Show Me Strong RECOVERY PLAN

What You Should Know COVID-19

State of Missouri regional COVID-19 hospitalized cases model

April 06, 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

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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 transmission rate ("R_e") remains below 1.0

Northeast Region
0.68 -> 0.64

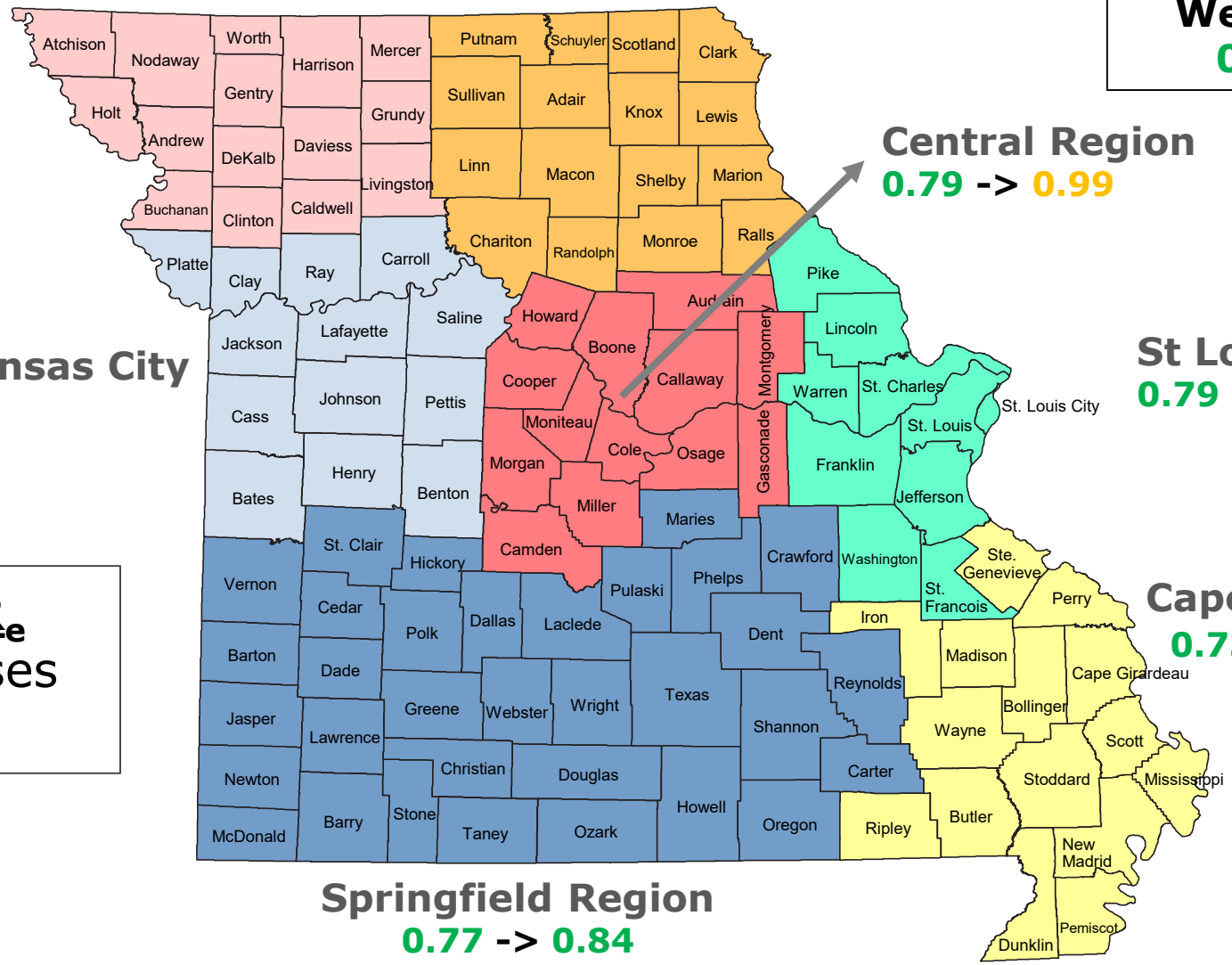
Estimated Statewide Weighted R_e
0.76 -> 0.93

