

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 8/30/21**

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 8/30/21 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.**

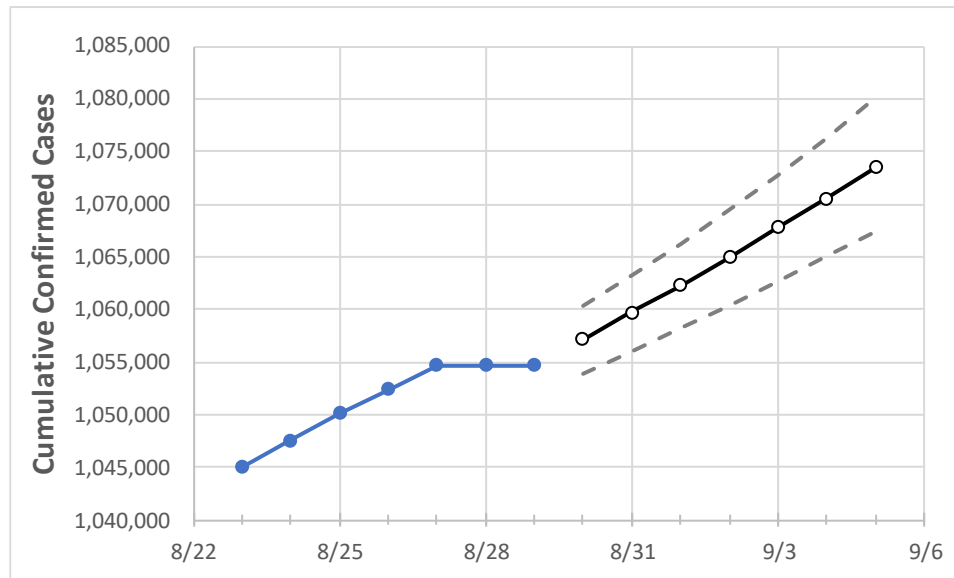
**IEM's Modeling Lead**

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.

## Michigan State Projections



	Actual Confirmed Cases On:					Projected Cases For:					
	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5
Michigan	1,052,431	1,054,709	1,054,709	1,054,709	1,057,184	1,059,750	1,062,326	1,064,923	1,067,742	1,070,544	1,073,458

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.

## Michigan Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5
Genesee	43,729	43,829	43,829	43,829	43,937	44,050	44,165	44,286	44,410	44,539	44,672
Ingham	26,229	26,289	26,289	26,289	26,337	26,387	26,436	26,487	26,538	26,592	26,645
Kent	77,152	77,359	77,359	77,359	77,557	77,764	77,974	78,196	78,431	78,673	78,918
Livingston	18,028	18,089	18,089	18,089	18,167	18,247	18,329	18,415	18,504	18,599	18,695
Macomb	104,644	104,821	104,821	104,821	105,008	105,203	105,398	105,600	105,807	106,012	106,229
Monroe	16,241	16,274	16,274	16,274	16,312	16,352	16,392	16,433	16,476	16,519	16,566
Oakland	125,669	125,917	125,917	125,917	126,186	126,459	126,736	127,024	127,309	127,606	127,901
Washtenaw	28,086	28,139	28,139	28,139	28,204	28,268	28,333	28,401	28,467	28,537	28,608
Wayne	174,726	175,021	175,021	175,021	175,360	175,716	176,064	176,423	176,793	177,165	177,542

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.

### Michigan Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	8/26	8/27	8/28	8/29	8/31				9/2				9/4			
Genesee	43,729	43,829	43,829	43,829	44,050	(8,810)	[2,114]	{1,057}	44,286	(8,857)	[2,126]	{1,063}	44,539	(8,908)	[2,138]	{1,069}
Ingham	26,229	26,289	26,289	26,289	26,387	(5,277)	[1,267]	{633}	26,487	(5,297)	[1,271]	{636}	26,592	(5,318)	[1,276]	{638}
Kent	77,152	77,359	77,359	77,359	77,764	(15,553)	[3,733]	{1,866}	78,196	(15,639)	[3,753]	{1,877}	78,673	(15,735)	[3,776]	{1,888}
Livingston	18,028	18,089	18,089	18,089	18,247	(3,649)	[876]	{438}	18,415	(3,683)	[884]	{442}	18,599	(3,720)	[893]	{446}
Macomb	104,644	104,821	104,821	104,821	105,203	(21,041)	[5,050]	{2,525}	105,600	(21,120)	[5,069]	{2,534}	106,012	(21,202)	[5,089]	{2,544}
Monroe	16,241	16,274	16,274	16,274	16,352	(3,270)	[785]	{392}	16,433	(3,287)	[789]	{394}	16,519	(3,304)	[793]	{396}
Oakland	125,669	125,917	125,917	125,917	126,459	(25,292)	[6,070]	{3,035}	127,024	(25,405)	[6,097]	{3,049}	127,606	(25,521)	[6,125]	{3,063}
Washtenaw	28,086	28,139	28,139	28,139	28,268	(5,654)	[1,357]	{678}	28,401	(5,680)	[1,363]	{682}	28,537	(5,707)	[1,370]	{685}
Wayne	174,726	175,021	175,021	175,021	175,716	(35,143)	[8,434]	{4,217}	176,423	(35,285)	[8,468]	{4,234}	177,165	(35,433)	[8,504]	{4,252}

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.