

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 9/22/21**

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 9/22/21 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.**

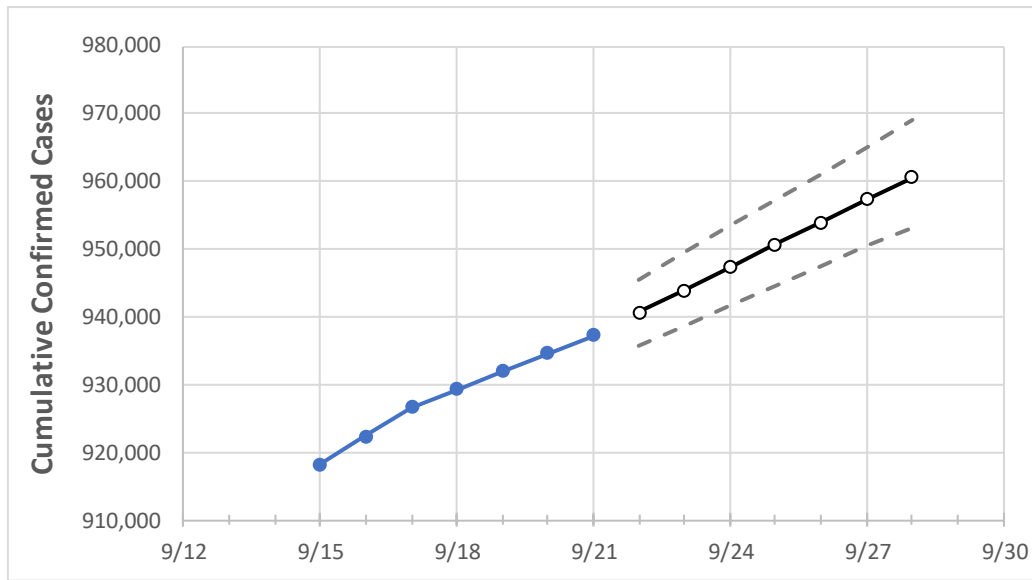
**IEM's Modeling Lead**

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:						
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28
Indiana	929,265	931,925	934,586	937,221	940,699	943,984	947,345	950,646	953,970	957,322	960,629

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:						
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28
Decatur	3,808	3,821	3,834	3,839	3,856	3,872	3,888	3,905	3,921	3,937	3,953
Hamilton	43,390	43,496	43,603	43,720	43,847	43,975	44,105	44,229	44,357	44,479	44,608
Hendricks	21,969	22,035	22,102	22,143	22,226	22,309	22,390	22,475	22,554	22,637	22,720
Johnson	23,333	23,400	23,466	23,524	23,600	23,671	23,740	23,812	23,881	23,949	24,019
Lake	62,791	62,891	62,992	63,162	63,310	63,458	63,603	63,750	63,895	64,047	64,192
Madison	17,114	17,164	17,213	17,280	17,346	17,411	17,477	17,541	17,604	17,667	17,727
Marion	126,576	126,931	127,287	127,611	128,055	128,500	128,934	129,364	129,809	130,248	130,683
St. Joseph	41,560	41,644	41,729	41,805	41,916	42,031	42,137	42,247	42,356	42,467	42,579

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:											
	9/18	9/19	9/20	9/21	9/23				9/25				9/27			
Decatur	3,808	3,821	3,834	3,839	3,872	(774)	[186]	{93}	3,905	(781)	[187]	{94}	3,937	(787)	[189]	{94}
Hamilton	43,390	43,496	43,603	43,720	43,975	(8,795)	[2,111]	{1,055}	44,229	(8,846)	[2,123]	{1,061}	44,479	(8,896)	[2,135]	{1,067}
Hendricks	21,969	22,035	22,102	22,143	22,309	(4,462)	[1,071]	{535}	22,475	(4,495)	[1,079]	{539}	22,637	(4,527)	[1,087]	{543}
Johnson	23,333	23,400	23,466	23,524	23,671	(4,734)	[1,136]	{568}	23,812	(4,762)	[1,143]	{571}	23,949	(4,790)	[1,150]	{575}
Lake	62,791	62,891	62,992	63,162	63,458	(12,692)	[3,046]	{1,523}	63,750	(12,750)	[3,060]	{1,530}	64,047	(12,809)	[3,074]	{1,537}
Madison	17,114	17,164	17,213	17,280	17,411	(3,482)	[836]	{418}	17,541	(3,508)	[842]	{421}	17,667	(3,533)	[848]	{424}
Marion	126,576	126,931	127,287	127,611	128,500	(25,700)	[6,168]	{3,084}	129,364	(25,873)	[6,209]	{3,105}	130,248	(26,050)	[6,252]	{3,126}
St. Joseph	41,560	41,644	41,729	41,805	42,031	(8,406)	[2,017]	{1,009}	42,247	(8,449)	[2,028]	{1,014}	42,467	(8,493)	[2,038]	{1,019}

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.