State of Missouri regional COVID-19 hospitalized cases model

June 22, 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.

Show Me Strong
RECOVERY PLAN

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

Click on region name to view details

Northwest Region

0.77 → 0.77

Northeast Region

0.60 → 0.60

Central Region

1.02 → 1.04

Greater Kansas City

0.94 → 0.94

St. Louis Region

0.89 → 0.89

Cape Girardeau Region

0.98 → 0.96

Springfield Region

1.22 → 1.23

Estimated Statewide Weighted Re

0.97 → 0.95

Understanding Re

Re > 1 = COVID cases are growing
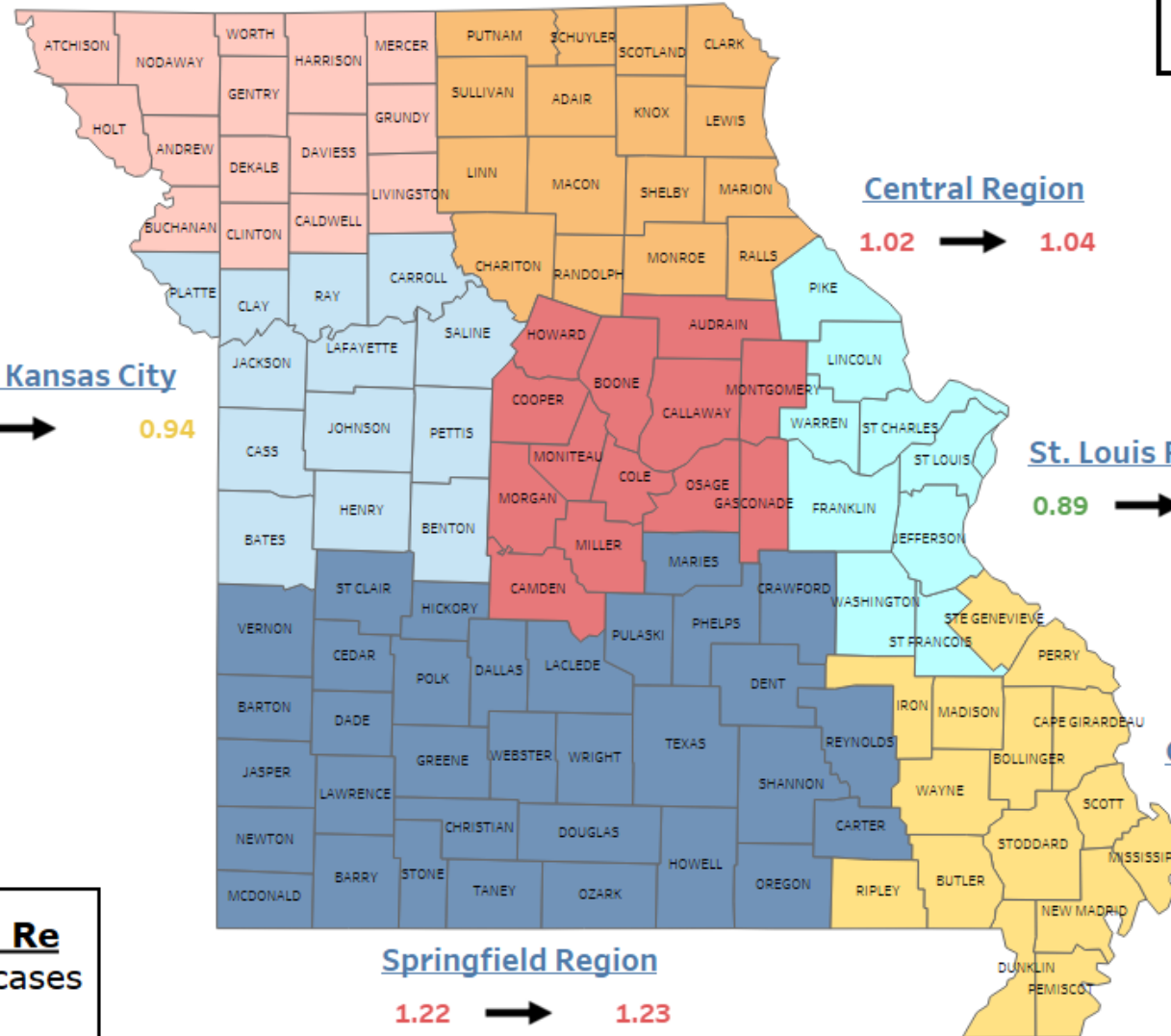
LEMMA Model as of 6/22/2021

