Show Me Strong RECOVERY PLAN

What You Should Know COVID-19

State of Missouri regional COVID-19 hospitalized cases model

February 3, 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
Projected hospitalizations for regions in MO with sufficient data, i.e. Kansas City Area, Central, St. Louis Area, Southeast and Southwest	Projected hospitalizations in regions where daily COVID-19 hospitalizations are fewer than 15 because insufficient cases

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

Transmission rates ("R_e") declining but remain above 1

Northeast Region
0.88 -> 0.88

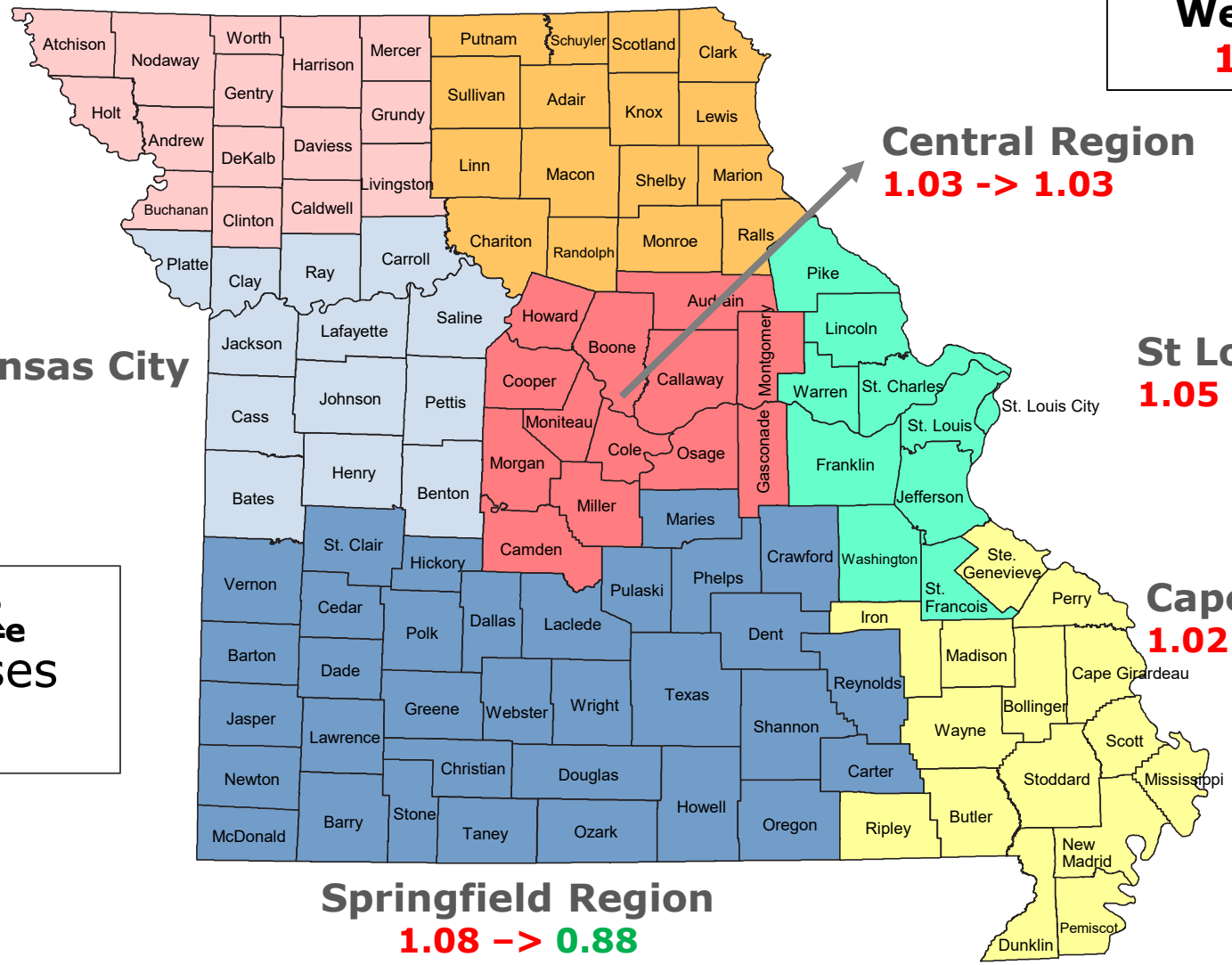
Estimated Statewide Weighted R_e
1.06 -> 0.96

