

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

**Date: 12/20/21**

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 12/20/21 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.**

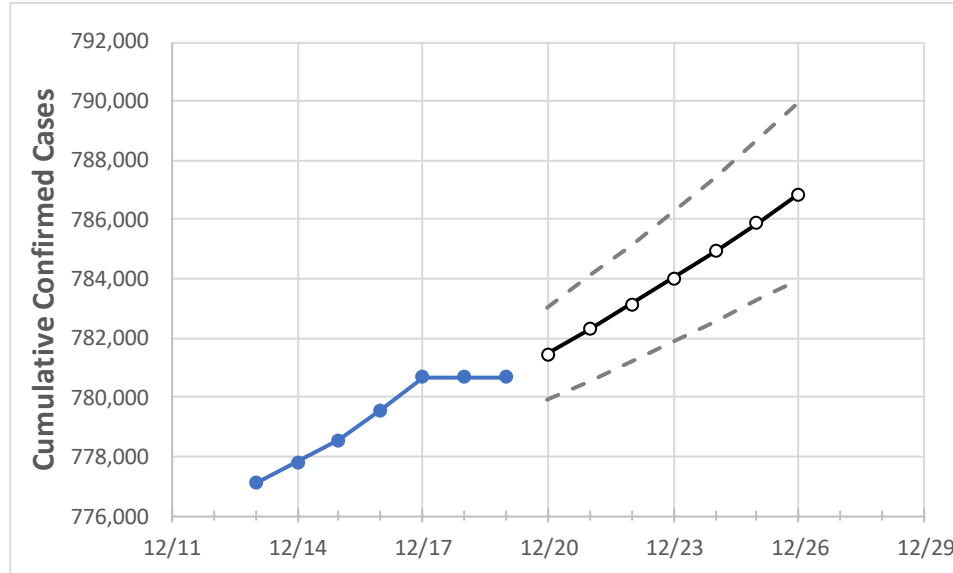
### **IEM's Modeling Lead**

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.

## Louisiana State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	12/16	12/17	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26
Louisiana	779,567	780,668	780,668	780,668	781,460	782,294	783,160	784,027	784,945	785,872	786,868

**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:						
	12/16	12/17	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26
Ascension Parish	22,329	22,348	22,348	22,348	22,375	22,403	22,433	22,464	22,496	22,530	22,565
Bossier Parish	22,379	22,398	22,398	22,398	22,416	22,434	22,450	22,468	22,486	22,504	22,522
Caddo Parish	40,580	40,654	40,654	40,654	40,698	40,741	40,786	40,834	40,882	40,932	40,983
Calcasieu Parish	35,261	35,297	35,297	35,297	35,323	35,350	35,377	35,405	35,434	35,464	35,494
East Baton Rouge Parish	65,201	65,255	65,255	65,255	65,308	65,364	65,419	65,475	65,536	65,598	65,659
Jefferson Parish	71,086	71,240	71,240	71,240	71,329	71,430	71,529	71,637	71,749	71,870	71,992
Lafayette Parish	40,008	40,031	40,031	40,031	40,063	40,095	40,129	40,163	40,198	40,233	40,269
Lafourche Parish	18,381	18,411	18,411	18,411	18,429	18,446	18,464	18,483	18,503	18,523	18,543
Orleans Parish	48,478	48,784	48,784	48,784	48,996	49,227	49,469	49,732	50,024	50,342	50,688
Ouachita Parish	32,601	32,617	32,617	32,617	32,642	32,665	32,689	32,713	32,737	32,761	32,784
Rapides Parish	21,733	21,756	21,756	21,756	21,770	21,785	21,799	21,814	21,829	21,844	21,860
St. Bernard Parish	7,103	7,130	7,130	7,130	7,140	7,151	7,161	7,173	7,184	7,197	7,210
St. Charles Parish	9,113	9,125	9,125	9,125	9,140	9,154	9,170	9,185	9,202	9,220	9,238
St. James Parish	3,567	3,572	3,572	3,572	3,575	3,577	3,580	3,583	3,587	3,590	3,594
St. John the Baptist Parish	6,443	6,454	6,454	6,454	6,460	6,466	6,472	6,478	6,485	6,492	6,499
St. Tammany Parish	44,866	44,938	44,938	44,938	44,989	45,042	45,097	45,151	45,209	45,270	45,331