Central (Region F)

Overview*

Population	502,486
Cumulative Cases	53,221
Cumulative Deaths	668
7-day New Cases	402
WoW % Case Change	0.8%

Reproductive Rate (Re)***

Pre-intervention	2.30
Last Week	1.02
Current Week	1.04
WoW % Re Change	2.0

Bed / Ventilator Availabilty**

% ICU Beds Occupied	59%
% ICU Beds Occupied C19	8%
% ICU Beds Free	41%
% Ventilators in use	37%
% Ventilators free	63%

Base Case Central Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
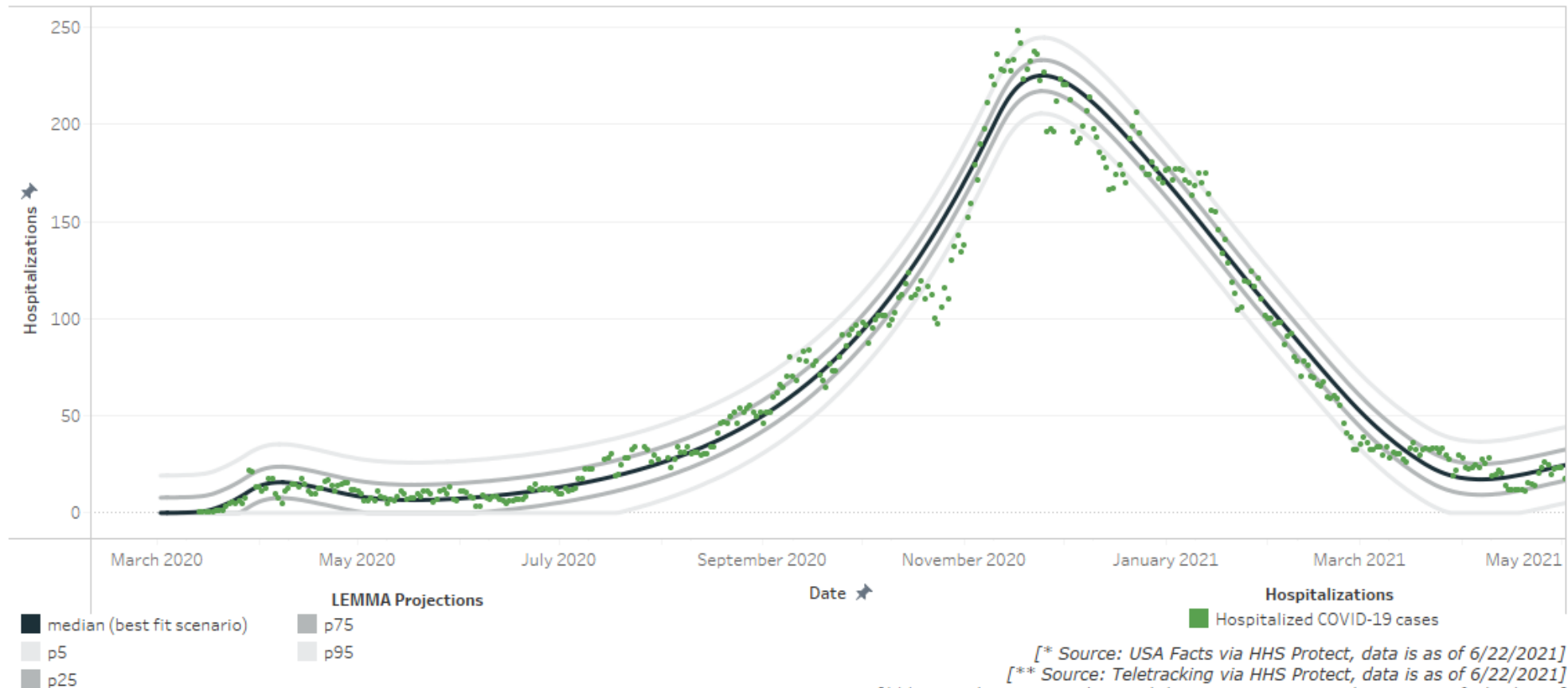
LEMMA Projections
- median (best fit scenario)
- p5
- p25
- p75
- p95