Northwest Region
1.13 -> 1.06

Central Region
1.03 -> 1.03

Greater Kansas City
1.09 -> 1.05

St Louis Region
1.05 -> 0.95



Cape Girardeau Region
1.02 -> 0.84

Springfield Region
1.08 –> 0.88

Understanding R_e
R_e > 1 = COVID cases are growing

** Data date range: 01/26/21 – 02/1/21*

Central (Region F)

Overview	
Population	502,486
Cumulative Cases	44275
Cumulative Deaths	509
7-day New Cases	765
WoW % Case Change	1.8%

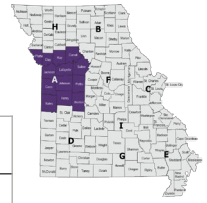
Reproductive Rate	
Pre-intervention	2.3
Last Week	1.03
Current Week	1.03
WoW % Change	0.1%

Bed / Ventilator Availability	
% ICU Beds Occupied	62%
% ICU Beds Occupied C19	12%
% ICU Beds Free	38%
% Ventilators in use	28%
% Ventilators available	72%

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

[Data updated 02/03/21]

Greater Kansas City Area (Region A)

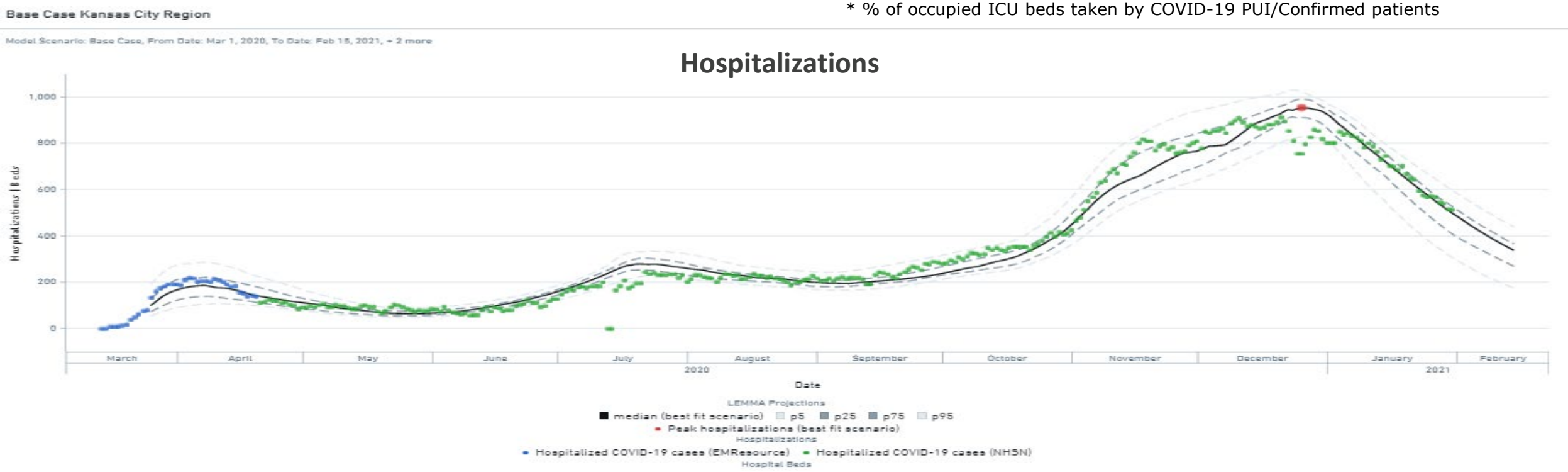


Overview	
Population	1,395,314
Cumulative Cases	100857
Cumulative Deaths	1258
7-day New Cases	2757
WoW % Case Change	2.8%

