

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

Date: 12/8/20

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 12/8/20 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.**

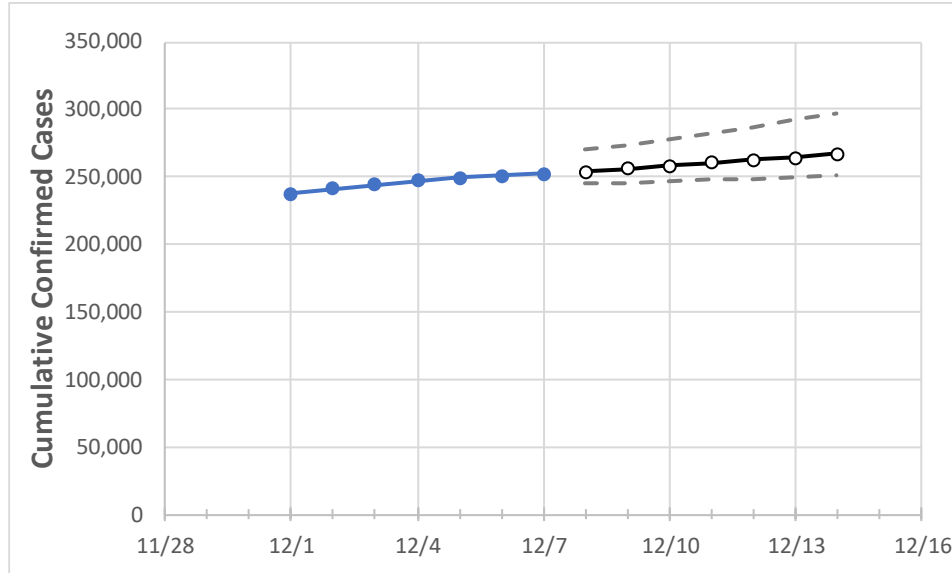
### IEM's Modeling Lead

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:							
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	
Louisiana	247,177	249,150	251,123	252,136	254,066	256,046	258,076	260,158	262,293	264,482	266,726	

**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 20%, and are often within 10%, of actual confirmed cases.

Louisiana Parishes

	Actual Confirmed Cases On:				Projected Cases For:							
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	
Ascension Parish	6,074	6,124	6,174	6,215	6,247	6,279	6,311	6,343	6,375	6,407	6,438	
Bossier Parish	6,734	6,805	6,875	6,897	6,941	6,986	7,030	7,074	7,117	7,161	7,204	
Caddo Parish	14,271	14,363	14,454	14,507	14,592	14,678	14,763	14,849	14,936	15,022	15,109	
Calcasieu Parish	10,939	10,998	11,056	11,087	11,138	11,189	11,241	11,292	11,344	11,396	11,448	
East Baton Rouge Parish	20,941	21,071	21,200	21,300	21,442	21,589	21,739	21,894	22,054	22,218	22,387	
Jefferson Parish	24,588	24,766	24,943	25,072	25,287	25,509	25,740	25,978	26,225	26,481	26,746	
Lafayette Parish	12,877	12,966	13,054	13,096	13,214	13,335	13,459	13,586	13,717	13,850	13,987	
Lafourche Parish	5,001	5,044	5,086	5,104	5,152	5,202	5,254	5,307	5,363	5,420	5,480	
Orleans Parish	16,733	16,873	17,013	17,082	17,199	17,319	17,442	17,570	17,700	17,835	17,973	
Ouachita Parish	10,648	10,755	10,861	10,907	10,995	11,084	11,175	11,267	11,361	11,456	11,553	
Rapides Parish	6,562	6,593	6,624	6,650	6,686	6,722	6,758	6,796	6,833	6,871	6,910	
St. Bernard Parish	1,921	1,934	1,946	1,954	1,970	1,988	2,006	2,024	2,044	2,065	2,086	
St. Charles Parish	2,812	2,830	2,848	2,864	2,894	2,925	2,957	2,991	3,027	3,064	3,102	
St. James Parish	1,035	1,054	1,073	1,078	1,089	1,100	1,112	1,125	1,139	1,154	1,169	
St. John the Baptist Parish	2,094	2,106	2,118	2,124	2,136	2,149	2,161	2,174	2,187	2,201	2,214	
St. Tammany Parish	11,128	11,217	11,305	11,365	11,492	11,624	11,760	11,902	12,049	12,200	12,358	

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:											
	12/4	12/5	12/6	12/7	12/9				12/11				12/13			
Ascension Parish	6,074	6,124	6,174	6,215	6,279	(1,256)	[301]	{151}	6,343	(1,269)	[304]	{152}	6,407	(1,281)	[308]	{154}
Bossier Parish	6,734	6,805	6,875	6,897	6,986	(1,397)	[335]	{168}	7,074	(1,415)	[340]	{170}	7,161	(1,432)	[344]	{172}
Caddo Parish	14,271	14,363	14,454	14,507	14,678	(2,936)	[705]	{352}	14,849	(2,970)	[713]	{356}	15,022	(3,004)	[721]	{361}
Calcasieu Parish	10,939	10,998	11,056	11,087	11,189	(2,238)	[537]	{269}	11,292	(2,258)	[542]	{271}	11,396	(2,279)	[547]	{274}
East Baton Rouge Parish	20,941	21,071	21,200	21,300	21,589	(4,318)	[1,036]	{518}	21,894	(4,379)	[1,051]	{525}	22,218	(4,444)	[1,066]	{533}
Jefferson Parish	24,588	24,766	24,943	25,072	25,509	(5,102)	[1,224]	{612}	25,978	(5,196)	[1,247]	{623}	26,481	(5,296)	[1,271]	{636}
Lafayette Parish	12,877	12,966	13,054	13,096	13,335	(2,667)	[640]	{320}	13,586	(2,717)	[652]	{326}	13,850	(2,770)	[665]	{332}
Lafourche Parish	5,001	5,044	5,086	5,104	5,202	(1,040)	[250]	{125}	5,307	(1,061)	[255]	{127}	5,420	(1,084)	[260]	{130}
Orleans Parish	16,733	16,873	17,013	17,082	17,319	(3,464)	[831]	{416}	17,570	(3,514)	[843]	{422}	17,835	(3,567)	[856]	{428}
Ouachita Parish	10,648	10,755	10,861	10,907	11,084	(2,217)	[532]	{266}	11,267	(2,253)	[541]	{270}	11,456	(2,291)	[550]	{275}
Rapides Parish	6,562	6,593	6,624	6,650	6,722	(1,344)	[323]	{161}	6,796	(1,359)	[326]	{163}	6,871	(1,374)	[330]	{165}
St. Bernard Parish	1,921	1,934	1,946	1,954	1,988	(398)	[95]	{48}	2,024	(405)	[97]	{49}	2,065	(413)	[99]	{50}
St. Charles Parish	2,812	2,830	2,848	2,864	2,925	(585)	[140]	{70}	2,991	(598)	[144]	{72}	3,064	(613)	[147]	{74}
St. James Parish	1,035	1,054	1,073	1,078	1,100	(220)	[53]	{26}	1,125	(225)	[54]	{27}	1,154	(231)	[55]	{28}
St. John the Baptist Parish	2,094	2,106	2,118	2,124	2,149	(430)	[103]	{52}	2,174	(435)	[104]	{52}	2,201	(440)	[106]	{53}
St. Tammany Parish	11,128	11,217	11,305	11,365	11,624	(2,325)	[558]	{279}	11,902	(2,380)	[571]	{286}	12,200	(2,440)	[586]	{293}

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.