Northwest Region
0.78 -> 0.79

Central Region
0.79 -> 0.99

Greater Kansas City
0.73 -> 0.73

St Louis Region
0.79 -> 1.17



Cape Girardeau Region
0.73 -> 0.72

Springfield Region
0.77 -> 0.84

Understanding R_e
R_e > 1 = COVID cases are growing

** R estimates as of 04/06/2021*

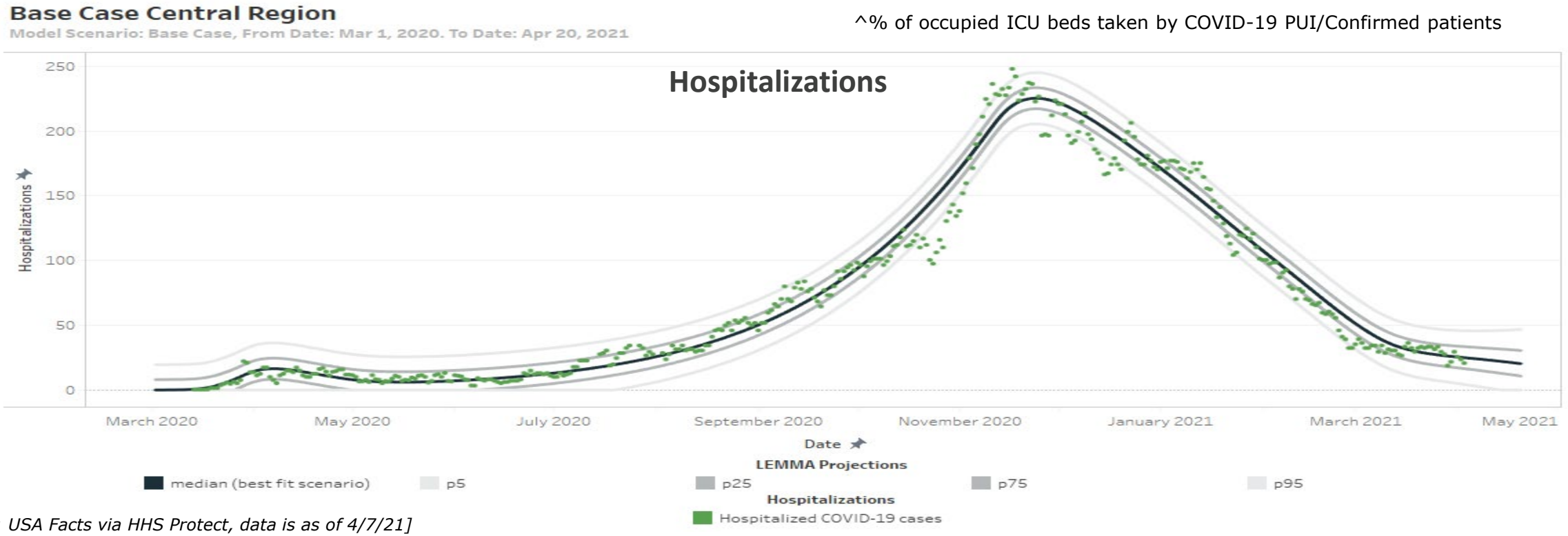
Central (Region F)

Overview*	
Population	502,486
Cumulative Cases	46,633
Cumulative Deaths	626
7-day New Cases	166
WoW % Case Change	0.4%

Reproductive Rate***	
Pre-intervention	2.3
Last Week	0.79
Current Week	0.99
WoW % Change	25.7%

Bed / Ventilator Availability**	
% ICU Beds Occupied	61%
% ICU Beds Occupied C19^	1%
% ICU Beds Free	39%
% Ventilators in use	32%
% Ventilators available	68%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



[Source: USA Facts via HHS Protect, data is as of 4/7/21]*
*[** Source: Teletracking via HHS Protect, data is as of 4/7/21]*
*[*** Reproductive Rate data and the Region Projection chart are as of 4/6/21]*

