Show Me Strong RECOVERY PLAN

What You Should Know COVID-19

State of Missouri regional COVID-19 hospitalized cases model

May 11, 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

Show Me Strong RECOVERY PLAN

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")

Click on region name to view details

Estimated Statewide Weighted Re

0.93 → 0.99

Northwest Region

0.76 → 0.76

Northeast Region

0.61 → 0.61

Central Region

0.90 → 0.90

Greater Kansas City

1.04 → 1.03

St. Louis Region

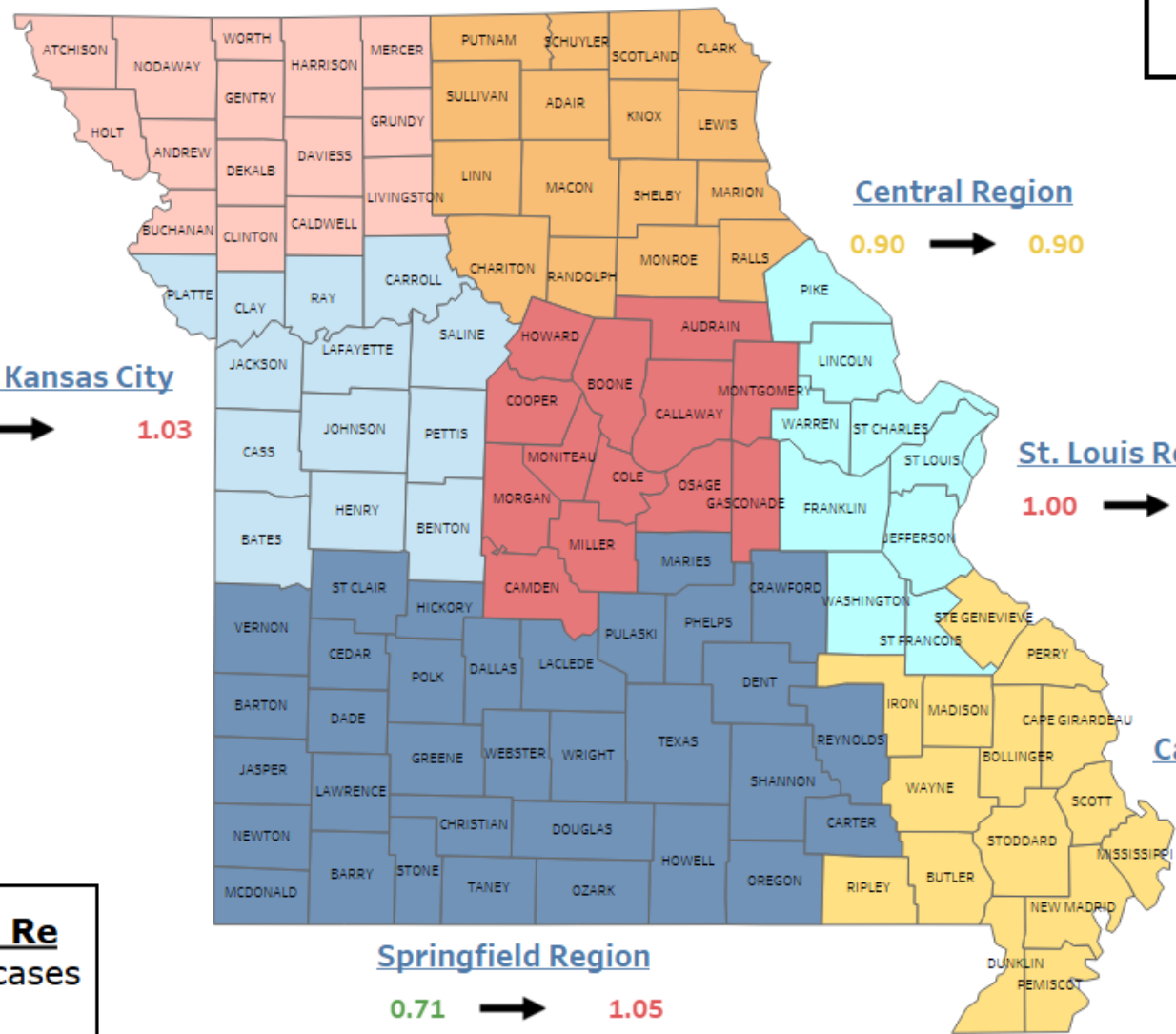
1.00 → 0.99

Cape Girardeau Region

1.07 → 1.08

Springfield Region

0.71 → 1.05



Understanding Re

Re > 1 = COVID cases are growing

LEMMA Model as of 5/11/2021

Central (Region F)

Return to Statewide View

Overview*

Population	502,486
Cumulative Cases	51,969
Cumulative Deaths	645
7-day New Cases	148
WoW % Case Change	0.3%