Hospitalizations
- Hospitalized COVID-19 cases

[* Source: USA Facts via HHS Protect, data is as of 6/22/2021]
[** Source: Teletracking via HHS Protect, data is as of 6/22/2021]
[*** Reproductive Rate data and the Region Projection chart are as of 6/22/2021]

Greater St. Louis Area (Region C)

Overview*

Population	2,229,518
Cumulative Cases	220,518
Cumulative Deaths	3,551
7-day New Cases	662
WoW % Case Change	0.3%

Reproductive Rate (Re)***

Pre-intervention	3.39
Last Week	0.89
Current Week	0.89
WoW % Re Change	-0.1

Bed / Ventilator Availabilty**

% ICU Beds Occupied	82%
% ICU Beds Occupied C19	5%
% ICU Beds Free	18%
% Ventilators in use	29%
% Ventilators free	71%

Base Case St. Louis Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
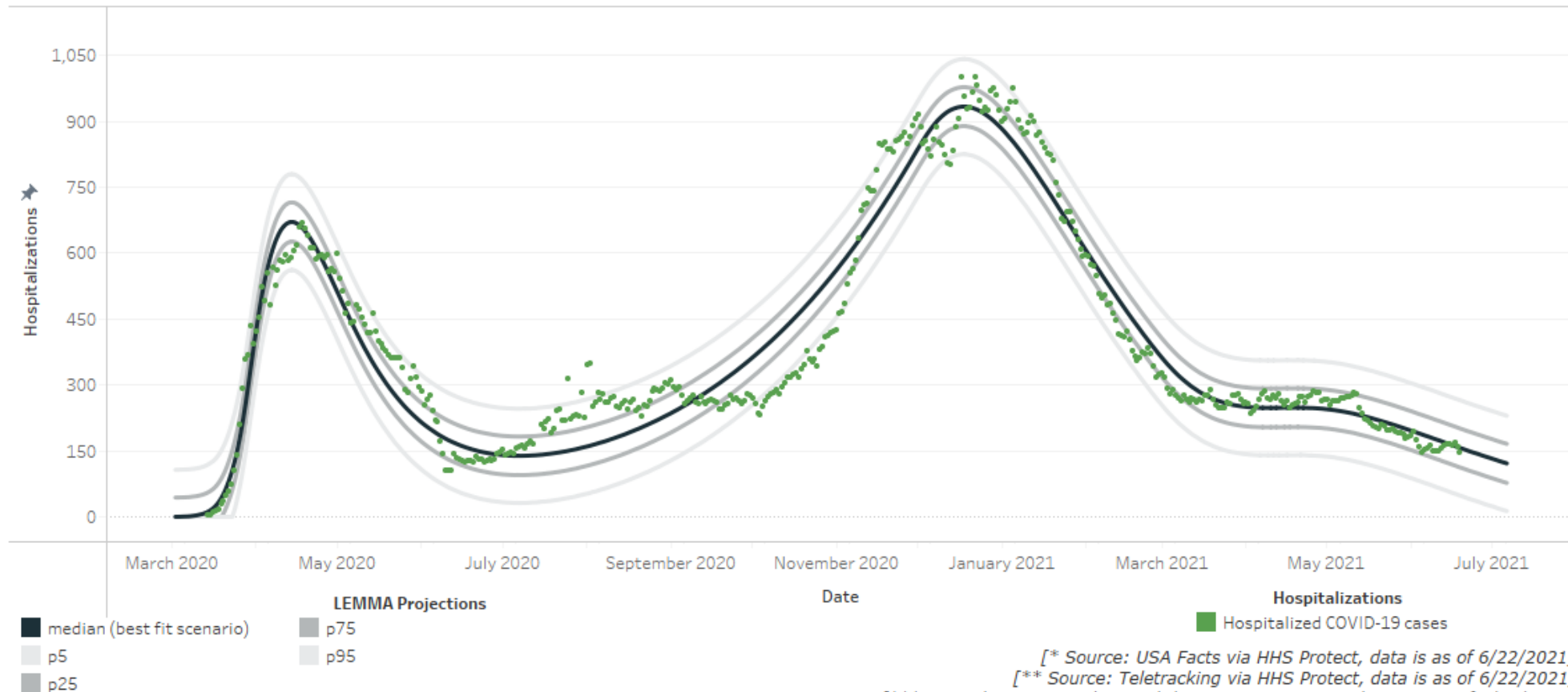
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Hospitalizations
- Hospitalized COVID-19 cases