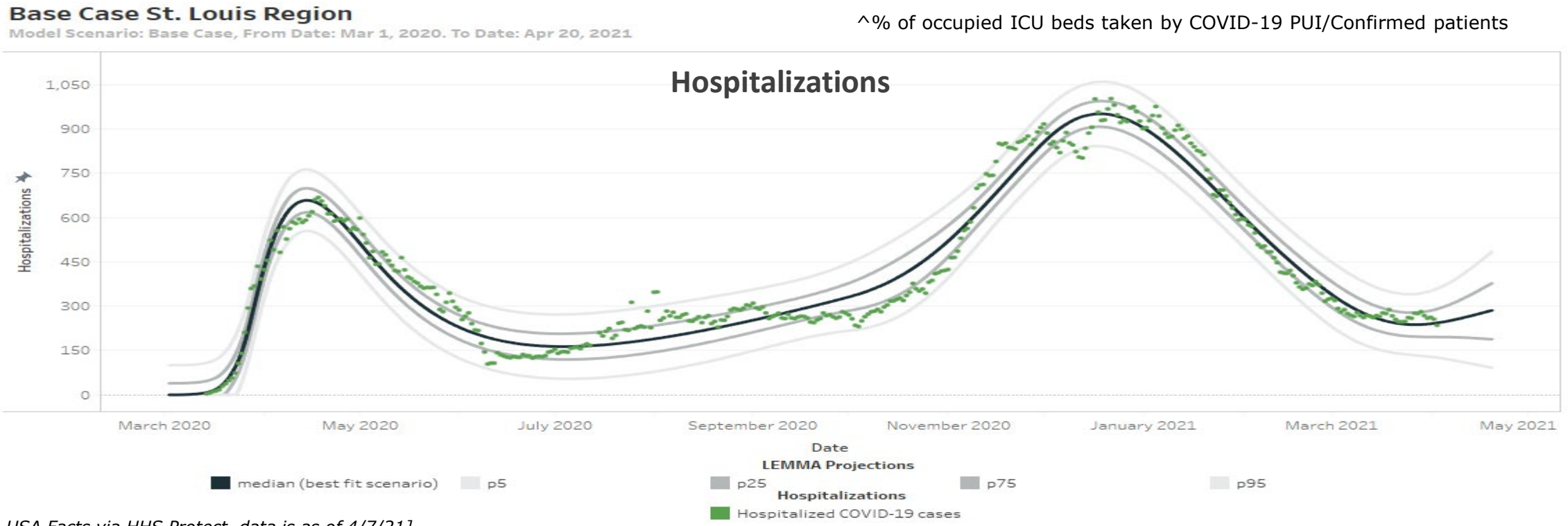
Greater St Louis Area (Region C)

Overview*	
Population	2,229,518
Cumulative Cases	177,426
Cumulative Deaths	3,285
7-day New Cases	2,811
WoW % Case Change	1.6%

Reproductive Rate***	
Pre-intervention	3.39
Last Week	0.79
Current Week	1.17
WoW % Change	49.6%

Bed / Ventilator Availability**	
% ICU Beds Occupied	84%
% ICU Beds Occupied C19^	6%
% ICU Beds Free	16%
% Ventilators in use	35%
% Ventilators available	65%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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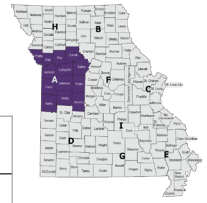
Greater Kansas City Area (Region A)

