

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 8/27/21**

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 8/27/21 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.**

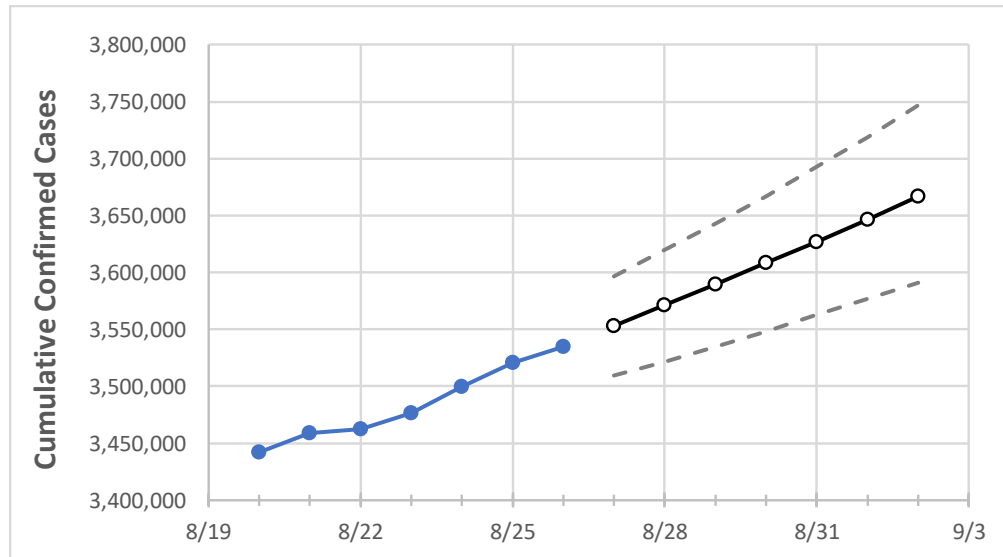
**IEM's Modeling Lead**

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:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Texas	3,476,394	3,499,482	3,520,818	3,534,862	3,553,045	3,571,110	3,589,537	3,608,582	3,626,821	3,646,562	3,666,414

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:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Bexar	273,913	275,167	276,435	277,776	279,054	280,327	281,580	282,826	284,071	285,295	286,539
Brazoria	47,613	47,906	48,361	48,599	48,911	49,242	49,570	49,902	50,223	50,555	50,895
Brazos	30,252	30,369	30,522	30,677	30,772	30,871	30,970	31,076	31,181	31,291	31,404
Collin	105,208	106,039	106,605	107,066	107,588	108,089	108,599	109,159	109,707	110,235	110,796
Dallas	340,244	343,824	345,007	345,007	346,368	347,772	349,198	350,739	352,171	353,762	355,192
Denton	86,481	86,996	87,402	87,828	88,203	88,567	88,932	89,320	89,689	90,089	90,466
El Paso	140,915	141,043	141,304	141,472	141,646	141,824	142,002	142,180	142,372	142,565	142,762
Ellis	25,998	26,070	26,295	26,431	26,563	26,689	26,824	26,957	27,105	27,246	27,392
Fort Bend	80,796	81,393	81,812	82,344	82,723	83,081	83,463	83,878	84,229	84,651	85,037
Galveston	51,800	52,035	52,490	52,705	53,024	53,345	53,644	53,971	54,290	54,595	54,928
Harris	479,547	482,046	485,403	486,701	489,987	493,358	496,314	499,824	503,469	507,141	510,893
Hidalgo	105,727	106,209	106,524	106,968	107,244	107,529	107,788	108,064	108,333	108,597	108,868
Johnson	22,402	22,440	22,556	22,629	22,703	22,775	22,846	22,920	22,995	23,065	23,141
Lubbock	54,566	54,703	55,006	55,319	55,538	55,761	55,991	56,221	56,456	56,704	56,939
McLennan	32,591	32,779	32,821	33,139	33,333	33,532	33,736	33,935	34,141	34,353	34,572
Montgomery	68,664	69,240	69,816	69,816	70,283	70,775	71,252	71,719	72,227	72,729	73,214
Tarrant	294,498	295,152	296,415	297,617	298,725	299,948	301,138	302,361	303,585	304,829	306,122
Travis	99,717	100,341	100,976	101,576	102,146	102,730	103,324	103,905	104,516	105,126	105,791
Williamson	59,187	59,711	60,004	60,220	60,558	60,895	61,217	61,546	61,885	62,229	62,547