Reproductive Rate (Re)***

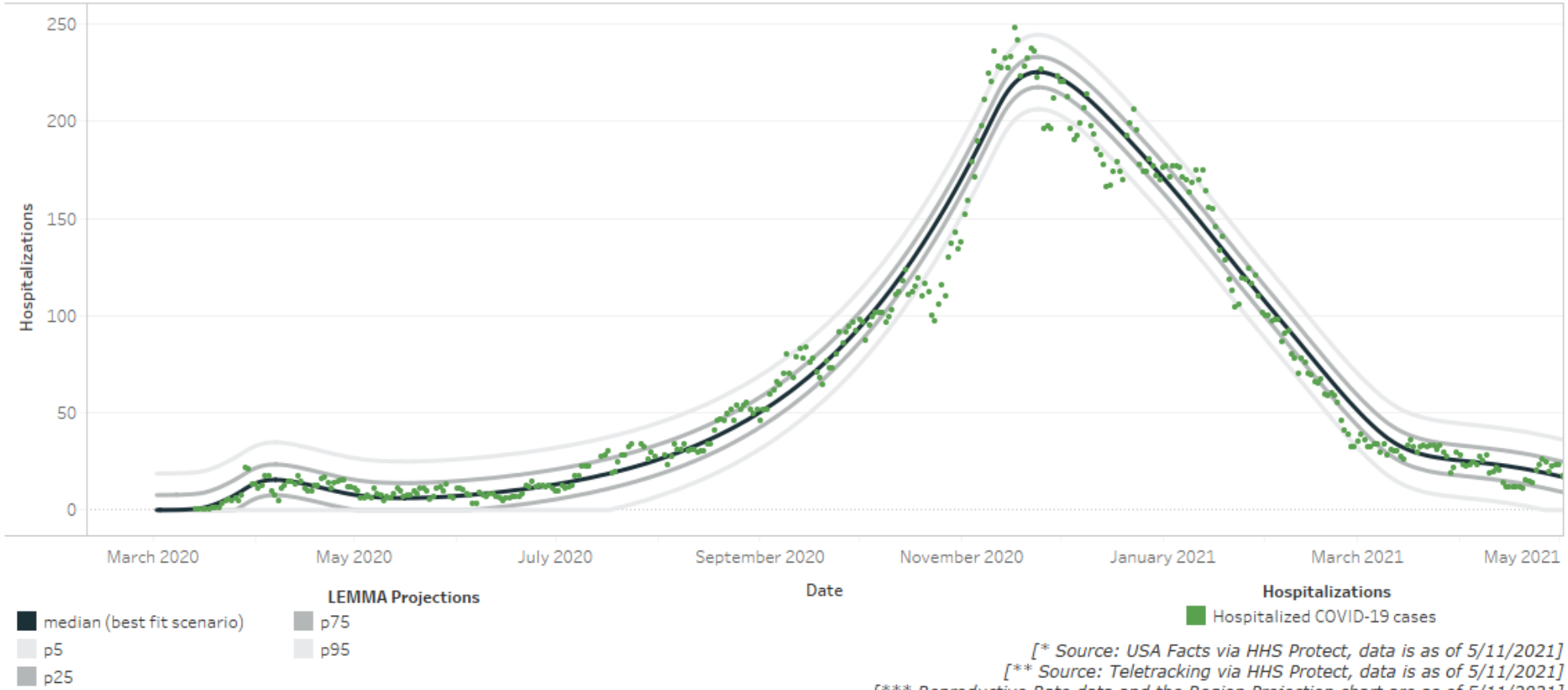
Pre-intervention	2.30
Last Week	0.90
Current Week	0.90
WoW % Re Change	-0.3

Bed / Ventilator Availabilty**

% ICU Beds Occupied	61%
% ICU Beds Occupied C19	2%
% ICU Beds Free	39%
% Ventilators in use	22%
% Ventilators free	78%

Base Case Central Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



[Source: USA Facts via HHS Protect, data is as of 5/11/2021]*
*[** Source: Teletracking via HHS Protect, data is as of 5/11/2021]*
*[*** Reproductive Rate data and the Region Projection chart are as of 5/11/2021]*

Greater St. Louis Area (Region C)

Return to Statewide View

Overview*

Population	2,229,518
Cumulative Cases	215,369
Cumulative Deaths	3,424
7-day New Cases	1,371
WoW % Case Change	0.6%

