

# Date & Epidemiology: The Need to Educate the Public

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Professor & Chair Emerita

- What was happening when this all started
- How distribution of COVID information started
- What it evolved into
- Where we are now

**Goal: Inform & Educate**

# What was Happening? EA Martin Program/SDSU



## Nutritional epidemiology

- Exercise & diet interactions
- Bone health & body composition

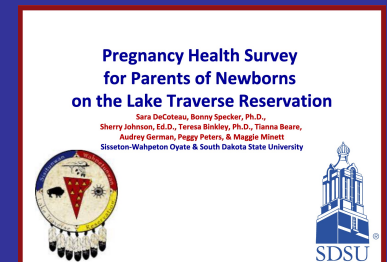
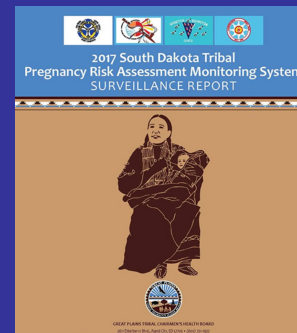
## Maternal-child health epidemiology (with DOH, GPTCHB & SWO)

- Infant mortality
- Surveys on attitudes and behaviors during pregnancy

Infant Mortality Task Force Reports To Govern

Dec 21, 2011

South Dakota  
2018 PRAMS Surveillance  
Data Report



# How Distribution of COVID Information Started



Seattle, 1918



Washington, 2020

*April, 2020:* A talk on similarities between the 1918 Influenza outbreak and COVID to various service organizations and city councils in eastern SD.

