

**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.**

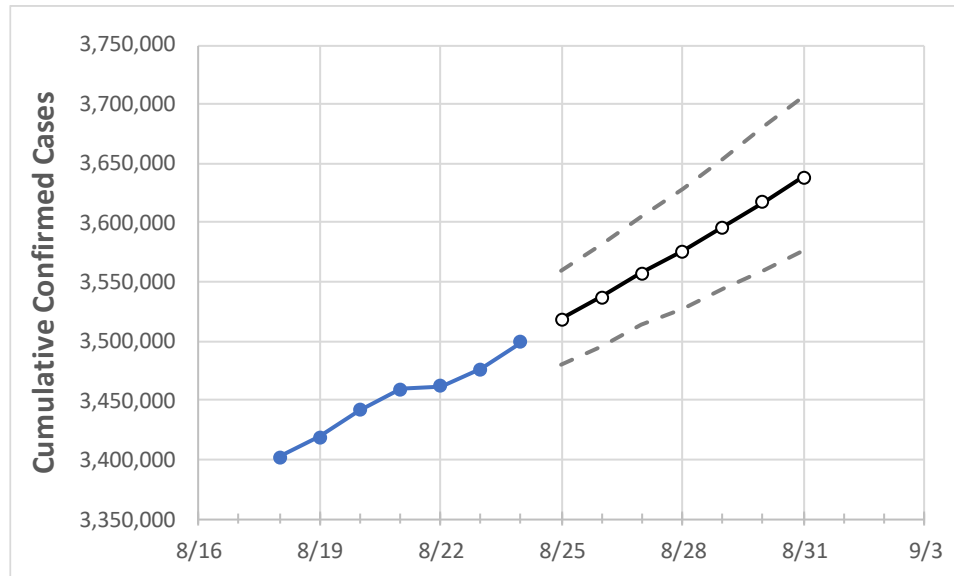
**IEM's Modeling Lead**

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.

## Texas 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	
Texas	3,459,060	3,462,334	3,476,394	3,499,482	3,518,152	3,537,393	3,557,053	3,575,969	3,596,005	3,616,912	3,638,635	

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:							
	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	
Bexar	271,445	272,679	273,913	275,167	276,702	278,242	279,805	281,350	282,911	284,502	286,125	
Brazoria	47,218	47,416	47,613	47,906	48,284	48,653	49,032	49,420	49,839	50,239	50,646	
Brazos	30,179	30,215	30,252	30,369	30,451	30,537	30,623	30,707	30,792	30,883	30,973	
Collin	104,956	105,061	105,208	106,039	106,527	106,998	107,527	108,049	108,550	109,097	109,667	
Dallas	339,376	339,810	340,244	343,824	345,260	346,617	348,198	349,654	351,272	352,829	354,499	
Denton	86,064	86,272	86,481	86,996	87,432	87,889	88,364	88,826	89,325	89,831	90,345	
El Paso	140,780	140,839	140,915	141,043	141,188	141,340	141,500	141,649	141,816	141,980	142,140	
Ellis	25,854	25,926	25,998	26,070	26,192	26,312	26,434	26,558	26,687	26,813	26,947	
Fort Bend	80,619	80,707	80,796	81,393	81,804	82,144	82,551	82,949	83,375	83,751	84,159	
Galveston	51,237	51,565	51,800	52,035	52,387	52,738	53,095	53,458	53,821	54,184	54,544	
Harris	478,265	478,845	479,547	482,046	485,691	488,915	492,665	496,228	500,130	503,856	507,706	
Hidalgo	105,581	105,654	105,727	106,209	106,523	106,849	107,170	107,495	107,801	108,143	108,466	
Johnson	22,326	22,364	22,402	22,440	22,517	22,596	22,679	22,758	22,843	22,923	23,006	
Lubbock	54,293	54,430	54,566	54,703	54,902	55,100	55,306	55,511	55,718	55,929	56,151	
McLennan	32,216	32,404	32,591	32,779	32,979	33,180	33,387	33,599	33,815	34,037	34,262	
Montgomery	68,104	68,384	68,664	68,664	69,133	69,629	70,095	70,605	71,110	71,617	72,132	
Tarrant	292,265	292,820	294,498	295,152	296,263	297,439	298,614	299,835	301,033	302,337	303,605	
Travis	99,245	99,481	99,717	100,341	100,865	101,414	101,968	102,536	103,114	103,684	104,291	
Williamson	58,804	58,996	59,187	59,711	60,090	60,471	60,864	61,248	61,635	62,029	62,427	