Reproductive Rate (Re)***

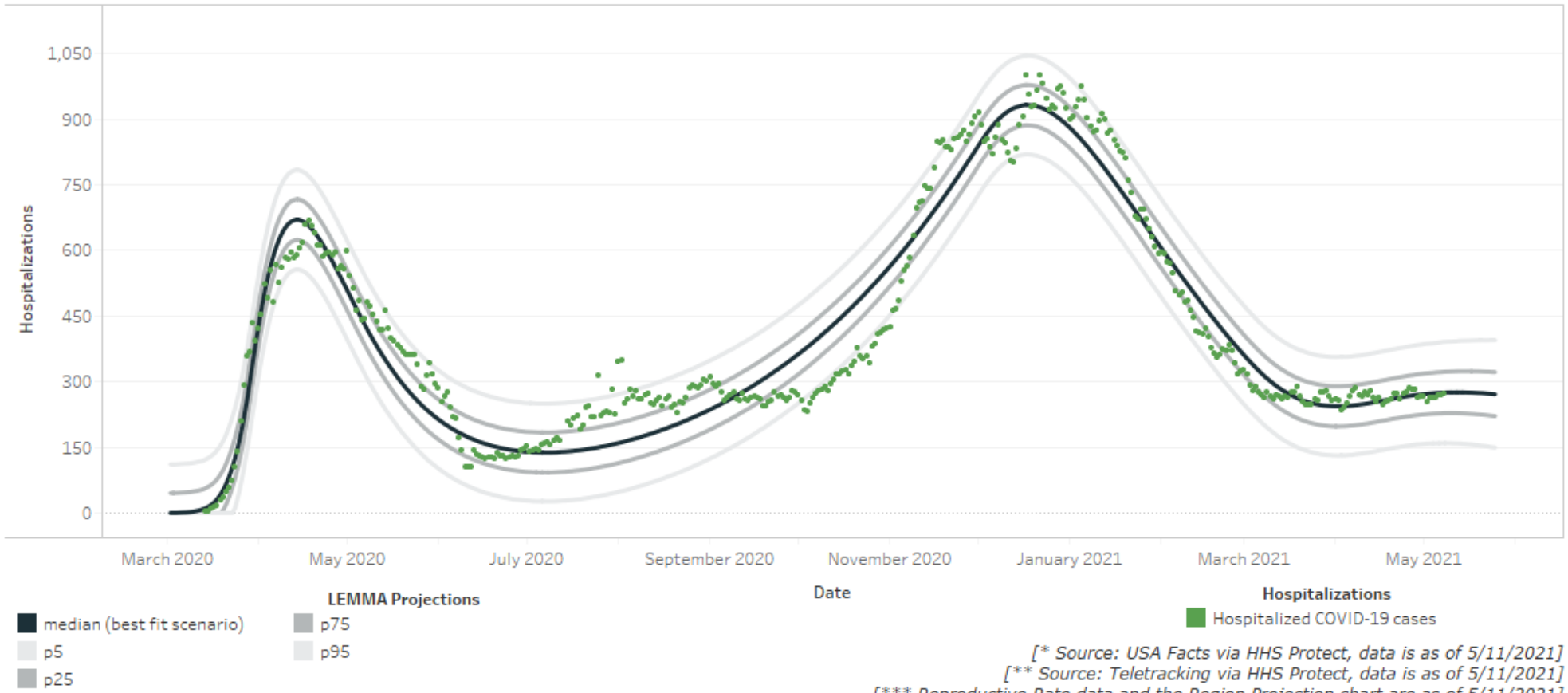
Pre-intervention	3.39
Last Week	1.00
Current Week	0.99
WoW % Re Change	-1.9

Bed / Ventilator Availabilty**

% ICU Beds Occupied	78%
% ICU Beds Occupied C19	8%
% ICU Beds Free	22%
% Ventilators in use	31%
% Ventilators free	69%

Base Case St. Louis Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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Greater Kansas City Area (Region A)

Return to Statewide View

Overview*

Population	1,395,314
Cumulative Cases	128,906
Cumulative Deaths	1,695
7-day New Cases	918
WoW % Case Change	0.7%