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Greater Kansas City Area (Region A)

Overview*

Population	1,395,314
Cumulative Cases	132,822
Cumulative Deaths	1,786
7-day New Cases	678
WoW % Case Change	0.5%

Reproductive Rate (Re)***

Pre-intervention	2.80
Last Week	0.94
Current Week	0.94
WoW % Re Change	0.4

Bed / Ventilator Availabilty**

% ICU Beds Occupied	75%
% ICU Beds Occupied C19	7%
% ICU Beds Free	25%
% Ventilators in use	20%
% Ventilators free	80%

Base Case Kansas City Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
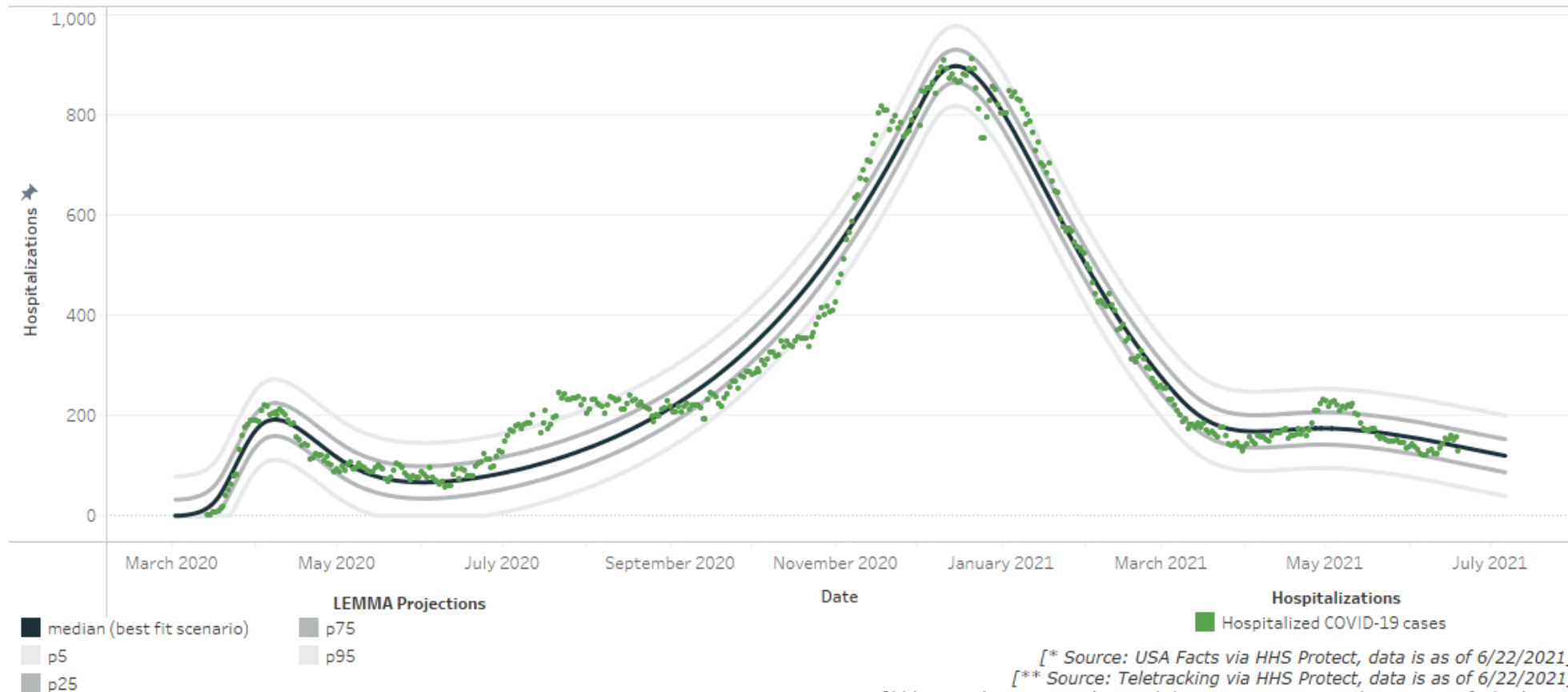
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Hospitalizations