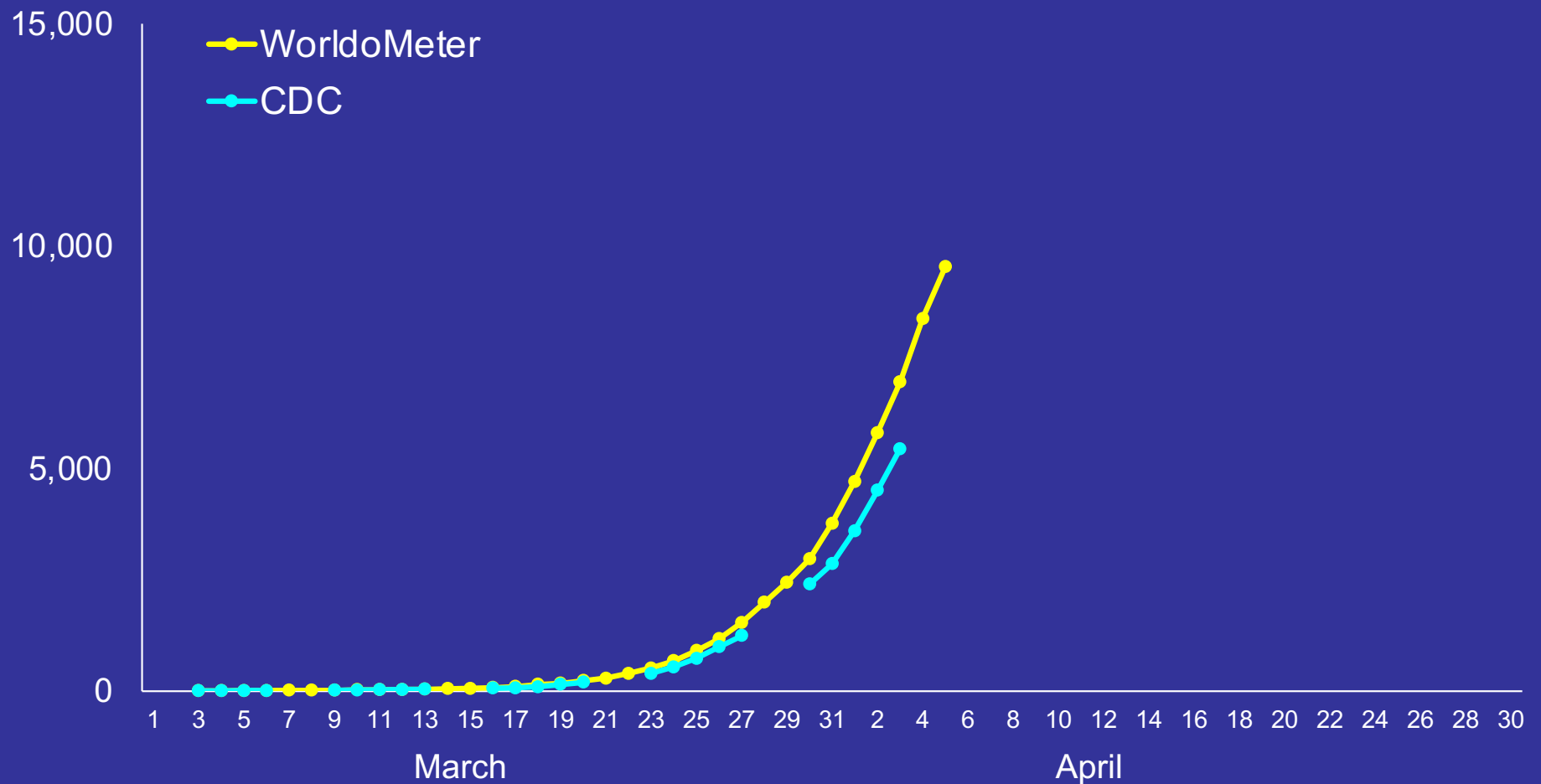
# COVID-19

## Why are so many people affected?

- A new virus (no prior immunity)
- No vaccine
- Control efforts limited to non-pharmaceutical interventions & they ~~need to~~ *must* be applied:
  - Isolation/quarantine
  - Good personal hygiene/use of disinfectants
  - Limit public gatherings

