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VECTOR-BORNE DISEASE OUTBREAK PREPAREDNESS: A CHIKUNGUNYA RESPONSE ROUNDTABLE

On April 13, 2023 a group of leaders from the White House; Centers for Disease Control and Prevention; and universities in the Gulf States region converged in Washington DC to discuss outbreak preparedness for the future with a focus on a little-known alphavirus called Chikungunya. [Watch the recording here](#)

KEY MESSAGES

- Improving pandemic readiness requires a dedicated set of professionals embedding health security expertise into everyday public health practice and utilizing current public health challenges like chikungunya to exercise responses.
- The disease usually manifests in two ways: long-term spread in vulnerable populations or spikes in remote communities followed by herd immunity and limited detection for decades.
- The chikungunya virus can cause significant economic losses on individual and community levels.
- Communicating the science of infectious diseases and the importance of vaccines is critical in interrupting the transmission of chikungunya.
- Collaboration across sectors and bringing a response to at-risk communities are essential to lower the harm caused by infectious diseases in the future.

SUMMARY OF EXPERT PRESENTATIONS

OPENING REMARKS

Matthew Hepburn, MD, Senior Advisor, Office of Science and Technology Policy, The White House

Dr. Hepburn provided remarks on how the world can approach chikungunya, bringing his expertise from previous infectious disease outbreaks. While our country might want to move on and forget the challenging times during the intense era of COVID-19, we cannot ignore the impact on the economy, mental health, and social connections.

Reflecting on his experience with the H1N1 influenza outbreak in 2009, Dr. Hepburn recalled how determination was essential to keep moving forward. Since then, the development of next-generation vaccines expanded the toolkit to respond to COVID-19 and future pandemics. However, the world needs a dedicated team of professionals to prepare for the next outbreak and exercise our capabilities between pandemics by addressing current public health challenges like chikungunya.

The long-term individual and economic consequences of chikungunya infection are essential to weigh against the costs of mitigation and eradication. The durability of immunity conferred by chikungunya infection makes it possible to eradicate the disease. It is not a technological barrier but a need for commitment. Additional tools like vaccines, monoclonal antibody treatments, and home testing will reduce the impact of the painful disease.

During the question-and-answer session, Dr. Hepburn discussed the efforts to educate the public about diseases, achieve vaccine equity, advance health communication, and make testing accessible to buoy an eradication effort. He cited Puerto Rico and North Carolina's successful, multisectoral COVID-19 vaccination campaigns, which focused on matching the community with trusted messengers and resulted in impressive uptake. The future is bright, but disruptive thought in all industries should also be encouraged to improve the field. Robust public and private sector funding and not getting discouraged are necessary to prepare for the next pandemic.

“We’ve just got to stay in the fight. And we have to work. We have to be resilient. We have to be determined.”

ECONOMIC IMPACT OF A CHIKUNGUNYA OUTBREAK

Lori Pennington-Gray, PhD, Endowed Chair and Professor, The Center for Excellence in Economic Development and Tourism, University of South Carolina

Christa Court, PhD, Director of the Economic Impact Analysis Program, University of Florida

Drs. Pennington-Gray and Court presented three studies on the economic impact of a potential chikungunya virus outbreak in the United States. With the background that mosquito-borne diseases have tripled in the last decade, and about a million people die yearly from mosquito-transmitted diseases, it is important to understand how chikungunya could impact the U.S. Before this research, there was no existing data or modeling on a U.S. chikungunya outbreak.

This results found that a chikungunya outbreak is highly likely to occur in areas with heavy air traffic and a climate suitable for mosquito breeding; an outbreak could follow the contours of the 2016 Zika outbreak in Florida; and media and social media could distort the perception of the geographic scope of an outbreak. While a chikungunya outbreak would not cause the economy to close, given the morbidity and mortality of the disease. Still, it would cause behavior changes and thus reduce travel to an impacted area, especially for those more likely to suffer from the long-term effects of chikungunya.

“Essentially visitors may not want to go there [a place with a chikungunya outbreak], or they may not pay as much to go there if they do still visit.”

DETAILED FINDINGS

To estimate the potential economic effects of a chikungunya outbreak, the study focused on communities in Florida and made the following assumptions: a four percent decrease in visitation to the Wynwood area, an entertainment district in Miami, and a two percent decrease in Miami-Dade and Orlando counties based on the impact of the Zika outbreak. Resulting data shows how a decline in tourism dollars would affect the overall economy, including lodging, entertainment, and food expenditure.

	Wynwood	Miami-Dade	Orlando
ECONOMIC LOSSES	\$20.2 million	\$82.3 million	\$226.9 million
JOB YEARS LOST	244	992	2,569
PROJECTED LOSSES ON SALES	\$30 million	\$121.9 million	\$321.7 million
LOSSES IN VALUE-ADDED	\$18.3 million	\$74.7 million	\$203.2 million
LOSSES IN TAXES COLLECTED	\$5 million	\$20.5 million	\$52.7 million

Questions and answers focused on social determinants as a driver in economic losses, how to add existing data to the model to understand the most impacted job types, and how to use data to inform communications with different populations and mitigate adverse economic outcomes.