- Hospitalized COVID-19 cases

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Northeast (Region B)

Overview*

Population	179,448
Cumulative Cases	19,623
Cumulative Deaths	232
7-day New Cases	161
WoW % Case Change	0.8%

Reproductive Rate (Re)***

Pre-intervention	2.15
Last Week	0.60
Current Week	0.60
WoW % Re Change	-0.5

Bed / Ventilator Availabilty**

|	
% ICU Beds Occupied	69%
% ICU Beds Occupied C19	12%
% ICU Beds Free	31%
% Ventilators in use	22%
% Ventilators free	78%

Base Case Northeast Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
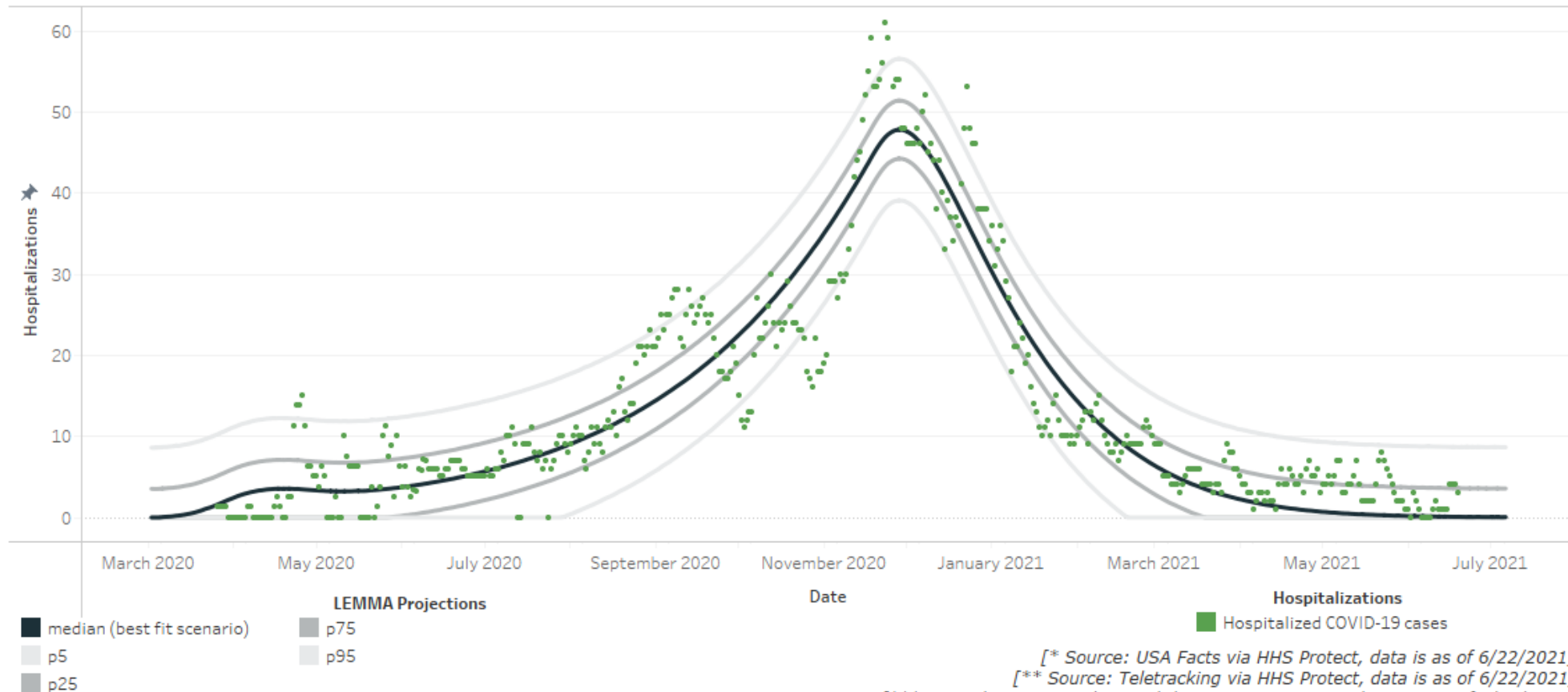
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Hospitalizations
- Hospitalized COVID-19 cases

