

Coronaviruses from Bats in Laikipia County, Kenya and their Implications on Human and Animal Health

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INTRODUCTION

There is a global rise in outbreaks of coronavirus infections resulting in high morbidity and mortality rates among humans and animals. Bats which are widely distributed, have capability of flight and are the second largest group of mammalian species are natural reservoirs of these viruses. Coronaviruses are viruses that typically affect the respiratory tract and gut of mammals and birds, causing important diseases. In animals, these viruses include the porcine epidemic diarrhoea virus (PEDv) and porcine delta-coronavirus (PDCoV) in pigs and infectious bronchitis virus (IBV) and turkey coronavirus in poultry.

In humans, coronaviruses causing diseases include the common cold virus, severe acute respiratory syndrome coronavirus (SARS- CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV). SARS was linked to marketplace Himalayan palm civets (*Paguma larvata*), bats¹ and racoon dogs (*Nyctereutes procyonoides*) while MERS originated in bats.² Both SARS and MERS showed similar clinical symptoms such as cough, dyspnea and pneumonia but advanced cases of MERS appear with clinical renal failure. Outbreaks of coronaviruses spread like wild bush-fire affecting people from different nationalities and color. It is important to understand the origin of coronaviruses infecting humans and animals, for purposes of prediction and prevention of pandemic emergence in the future.

ECONOMIC CONSEQUENCES OF CORONAVIRUSES OUTBREAKS

Containing epidemics from coronaviruses spillover from bats can be very expensive due to the high morbidity and mortality rates.

The occurrence of porcine epidemic diarrhea in 2013 in the United States resulted in a mortality rate of about 100% in affected piglets⁴ and approximately 10% of America's pig population was lost in just a year with an estimated net annual decrease for U.S. economic welfare from \$900 million to \$1.8 billion. Severe acute respiratory syndrome coronavirus (SARS-CoV) infected 8,000 people from different continents of the world regardless of color and race with a mortality rate of 10%. In addition to the impact of SARS-CoV on infected individuals and the global community, the economic cost of the SARS- CoV outbreak event was estimated at \$16 billion³. Middle East Respiratory Syndrome

Coronavirus (MERS-CoV) in Saudi-Arabia infecting more than 1,700 people with mortality rate of 35%⁵. With the isolation of novel coronaviruses in bats in Laikipia County, the 46.9% sero-prevalence of MERS-CoVs in camels in that region⁶, and considering the economic implication of coronavirus outbreaks, full evaluation of these viruses needs to be carried out.

Methodology

This study was carried out to determine the presence and genetic identity of coronaviruses in bats in Laikipia County, Kenya and to assess the interaction of the people with food, water and animals at the human-wildlife-livestock interface. Samples were collected from two hundred and two (202) bats for RNA extraction. Analysis of the sequenced products with reference sequences from the genbank showed all isolates belonged to unclassified alpha coronaviruses.

The study also reveals a highly complex human-wildlife-livestock interface in Laikipia County, Kenya. The risk of disease transmission is heightened due to high human-animal interaction and high-risk food practices, such as consuming sick animals or collecting animals found dead. Although respondents were concerned about disease transmission, safe practices in water, food, and animal handling to decrease risk were not commonly used.

MANAGING BATS IN THE HOMES

There are many kinds of bats that live around villages or in cities. Most bats that would live inside buildings or houses are small and usually eat insects. Normally, bats are harmless and will not bite or scratch people if left alone. To manage bats in homes and prevent human and animal exposure to infections, the following can be done:

Because some bats with disease causing organisms may appear normal, direct contact with all bats and their body fluids should always be avoided as a preventive measure.

Bats may be attracted to uncovered sources of water and other liquids. When bats drink from these sources, they contaminate them with their saliva, urine, or feces. To prevent bats from being drawn to liquids, water or foods in homes, such liquids should always be securely covered and the covers regularly cleaned.

The most effective method for preventing bats from entering a building or house is to make sure that there are no holes or extra spaces around doors, windows, ceiling, and roof where they can enter. Tightly placed screens or wire mesh can be used to cover windows and doors.

POLICY RECOMMENDATIONS

A detailed genome analysis is recommended to characterize the coronaviruses present in bat samples and to determine their implication on human health.

Government at county and national levels in Kenya should adopt One Health approach to address emerging infectious and zoonotic disease.

Government should promote proper sanitation and disinfecting of hands, especially when human comes in physical contact with wild animal such as bats.

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