Reproductive Rate (Re)***

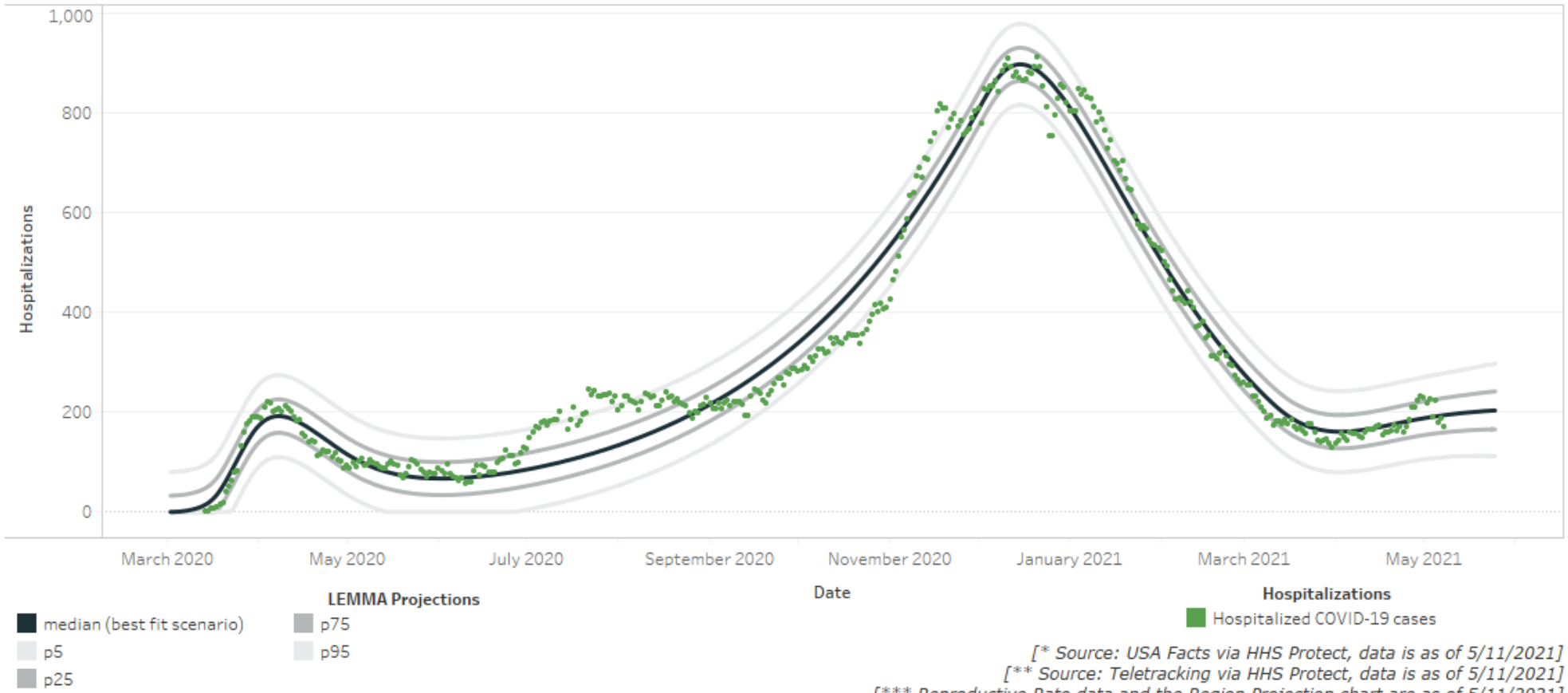
Pre-intervention	2.80
Last Week	1.04
Current Week	1.03
WoW % Re Change	-0.7

Bed / Ventilator Availabilty**

% ICU Beds Occupied	72%
% ICU Beds Occupied C19	7%
% ICU Beds Free	28%
% Ventilators in use	20%
% Ventilators free	80%

Base Case Kansas City Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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Northeast (Region B)

Return to Statewide View

Overview*

Population	179,448
Cumulative Cases	18,541
Cumulative Deaths	210
7-day New Cases	70
WoW % Case Change	0.4%