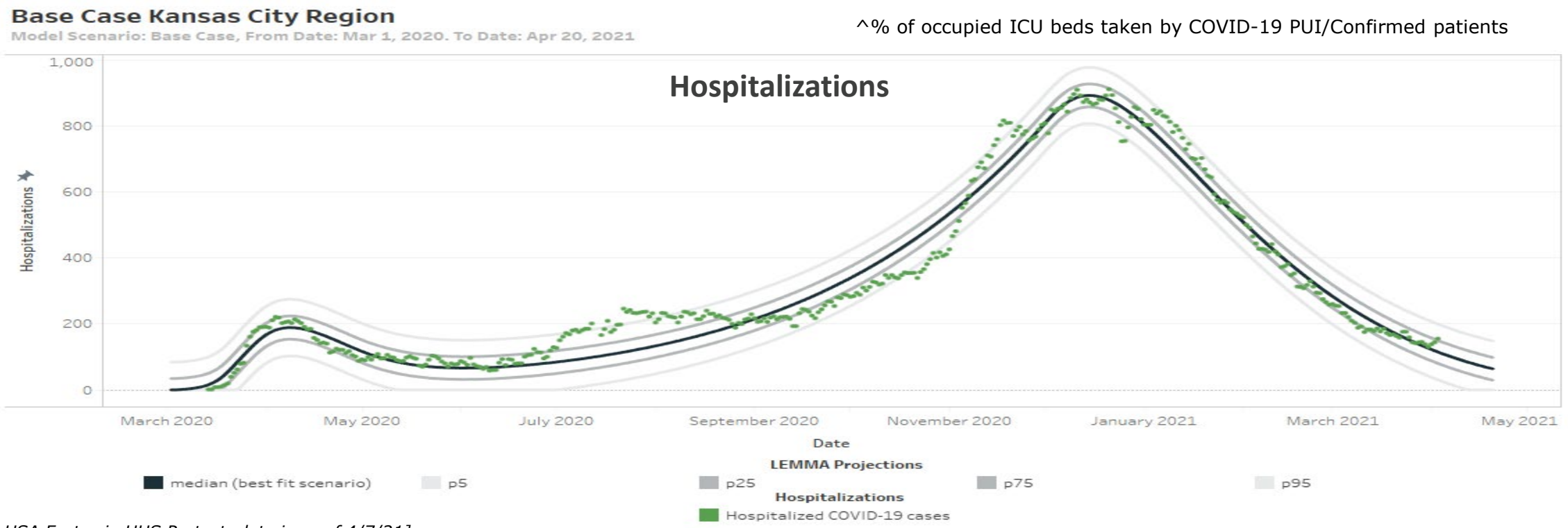


Overview*	
Population	1,395,314
Cumulative Cases	108,031
Cumulative Deaths	1,636
7-day New Cases	664
WoW % Case Change	0.6%

Reproductive Rate***	
Pre-intervention	2.8
Last Week	0.73
Current Week	0.73
WoW % Change	0.0%

Bed / Ventilator Availability**	
% ICU Beds Occupied	74%
% ICU Beds Occupied C19^	5%
% ICU Beds Free	26%
% Ventilators in use	19%
% Ventilators available	81%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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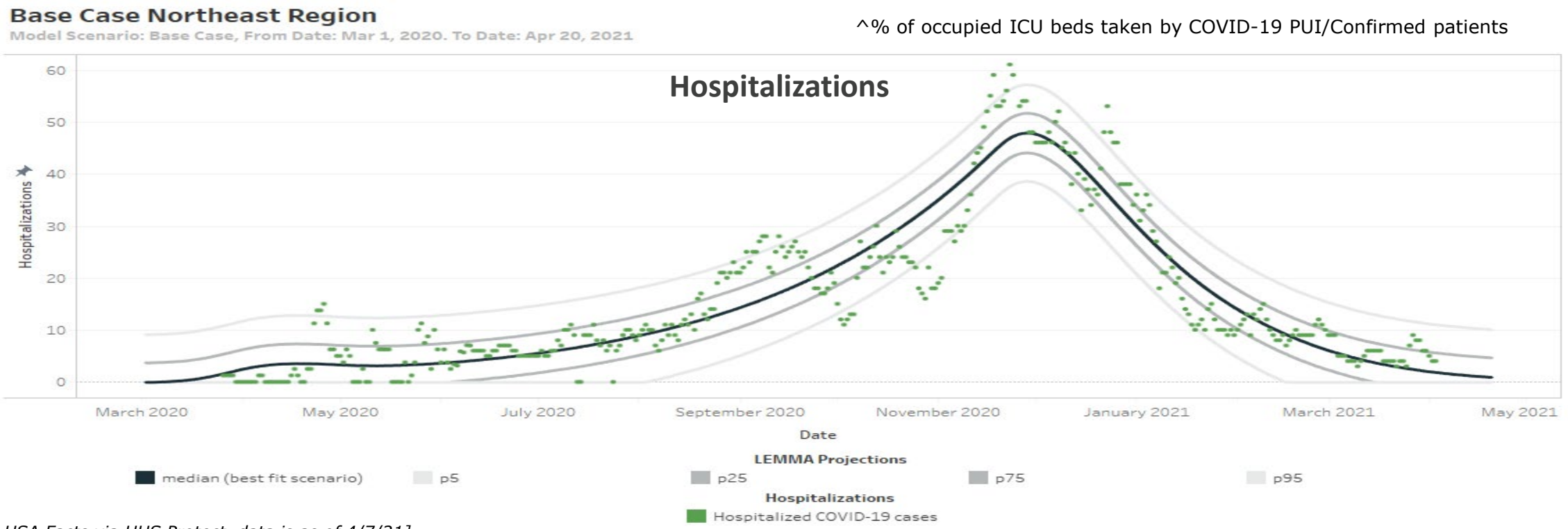
Northeast (Region B)