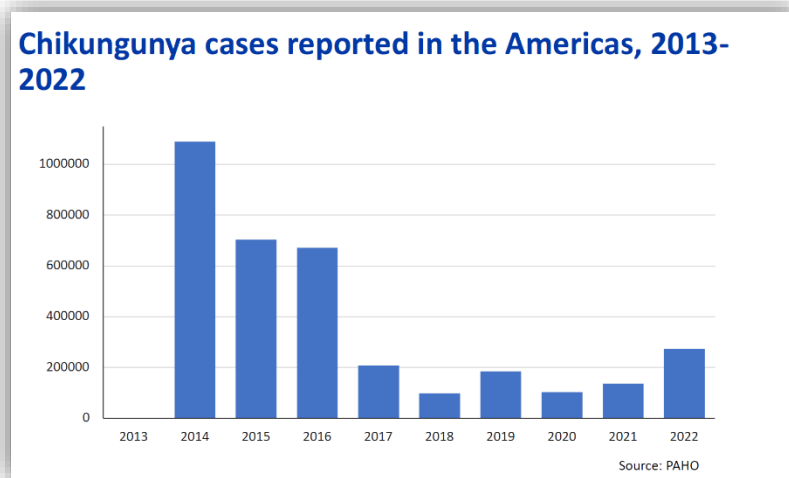
ADVANCES IN CHIKUNGUNYA VIRUS DETECTION AND SURVEILLANCE

J. Erin Staples, MD, PhD, Division of Vector-Borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention (CDC)

Dr. Staples reviewed the current understanding of the chikungunya virus, including its transmission patterns and the challenges in predicting outbreaks due to various environmental factors. The virus is typically found in tropical and subtropical climates where *Aedes aegypti* mosquitos thrive.

There are two common patterns of transmission: 1) low-level outbreaks that are hard to predict, often affecting immunocompromised populations, and 2) intense, rapid outbreaks in tropical areas where chikungunya can infect up to 60 percent of the population in about three months.

Testing people with symptoms is the most effective way to monitor the virus. Unlike vector-borne diseases like Dengue, 97 percent of people infected with chikungunya develop severe symptoms quickly. Mapping the virus's genome can help estimate its replication and transmission speed.



To improve the visibility of the disease in the U.S., state and local health departments must report positive tests to CDC through the National Notifiable Disease Surveillance System. Globally, ongoing outbreaks in the Americas are helping to build [Nowcast](#) models, which can inform outreach programs to raise public and healthcare provider awareness for early recognition of cases or potential outbreaks.

In the future, strategies like releasing sterile *Aedes aegypti* insects and vaccines nearing FDA approval show promise in combatting and reducing the burden of chikungunya on populations.

Questions and answers focused on a new mosquito species in Florida and ongoing studies to know if it can transmit chikungunya.

INTERNATIONAL COLLABORATION FOR VECTOR-BORNE DISEASE RESPONSE

Dr. Carlos Espinal, MD, Director of the Global Health Consortium, Robert Stempel College of Public Health & Social Work, Florida International University

Dr. Espinal outlined the efforts to combat the active chikungunya outbreak in Paraguay, highlighting his close collaboration with the Pan American Health Organization's arbovirus team to implement a virus interruption program. Despite ongoing efforts, these diseases continue to burden Latin America significantly. Florida International University (FIU) has identified several critical areas for collaboration, including innovative disease surveillance, mosquito and vector control strategies, and climate change's impact on health.

Dr. Espinal emphasized that climate change is a real and pressing threat with far-reaching consequences beyond the Caribbean and the United States. To mitigate the impacts, he stressed the importance of empowering and preparing communities through participatory research, especially in the preliminary stages of preparedness and response initiatives. He also highlighted the staggering economic cost of chikungunya in Latin America, estimated at \$185 billion. Working in partnership across countries will build more resilient and sustainable communities and lessen the costs of these types of diseases.

MEDICAL COUNTERMEASURE INNOVATION AND AVAILABILITY FOR LOCAL OUTBREAK

Gerald Parker, DVM, PhD, Associate Dean for Global One Health, Texas A&M University

Dr. Parker exuded optimism as he spoke, citing comprehensive approaches to address current global challenges. He noted that breaking down silos and increasing cross-industry collaboration are worthwhile paths forward. However, he underlined the need to invest in the biomedical enterprise to address emerging and reemerging infectious diseases, such as chikungunya. Dr. Parker emphasized that it takes years of research and long-term investments to progress and control such viruses.

He urged regulators to innovate to support drugs that may be considered orphans and to fortify international partnerships to bolster security by prioritizing scarce medical resources and providing critical investments worldwide to strengthen pandemic preparedness and health security.

Dr. Parker stressed the importance of understanding lessons from previous outbreaks, particularly in reaching underserved communities. In Texas, a successful partnership between the Texas Department of Health, the Texas Land Grant University (Texas A&M University), and the Texas Division of Emergency Management worked to understand who the trusted voices in the community are to deliver COVID-19 vaccine messages and improve uptake.

During the question-and-answer session, Dr. Parker addressed concerns about vaccine complacency and low trust in science. He urged transparency in discussing side effects to counter vaccine hesitancy. He also discussed the value of including low probability/high consequence events, such as emerging diseases, into daily health routines to prevent forgetting past lessons. Dr. Parker reminded the audience that their voice matters and urged them to speak up to influence policy, especially in the upcoming reauthorization of the Pandemic and All-Hazards Preparedness Act, where there is an opportunity to authorize a national plan for arboviral diseases.