Reproductive Rate	
Pre-intervention	2.8
Last Week	1.09
Current Week	1.05
WoW % Change	-3.6%

Bed / Ventilator Availability	
% ICU Beds Occupied	79%
% ICU Beds Occupied C19	13%
% ICU Beds Free	21%
% Ventilators in use	24%
% Ventilators available	76%

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



[Data updated 02/03/21]

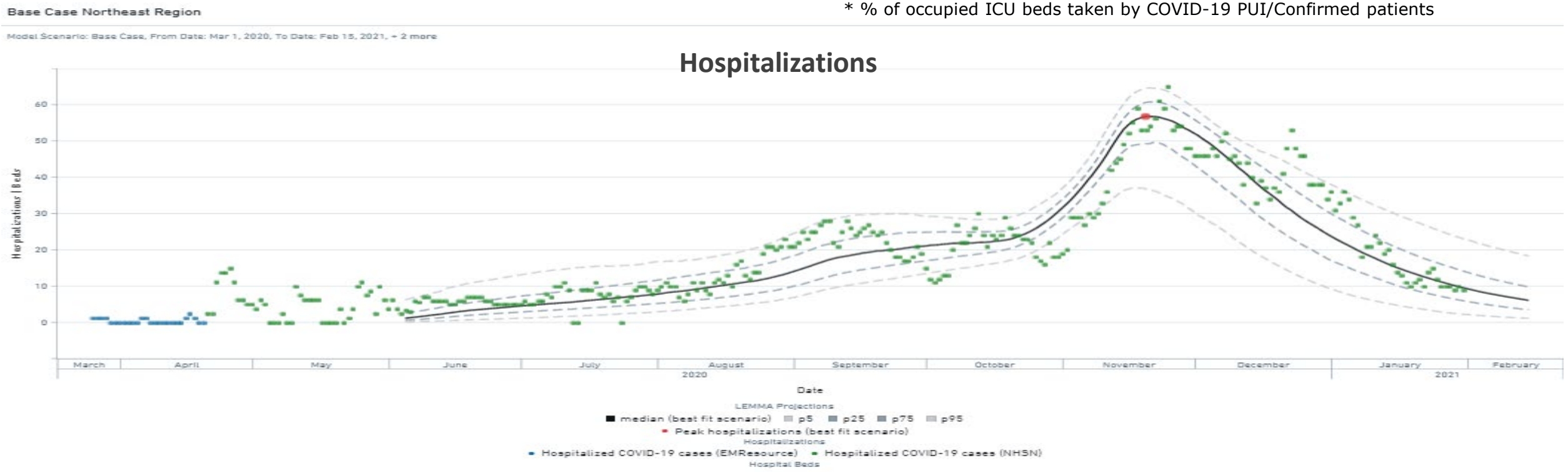
Northeast (Region B)

Overview	
Population	179,448
Cumulative Cases	12827
Cumulative Deaths	142
7-day New Cases	217
WoW % Case Change	1.7%

Reproductive Rate	
Pre-intervention	N/A
Last Week	0.88
Current Week	0.88
WoW % Change	-0.1%

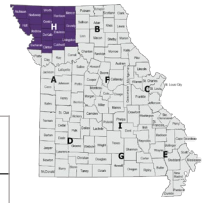
Bed / Ventilator Availability	
% ICU Beds Occupied	53%
% ICU Beds Occupied C19	17%
% ICU Beds Free	47%
% Ventilators in use	13%
% Ventilators available	87%

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



[Data updated 02/03/21]

Northwest (Region H)