Overview*	
Population	179,448
Cumulative Cases	13,525
Cumulative Deaths	201
7-day New Cases	39
WoW % Case Change	0.3%

Reproductive Rate***	
Pre-intervention	N/A
Last Week	0.68
Current Week	0.64
WoW % Change	-5.9%

Bed / Ventilator Availability**	
% ICU Beds Occupied	38%
% ICU Beds Occupied C19^	0%
% ICU Beds Free	63%
% Ventilators in use	3%
% Ventilators available	97%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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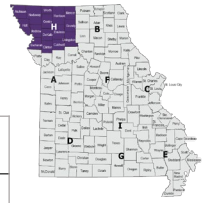
Northwest (Region H)

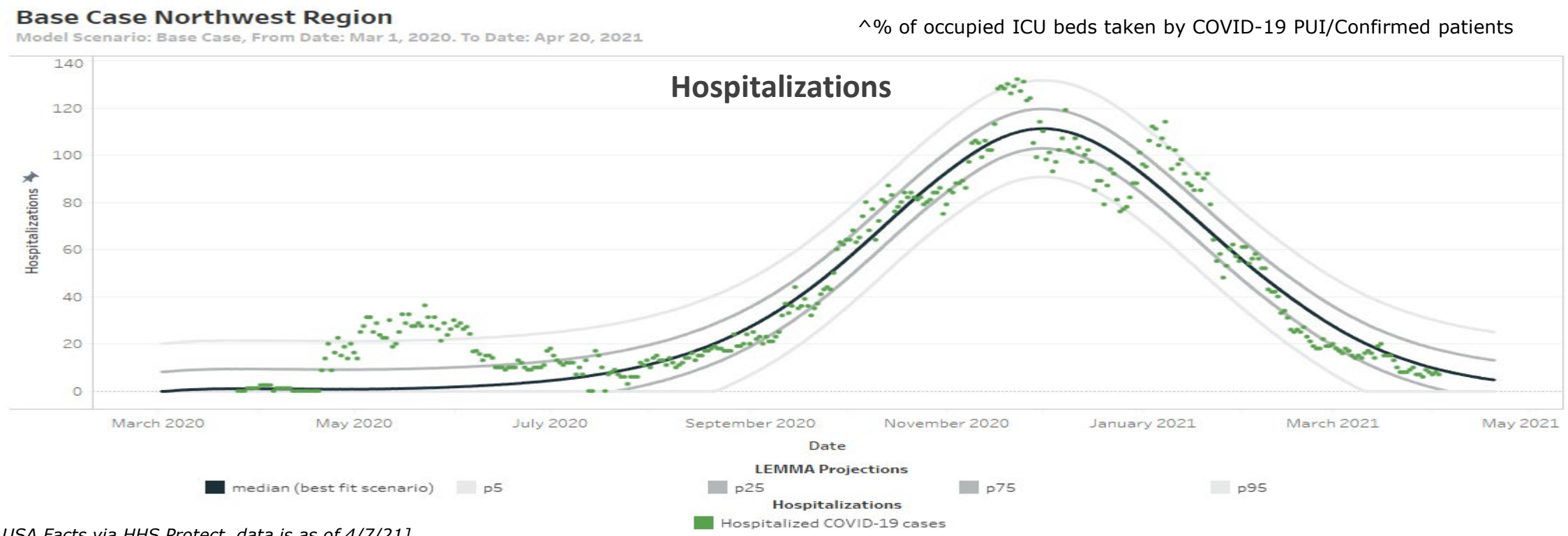


Overview*	
Population	234,361
Cumulative Cases	18,992
Cumulative Deaths	432
7-day New Cases	44
WoW % Case Change	0.2%

