

## IEM's AI Modeling: Short-term COVID-19 Projections

Date: 1/24/22

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 1/24/22 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.**

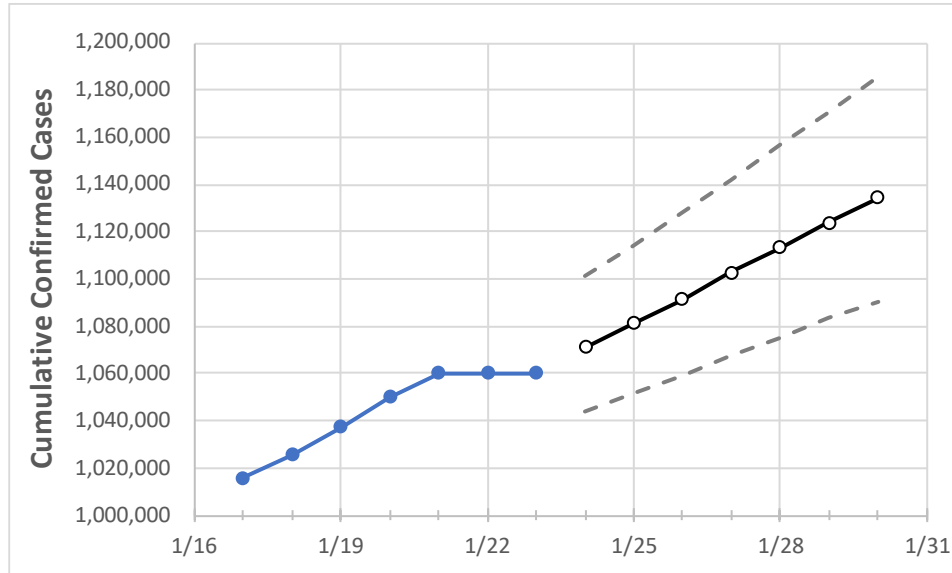
### IEM's Modeling Lead

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.

## Louisiana State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30
Louisiana	1,050,080	1,060,022	1,060,022	1,060,022	1,071,116	1,081,332	1,091,627	1,102,793	1,113,205	1,123,813	1,134,648

**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.

## Louisiana Parishes

	Actual Confirmed Cases On:				Projected Cases For:						
	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30
Ascension Parish	30,434	30,639	30,639	30,639	30,944	31,249	31,559	31,850	32,138	32,440	32,718
Bossier Parish	31,401	31,757	31,757	31,757	32,194	32,618	33,052	33,480	33,909	34,339	34,777
Caddo Parish	57,493	58,155	58,155	58,155	58,714	59,290	59,862	60,410	60,969	61,517	62,072
Calcasieu Parish	45,635	45,999	45,999	45,999	46,484	46,955	47,424	47,908	48,381	48,852	49,349
East Baton Rouge Parish	95,933	96,847	96,847	96,847	98,142	99,502	100,654	102,011	103,277	104,624	105,745
Jefferson Parish	100,180	100,790	100,790	100,790	101,429	102,003	102,619	103,174	103,745	104,287	104,824
Lafayette Parish	52,314	52,751	52,751	52,751	53,270	53,784	54,295	54,804	55,317	55,835	56,336
Lafourche Parish	23,574	23,792	23,792	23,792	24,062	24,345	24,641	24,928	25,202	25,517	25,819
Orleans Parish	76,214	76,754	76,754	76,754	77,225	77,661	78,072	78,498	78,892	79,264	79,633
Ouachita Parish	41,843	42,323	42,323	42,323	42,796	43,286	43,766	44,264	44,757	45,265	45,758
Rapides Parish	27,942	28,182	28,182	28,182	28,486	28,787	29,092	29,407	29,740	30,050	30,377
St. Bernard Parish	9,927	9,974	9,974	9,974	10,055	10,138	10,211	10,293	10,372	10,447	10,518
St. Charles Parish	12,275	12,367	12,367	12,367	12,464	12,563	12,655	12,748	12,840	12,936	13,022
St. James Parish	4,803	4,862	4,862	4,862	4,907	4,952	4,997	5,042	5,087	5,134	5,182
St. John the Baptist Parish	9,181	9,297	9,297	9,297	9,382	9,467	9,547	9,625	9,707	9,789	9,864
St. Tammany Parish	61,598	62,352	62,352	62,352	62,979	63,608	64,231	64,863	65,481	66,097	66,705

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.

### Louisiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	1/20	1/21	1/22	1/23	1/25				1/27				1/29			
Ascension Parish	30,434	30,639	30,639	30,639	31,249	(6,250)	[1,500]	{750}	31,850	(6,370)	[1,529]	{764}	32,440	(6,488)	[1,557]	{779}
Bossier Parish	31,401	31,757	31,757	31,757	32,618	(6,524)	[1,566]	{783}	33,480	(6,696)	[1,607]	{804}	34,339	(6,868)	[1,648]	{824}
Caddo Parish	57,493	58,155	58,155	58,155	59,290	(11,858)	[2,846]	{1,423}	60,410	(12,082)	[2,900]	{1,450}	61,517	(12,303)	[2,953]	{1,476}
Calcasieu Parish	45,635	45,999	45,999	45,999	46,955	(9,391)	[2,254]	{1,127}	47,908	(9,582)	[2,300]	{1,150}	48,852	(9,770)	[2,345]	{1,172}
East Baton Rouge Parish	95,933	96,847	96,847	96,847	99,502	(19,900)	[4,776]	{2,388}	102,011	(20,402)	[4,897]	{2,448}	104,624	(20,925)	[5,022]	{2,511}
Jefferson Parish	100,180	100,790	100,790	100,790	102,003	(20,401)	[4,896]	{2,448}	103,174	(20,635)	[4,952]	{2,476}	104,287	(20,857)	[5,006]	{2,503}
Lafayette Parish	52,314	52,751	52,751	52,751	53,784	(10,757)	[2,582]	{1,291}	54,804	(10,961)	[2,631]	{1,315}	55,835	(11,167)	[2,680]	{1,340}
Lafourche Parish	23,574	23,792	23,792	23,792	24,345	(4,869)	[1,169]	{584}	24,928	(4,986)	[1,197]	{598}	25,517	(5,103)	[1,225]	{612}
Orleans Parish	76,214	76,754	76,754	76,754	77,661	(15,532)	[3,728]	{1,864}	78,498	(15,700)	[3,768]	{1,884}	79,264	(15,853)	[3,805]	{1,902}
Ouachita Parish	41,843	42,323	42,323	42,323	43,286	(8,657)	[2,078]	{1,039}	44,264	(8,853)	[2,125]	{1,062}	45,265	(9,053)	[2,173]	{1,086}
Rapides Parish	27,942	28,182	28,182	28,182	28,787	(5,757)	[1,382]	{691}	29,407	(5,881)	[1,412]	{706}	30,050	(6,010)	[1,442]	{721}
St. Bernard Parish	9,927	9,974	9,974	9,974	10,138	(2,028)	[487]	{243}	10,293	(2,059)	[494]	{247}	10,447	(2,089)	[501]	{251}
St. Charles Parish	12,275	12,367	12,367	12,367	12,563	(2,513)	[603]	{302}	12,748	(2,550)	[612]	{306}	12,936	(2,587)	[621]	{310}
St. James Parish	4,803	4,862	4,862	4,862	4,952	(990)	[238]	{119}	5,042	(1,008)	[242]	{121}	5,134	(1,027)	[246]	{123}
St. John the Baptist Parish	9,181	9,297	9,297	9,297	9,467	(1,893)	[454]	{227}	9,625	(1,925)	[462]	{231}	9,789	(1,958)	[470]	{235}
St. Tammany Parish	61,598	62,352	62,352	62,352	63,608	(12,722)	[3,053]	{1,527}	64,863	(12,973)	[3,113]	{1,557}	66,097	(13,219)	[3,173]	{1,586}

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.