

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 7/28/21**

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 7/28/21 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.**

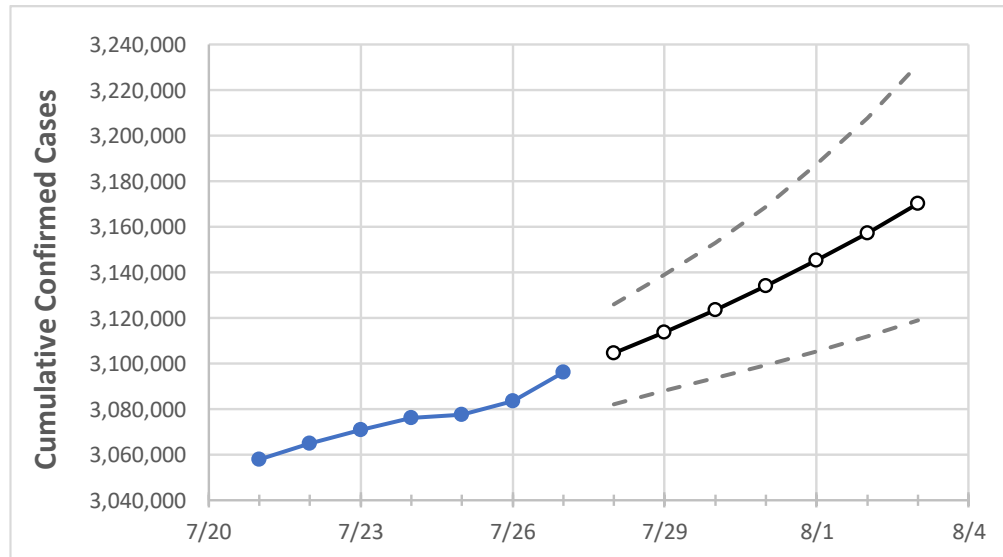
**IEM's Modeling Lead**

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.

## Texas State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3
Texas	3,076,115	3,077,513	3,083,368	3,095,920	3,104,514	3,113,700	3,123,495	3,133,940	3,145,128	3,157,339	3,170,383

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.

## Texas Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3
Bexar	234,925	235,510	236,096	236,682	237,334	238,023	238,741	239,496	240,294	241,142	242,020
Brazoria	40,090	40,126	40,161	40,197	40,273	40,348	40,424	40,502	40,586	40,669	40,752
Brazos	28,503	28,519	28,535	28,591	28,628	28,668	28,712	28,756	28,803	28,852	28,905
Collin	94,824	95,090	95,185	95,340	95,506	95,681	95,867	96,069	96,274	96,502	96,741
Dallas	312,154	312,537	312,919	314,372	314,949	315,575	316,232	316,963	317,730	318,559	319,484
Denton	78,837	78,880	78,924	79,128	79,261	79,398	79,543	79,690	79,851	80,015	80,192
El Paso	137,552	137,567	137,588	137,714	137,774	137,836	137,901	137,969	138,041	138,117	138,191
Ellis	23,367	23,407	23,447	23,487	23,523	23,562	23,603	23,644	23,691	23,740	23,791
Fort Bend	71,542	71,566	71,589	72,136	72,278	72,431	72,608	72,801	73,016	73,230	73,455
Galveston	42,809	42,953	43,097	43,241	43,413	43,598	43,795	44,007	44,230	44,469	44,724
Harris	412,768	413,022	413,404	414,098	414,968	415,866	416,859	417,881	419,002	420,222	421,504
Hidalgo	96,349	96,572	96,796	97,122	97,418	97,739	98,092	98,469	98,869	99,309	99,784
Johnson	20,453	20,452	20,493	20,534	20,568	20,605	20,644	20,685	20,730	20,778	20,831
Lubbock	50,218	50,279	50,339	50,400	50,491	50,588	50,694	50,809	50,936	51,076	51,229
McLennan	28,443	28,443	28,443	28,443	28,548	28,667	28,799	28,948	29,118	29,307	29,513
Montgomery	57,417	57,608	57,800	57,991	58,229	58,478	58,755	59,066	59,396	59,762	60,159
Tarrant	269,380	269,621	270,663	271,068	271,724	272,446	273,211	274,012	274,880	275,799	276,777
Travis	87,274	87,422	87,571	87,946	88,233	88,555	88,902	89,277	89,680	90,132	90,619
Williamson	49,270	49,442	49,613	49,778	49,973	50,183	50,406	50,637	50,879	51,141	51,414

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.