Reproductive Rate (Re)***

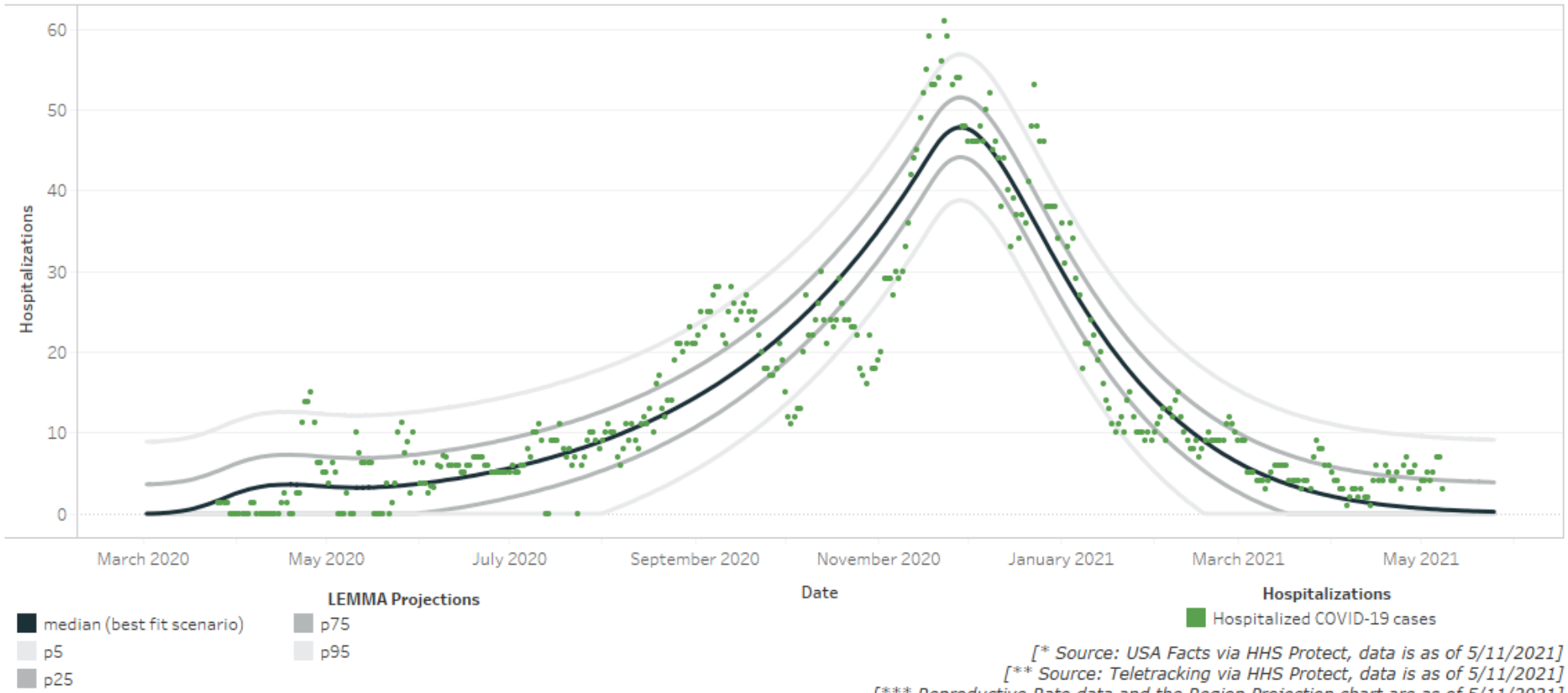
Pre-intervention	2.15
Last Week	0.61
Current Week	0.61
WoW % Re Change	-0.5

Bed / Ventilator Availabilty**

% ICU Beds Occupied	73%
% ICU Beds Occupied C19	0%
% ICU Beds Free	27%
% Ventilators in use	5%
% Ventilators free	95%

Base Case Northeast Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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Northwest (Region H)

Return to Statewide View

Overview*

Population	234,361
Cumulative Cases	23,786
Cumulative Deaths	442
7-day New Cases	90
WoW % Case Change	0.4%

Reproductive Rate (Re)***

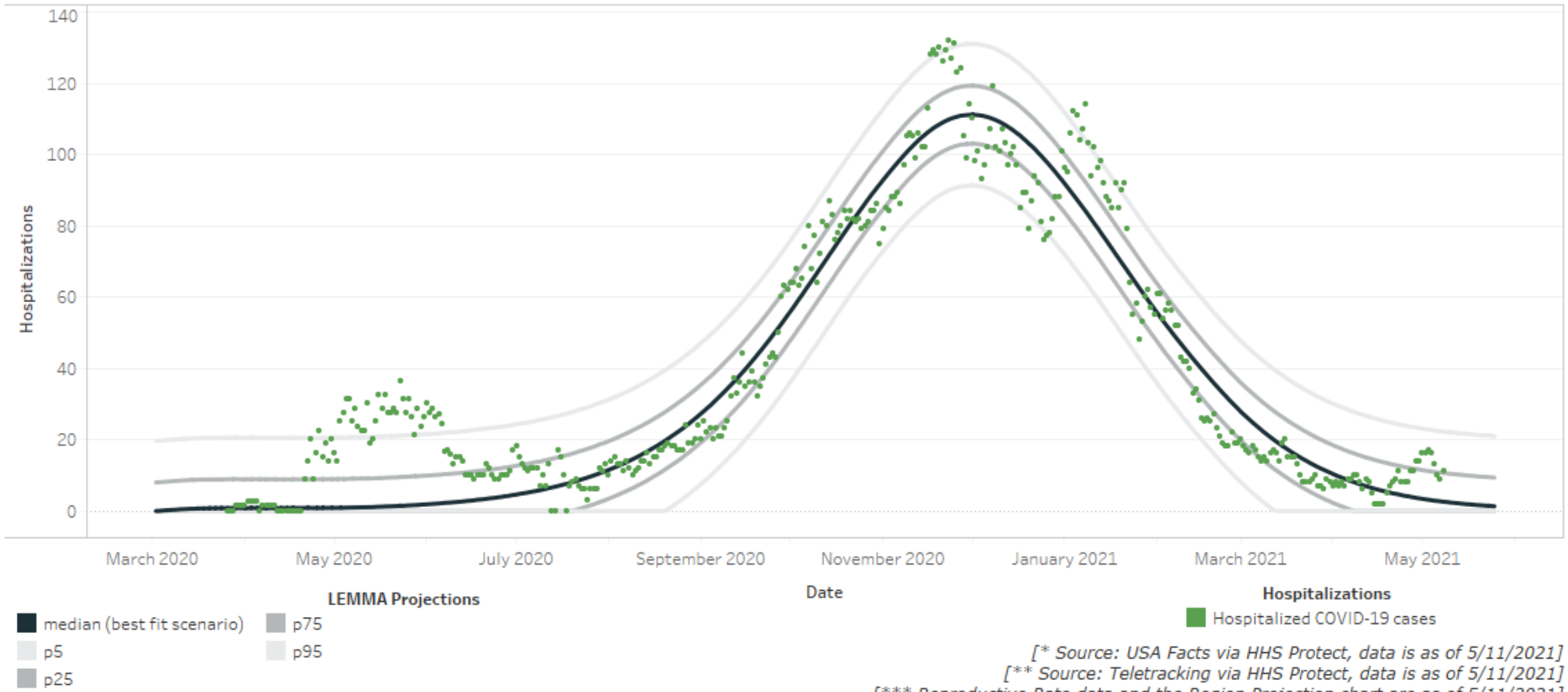
Pre-intervention	1.24
Last Week	0.76
Current Week	0.76
WoW % Re Change	-0.5