# US COVID-19 Situation

## Number of Deaths from COVID-19, 2020

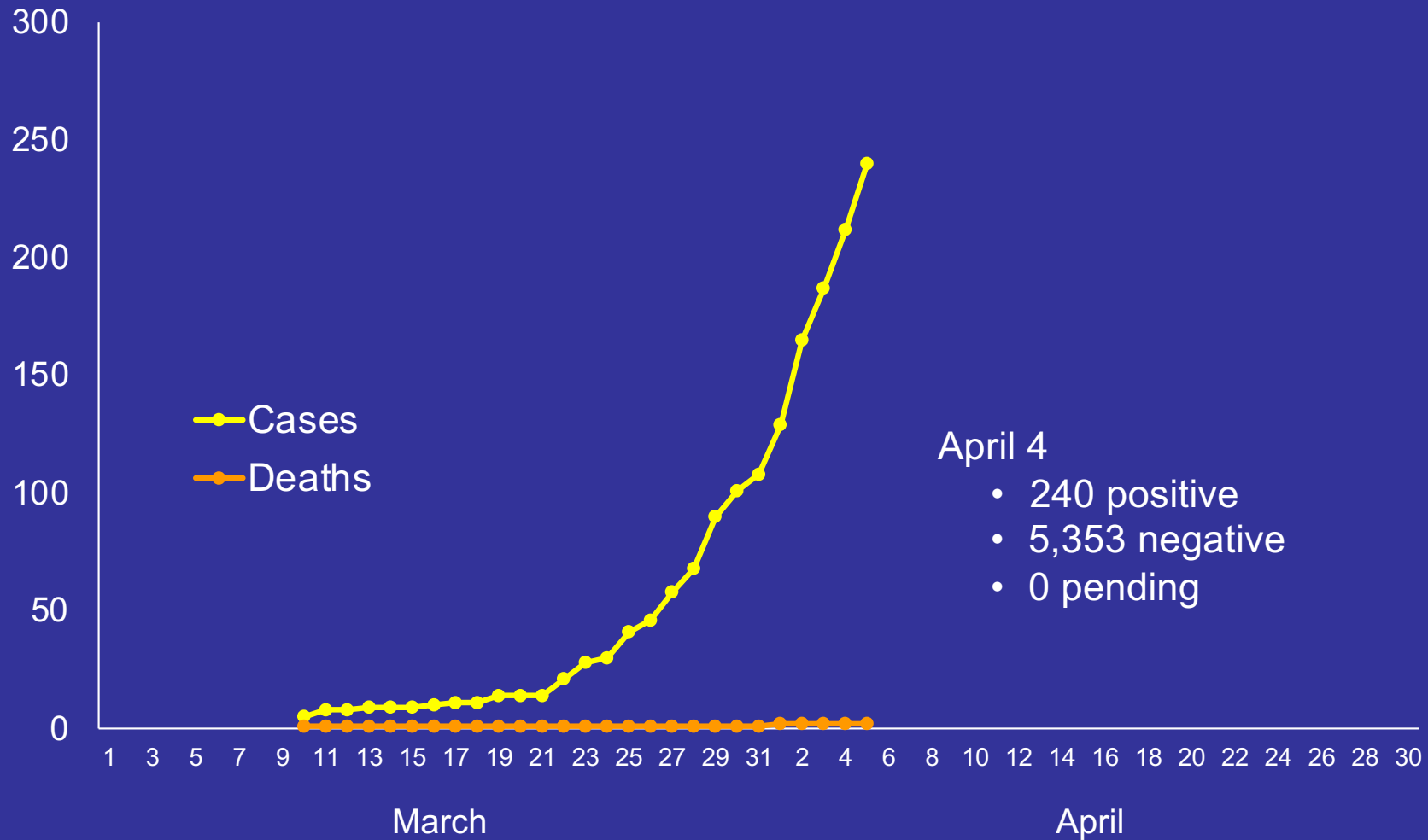


\* Does not include Diamond Princess or repatriated deaths

<https://www.worldometers.info/coronavirus/#countries>  
<https://www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html>