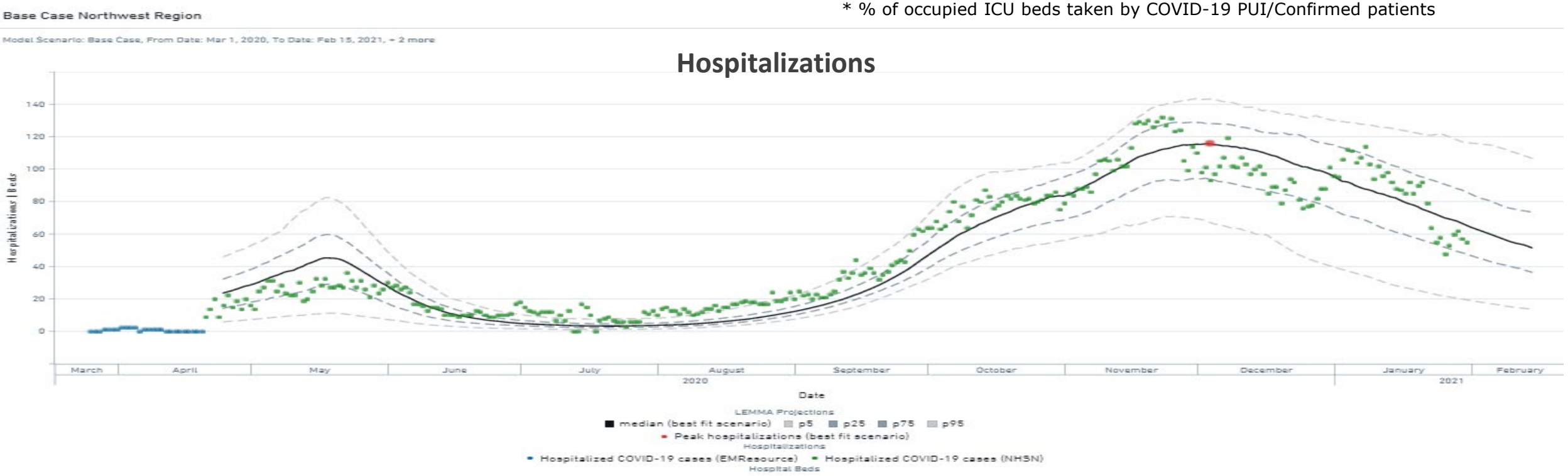


Overview	
Population	234,361
Cumulative Cases	18209
Cumulative Deaths	375
7-day New Cases	351
WoW % Case Change	2.0%

Reproductive Rate	
Pre-intervention	1.24
Last Week	1.13
Current Week	1.06
WoW % Change	-6.3%

Bed / Ventilator Availability	
% ICU Beds Occupied	84%
% ICU Beds Occupied C19	13%
% ICU Beds Free	16%
% Ventilators in use	10%
% Ventilators available	90%

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



[Data updated 02/03/21]

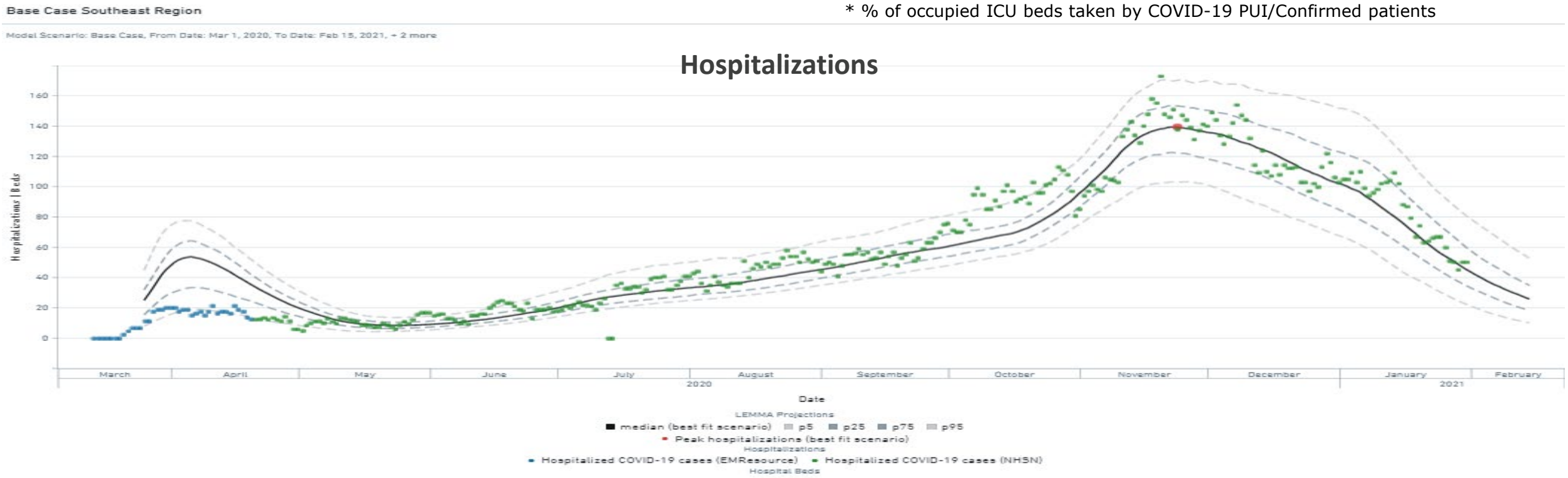
Southeast / Cape Girardeau (Region E)

