

# GAO Highlights

Highlights of [GAO-20-372](#), a report to congressional requesters

## Why GAO Did This Study

Outbreaks of infectious diseases—such as Ebola, Zika, and pandemic influenza—have raised concerns from Congress about how federal agencies use modeling to, among other things, predict disease distribution and potential impacts. In general, a model is a representation of reality expressed through mathematical or logical relationships. Models of infectious diseases can help decision makers set policies for disease control and may help to allocate resources.

GAO was asked to review federal modeling for selected infectious diseases. This report examines (1) the extent to which HHS used models to inform policy, planning, and resource allocation for public health decisions; (2) the extent to which HHS coordinated modeling efforts; (3) steps HHS generally takes to assess model development and performance; and (4) the extent to which HHS has addressed challenges related to modeling. GAO reviewed documents and interviewed HHS officials, state officials, and subject matter experts. GAO identified practices commonly used to assess infectious disease model performance and reviewed 10 selected modeling efforts to see if they followed these practices.

## What GAO Recommends

GAO recommends that HHS (1) develop a way to routinely monitor, evaluate, and report on modeling coordination efforts across multiple agencies and (2) direct CDC to establish guidelines to ensure full reproducibility of its models. HHS agreed with GAO's recommendations.

View [GAO-20-372](#). For more information, contact Timothy M. Persons, PhD, Chief Scientist at (202) 512-6888 or [personst@gao.gov](mailto:personst@gao.gov).

May 2020

## INFECTIOUS DISEASE MODELING

### Opportunities to Improve Coordination and Ensure Reproducibility

## What GAO Found

Within the Department of Health and Human Services (HHS), the Centers for Disease Control and Prevention (CDC) and the Office of the Assistant Secretary for Preparedness and Response (ASPR) used models to inform decision-making during and after outbreaks of Ebola, Zika, and pandemic influenza. These agencies' modeling efforts informed public health planning, outbreak response, and, to a limited extent, resource allocation. Four CDC centers perform modeling.

HHS agencies reported using multiple mechanisms to coordinate modeling efforts across agencies, but they do not routinely monitor, evaluate, or report on the extent and success of coordination. Consequently, they risk missing opportunities to identify and address modeling challenges—such as communicating clearly, and obtaining adequate data and resources—before and during an outbreak. As a result, agencies may be limiting their ability to identify improvements in those and other areas. Further, there is potential for overlap and duplication of cross-agency modeling efforts, which could lead to inefficiencies.

#### Office of the Assistant Secretary for Preparedness and Response's Visualization Hub, which Can Be Used for Infectious Disease Planning and Response



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CDC and ASPR generally developed and assessed their models in accordance with four steps GAO identified as commonly-recognized modeling practices: (1) communication between modeler and decision maker, (2) model description, (3) verification, and (4) validation. However, for four of the 10 models reviewed, CDC did not provide all details needed to reproduce model results, a key step that lets other scientists confirm those results. GAO found that CDC's guidelines and policy do not address reproducibility of models or their code. This is inconsistent with HHS guidelines and may jeopardize the reliability of CDC's research.

This report also identifies several modeling-related challenges, along with steps agencies have taken to address them.