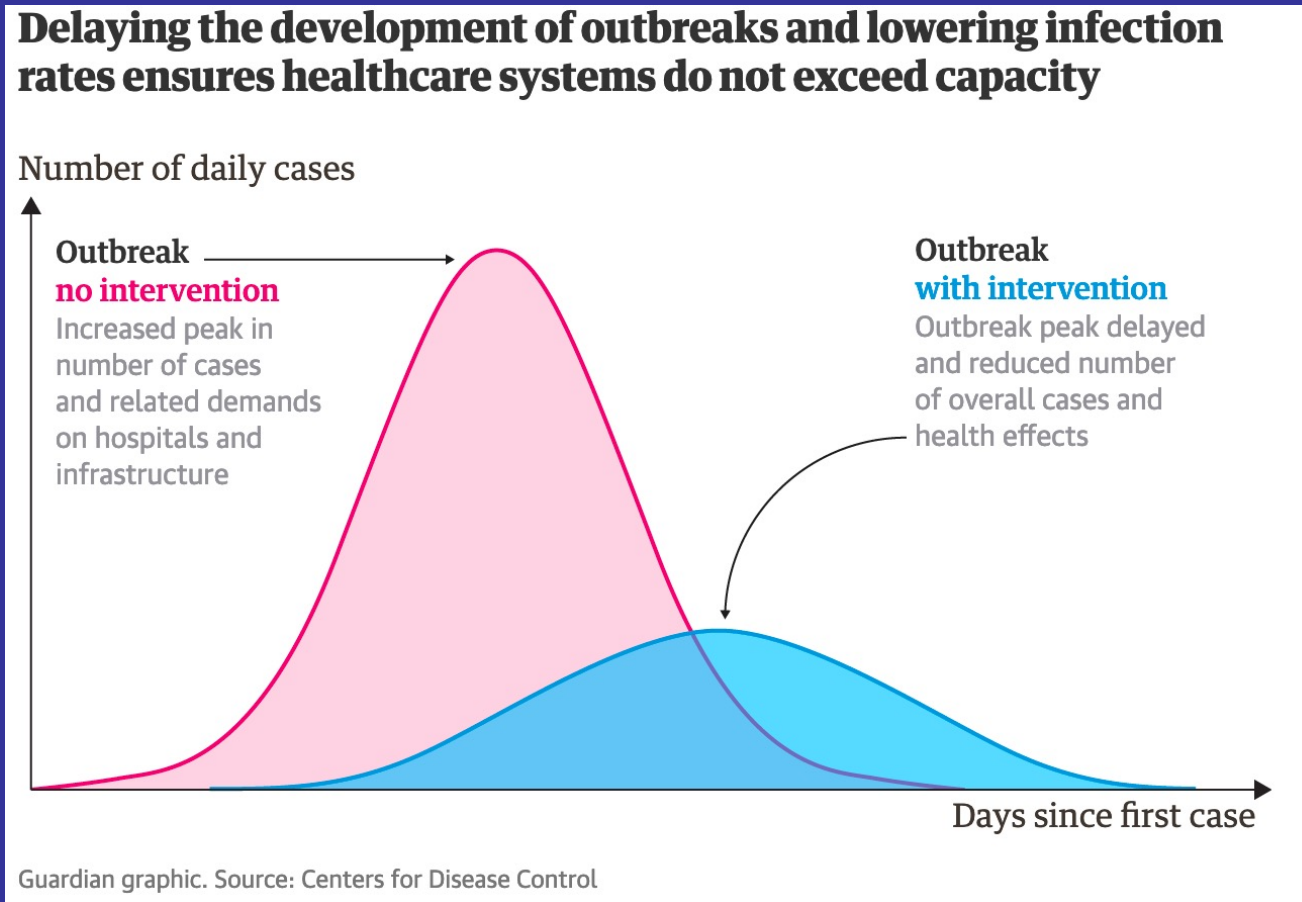
# South Dakota COVID-19 Situation

## Number of Confirmed Cases of COVID-19



# COVID-19

The key is to **slow the spread** of this disease down.



This idea led to modelling predictions based on current data.

# South Dakota COVID-19 Situation

Data Used in CHIME Model	State	Sioux Falls Area <sup>^</sup>	SD Minus SF Area
Population Size	889,447	255,438	634,009
Currently Hospitalized	76	68	8
Date of First Hospitalization <sup>^^</sup>	DT = 6	DT = 6	DT = 6
Date of Social Distancing & %	3/16/20 (25%)	3/16/20 (25%)	3/16/20 (25% vs. 5%)
Hospitalization % of Total Infections*	0.77	0.63	0.83
ICU % of Total Infections*	0.27	0.18	0.30
Ventilated % of Total Infections*	0.19	0.13	0.21
Infectious Days	14	14	14
Average Hospital LOS	13	13	13
Average ICU Days	10	10	10
Average Ventilated Days	8	8	8
Current Date	4/30/2020	4/30/2020	4/30/2020

<sup>^</sup> Sioux Falls area consists of Minnehaha, Lincoln, McCook, and Turner counties

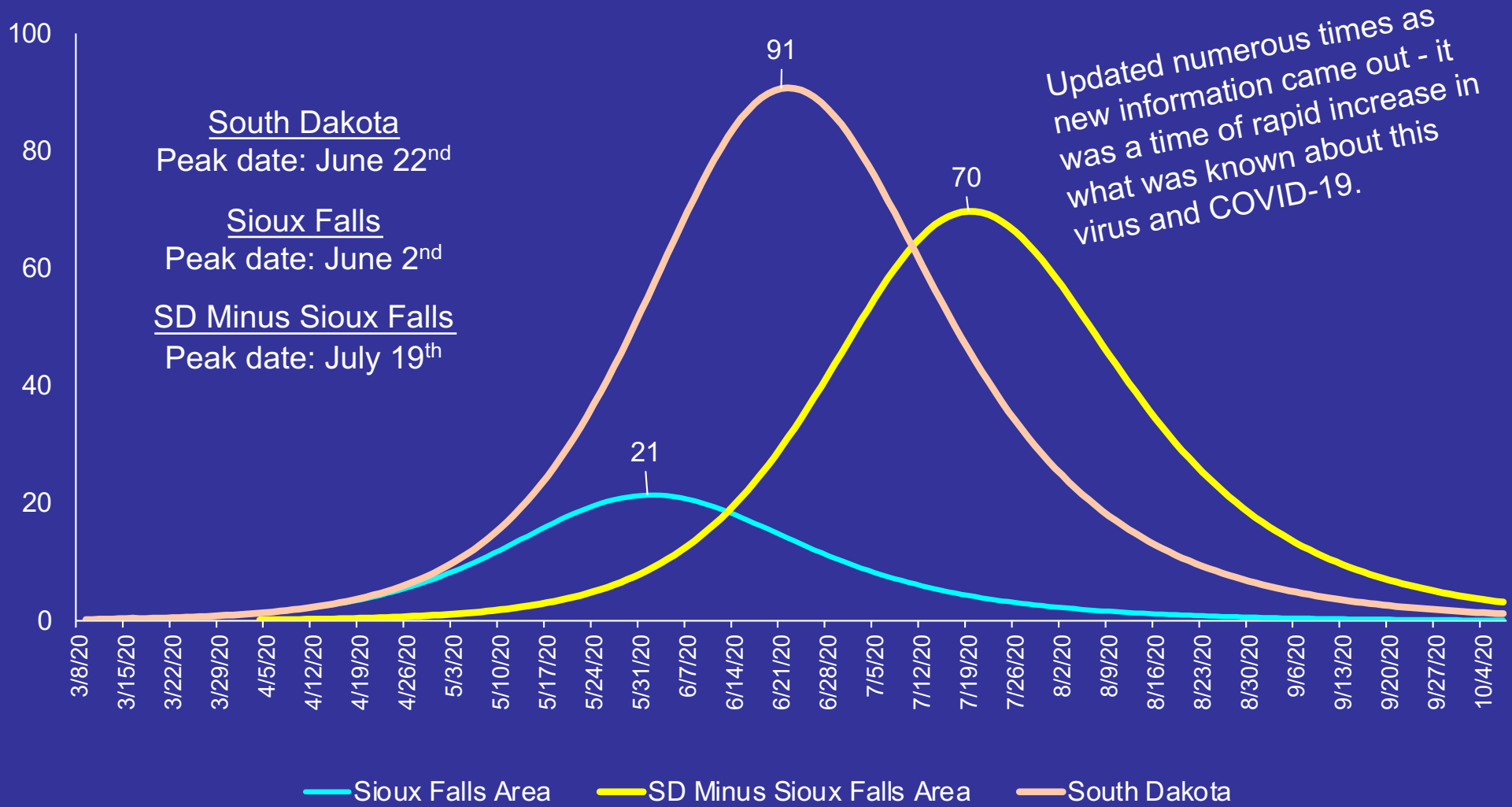
<sup>^^</sup> A doubling time of 6 days was used instead of date of first hospitalization. Estimated 90% of cases were from the Sioux Falls Area. As of 4/30/20 there were 76 current hospitalizations (estimated 68 from the Sioux Falls area and 8 from SD minus Sioux Falls).