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Northwest (Region H)

Overview*

Population	234,361
Cumulative Cases	24,988
Cumulative Deaths	453
7-day New Cases	296
WoW % Case Change	1.2%

Reproductive Rate (Re)***

Pre-intervention	1.24
Last Week	0.77
Current Week	0.77
WoW % Re Change	0.7

Bed / Ventilator Availabilty**

% ICU Beds Occupied	50%
% ICU Beds Occupied C19	9%
% ICU Beds Free	50%
% Ventilators in use	11%
% Ventilators free	89%

Base Case Northwest Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
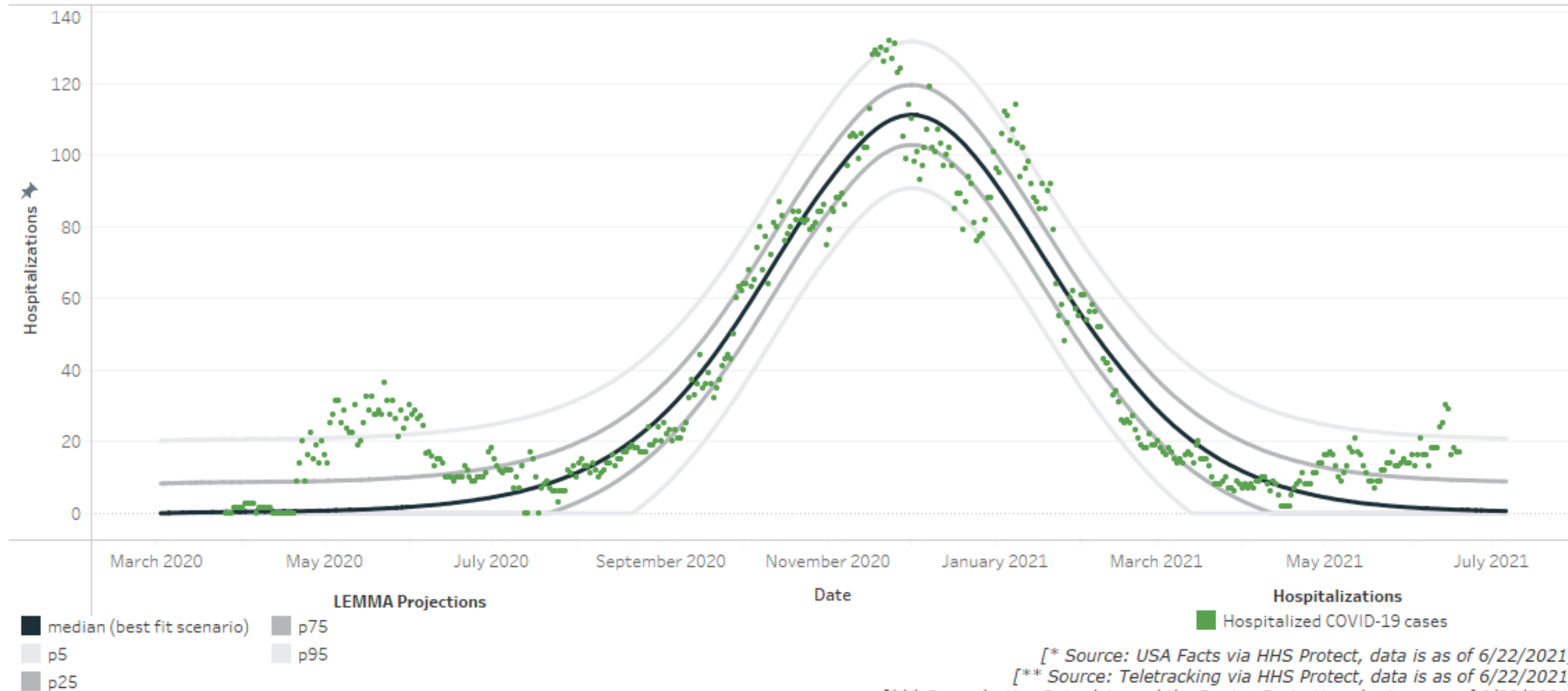
LEMMA Projections

