

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

**Date: 3/9/21**

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 3/9/21 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.**

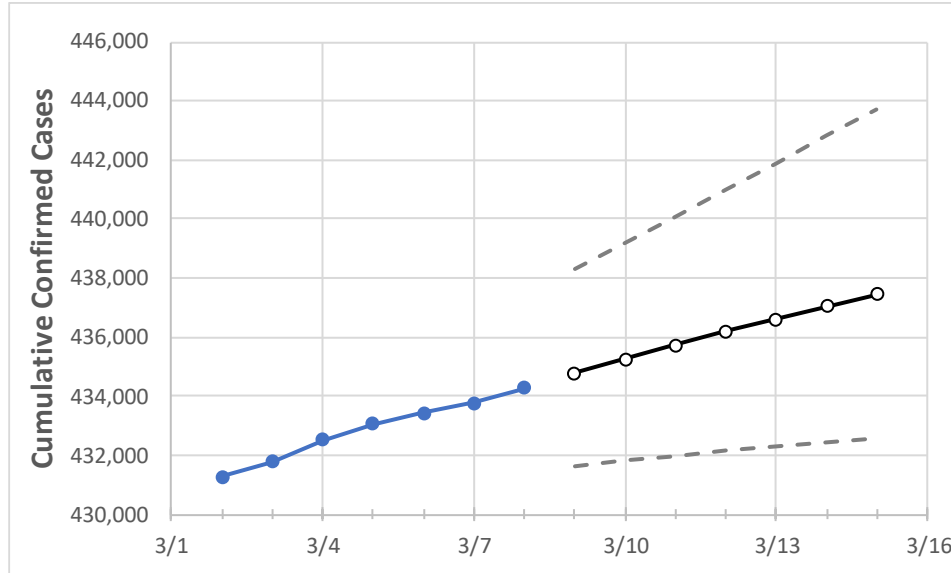
### **IEM's Modeling Lead**

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:						
	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	3/15
Louisiana	433,045	433,415	433,785	434,289	434,773	435,261	435,725	436,196	436,620	437,041	437,457

**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:						
	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	3/15
Ascension Parish	11,048	11,061	11,074	11,088	11,102	11,115	11,128	11,140	11,153	11,165	11,178
Bossier Parish	13,064	13,068	13,071	13,084	13,092	13,100	13,108	13,115	13,121	13,128	13,133
Caddo Parish	24,819	24,828	24,837	24,862	24,879	24,896	24,913	24,928	24,943	24,958	24,971
Calcasieu Parish	19,723	19,773	19,822	19,882	19,937	19,992	20,045	20,097	20,153	20,203	20,252
East Baton Rouge Parish	35,949	36,001	36,052	36,115	36,174	36,231	36,286	36,339	36,393	36,445	36,496
Jefferson Parish	44,184	44,205	44,226	44,282	44,329	44,373	44,416	44,458	44,500	44,540	44,578
Lafayette Parish	21,700	21,715	21,729	21,735	21,752	21,768	21,784	21,799	21,814	21,828	21,842
Lafourche Parish	9,203	9,209	9,215	9,233	9,243	9,252	9,262	9,270	9,278	9,286	9,293
Orleans Parish	28,655	28,683	28,710	28,744	28,775	28,805	28,835	28,863	28,891	28,916	28,941
Ouachita Parish	17,719	17,725	17,730	17,731	17,735	17,740	17,743	17,747	17,750	17,753	17,756
Rapides Parish	11,313	11,321	11,328	11,339	11,348	11,357	11,366	11,375	11,383	11,392	11,400
St. Bernard Parish	3,783	3,789	3,794	3,799	3,806	3,813	3,819	3,825	3,831	3,837	3,842
St. Charles Parish	5,150	5,154	5,158	5,160	5,167	5,173	5,179	5,185	5,190	5,196	5,201
St. James Parish	1,858	1,859	1,859	1,863	1,864	1,866	1,867	1,868	1,869	1,870	1,871
St. John the Baptist Parish	3,551	3,553	3,554	3,557	3,560	3,563	3,566	3,569	3,572	3,575	3,577
St. Tammany Parish	24,324	24,362	24,400	24,454	24,502	24,550	24,596	24,638	24,678	24,718	24,758

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:											
	3/5	3/6	3/7	3/8	3/10				3/12				3/14			
Ascension Parish	11,048	11,061	11,074	11,088	11,115	(2,223)	[534]	{267}	11,140	(2,228)	[535]	{267}	11,165	(2,233)	[536]	{268}
Bossier Parish	13,064	13,068	13,071	13,084	13,100	(2,620)	[629]	{314}	13,115	(2,623)	[630]	{315}	13,128	(2,626)	[630]	{315}
Caddo Parish	24,819	24,828	24,837	24,862	24,896	(4,979)	[1,195]	{598}	24,928	(4,986)	[1,197]	{598}	24,958	(4,992)	[1,198]	{599}
Calcasieu Parish	19,723	19,773	19,822	19,882	19,992	(3,998)	[960]	{480}	20,097	(4,019)	[965]	{482}	20,203	(4,041)	[970]	{485}
East Baton Rouge Parish	35,949	36,001	36,052	36,115	36,231	(7,246)	[1,739]	{870}	36,339	(7,268)	[1,744]	{872}	36,445	(7,289)	[1,749]	{875}
Jefferson Parish	44,184	44,205	44,226	44,282	44,373	(8,875)	[2,130]	{1,065}	44,458	(8,892)	[2,134]	{1,067}	44,540	(8,908)	[2,138]	{1,069}
Lafayette Parish	21,700	21,715	21,729	21,735	21,768	(4,354)	[1,045]	{522}	21,799	(4,360)	[1,046]	{523}	21,828	(4,366)	[1,048]	{524}
Lafourche Parish	9,203	9,209	9,215	9,233	9,252	(1,850)	[444]	{222}	9,270	(1,854)	[445]	{222}	9,286	(1,857)	[446]	{223}
Orleans Parish	28,655	28,683	28,710	28,744	28,805	(5,761)	[1,383]	{691}	28,863	(5,773)	[1,385]	{693}	28,916	(5,783)	[1,388]	{694}
Ouachita Parish	17,719	17,725	17,730	17,731	17,740	(3,548)	[852]	{426}	17,747	(3,549)	[852]	{426}	17,753	(3,551)	[852]	{426}
Rapides Parish	11,313	11,321	11,328	11,339	11,357	(2,271)	[545]	{273}	11,375	(2,275)	[546]	{273}	11,392	(2,278)	[547]	{273}
St. Bernard Parish	3,783	3,789	3,794	3,799	3,813	(763)	[183]	{92}	3,825	(765)	[184]	{92}	3,837	(767)	[184]	{92}
St. Charles Parish	5,150	5,154	5,158	5,160	5,173	(1,035)	[248]	{124}	5,185	(1,037)	[249]	{124}	5,196	(1,039)	[249]	{125}
St. James Parish	1,858	1,859	1,859	1,863	1,866	(373)	[90]	{45}	1,868	(374)	[90]	{45}	1,870	(374)	[90]	{45}
St. John the Baptist Parish	3,551	3,553	3,554	3,557	3,563	(713)	[171]	{86}	3,569	(714)	[171]	{86}	3,575	(715)	[172]	{86}
St. Tammany Parish	24,324	24,362	24,400	24,454	24,550	(4,910)	[1,178]	{589}	24,638	(4,928)	[1,183]	{591}	24,718	(4,944)	[1,186]	{593}

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.