Bed / Ventilator Availabilty**

% ICU Beds Occupied	47%
% ICU Beds Occupied C19	6%
% ICU Beds Free	53%
% Ventilators in use	14%
% Ventilators free	86%

Base Case Northwest Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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Southeast / Cape Girardeau (Region E)

Return to Statewide View

Overview*

Population	363,478
Cumulative Cases	37,977
Cumulative Deaths	529
7-day New Cases	141
WoW % Case Change	0.4%

Reproductive Rate (Re)***

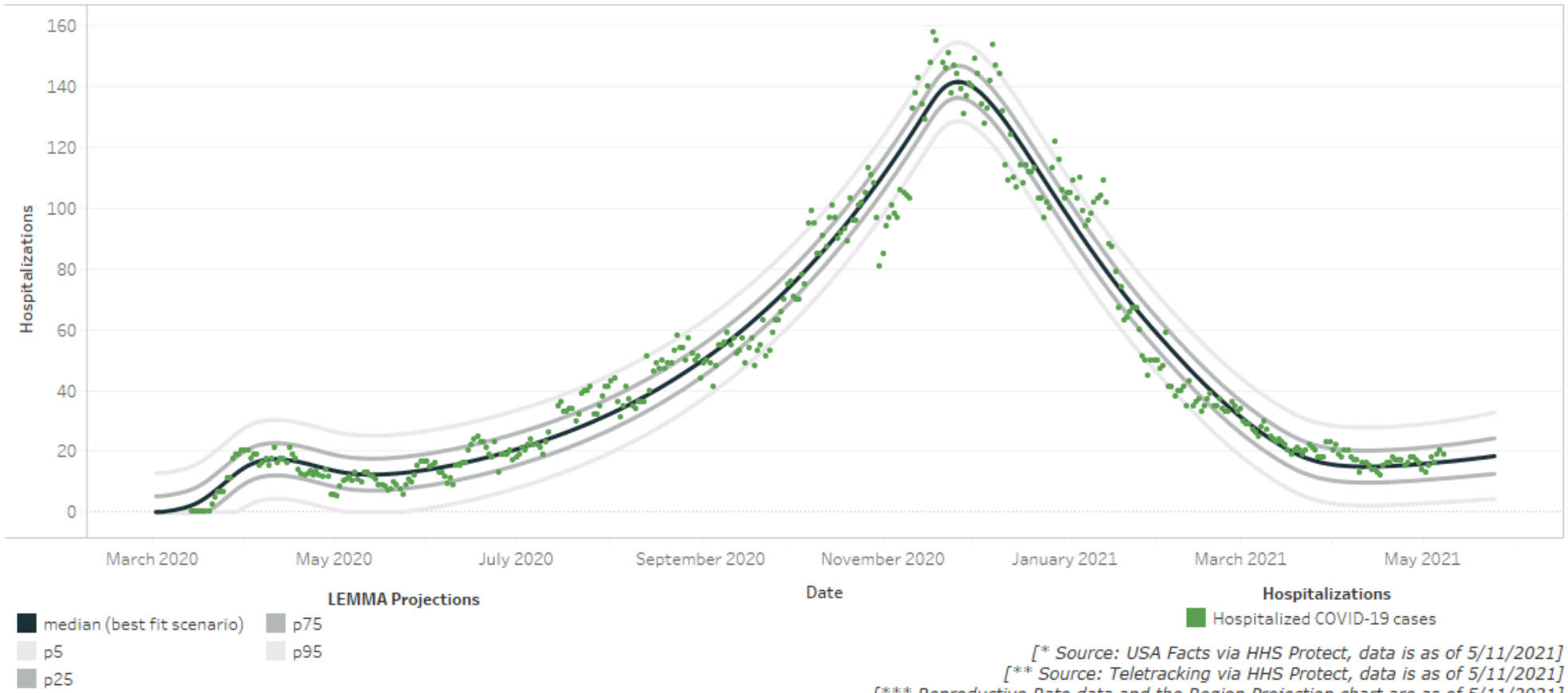
Pre-intervention	2.61
Last Week	1.07
Current Week	1.08
WoW % Re Change	1.1

