

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

Date: 12/16/20

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 12/16/20 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.**

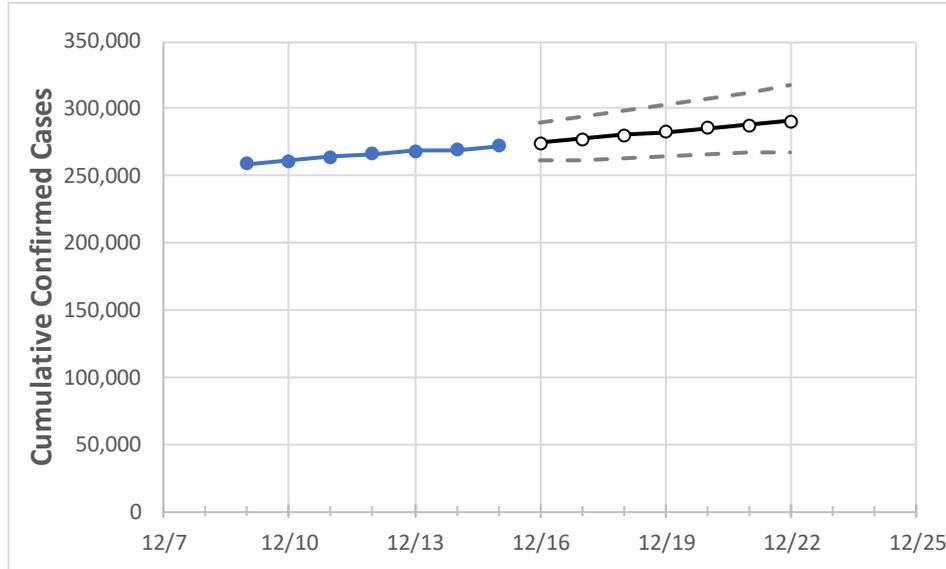
### IEM's Modeling Lead

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:						
	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22
Louisiana	266,402	268,613	269,643	272,276	274,826	277,410	280,030	282,685	285,373	288,097	290,855

**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:						
	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22
Ascension Parish	6,670	6,734	6,761	6,786	6,852	6,919	6,987	7,056	7,126	7,197	7,269
Bossier Parish	7,311	7,384	7,394	7,455	7,521	7,586	7,651	7,715	7,779	7,843	7,906
Caddo Parish	15,158	15,245	15,280	15,359	15,467	15,574	15,681	15,786	15,891	15,995	16,098
Calcasieu Parish	11,750	11,822	11,868	11,934	12,012	12,091	12,171	12,251	12,332	12,413	12,495
East Baton Rouge Parish	22,265	22,468	22,545	22,604	22,760	22,916	23,072	23,229	23,386	23,543	23,700
Jefferson Parish	26,482	26,686	26,821	27,128	27,407	27,690	27,976	28,265	28,557	28,852	29,151
Lafayette Parish	14,028	14,200	14,269	14,432	14,587	14,745	14,906	15,070	15,237	15,407	15,581
Lafourche Parish	5,356	5,388	5,439	5,510	5,562	5,616	5,671	5,727	5,784	5,842	5,901
Orleans Parish	17,808	17,949	18,036	18,179	18,329	18,481	18,634	18,788	18,944	19,101	19,259
Ouachita Parish	11,538	11,649	11,682	11,779	11,885	11,990	12,095	12,199	12,303	12,406	12,509
Rapides Parish	7,054	7,101	7,108	7,186	7,239	7,291	7,345	7,398	7,452	7,506	7,561
St. Bernard Parish	2,025	2,036	2,045	2,065	2,079	2,094	2,108	2,123	2,138	2,152	2,167
St. Charles Parish	2,980	2,996	3,021	3,053	3,077	3,100	3,123	3,146	3,168	3,190	3,212
St. James Parish	1,128	1,135	1,137	1,152	1,163	1,175	1,187	1,200	1,213	1,226	1,240
St. John the Baptist Parish	2,215	2,231	2,244	2,276	2,296	2,317	2,338	2,359	2,381	2,403	2,426
St. Tammany Parish	12,143	12,257	12,334	12,622	12,775	12,931	13,090	13,252	13,418	13,586	13,758

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:											
	12/12	12/13	12/14	12/15	12/17				12/19				12/21			
Ascension Parish	6,670	6,734	6,761	6,786	6,919	(1,384)	[332]	{166}	7,056	(1,411)	[339]	{169}	7,197	(1,439)	[345]	{173}
Bossier Parish	7,311	7,384	7,394	7,455	7,586	(1,517)	[364]	{182}	7,715	(1,543)	[370]	{185}	7,843	(1,569)	[376]	{188}
Caddo Parish	15,158	15,245	15,280	15,359	15,574	(3,115)	[748]	{374}	15,786	(3,157)	[758]	{379}	15,995	(3,199)	[768]	{384}
Calcasieu Parish	11,750	11,822	11,868	11,934	12,091	(2,418)	[580]	{290}	12,251	(2,450)	[588]	{294}	12,413	(2,483)	[596]	{298}
East Baton Rouge Parish	22,265	22,468	22,545	22,604	22,916	(4,583)	[1,100]	{550}	23,229	(4,646)	[1,115]	{557}	23,543	(4,709)	[1,130]	{565}
Jefferson Parish	26,482	26,686	26,821	27,128	27,690	(5,538)	[1,329]	{665}	28,265	(5,653)	[1,357]	{678}	28,852	(5,770)	[1,385]	{692}
Lafayette Parish	14,028	14,200	14,269	14,432	14,745	(2,949)	[708]	{354}	15,070	(3,014)	[723]	{362}	15,407	(3,081)	[740]	{370}
Lafourche Parish	5,356	5,388	5,439	5,510	5,616	(1,123)	[270]	{135}	5,727	(1,145)	[275]	{137}	5,842	(1,168)	[280]	{140}
Orleans Parish	17,808	17,949	18,036	18,179	18,481	(3,696)	[887]	{444}	18,788	(3,758)	[902]	{451}	19,101	(3,820)	[917]	{458}
Ouachita Parish	11,538	11,649	11,682	11,779	11,990	(2,398)	[576]	{288}	12,199	(2,440)	[586]	{293}	12,406	(2,481)	[595]	{298}
Rapides Parish	7,054	7,101	7,108	7,186	7,291	(1,458)	[350]	{175}	7,398	(1,480)	[355]	{178}	7,506	(1,501)	[360]	{180}
St. Bernard Parish	2,025	2,036	2,045	2,065	2,094	(419)	[101]	{50}	2,123	(425)	[102]	{51}	2,152	(430)	[103]	{52}
St. Charles Parish	2,980	2,996	3,021	3,053	3,100	(620)	[149]	{74}	3,146	(629)	[151]	{75}	3,190	(638)	[153]	{77}
St. James Parish	1,128	1,135	1,137	1,152	1,175	(235)	[56]	{28}	1,200	(240)	[58]	{29}	1,226	(245)	[59]	{29}
St. John the Baptist Parish	2,215	2,231	2,244	2,276	2,317	(463)	[111]	{56}	2,359	(472)	[113]	{57}	2,403	(481)	[115]	{58}
St. Tammany Parish	12,143	12,257	12,334	12,622	12,931	(2,586)	[621]	{310}	13,252	(2,650)	[636]	{318}	13,586	(2,717)	[652]	{326}

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.