pathogen exposure risk. Data analysis was conducted in R with a series of Chi-squared tests and

LASSO regression. Each community was characterized by one of three different land use strategies. Observational data was also collected during a site visit to Laikipia County, which served to contextualize quantitative data. Results revealed that communities with the same land use system express similar reports of high-risk behavior. Even so, variation was observed on an individual community basis. These results highlight the need to understand human behaviors and disease dynamics on a fine scale. Data from the PREDICT project will be used to develop intervention strategies, which must address specific behaviors within a local context. This study represents a growing body of research that aims to implement interdisciplinary studies to detect potential pandemic threats. Land use and livestock management systems influence pathogen exposure risk, but there are many factors that must be considered when developing effective disease mitigation efforts. Further research should combine quantitative and qualitative research to conduct holistic assessments of disease risk in order to develop relevant, tailored intervention strategies.