

BIBLIOGRAPHIC INFORMATION SYSTEM

Journal Full Title: [Journal of Biomedical Research & Environmental Sciences](#)

Journal NLM Abbreviation: J Biomed Res Environ Sci

Journal Website Link: <https://www.jelsciences.com>

Journal ISSN: 2766-2276

Category: Multidisciplinary

Subject Areas: [Medicine Group](#), [Biology Group](#), [General](#), [Environmental Sciences](#)

Topics Summation: 133

Issue Regularity: [Monthly](#)

Review Process: [Double Blind](#)

Time to Publication: 21 Days

Indexing catalog: [IndexCopernicus ICV 2022: 88.03](#) | [GoogleScholar](#) | [View more](#)

Publication fee catalog: [Visit here](#)

DOI: 10.37871 ([CrossRef](#))

Plagiarism detection software: [iThenticate](#)

Managing entity: USA

Language: English

Research work collecting capability: Worldwide

Organized by: [SciRes Literature LLC](#)

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Manuscript should be submitted in Word Document (.doc or .docx) through

Online Submission

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**IndexCopernicus
ICV 2022:
83.03**

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MINI REVIEW

Interpreting Infectious Disease from a Social-Behavioral Perspective: Zoonotic Infectious Disease Control

Kexin Yuan*

Colorado state university, Human dimension of natural resources, USA

Introduction

More than 60% of human infectious diseases are caused by zoonotic pathogen transmission from animals [1]. There are limited interdisciplinary approaches to surveillance and control strategy of infectious diseases [2]. Narrowing human behavioral research, human cognition influences people's behavior in interactions with wildlife, such as human values [3,4]. Understanding human behaviors can facilitate policymakers forming social interventions to control infectious diseases. For instance, Stockmaier, et al. [5] revealed that social distance intervention effectively controls zoonotic infectious diseases.

The intricate relationships between the public and wildlife have long been a subject of ecological and health research, given their significant implications for both conservation efforts and public health. Public values towards wildlife, are often shaped by historical, economic, and social factors. These values range broadly from seeing wildlife as a source of economic benefit or aesthetic value to viewing them as fellow beings with rights and intrinsic value [6]. However, the rising interface between humans and wildlife has led to the threats of zoonotic infectious diseases that are transmitted from animals to humans [2].

The prevalence of Avian Influenza, especially the H5N1 strain, has been linked to close contact between humans and wild birds [7]. In many regions, especially in parts of Asia and Africa, the necessity of interacting with wildlife and livelihood contributes to these close contacts [8,9].

This paper explores the nuanced ways in which different public values towards wildlife influence the transmission of zoonotic diseases such as H5N1. By understanding the behavioral tendencies of mutualists, health professionals and conservationists can better predict and mitigate the risks associated with zoonotic diseases. This requires an interdisciplinary approach, integrating insights from epidemiological intervention to create a comprehensive strategy for managing human-wildlife interactions in a way that respects human health needs.

*Corresponding author(s)

Kexin Yuan, Colorado state university,
Human dimension of natural resources,
USA

Email: kexin@colostate.edu

DOI: 10.37871/jbres1909

Submitted: 18 April 2024

Accepted: 17 May 2024

Published: 20 May 2024

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OPEN ACCESS

MEDICINE GROUP

EPIDEMIOLOGY

PUBLIC HEALTH

VOLUME: 5 ISSUE: 5 - MAY, 2024





Values toward wildlife incorporating infectious disease control

According to WHO, from 2003 to 2024 April, the H5N1 virus has reported a total of 889 cases with a 52% death rate worldwide from 23 countries [10]. WHO (2024) suggested conducting surveillance activities and recommending that the public avoid unprotected contact with unhealthy wildlife and consumption of wildlife products. However, Dr. Roberts mentioned that “individuals have recreational activities with wildlife, especially birds, with a higher risk for the bird flu” [11]. Meanwhile, Richard and Lipsitch [12] suggested incorporating specific settings of interest populations with contact patterns could provide a more comprehensive understanding of infectious disease social determinants. Human behavior is significantly influenced by values [13].

'Mutualism orientation,' reflects individuals' values with an empathetic and caring view towards wildlife [14,15], where animals are seen as deserving of moral consideration and capable of forming mutual relationships with humans. People with a mutualistic orientation are likely to engage more frequently and intimately with wildlife, potentially increasing their exposure to pathogens carried by these animals [16]. This scenario poses a unique challenge: how do we balance the beneficial mutualism orientation toward wildlife with the associated zoonotic infectious disease? This view contrasts with a more dominionistic or utilitarian perspective where animals are primarily considered valuable for their utility to human needs [17]. Recent studies suggest that while mutualism orientation can foster conservation initiatives, it might also inadvertently increase the risk of zoonotic diseases [18].

The mutualism orientation impacts how frequently and closely humans interact with wildlife, which in turn has implications for the transmission and mutation rates of infectious diseases [19]. The frequent and close interactions fostered by mutualist perspectives can have significant epidemiological implications. When wildlife enthusiasts frequently interact with wildlife, they increase the opportunity for zoonotic pathogens to jump between species. This is particularly relevant in areas where wildlife carries viruses that could potentially infect humans [7,8].

Moreover, the behavior of the public, who hold mutualistic values toward wildlife, is also influenced by public health interventions, such as widespread

media dissemination of negative information about the lethality of pathogens [20,21] and the social distance [5]. For instance, extensive reports on the role of wildlife as vectors in infectious disease spread might lead even those who value mutualism to reassess the frequency and proximity of their interactions with wildlife. Furthermore, the promotion of social distancing has impacted the behaviors of mutualists; such public health strategies likely lead to a reduction in direct contact with wildlife, thereby indirectly affecting the nature of human-animal interactions [8].

This phenomenon indicates that value-based public health interventions can effectively prevent infectious diseases from spreading. Therefore, understanding and leveraging mutualistic values may be key to increasing the acceptance and effectiveness of health interventions aimed at controlling diseases spread by wildlife [22].

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How to cite this article: Yuan K. Interpreting Infectious Disease from a Social-Behavioral Perspective: Zoonotic Infectious Disease Control. *J Biomed Res Environ Sci*. 2024 May 20; 5(5): 417-419. doi: 10.37871/jbres1909, Article ID: JBRES1909, Available at: <https://www.jelsciences.com/articles/jbres1909.pdf>