Reproductive Rate***	
Pre-intervention	1.24
Last Week	0.78
Current Week	0.79
WoW % Change	1.4%

Bed / Ventilator Availability**	
% ICU Beds Occupied	56%
% ICU Beds Occupied C19^	0%
% ICU Beds Free	44%
% Ventilators in use	11%
% Ventilators available	89%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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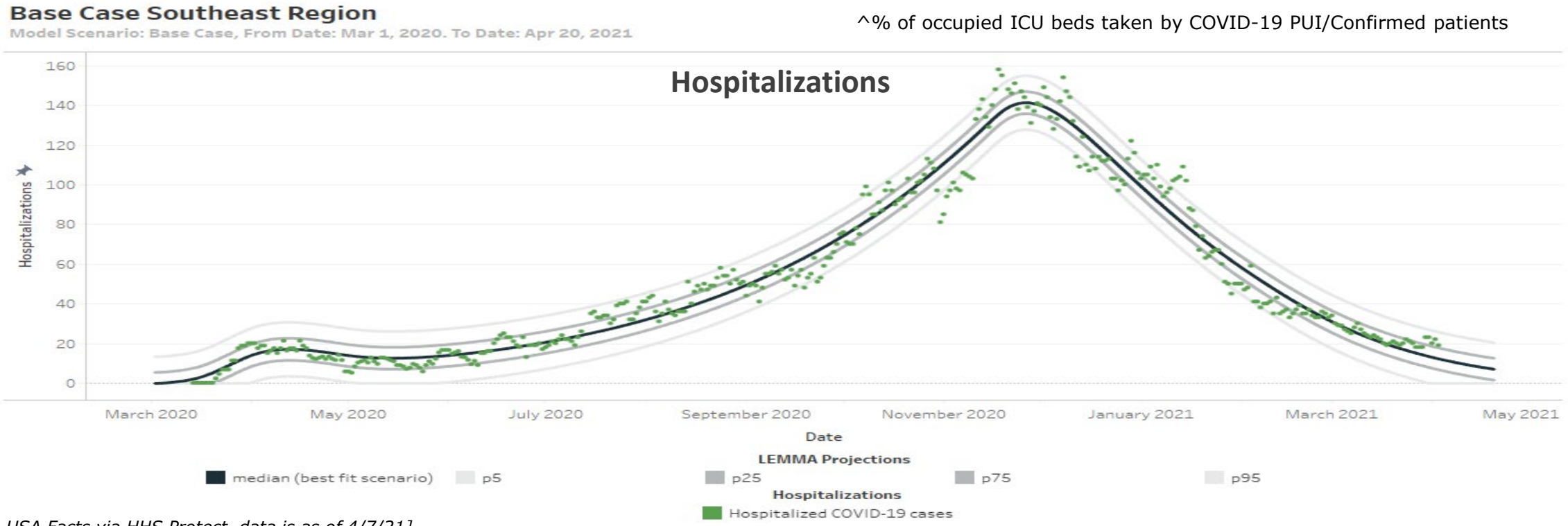
Southeast / Cape Girardeau (Region E)

Overview*	
Population	363,478
Cumulative Cases	32,861
Cumulative Deaths	516
7-day New Cases	148
WoW % Case Change	0.5%

Reproductive Rate***	
Pre-intervention	2.61
Last Week	0.73
Current Week	0.72
WoW % Change	-1.6%

