

# Vector-borne disease intelligence: strategies to deal with disease burden and threats.

Juliana Q. Reimão\*

Department of Morphology and Basic Pathology, Faculty of Medicine of Jundiaí, Jundiaí, Brazil

## Abstract

**Vector-borne diseases, driven by arthropod vectors such as mosquitoes, ticks, and sandflies, continue to pose significant threats to global public health. This rapid communication provides a succinct overview of the pressing challenges associated with vector-borne diseases and highlights innovative strategies aimed at prevention, control, and mitigation.**

## Introduction

Vector-borne diseases account for a substantial burden of morbidity and mortality worldwide, affecting billions of people annually. Rapid urbanization, climate change, and globalization are amplifying the challenges posed by vectors, necessitating swift and adaptive responses to mitigate the impact of these diseases[1].

### *Emerging threats*

The landscape of vector-borne diseases is evolving rapidly, with the emergence of new pathogens and the re-emergence of previously controlled diseases [2, 3]. This section briefly discusses recent trends in vector-borne diseases, emphasizing the dynamic nature of their epidemiology.

### *Climate change and vector distribution*

Alterations in climate patterns influence the distribution and behavior of vectors, impacting the prevalence and geographic spread of vector-borne diseases [5, 6, 7]. The communication explores the intersection between climate change and vector biology, highlighting the need for proactive measures to anticipate and address these shifts.

### *Innovative vector control strategies*

Conventional vector control methods, such as insecticide-treated bed nets and indoor residual spraying, are effective but face challenges such as insecticide resistance. This section outlines innovative strategies, including genetically modified mosquitoes, sterile insect technique, and the use of Wolbachia bacteria, showcasing how science and technology are driving novel approaches to vector control.

### *Community engagement and education*

Empowering communities with knowledge about vector-borne diseases is integral to successful prevention efforts. Rapid communication emphasizes the importance of community engagement, educational campaigns, and citizen science

initiatives in creating awareness and fostering sustainable vector control practices.

### *Cross-sectoral collaboration*

Vector-borne disease control requires interdisciplinary collaboration across health, environmental, and agricultural sectors [8]. This section underscores the significance of a One Health approach, emphasizing the interconnectedness of human, animal, and environmental health in the context of vector-borne diseases.

### *Technological advancements and early detection*

Advancements in diagnostics and monitoring technologies enable early detection of vector-borne diseases. The communication briefly discusses the role of remote sensing, mobile applications, and rapid diagnostic tests in enhancing surveillance, facilitating early intervention, and minimizing the spread of these diseases.

## Conclusion

Vector-borne diseases demand urgent attention and innovative solutions to curb their impact on global health. This rapid communication underscores the need for a holistic approach, blending technological advancements, community engagement, and cross-sectoral collaboration to tackle the multifaceted challenges posed by vector-borne diseases [9]. As we navigate this dynamic landscape, proactive and adaptive strategies are essential to stay ahead of emerging threats and protect vulnerable populations from the devastating consequences of these diseases [10].

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\*Correspondence to: Juliana Q. Reimão, Department of Morphology and Basic Pathology, Faculty of Medicine of Jundiaí, Jundiaí, Brazil, E-mail: juliana\_reimao@yahoo.com.br

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