### Texas Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	7/24	7/25	7/26	7/27	7/29				7/31				8/2			
Bexar	234,925	235,510	236,096	236,682	238,023	(47,605)	[11,425]	{5,713}	239,496	(47,899)	[11,496]	{5,748}	241,142	(48,228)	[11,575]	{5,787}
Brazoria	40,090	40,126	40,161	40,197	40,348	(8,070)	[1,937]	{968}	40,502	(8,100)	[1,944]	{972}	40,669	(8,134)	[1,952]	{976}
Brazos	28,503	28,519	28,535	28,591	28,668	(5,734)	[1,376]	{688}	28,756	(5,751)	[1,380]	{690}	28,852	(5,770)	[1,385]	{692}
Collin	94,824	95,090	95,185	95,340	95,681	(19,136)	[4,593]	{2,296}	96,069	(19,214)	[4,611]	{2,306}	96,502	(19,300)	[4,632]	{2,316}
Dallas	312,154	312,537	312,919	314,372	315,575	(63,115)	[15,148]	{7,574}	316,963	(63,393)	[15,214]	{7,607}	318,559	(63,712)	[15,291]	{7,645}
Denton	78,837	78,880	78,924	79,128	79,398	(15,880)	[3,811]	{1,906}	79,690	(15,938)	[3,825]	{1,913}	80,015	(16,003)	[3,841]	{1,920}
El Paso	137,552	137,567	137,588	137,714	137,836	(27,567)	[6,616]	{3,308}	137,969	(27,594)	[6,623]	{3,311}	138,117	(27,623)	[6,630]	{3,315}
Ellis	23,367	23,407	23,447	23,487	23,562	(4,712)	[1,131]	{565}	23,644	(4,729)	[1,135]	{567}	23,740	(4,748)	[1,139]	{570}
Fort Bend	71,542	71,566	71,589	72,136	72,431	(14,486)	[3,477]	{1,738}	72,801	(14,560)	[3,494]	{1,747}	73,230	(14,646)	[3,515]	{1,758}
Galveston	42,809	42,953	43,097	43,241	43,598	(8,720)	[2,093]	{1,046}	44,007	(8,801)	[2,112]	{1,056}	44,469	(8,894)	[2,135]	{1,067}
Harris	412,768	413,022	413,404	414,098	415,866	(83,173)	[19,962]	{9,981}	417,881	(83,576)	[20,058]	{10,029}	420,222	(84,044)	[20,171]	{10,085}
Hidalgo	96,349	96,572	96,796	97,122	97,739	(19,548)	[4,691]	{2,346}	98,469	(19,694)	[4,726]	{2,363}	99,309	(19,862)	[4,767]	{2,383}
Johnson	20,453	20,452	20,493	20,534	20,605	(4,121)	[989]	{495}	20,685	(4,137)	[993]	{496}	20,778	(4,156)	[997]	{499}
Lubbock	50,218	50,279	50,339	50,400	50,588	(10,118)	[2,428]	{1,214}	50,809	(10,162)	[2,439]	{1,219}	51,076	(10,215)	[2,452]	{1,226}
McLennan	28,443	28,443	28,443	28,443	28,667	(5,733)	[1,376]	{688}	28,948	(5,790)	[1,390]	{695}	29,307	(5,861)	[1,407]	{703}
Montgomery	57,417	57,608	57,800	57,991	58,478	(11,696)	[2,807]	{1,403}	59,066	(11,813)	[2,835]	{1,418}	59,762	(11,952)	[2,869]	{1,434}
Tarrant	269,380	269,621	270,663	271,068	272,446	(54,489)	[13,077]	{6,539}	274,012	(54,802)	[13,153]	{6,576}	275,799	(55,160)	[13,238]	{6,619}
Travis	87,274	87,422	87,571	87,946	88,555	(17,711)	[4,251]	{2,125}	89,277	(17,855)	[4,285]	{2,143}	90,132	(18,026)	[4,326]	{2,163}
Williamson	49,270	49,442	49,613	49,778	50,183	(10,037)	[2,409]	{1,204}	50,637	(10,127)	[2,431]	{1,215}	51,141	(10,228)	[2,455]	{1,227}

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.