Date

Hospitalizations

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Southeast / Cape Girardeau (Region E)

Overview*

Population	363,478
Cumulative Cases	38,818
Cumulative Deaths	596
7-day New Cases	113
WoW % Case Change	0.3%

Reproductive Rate (Re)***

Pre-intervention	2.61
Last Week	0.98
Current Week	0.96
WoW % Re Change	-1.9

Bed / Ventilator Availabilty**

% ICU Beds Occupied	58%
% ICU Beds Occupied C19	1%
% ICU Beds Free	42%
% Ventilators in use	23%
% Ventilators free	77%

Base Case Southeast Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
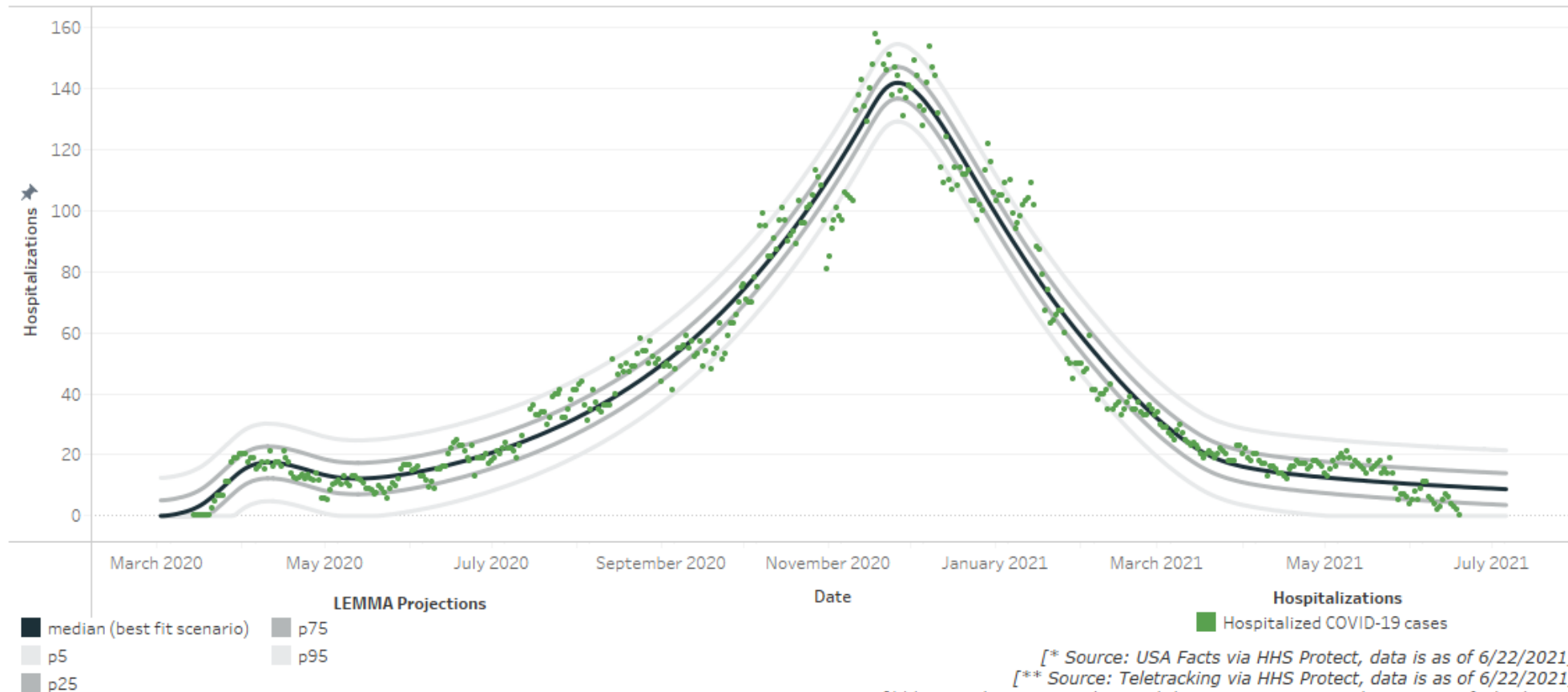
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Date

