

## IEM's AI Modeling: Short-term COVID-19 Projections

Date: 8/25/21

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence (AI) models, IEM believes that our Coronavirus model outputs can 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, and to determine where increased levels of transmission may be occurring.

**We have been refining our AI model over the past month and are confident in its ability to provide accurate 7-day projections that can be used for operational and logistical planning.**

### AI-based Model Background

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. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 8/25/21 9 a.m.

**Please provide any feedback or send any questions that you might have to us. We are continually updating and improving the model, so your feedback is critical.**

**Also, if you have more current or refined data for your State, Commonwealth or Territory that you would like IEM to factor in, please let us know.**

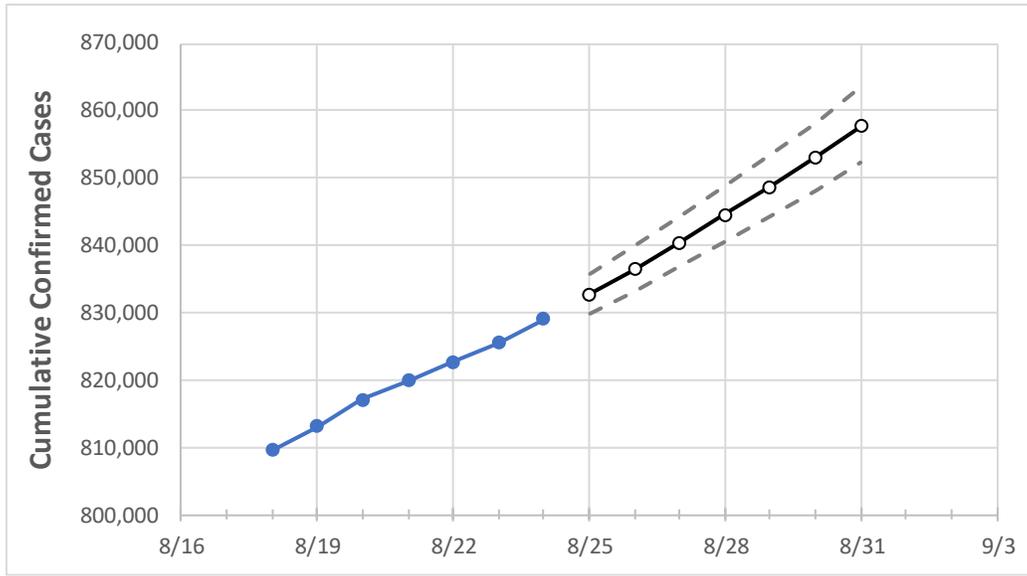
### IEM's Modeling Lead

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.

Indiana State Projections



	Actual Confirmed Cases On:				Projected Cases For:							
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	
Indiana	819,949	822,749	825,549	829,010	832,706	836,476	840,459	844,552	848,707	853,127	857,692	

Note: The State’s projection shows a “best estimate” curve (the solid line with circles) and the dotted lines are the upper and lower estimates around that best estimate. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

Indiana Counties

	Actual Confirmed Cases On:				Projected Cases For:							
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	
Decatur	3,180	3,204	3,227	3,249	3,277	3,306	3,338	3,370	3,406	3,443	3,484	
Hamilton	39,393	39,512	39,631	39,735	39,877	40,023	40,174	40,331	40,490	40,655	40,824	
Hendricks	19,356	19,418	19,479	19,531	19,619	19,710	19,804	19,900	20,000	20,103	20,208	
Johnson	20,357	20,453	20,550	20,677	20,804	20,935	21,074	21,217	21,368	21,526	21,690	
Lake	58,688	58,775	58,861	59,012	59,132	59,254	59,380	59,511	59,647	59,787	59,932	
Madison	14,739	14,800	14,860	14,937	15,018	15,102	15,187	15,276	15,365	15,460	15,559	
Marion	112,532	112,930	113,328	113,803	114,280	114,771	115,279	115,801	116,331	116,893	117,462	
St. Joseph	38,438	38,503	38,567	38,669	38,751	38,836	38,925	39,018	39,110	39,212	39,313	

Some recipients of our daily COVID-19 short-term (7 day) projections have requested projections of demand for: hospital bed, intensive care unit (ICU) beds, and mechanical ventilation. We realize that different states and localities will have different characteristics for hospital demand of COVID-19 cases, and we are presenting the best assumptions we could find for those medical demands based on scientific literature and health data reporting. Specifically:

- **Beds:** For hospitalization, we use a range of 10% and 20% of cases require hospitalization based on CDC's report ([MMWR, March 18, 2020](#)) and state reports of COVID-19 cases.
- **ICU:** The CDC report found that 24% of hospitalized cases require ICU care.
- **Ventilators:** Based on clinical data from China and state reports, we assume that 50% of ICU cases require a ventilator.

If you have other estimates for these assumptions, please share them with us as we work to refine our modeling, assumptions, and data on a daily basis.

The medical demands shown in the table assume 20% of **cumulative** confirmed cases require hospitalization. To get the medical demand for the assumption that 10% of confirmed cases require hospitalization, simply divide the demand by 2.

### Indiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	8/21	8/22	8/23	8/24	8/26				8/28				8/30			
Decatur	3,180	3,204	3,227	3,249	3,306 (661) [159] {79}				3,370 (674) [162] {81}				3,443 (689) [165] {83}			
Hamilton	39,393	39,512	39,631	39,735	40,023 (8,005) [1,921] {961}				40,331 (8,066) [1,936] {968}				40,655 (8,131) [1,951] {976}			
Hendricks	19,356	19,418	19,479	19,531	19,710 (3,942) [946] {473}				19,900 (3,980) [955] {478}				20,103 (4,021) [965] {482}			
Johnson	20,357	20,453	20,550	20,677	20,935 (4,187) [1,005] {502}				21,217 (4,243) [1,018] {509}				21,526 (4,305) [1,033] {517}			
Lake	58,688	58,775	58,861	59,012	59,254 (11,851) [2,844] {1,422}				59,511 (11,902) [2,857] {1,428}				59,787 (11,957) [2,870] {1,435}			
Madison	14,739	14,800	14,860	14,937	15,102 (3,020) [725] {362}				15,276 (3,055) [733] {367}				15,460 (3,092) [742] {371}			
Marion	112,532	112,930	113,328	113,803	114,771 (22,954) [5,509] {2,754}				115,801 (23,160) [5,558] {2,779}				116,893 (23,379) [5,611] {2,805}			
St. Joseph	38,438	38,503	38,567	38,669	38,836 (7,767) [1,864] {932}				39,018 (7,804) [1,873] {936}				39,212 (7,842) [1,882] {941}			

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.