Overview	
Population	363,478
Cumulative Cases	31054
Cumulative Deaths	421
7-day New Cases	493
WoW % Case Change	1.6%

Reproductive Rate	
Pre-intervention	2.61
Last Week	1.02
Current Week	0.84
WoW % Change	-17.6%

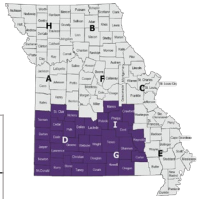
Bed / Ventilator Availability	
% ICU Beds Occupied	55%
% ICU Beds Occupied C19	7%
% ICU Beds Free	45%
% Ventilators in use	25%
% Ventilators available	75%

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



[Data updated 02/03/21]

Southwest / Springfield (Regions D,G, I)

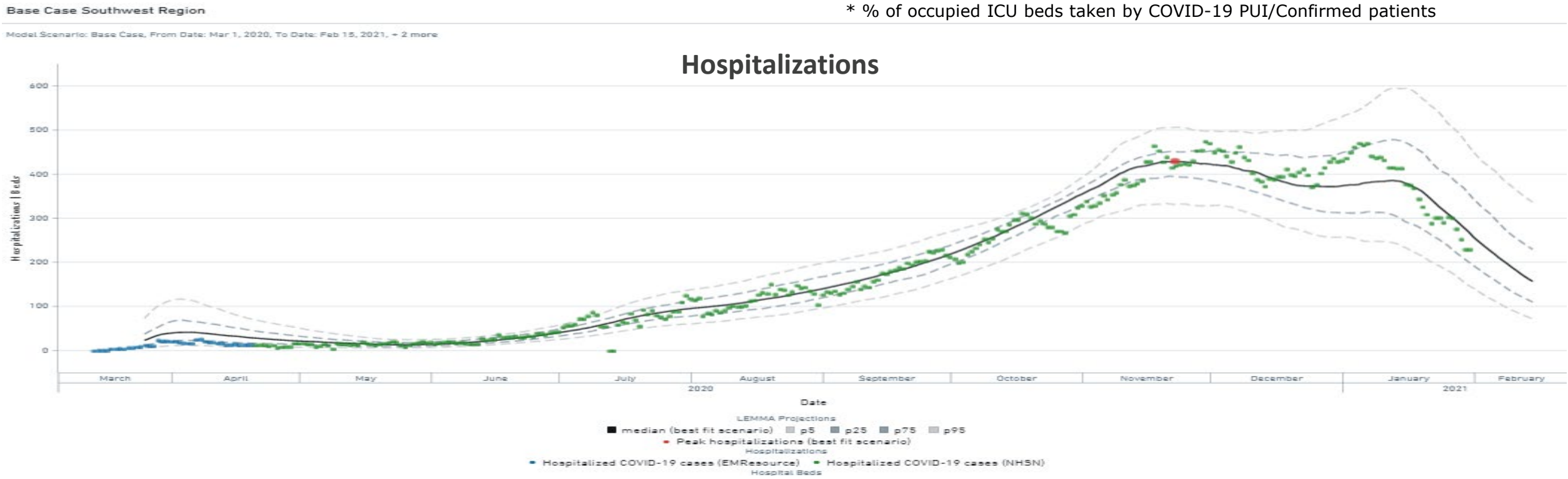


Overview	
Population	1,221,847
Cumulative Cases	88281
Cumulative Deaths	1477
7-day New Cases	1901
WoW % Case Change	2.2%