Bed / Ventilator Availabilty**

% ICU Beds Occupied	52%
% ICU Beds Occupied C19	7%
% ICU Beds Free	48%
% Ventilators in use	21%
% Ventilators free	79%

Base Case Southeast Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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Southwest / Springfield (Region D,G,I)

Return to Statewide View

Overview*

Population	1,221,847
Cumulative Cases	113,705
Cumulative Deaths	1,879
7-day New Cases	527
WoW % Case Change	0.5%

Reproductive Rate (Re)***

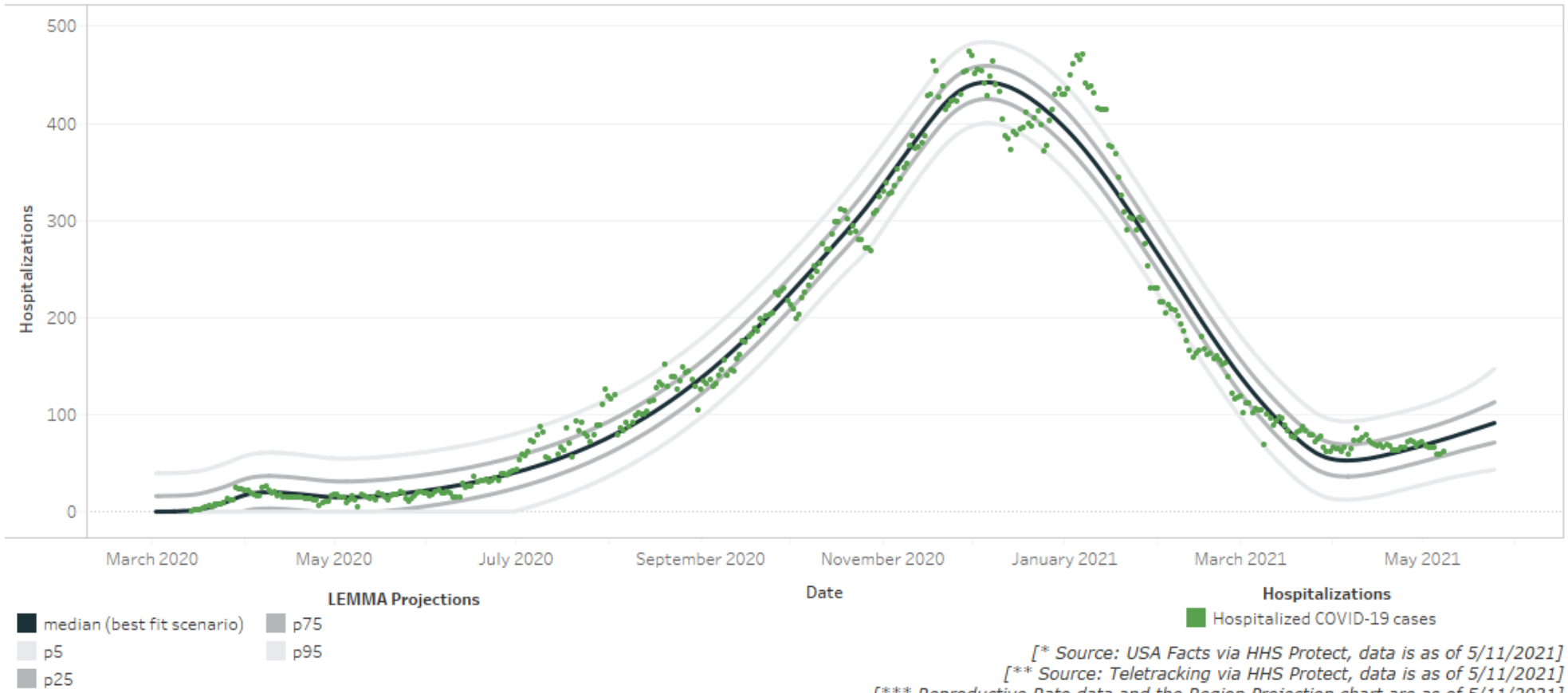
Pre-intervention	2.36
Last Week	0.71
Current Week	1.05
WoW % Re Change	48.9

