

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

**Date: 12/22/20**

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 12/22/20 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.**

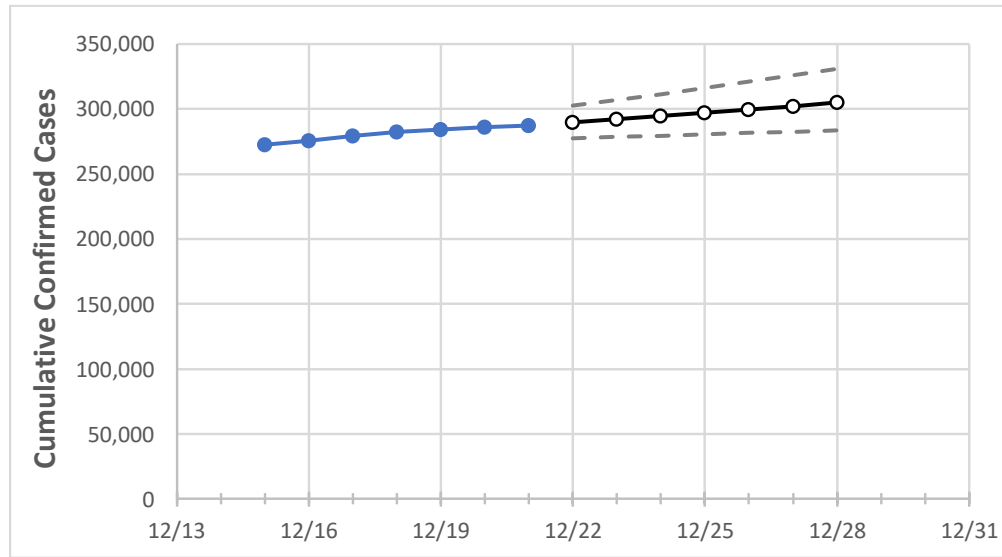
### **IEM's Modeling Lead**

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:						
	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26	12/27	12/28
Louisiana	282,434	284,290	286,145	287,261	289,717	292,189	294,676	297,177	299,692	302,220	304,760

**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:						
	12/18	12/19	12/20	12/21	12/22	12/23	12/24	12/25	12/26	12/27	12/28
Ascension Parish	7,048	7,094	7,140	7,160	7,211	7,261	7,310	7,359	7,407	7,454	7,500
Bossier Parish	7,801	7,896	7,991	8,026	8,110	8,194	8,280	8,367	8,454	8,543	8,632
Caddo Parish	15,909	16,035	16,160	16,240	16,357	16,475	16,593	16,712	16,831	16,951	17,071
Calcasieu Parish	12,400	12,481	12,562	12,586	12,688	12,791	12,894	12,999	13,105	13,211	13,318
East Baton Rouge Parish	23,427	23,563	23,698	23,775	23,937	24,100	24,264	24,429	24,594	24,760	24,927
Jefferson Parish	28,045	28,238	28,431	28,613	28,860	29,108	29,356	29,605	29,854	30,104	30,354
Lafayette Parish	15,040	15,130	15,219	15,272	15,418	15,565	15,712	15,860	16,008	16,156	16,304
Lafourche Parish	5,638	5,685	5,731	5,742	5,783	5,824	5,864	5,904	5,944	5,984	6,023
Orleans Parish	18,682	18,813	18,944	19,030	19,170	19,311	19,452	19,595	19,738	19,882	20,026
Ouachita Parish	12,444	12,535	12,626	12,670	12,801	12,935	13,070	13,207	13,345	13,485	13,627
Rapides Parish	7,396	7,436	7,476	7,487	7,535	7,583	7,630	7,678	7,724	7,771	7,817
St. Bernard Parish	2,101	2,111	2,121	2,136	2,148	2,160	2,172	2,184	2,196	2,207	2,219
St. Charles Parish	3,224	3,251	3,277	3,297	3,329	3,362	3,396	3,430	3,465	3,501	3,537
St. James Parish	1,196	1,200	1,204	1,208	1,216	1,223	1,230	1,238	1,245	1,252	1,259
St. John the Baptist Parish	2,346	2,367	2,388	2,403	2,426	2,450	2,474	2,499	2,524	2,550	2,577
St. Tammany Parish	13,258	13,351	13,443	13,551	13,704	13,860	14,018	14,177	14,339	14,502	14,668

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:											
	12/18	12/19	12/20	12/21	12/23				12/25				12/27			
Ascension Parish	7,048	7,094	7,140	7,160	7,261	(1,452)	[349]	{174}	7,359	(1,472)	[353]	{177}	7,454	(1,491)	[358]	{179}
Bossier Parish	7,801	7,896	7,991	8,026	8,194	(1,639)	[393]	{197}	8,367	(1,673)	[402]	{201}	8,543	(1,709)	[410]	{205}
Caddo Parish	15,909	16,035	16,160	16,240	16,475	(3,295)	[791]	{395}	16,712	(3,342)	[802]	{401}	16,951	(3,390)	[814]	{407}
Calcasieu Parish	12,400	12,481	12,562	12,586	12,791	(2,558)	[614]	{307}	12,999	(2,600)	[624]	{312}	13,211	(2,642)	[634]	{317}
East Baton Rouge Parish	23,427	23,563	23,698	23,775	24,100	(4,820)	[1,157]	{578}	24,429	(4,886)	[1,173]	{586}	24,760	(4,952)	[1,188]	{594}
Jefferson Parish	28,045	28,238	28,431	28,613	29,108	(5,822)	[1,397]	{699}	29,605	(5,921)	[1,421]	{711}	30,104	(6,021)	[1,445]	{722}
Lafayette Parish	15,040	15,130	15,219	15,272	15,565	(3,113)	[747]	{374}	15,860	(3,172)	[761]	{381}	16,156	(3,231)	[775]	{388}
Lafourche Parish	5,638	5,685	5,731	5,742	5,824	(1,165)	[280]	{140}	5,904	(1,181)	[283]	{142}	5,984	(1,197)	[287]	{144}
Orleans Parish	18,682	18,813	18,944	19,030	19,311	(3,862)	[927]	{463}	19,595	(3,919)	[941]	{470}	19,882	(3,976)	[954]	{477}
Ouachita Parish	12,444	12,535	12,626	12,670	12,935	(2,587)	[621]	{310}	13,207	(2,641)	[634]	{317}	13,485	(2,697)	[647]	{324}
Rapides Parish	7,396	7,436	7,476	7,487	7,583	(1,517)	[364]	{182}	7,678	(1,536)	[369]	{184}	7,771	(1,554)	[373]	{186}
St. Bernard Parish	2,101	2,111	2,121	2,136	2,160	(432)	[104]	{52}	2,184	(437)	[105]	{52}	2,207	(441)	[106]	{53}
St. Charles Parish	3,224	3,251	3,277	3,297	3,362	(672)	[161]	{81}	3,430	(686)	[165]	{82}	3,501	(700)	[168]	{84}
St. James Parish	1,196	1,200	1,204	1,208	1,223	(245)	[59]	{29}	1,238	(248)	[59]	{30}	1,252	(250)	[60]	{30}
St. John the Baptist Parish	2,346	2,367	2,388	2,403	2,450	(490)	[118]	{59}	2,499	(500)	[120]	{60}	2,550	(510)	[122]	{61}
St. Tammany Parish	13,258	13,351	13,443	13,551	13,860	(2,772)	[665]	{333}	14,177	(2,835)	[681]	{340}	14,502	(2,900)	[696]	{348}

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.