Reproductive Rate	
Pre-intervention	2.36
Last Week	1.08
Current Week	0.88
WoW % Change	-18.8%

Bed / Ventilator Availability	
% ICU Beds Occupied	77%
% ICU Beds Occupied C19	18%
% ICU Beds Free	23%
% Ventilators in use	22%
% Ventilators available	78%

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



[Data updated 02/03/21]

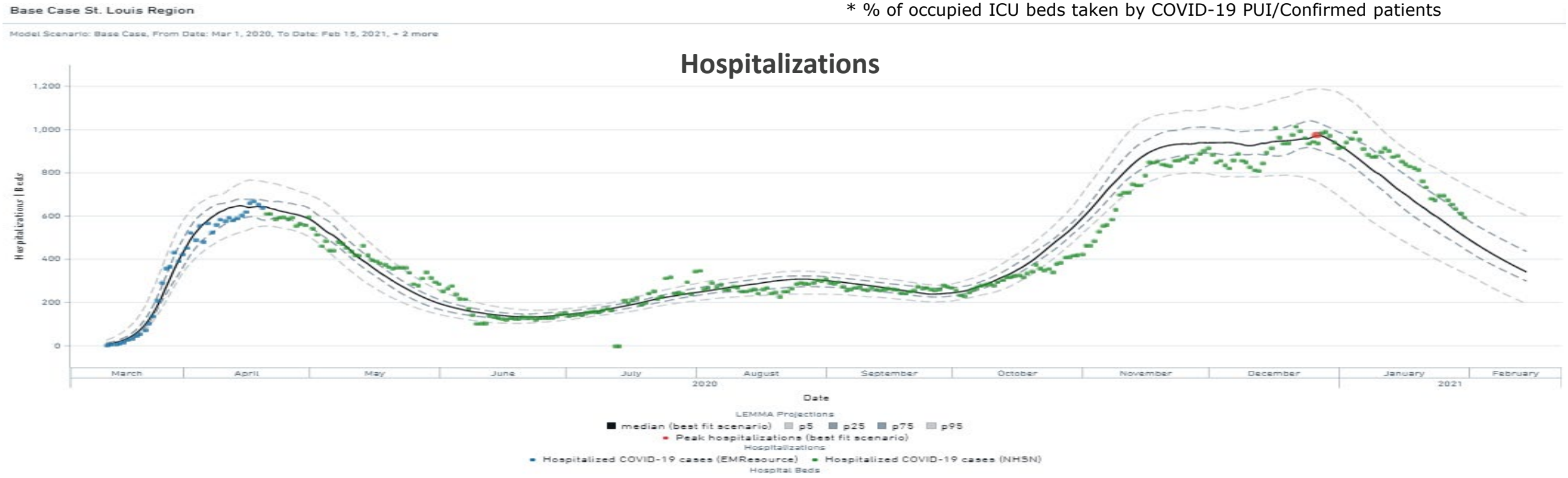
Greater St Louis Area (Region C)

Overview	
Population	2,229,518
Cumulative Cases	164094
Cumulative Deaths	2566
7-day New Cases	3578
WoW % Case Change	2.2%

Reproductive Rate	
Pre-intervention	3.39
Last Week	1.05
Current Week	0.95
WoW % Change	-10.1%

Bed / Ventilator Availability	
% ICU Beds Occupied	82%
% ICU Beds Occupied C19	13%
% ICU Beds Free	18%
% Ventilators in use	38%
% Ventilators available	62%