\* Hospitalization & ICU admission rates age-adjusted for specific populations based on data from Ferguson et al. Assumptions: 50% of infected individuals are asymptomatic (based on screening data from Iceland & Italy). Of those symptomatic, 40% have mild symptoms and likely not to be tested. Therefore, 10% of the hospitalization and ICU admission rates stated in Ferguson et al. were used. Ventilation rates were 70% of ICU rates.



# South Dakota Projections

Daily Hospital Admissions  
25% Social Distancing, 6-day Doubling Time



# What It Evolved Into

Daily data email updates using SDDOH dashboard data to:

- University emergency management
- City Council members
- Health care providers
- Members of the public who were interested

**Inform**

Once this number reached close to 60 individuals, a blog was made to post the data updates (*bonnysblog.net*).

*July 2020:* Began working with the City of Brookings on weekly videos: data updates, “Epi 101” and misinformation that was circulating, as well as new information.

**Educate**

# What It Evolved Into

## Topics of “Epi 101”:

- What is Epidemiology
- Numbers vs. Rates (pros & cons of each)
- Mortality Rates (including age adjustment)
- Case Fatality Rates (including age specific rates)
- Why We Use a Running Average
- How is Cause of Death Determined & Coded?
- What is Herd Immunity?
- What is R?
- Percentage Test Positivity
- COVID-19 Time Course

# What It Evolved Into

Topics of “Epi 101” (*continued*):

- What’s Going on with Bed Availability in SD?
- Health System Capacity & Projections
- Excess Deaths
- COVID Testing
- Graphing data (continuous vs. discrete; cumulative vs. daily; linear vs. exponential)
- Vaccine Breakthroughs & Are Vaccines Working?
- Predicting Hospitalizations
- South Dakota Mortality Over the Years
- Mobility Data

# What It Evolved Into

Topics of “Epi 101” (*continued*):