Bed / Ventilator Availabilty**

% ICU Beds Occupied	74%
% ICU Beds Occupied C19	4%
% ICU Beds Free	26%
% Ventilators in use	20%
% Ventilators free	80%

Base Case Southwest Region

Model Scenario: Base Case, From Date: Mar 1, 2020. To Date: May 25, 2021



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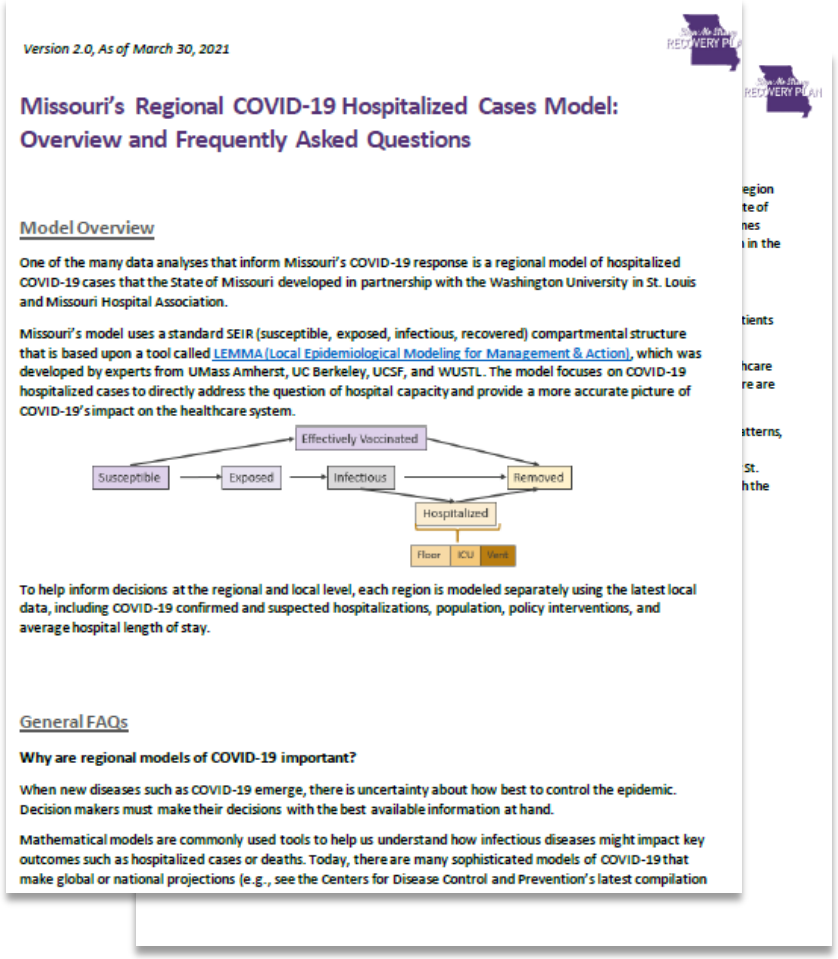
See FAQs for additional details

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



Version 2.0, As of March 30, 2021

Missouri's Regional COVID-19 Hospitalized Cases Model: Overview and Frequently Asked Questions

Model Overview

One of the many data analyses that inform Missouri's COVID-19 response is a regional model of hospitalized COVID-19 cases that the State of Missouri developed in partnership with the Washington University in St. Louis and Missouri Hospital Association.

Missouri's model uses a standard SEIR (susceptible, exposed, infectious, recovered) compartmental structure that is based upon a tool called LEMMA (Local Epidemiological Modeling for Management & Action), which was developed by experts from UMass Amherst, UC Berkeley, UCSF, and WUSTL. The model focuses on COVID-19 hospitalized cases to directly address the question of hospital capacity and provide a more accurate picture of COVID-19's impact on the healthcare system.

To help inform decisions at the regional and local level, each region is modeled separately using the latest local data, including COVID-19 confirmed and suspected hospitalizations, population, policy interventions, and average hospital length of stay.

General FAQs

Why are regional models of COVID-19 important?

When new diseases such as COVID-19 emerge, there is uncertainty about how best to control the epidemic. Decision makers must make their decisions with the best available information at hand.

Mathematical models are commonly used tools to help us understand how infectious diseases might impact key outcomes such as hospitalized cases or deaths. Today, there are many sophisticated models of COVID-19 that make global or national projections (e.g., see the Centers for Disease Control and Prevention's latest compilation

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)