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Southwest / Springfield (Region D,G,I)

Overview*

Population	1,221,847
Cumulative Cases	120,511
Cumulative Deaths	1,944
7-day New Cases	2,205
WoW % Case Change	1.9%

Reproductive Rate (Re)***

Pre-intervention	2.36
Last Week	1.22
Current Week	1.23
WoW % Re Change	1.0

Bed / Ventilator Availabilty**

% ICU Beds Occupied	80%
% ICU Beds Occupied C19	23%
% ICU Beds Free	20%
% Ventilators in use	23%
% Ventilators free	77%

Base Case Southwest Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: Jul 6, 2021
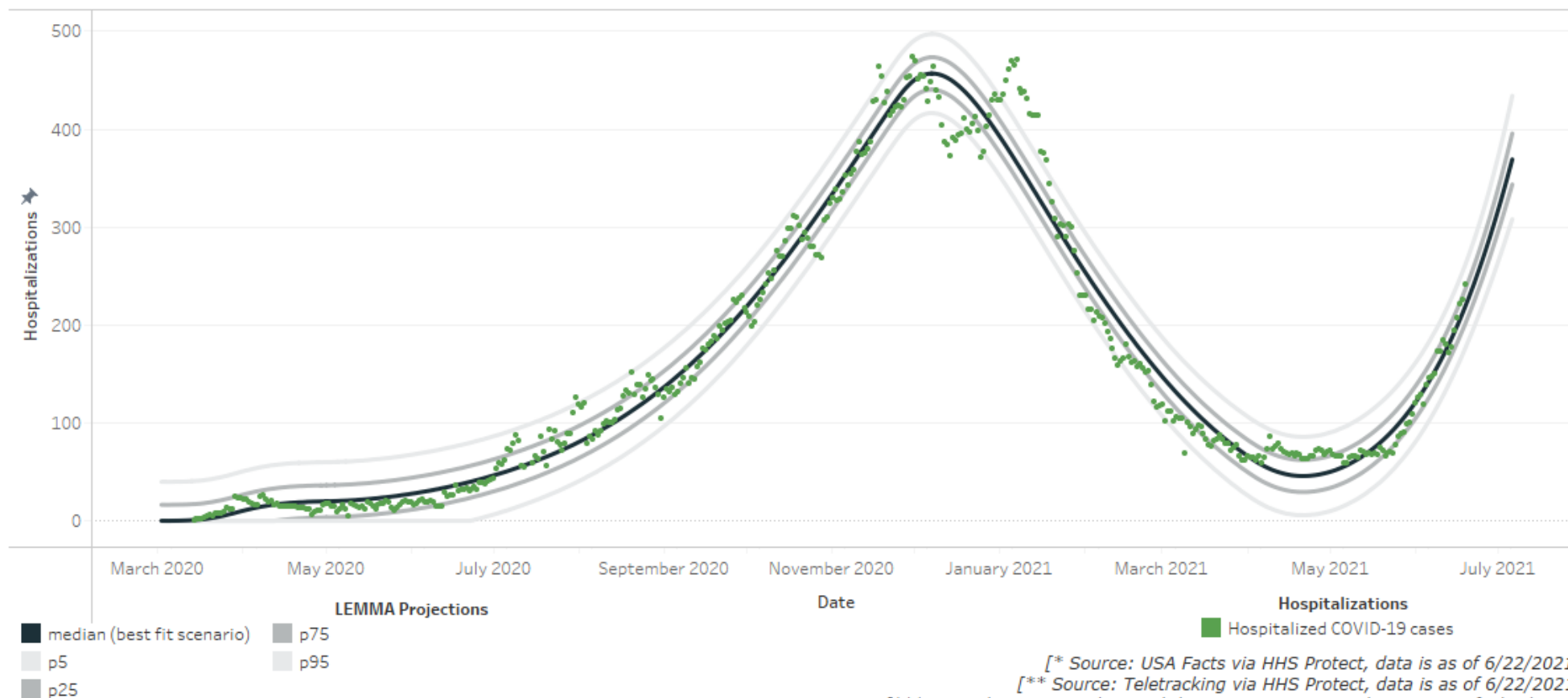
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See FAQs for additional details

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

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

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)