



State of Missouri regional COVID-19 hospitalized cases model

June 29, 2021

Multiple data points inform Missouri's COVID-19 response

- Syndromic surveillance
- Healthcare system capacity (bed, PPE, and staff availability)
- Testing
- COVID-19 cases and deaths
- Economic and social impact
- Insights from U.S. states, nationally, and other countries
- Evidence from scientific literature
- Mathematical disease modelling



Our model estimates possible outcomes based on currently available information

What does the model tell us	What does it not tell us
Range of plausible outcomes based on our current knowledge of COVID-19 in Missouri	What will happen in the future
Approximate date and magnitude of peak/s based on current understanding of policy interventions and human behavior and assumptions about future interventions	Date and magnitude of peak/s if there are major changes in planned policy interventions and human behavior
Approximate estimate of effective transmission rate across a region	Exact transmission rate in all parts of a region – there may be areas of higher and lower transmission within the region

The ability to forecast depends on the quality and availability of data. For a new disease such as COVID-19, much remains uncertain.



Statewide and Regional weekly changes in transmission rate ("Re")

<u>Click</u> on region name to view details



Central (Region F)

Return to Statewide View

Bed / Ventilator Availabilty** **Overview*** Reproductive Rate (Re)*** 502,486 Pre-intervention 2.30 **Cumulative Cases** 53,677 Last Week 1.04 669

Current Week

WoW % Re Change

Cumulative Deaths 7-day New Cases 456 WoW % Case Change 0.9%

Base Case Central Region

Population

2.30	% ICU Beds Occupied	52%
1 04	% ICU Beds Occupied C19	9%
1.04	% ICU Beds Free	48%
1.06	% Ventilators in use	34%
2.7	% Ventilators free	66%



Greater St. Louis Area (Region C)

Bed / Ventilator Availabilty**

Population	2,229,518	Pre-intervention	3.39	% ICU Beds Occupied	81%
Cumulative Cases	221,423	last Week	0.89	% ICU Beds Occupied C19	5%
Cumulative Deaths	3,558		0.00	% ICU Beds Free	19%
7-day New Cases	905	Current Week	0.89	% Ventilators in use	33%
WoW % Case Change	0.4%	WoW % Re Change	-0.2	% Ventilators free	67%

Reproductive Rate (Re)***

Base Case St. Louis Region

Overview*



Greater Kansas City Area (Region A)

Reproductive Rate (Re)*** **Overview*** Bed / Ventilator Availabilty** 1,395,314 72% Population % ICU Beds Occupied Pre-intervention 2.80 Cumulative Cases 133,667 % ICU Beds Occupied C19 6% Last Week 0.94 1,795 Cumulative Deaths % ICU Beds Free 28% Current Week 0.95 7-day New Cases 845 % Ventilators in use 18% WoW % Re Change 0.5 0.6% % Ventilators free 82% WoW % Case Change

Base Case Kansas City Region



Northeast (Region B)

Reproductive Rate (Re)***

Bed / Ventilator Availabilty**

Population	179,448	Pre-intervention	2.15	% ICU Beds Occupied	64%
Cumulative Cases	19,766	last Week	0.60	% ICU Beds Occupied C19	119
Cumulative Deaths	234	Lust week	0.00	% ICU Beds Free	369
7-day New Cases	143	Current Week	0.60	% Ventilators in use	109
WoW % Case Change	0.7%	WoW % Re Change	0.3	% Ventilators free	90%

Base Case Northeast Region

Overview*



Northwest (Region H)

Overview*

Reproductive Rate (Re)***

Bed / Ventilator Availabilty**

Population	234,361	Pre-intervention	1.24	% ICU Beds Occupied	63%
Cumulative Cases	25,344	last Week	0.77	% ICU Beds Occupied C19	19%
Cumulative Deaths	454		0.77	% ICU Beds Free	38%
7-day New Cases	356	Current Week	0.78	% Ventilators in use	15%
WoW % Case Change	1.4%	WoW % Re Change	0.6	% Ventilators free	85%

Base Case Northwest Region



Southeast / Cape Girardeau (Region E)

Overview*		Reproductive Rate (Re)***		Bed / Ventilator Availabilty**	
Population	363,478	Pre-intervention	2.61	% ICU Beds Occupied	59%
Cumulative Cases	38,983	Last Week	0.96	% ICU Beds Occupied C19	1%
Cumulative Deaths	595	Luse week	0.50	% ICU Beds Free	41%
7-day New Cases	165	Current Week	0.94	% Ventilators in use	27%
WoW % Case Change	0.4%	WoW % Re Change	-1.6	% Ventilators free	73%

Base Case Southeast Region



Southwest / Springfield (Region D,G,I)

Reproductive Rate (Re)*** **Overview*** Bed / Ventilator Availabilty** 1,221,847 90% Population % ICU Beds Occupied Pre-intervention 2.36 123,216 Cumulative Cases % ICU Beds Occupied C19 29% Last Week 1.23 1,952 Cumulative Deaths % ICU Beds Free 10% Current Week 1.24 7-day New Cases 2,705 % Ventilators in use 25% WoW % Re Change 1.1 2.2% % Ventilators free 75% WoW % Case Change

Base Case Southwest Region



DISEASE MODEL

See FAQs for additional details

Link here: <u>https://health.mo.gov/living/healthcondiseases/communicable/novel-</u> <u>coronavirus/pdf/modeling-faqs.pdf</u>



DISEASE MODEL

Regional COVID-19 transmission models help inform local policy, public health, and business decisions

- Mathematical models are commonly used to make projections of infectious disease epidemics (e.g., tuberculosis, HIV)
- Many sophisticated models on COVID-19 make global or national projections (e.g., Imperial College, Harvard, IHME)
- However, these generally do not incorporate critical local or regional inputs, such as:
 - Variations in local population size and age structure
 - Date and nature of social distancing and other policies
- Regional projections are important because:
 - Regional epidemics may differ markedly from the national average
 - Policy response occurs at state, county, and municipal levels



DISEASE MODEL

State of MO, WUSTL, and MHA have developed a regional model of hospitalized COVID-19 cases

- Standard SEIR model that combines universal characteristics of COVID-19 infection (e.g., transmission parameters) with local inputs to support regional decision making
 - Mathematical model developed by experts from UMass Amherst, UC Berkeley, UCSF, and WUSTL
 - Uses a statistical approach that adjusts underlying parameters as new data are observed
- Customized using the latest local data from Missouri's emergency response regions, including:
 - COVID-19 positives and PUIs
 - Population and age structure
 - Policy interventions
 - Avg. hospital length of stay
 - Vaccination rate by age and vaccine efficacy
- Projects COVID-19 hospitalized cases to directly address the question of hospital capacity and provide a more accurate picture on COVID-19's impact on the healthcare system

Model Structure (SEIR)