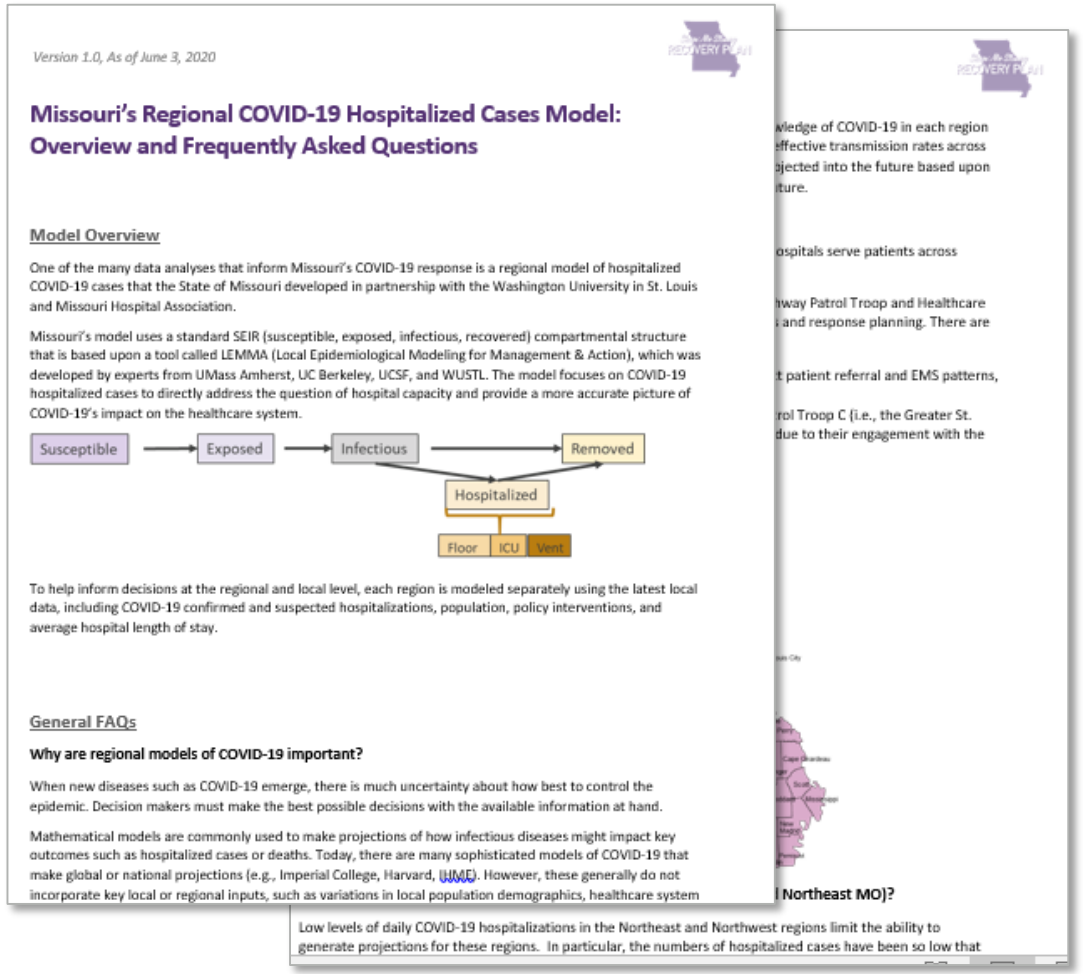
* % of occupied ICU beds taken by COVID-19 PUI/Confirmed patients



[Data updated 02/03/21]

See FAQs for additional details

Link here: https://health.mo.gov/living/healthcondiseases/communicable/novel-coronavirus/pdf/modeling-faqs06032020.pdf



Version 1.0, As of June 3, 2020

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 much uncertainty about how best to control the epidemic. Decision makers must make the best possible decisions with the available information at hand.

Mathematical models are commonly used to make projections of 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., Imperial College, Harvard, IHME). However, these generally do not incorporate key local or regional inputs, such as variations in local population demographics, healthcare system

wledge of COVID-19 in each region
effective transmission rates across
jected into the future based upon
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ospitals serve patients across

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and response planning. There are

t patient referral and EMS patterns,

rol Troop C (i.e., the Greater St.
due to their engagement with the

Northeast MO)?

Low levels of daily COVID-19 hospitalizations in the Northeast and Northwest regions limit the ability to generate projections for these regions. In particular, the numbers of hospitalized cases have been so low that

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
- **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)