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:											
	12/16	12/17	12/18	12/19	12/21				12/23				12/25			
Ascension Parish	22,329	22,348	22,348	22,348	22,403	(4,481)	[1,075]	{538}	22,464	(4,493)	[1,078]	{539}	22,530	(4,506)	[1,081]	{541}
Bossier Parish	22,379	22,398	22,398	22,398	22,434	(4,487)	[1,077]	{538}	22,468	(4,494)	[1,078]	{539}	22,504	(4,501)	[1,080]	{540}
Caddo Parish	40,580	40,654	40,654	40,654	40,741	(8,148)	[1,956]	{978}	40,834	(8,167)	[1,960]	{980}	40,932	(8,186)	[1,965]	{982}
Calcasieu Parish	35,261	35,297	35,297	35,297	35,350	(7,070)	[1,697]	{848}	35,405	(7,081)	[1,699]	{850}	35,464	(7,093)	[1,702]	{851}
East Baton Rouge Parish	65,201	65,255	65,255	65,255	65,364	(13,073)	[3,137]	{1,569}	65,475	(13,095)	[3,143]	{1,571}	65,598	(13,120)	[3,149]	{1,574}
Jefferson Parish	71,086	71,240	71,240	71,240	71,430	(14,286)	[3,429]	{1,714}	71,637	(14,327)	[3,439]	{1,719}	71,870	(14,374)	[3,450]	{1,725}
Lafayette Parish	40,008	40,031	40,031	40,031	40,095	(8,019)	[1,925]	{962}	40,163	(8,033)	[1,928]	{964}	40,233	(8,047)	[1,931]	{966}
Lafourche Parish	18,381	18,411	18,411	18,411	18,446	(3,689)	[885]	{443}	18,483	(3,697)	[887]	{444}	18,523	(3,705)	[889]	{445}
Orleans Parish	48,478	48,784	48,784	48,784	49,227	(9,845)	[2,363]	{1,181}	49,732	(9,946)	[2,387]	{1,194}	50,342	(10,068)	[2,416]	{1,208}
Ouachita Parish	32,601	32,617	32,617	32,617	32,665	(6,533)	[1,568]	{784}	32,713	(6,543)	[1,570]	{785}	32,761	(6,552)	[1,573]	{786}
Rapides Parish	21,733	21,756	21,756	21,756	21,785	(4,357)	[1,046]	{523}	21,814	(4,363)	[1,047]	{524}	21,844	(4,369)	[1,049]	{524}
St. Bernard Parish	7,103	7,130	7,130	7,130	7,151	(1,430)	[343]	{172}	7,173	(1,435)	[344]	{172}	7,197	(1,439)	[345]	{173}
St. Charles Parish	9,113	9,125	9,125	9,125	9,154	(1,831)	[439]	{220}	9,185	(1,837)	[441]	{220}	9,220	(1,844)	[443]	{221}
St. James Parish	3,567	3,572	3,572	3,572	3,577	(715)	[172]	{86}	3,583	(717)	[172]	{86}	3,590	(718)	[172]	{86}
St. John the Baptist Parish	6,443	6,454	6,454	6,454	6,466	(1,293)	[310]	{155}	6,478	(1,296)	[311]	{155}	6,492	(1,298)	[312]	{156}
St. Tammany Parish	44,866	44,938	44,938	44,938	45,042	(9,008)	[2,162]	{1,081}	45,151	(9,030)	[2,167]	{1,084}	45,270	(9,054)	[2,173]	{1,086}

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.