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:											
	8/23	8/24	8/25	8/26	8/28				8/30				9/1			
Bexar	273,913	275,167	276,435	277,776	280,327	(56,065)	[13,456]	{6,728}	282,826	(56,565)	[13,576]	{6,788}	285,295	(57,059)	[13,694]	{6,847}
Brazoria	47,613	47,906	48,361	48,599	49,242	(9,848)	[2,364]	{1,182}	49,902	(9,980)	[2,395]	{1,198}	50,555	(10,111)	[2,427]	{1,213}
Brazos	30,252	30,369	30,522	30,677	30,871	(6,174)	[1,482]	{741}	31,076	(6,215)	[1,492]	{746}	31,291	(6,258)	[1,502]	{751}
Collin	105,208	106,039	106,605	107,066	108,089	(21,618)	[5,188]	{2,594}	109,159	(21,832)	[5,240]	{2,620}	110,235	(22,047)	[5,291]	{2,646}
Dallas	340,244	343,824	345,007	345,007	347,772	(69,554)	[16,693]	{8,347}	350,739	(70,148)	[16,835]	{8,418}	353,762	(70,752)	[16,981]	{8,490}
Denton	86,481	86,996	87,402	87,828	88,567	(17,713)	[4,251]	{2,126}	89,320	(17,864)	[4,287]	{2,144}	90,089	(18,018)	[4,324]	{2,162}
El Paso	140,915	141,043	141,304	141,472	141,824	(28,365)	[6,808]	{3,404}	142,180	(28,436)	[6,825]	{3,412}	142,565	(28,513)	[6,843]	{3,422}
Ellis	25,998	26,070	26,295	26,431	26,689	(5,338)	[1,281]	{641}	26,957	(5,391)	[1,294]	{647}	27,246	(5,449)	[1,308]	{654}
Fort Bend	80,796	81,393	81,812	82,344	83,081	(16,616)	[3,988]	{1,994}	83,878	(16,776)	[4,026]	{2,013}	84,651	(16,930)	[4,063]	{2,032}
Galveston	51,800	52,035	52,490	52,705	53,345	(10,669)	[2,561]	{1,280}	53,971	(10,794)	[2,591]	{1,295}	54,595	(10,919)	[2,621]	{1,310}
Harris	479,547	482,046	485,403	486,701	493,358	(98,672)	[23,681]	{11,841}	499,824	(99,965)	[23,992]	{11,996}	507,141	(101,428)	[24,343]	{12,171}
Hidalgo	105,727	106,209	106,524	106,968	107,529	(21,506)	[5,161]	{2,581}	108,064	(21,613)	[5,187]	{2,594}	108,597	(21,719)	[5,213]	{2,606}
Johnson	22,402	22,440	22,556	22,629	22,775	(4,555)	[1,093]	{547}	22,920	(4,584)	[1,100]	{550}	23,065	(4,613)	[1,107]	{554}
Lubbock	54,566	54,703	55,006	55,319	55,761	(11,152)	[2,677]	{1,338}	56,221	(11,244)	[2,699]	{1,349}	56,704	(11,341)	[2,722]	{1,361}
McLennan	32,591	32,779	32,821	33,139	33,532	(6,706)	[1,610]	{805}	33,935	(6,787)	[1,629]	{814}	34,353	(6,871)	[1,649]	{824}
Montgomery	68,664	69,240	69,816	69,816	70,775	(14,155)	[3,397]	{1,699}	71,719	(14,344)	[3,443]	{1,721}	72,729	(14,546)	[3,491]	{1,745}
Tarrant	294,498	295,152	296,415	297,617	299,948	(59,990)	[14,398]	{7,199}	302,361	(60,472)	[14,513]	{7,257}	304,829	(60,966)	[14,632]	{7,316}
Travis	99,717	100,341	100,976	101,576	102,730	(20,546)	[4,931]	{2,466}	103,905	(20,781)	[4,987]	{2,494}	105,126	(21,025)	[5,046]	{2,523}
Williamson	59,187	59,711	60,004	60,220	60,895	(12,179)	[2,923]	{1,461}	61,546	(12,309)	[2,954]	{1,477}	62,229	(12,446)	[2,987]	{1,493}

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.