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:											
	8/21	8/22	8/23	8/24	8/26			8/28			8/30					
Bexar	271,445	272,679	273,913	275,167	278,242	(55,648)	[13,356]	{6,678}	281,350	(56,270)	[13,505]	{6,752}	284,502	(56,900)	[13,656]	{6,828}
Brazoria	47,218	47,416	47,613	47,906	48,653	(9,731)	[2,335]	{1,168}	49,420	(9,884)	[2,372]	{1,186}	50,239	(10,048)	[2,411]	{1,206}
Brazos	30,179	30,215	30,252	30,369	30,537	(6,107)	[1,466]	{733}	30,707	(6,141)	[1,474]	{737}	30,883	(6,177)	[1,482]	{741}
Collin	104,956	105,061	105,208	106,039	106,998	(21,400)	[5,136]	{2,568}	108,049	(21,610)	[5,186]	{2,593}	109,097	(21,819)	[5,237]	{2,618}
Dallas	339,376	339,810	340,244	343,824	346,617	(69,323)	[16,638]	{8,319}	349,654	(69,931)	[16,783]	{8,392}	352,829	(70,566)	[16,936]	{8,468}
Denton	86,064	86,272	86,481	86,996	87,889	(17,578)	[4,219]	{2,109}	88,826	(17,765)	[4,264]	{2,132}	89,831	(17,966)	[4,312]	{2,156}
El Paso	140,780	140,839	140,915	141,043	141,340	(28,268)	[6,784]	{3,392}	141,649	(28,330)	[6,799]	{3,400}	141,980	(28,396)	[6,815]	{3,408}
Ellis	25,854	25,926	25,998	26,070	26,312	(5,262)	[1,263]	{631}	26,558	(5,312)	[1,275]	{637}	26,813	(5,363)	[1,287]	{644}
Fort Bend	80,619	80,707	80,796	81,393	82,144	(16,429)	[3,943]	{1,971}	82,949	(16,590)	[3,982]	{1,991}	83,751	(16,750)	[4,020]	{2,010}
Galveston	51,237	51,565	51,800	52,035	52,738	(10,548)	[2,531]	{1,266}	53,458	(10,692)	[2,566]	{1,283}	54,184	(10,837)	[2,601]	{1,300}
Harris	478,265	478,845	479,547	482,046	488,915	(97,783)	[23,468]	{11,734}	496,228	(99,246)	[23,819]	{11,909}	503,856	(100,771)	[24,185]	{12,093}
Hidalgo	105,581	105,654	105,727	106,209	106,849	(21,370)	[5,129]	{2,564}	107,495	(21,499)	[5,160]	{2,580}	108,143	(21,629)	[5,191]	{2,595}
Johnson	22,326	22,364	22,402	22,440	22,596	(4,519)	[1,085]	{542}	22,758	(4,552)	[1,092]	{546}	22,923	(4,585)	[1,100]	{550}
Lubbock	54,293	54,430	54,566	54,703	55,100	(11,020)	[2,645]	{1,322}	55,511	(11,102)	[2,665]	{1,332}	55,929	(11,186)	[2,685]	{1,342}
McLennan	32,216	32,404	32,591	32,779	33,180	(6,636)	[1,593]	{796}	33,599	(6,720)	[1,613]	{806}	34,037	(6,807)	[1,634]	{817}
Montgomery	68,104	68,384	68,664	68,664	69,629	(13,926)	[3,342]	{1,671}	70,605	(14,121)	[3,389]	{1,695}	71,617	(14,323)	[3,438]	{1,719}
Tarrant	292,265	292,820	294,498	295,152	297,439	(59,488)	[14,277]	{7,139}	299,835	(59,967)	[14,392]	{7,196}	302,337	(60,467)	[14,512]	{7,256}
Travis	99,245	99,481	99,717	100,341	101,414	(20,283)	[4,868]	{2,434}	102,536	(20,507)	[4,922]	{2,461}	103,684	(20,737)	[4,977]	{2,488}
Williamson	58,804	58,996	59,187	59,711	60,471	(12,094)	[2,903]	{1,451}	61,248	(12,250)	[2,940]	{1,470}	62,029	(12,406)	[2,977]	{1,489}

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.