Bed / Ventilator Availability**	
% ICU Beds Occupied	62%
% ICU Beds Occupied C19^	2%
% ICU Beds Free	38%
% Ventilators in use	21%
% Ventilators available	79%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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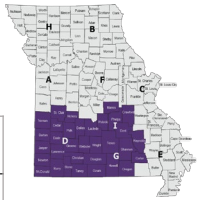
Southwest / Springfield (Regions D,G, I)

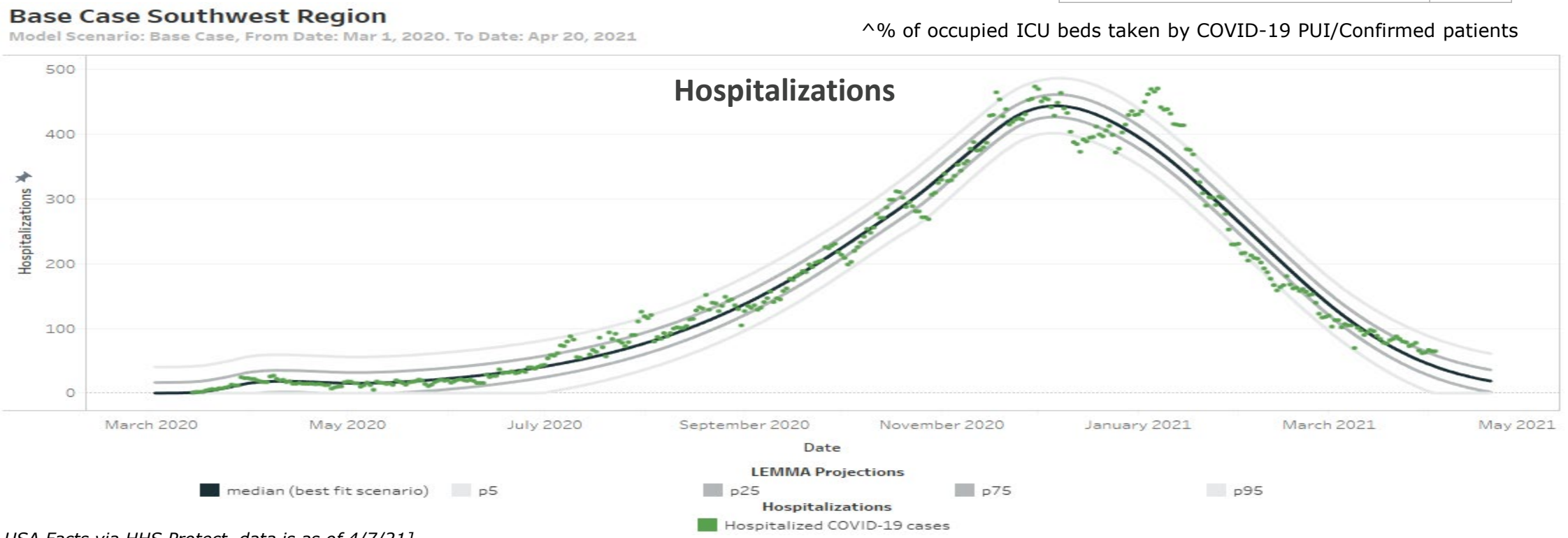


Overview*	
Population	1,221,847
Cumulative Cases	93,984
Cumulative Deaths	1,819
7-day New Cases	457
WoW % Case Change	0.5%

Reproductive Rate***	
Pre-intervention	2.36
Last Week	0.77
Current Week	0.84
WoW % Change	8.9%

Bed / Ventilator Availability**	
% ICU Beds Occupied	74%
% ICU Beds Occupied C19^	4%
% ICU Beds Free	26%
% Ventilators in use	16%
% Ventilators available	84%

