

## Coronavirus COVID-19 AI-Based Modeling



### IEM's Public Health Experience

IEM's public health and pandemic data and modeling expertise is world class, and our pandemic and medical countermeasures (MCM) modeling work remains the basis for federal government policies and plans that are used today. Our team works every day to enable data-driven planning at all levels of government and the private sector. We help public health agencies and healthcare organizations overcome the challenges they face preparing for emergencies and disasters.

### IEM's Coronavirus Support for HHS

For over 15 years, IEM has supported the U.S. Department of Health and Human Services (HHS) in their planning and modeling for public health emergencies and MCM requirements, including various federal interagency working groups to develop vetted disease models for all Category A and some Category B biological agents. Our modeling work transformed planning for national and regional medical countermeasures. IEM professionals have first-hand public health and medical services knowledge and expertise. Our staff of experts includes medical preparedness and response planners, epidemiologists, disease progression modelers, former hospital emergency managers, and public health policy analysts. They are experienced clinicians in the areas of public health, emergency care, critical care, medical-surgical, hospital administration, and emergency medical services. IEM supported HHS and their Exercise, Evaluation and After-Action Division to develop a Coronavirus Disease (COVID-19) tabletop exercise (TTX) series intended for senior Federal decision makers. Support is ongoing.

### IEM Modeling Impacts on United States: AI-Based, Short-Term COVID-19 Projections

In light of the recent spike of U.S. COVID-19 cases through community spread, IEM stands ready to assist all levels of government with COVID-19 modeling to support public health and emergency management planning and response efforts. Using state-of-the-art tools and technologies, we are building credible AI-based consequence predictions to drive planning and response.

IEM is currently using an AI model to fit data from various sources and project new cases of COVID-19. We do not assume the average number of secondary infections (R-value) stays the same over time. IEM's AI model finds the best R-value over time to evaluate how it changes over the course of the outbreak. The IEM modeling team is running ~11 million simulations to fit each state's data and using the best fit for the R-value to project new cases over the next 7 days. The AI models are executed on a daily basis to evaluate the changing dynamics of the COVID-19 pandemic.

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence models, IEM believes that the model outputs could be used to assist localities and their medical facilities to better prepare for an increase in hospitalizations, to better plan for and locate drive-through testing facilities, to locate points of distribution, and to determine where increased levels of transmission may be occurring.

### QUICK FACTS

Founded  
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Headquarters  
Research Triangle Park, NC

### Our Experts

The IEM team includes emergency management, homeland security, and disaster recovery professionals, former senior-level FEMA, HUD, state and local officials, and a large cadre of technical and subject matter experts.

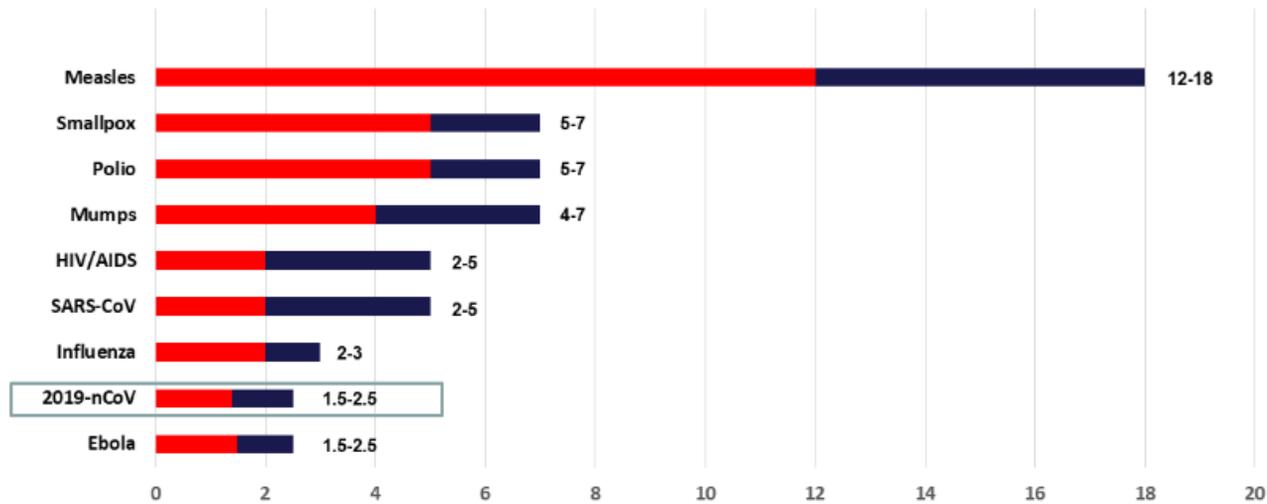
### Key Service Areas

- Homeland Security and Emergency Management
- Defense and National Security
- Information Technology
- Disaster Recovery

**To get started with your COVID-19 modeling and planning, contact:**  
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850-519-7966

# Contagiousness

Average number of people infected by an individual ( $R_0$ )



## Previous HHS Project Highlight

*Crimson Contagion:* IEM provided exercise last summer leading up to and during the HHS full-scale exercise called “Crimson Contagion” (a pandemic influenza scenario). Crimson Contagion was conducted August 13-16, 2019, and was the largest functional exercise ever conducted by HHS covering all ten HHS and FEMA regions, 12 states, and all four time zones in the continental United States. This exercise focused on a whole community response and policy issues of workforce viability; critical infrastructure protection; economic impact; non-pharmaceutical interventions; scarce resource allocation; prioritization of vaccines and other countermeasures; and medical surge operations. Leading up to Crimson Contagion, IEM worked with the states participating in the exercise to provide them with the epidemiological data they would need for the exercise. During the exercise, IEM provided states with their expected state-specific medical case-load on a daily basis. Some states requested a high number of minimum cases (1,000 to 2,000+) so that the state and local epidemiology teams could work on their contact-tracing procedures. Many states praised IEM’s support leading up to the exercise and stated that they could not have met their exercise goals and objectives without IEM’s assistance.

## IEM Lead

Dr. Prasith “Sid” Baccam is a **Computational Epidemiologist expert** at IEM with more than **20 years of experience in medical consequence modeling and simulation of disease outbreaks** and medical consequences following hypothetical attacks with biological agents or emerging infectious diseases. He develops key simulation models and decision support tools at IEM, specializing in public health, disaster response, and medical countermeasures (MCM) to enhance data-driven decision making and improve modeling assumptions.

Upon receiving his **Ph.D. in Applied Mathematics and Immunobiology** at Iowa State University, Dr. Baccam worked as a Postdoctoral Research Associate at Los Alamos National Laboratory where he focused on researching viral and immunological modeling. After his stint at Los Alamos, Dr. Baccam has served as Task Lead in multiple public health projects have allowed him to develop expertise as a mathematical biologist and a leader on high-performance modeling and simulation teams.

He has worked with state and local public health officials as well as Federal agencies, including **HHS**, the Centers for Disease Control and Prevention (**CDC**), and the Department of Homeland Security (**DHS**). Dr. Baccam has published numerous papers on public health response models and implications on policy and has been invited to participate in workshops and symposiums held by the Institute of Medicine (now the National Academy of Health). His modeling results have been briefed to the **Executive Office of the President** and informed two presidential policy actions.