

# Emerging Infectious Diseases and Health Surveillance at U.S. Air Travel Ports of Entry: Perspective From Within the Department of Homeland Security

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## Objective

NBIC analysts evaluated the options and effectiveness of airport symptom-based health screening programs available during emerging disease outbreaks occurring outside the U.S.

## Introduction

The National Biosurveillance Integration Center (NBIC) has the responsibility to integrate, analyze, and share the nation's biosurveillance information provided from capabilities distributed across public and private sectors. The integration of information enables early warning and shared situational awareness of biological events to inform critical decisions directing response and recovery efforts. In addition to its interagency partners, NBIC supports the Office of Health Affairs and DHS components responsible for safeguarding U.S. ports of entry. More than 150 U.S. international airports process an estimated two billion passengers and 50 million metric tons of cargo arriving in the U.S. from more than 1,000 international airports located outside the U.S. Entry and customs screening are points where travelers from international destinations pass; a logical location for assessing health of incoming travelers in order to identify and control import of diseases of emerging diseases. NBIC examined peer-reviewed literature, region-specific disease spectrum/frequency, and air travel patterns to assess options for ports of entry health screening as well as the challenges and potential benefits for active screening programs.

## Methods

Analysts reviewed information from peer-reviewed publications and open data/information sources to assess disease characteristics and spatial distribution. Regional relative proportion of Ebola virus, MERS-CoV, and other common regional infectious diseases was estimated using data from the Global Infectious Diseases and Epidemiology Network (Gideon). Flight passenger volume information was obtained from Customs and Border Protection (CBP). A crude estimate of the number of cases for a particular disease transiting a U.S. airport was obtained from disease frequency and total passenger volume data. In addition, analysts reviewed available peer-reviewed literature to evaluate health screening programs at airports and the potential effectiveness for controlling import of emerging diseases.

## Results

The initial symptoms of MERS-CoV and Ebola virus infections are common to many respiratory and enteric infectious illnesses. In Saudi Arabia, published literature indicates at least 50% of travelers experience an episode of influenza-like illness during travel and more than 80% of the infectious causes of febrile illness among travelers to Saudi Arabia and the United Arab Emirates are common agents also endemic in the U.S. Peer-reviewed literature indicates that 11-47% of travelers to sub-Saharan Africa experience at least one episode of febrile illness during their travel, and more than 90% of

the infectious causes of febrile illness among travelers to West Africa (Guinea, Sierra Leone, and Liberia) are common agents also endemic in the U.S. Based on historical travel trends, at least 150 passengers from West Africa (Guinea, Liberia, and Sierra Leone) and 1,500 Middle East passengers (Saudi Arabia and United Arab Emirates) arrive each day at U.S. airports. Given the frequency of febrile illness among travelers to these regions as well as the relative proportion of infectious disease causes, symptom-based screening alone would be unlikely to identify targeted rare emerging pathogens and would be confounded by a large portion of non-infectious health conditions and common infections endemic to the U.S.

## Conclusions

In agreement with models and meta-analyses found in the peer-reviewed literature, symptom based health screening, in the absence of additional screening measures such as exposure history or physical examination, is an inefficient method for identifying rare targeted illnesses. Furthermore, additional factors contribute to the effectiveness and practicality of symptom-based health screening programs: including impact to employee safety, impact to passenger safety and entry procedures, disease syndrome and ease of distinguishing, program coordination, and outcomes of introducing the screening program. Additional studies are needed to determine the best practices and support policy development to guide the use of health screening options at airports.

## Keywords

Airport; Travel; Biosurveillance; Emerging Infectious Disease

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