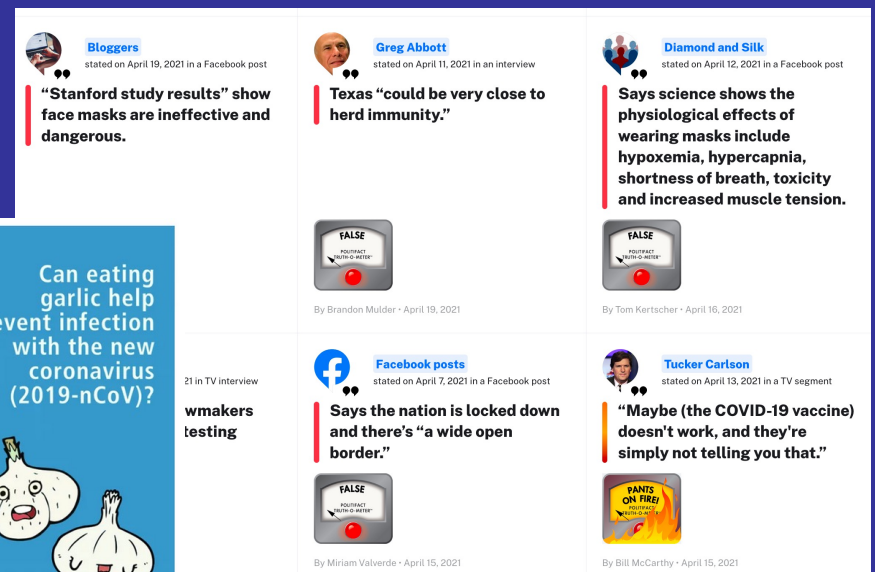
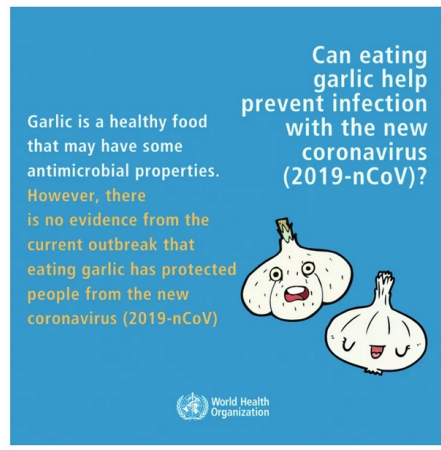
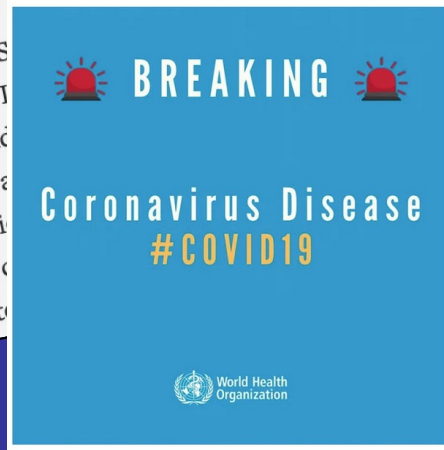
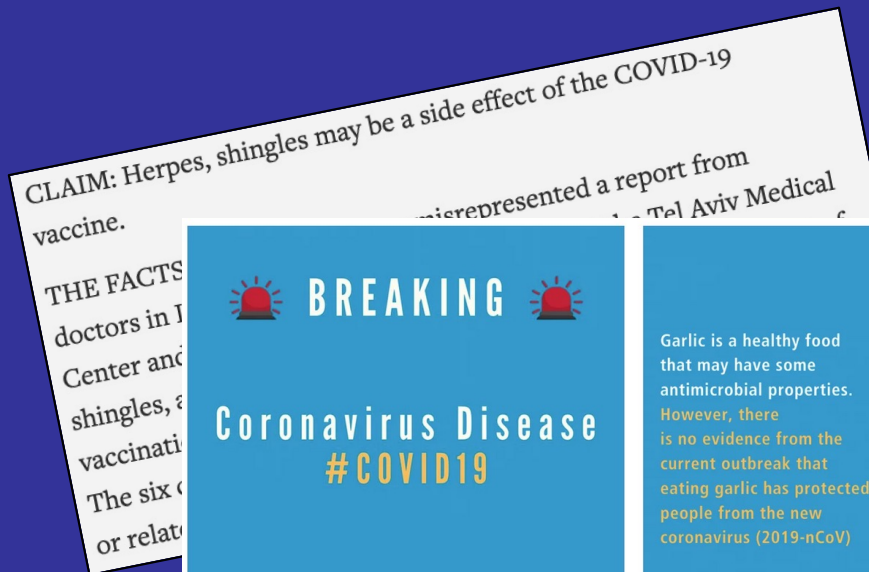
- Confirmed vs. Probable Cases
- SARS-CoV-2 Variants
- How Do We Know When the Pandemic is Over?
- What is Meant by “Recovered”?

*Other Speakers:*

- What is Coronavirus
- Vaccine Development
- Vaccine Effectiveness
- Seroprevalence
- Mental Health

# What It Evolved Into

- Threw in rankings by country, state & county for a variety of measures (new cases, deaths, hospitalizations, vaccinations, etc.)
- Also tried to address misinformation and review new research being published.