^% of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



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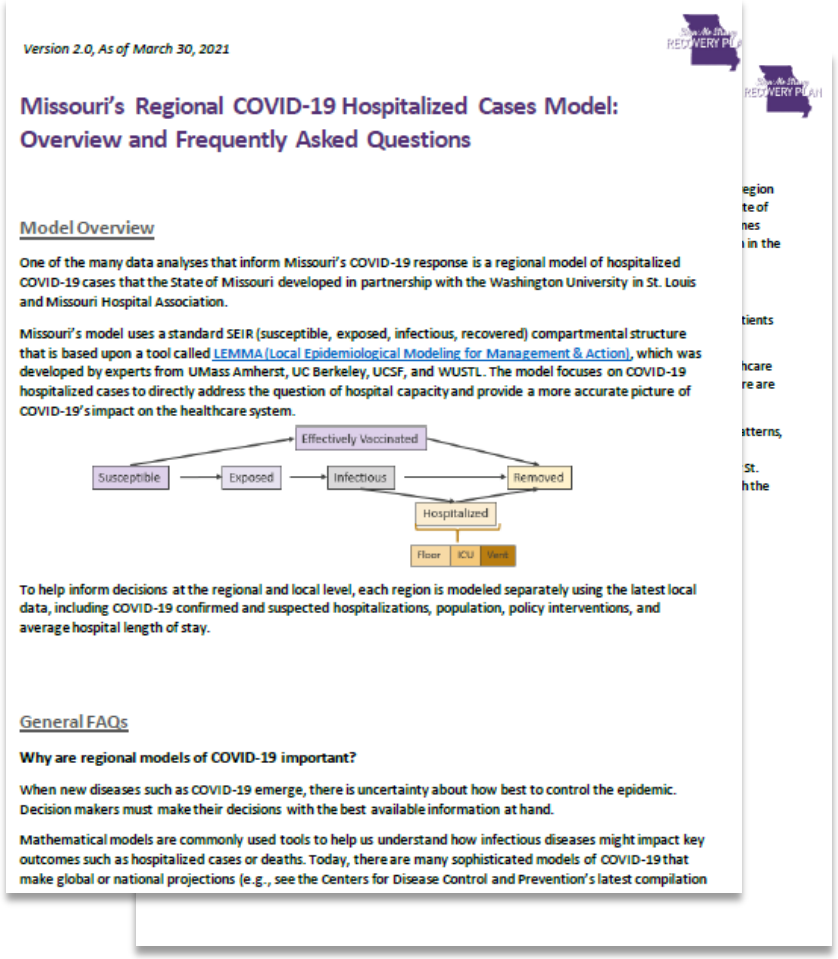
See FAQs for additional details

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?

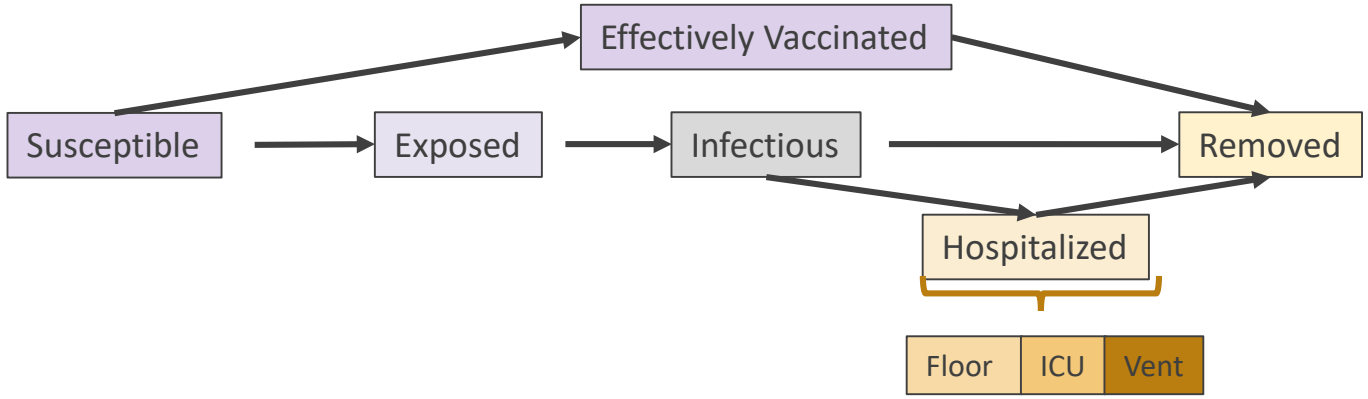
When new diseases such as COVID-19 emerge, there is uncertainty about how best to control the epidemic. Decision makers must make their decisions with the best available information at hand.

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)