# What It Evolved Into

- *July 2020 to Summer of 2021: daily data updates & weekly videos*
- *Summer 2021 through December 2021: data updates posted weekly; videos moved to bi-monthly rather than weekly.*
- *In 2022: data updates posted weekly; videos moved to monthly.*

# COVID-19 Situation

## Brookings County

February 2<sup>nd</sup>

- 7,891 cases (5,575 confirmed)
- 1,182 active cases
- 203 ever hospitalized
- 43 deaths

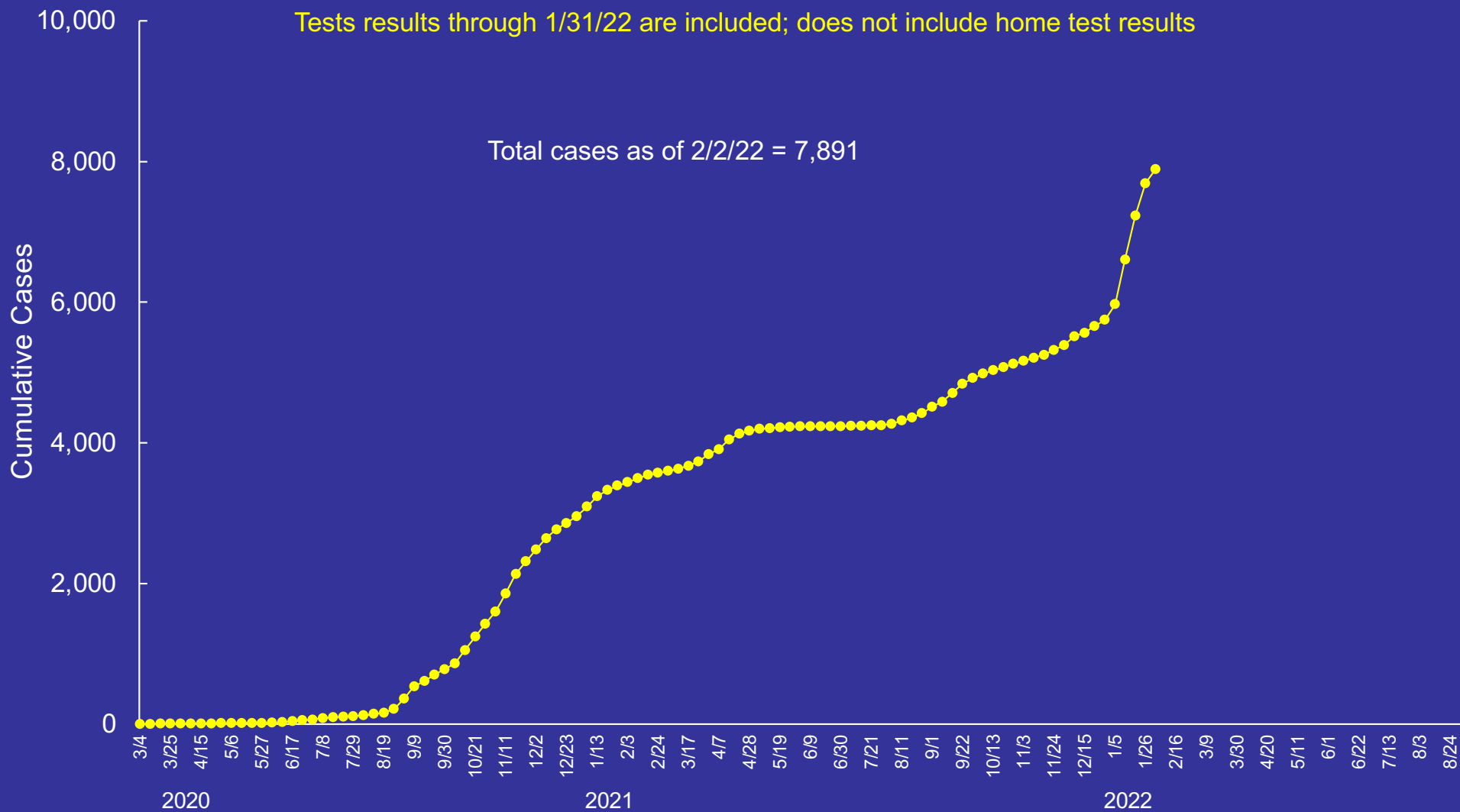
COVID (ICU) occupied beds of local hospitals:

- Brookings - 3 COVID beds (0 ICU)
- Avera Sioux Falls - 88 COVID beds (26 ICU)
- Sanford Sioux Falls - 100 COVID beds (20 ICU)



# Brookings COVID-19 Situation

## 2020-2022 Cumulative Number of Confirmed & Probable Cases by Week



State residents only. Includes confirmed cases by PCR & probable cases by antigen testing.

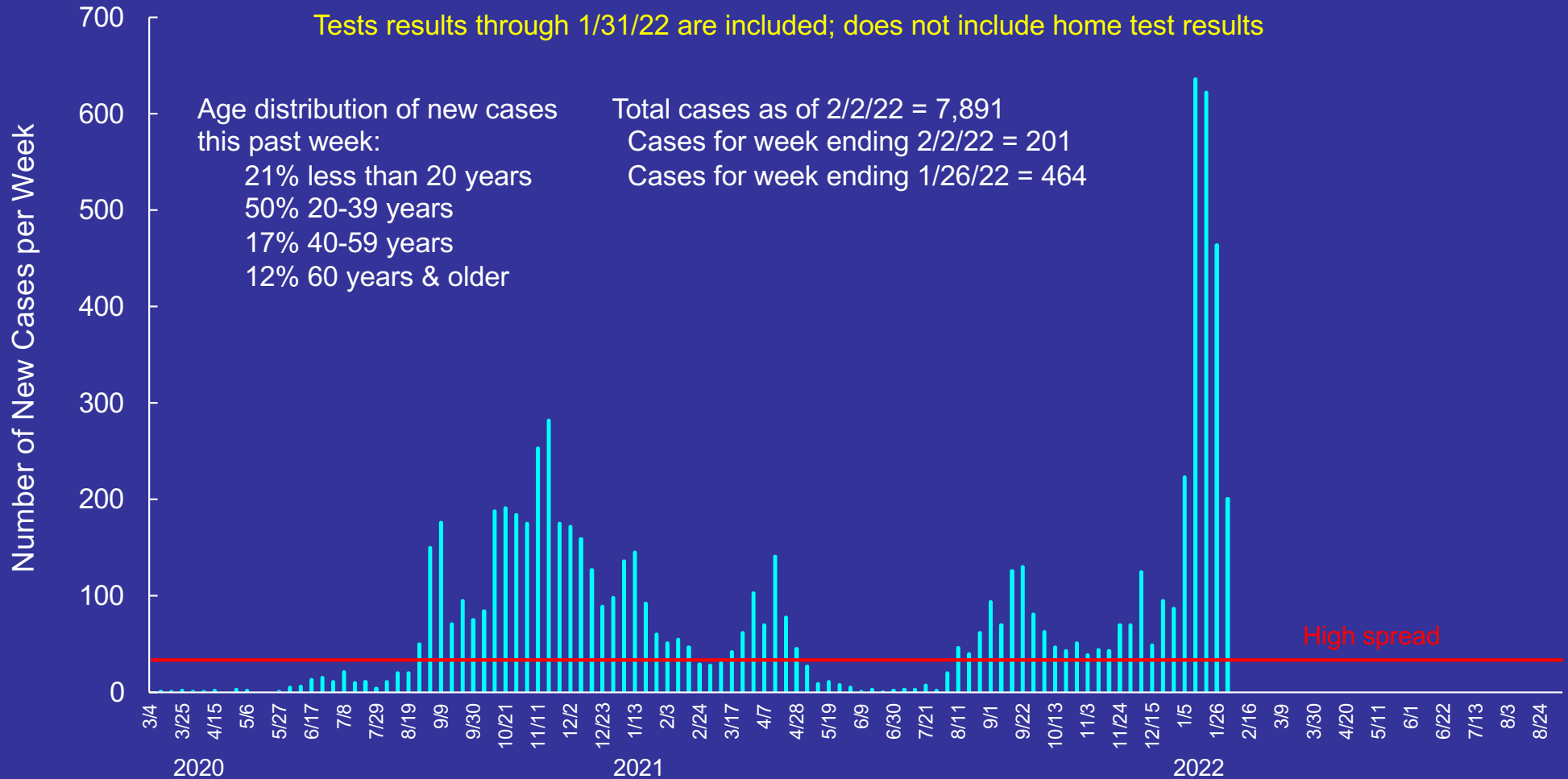
<https://doh.sd.gov/COVID/Dashboard.aspx>

# Brookings COVID-19 Situation

## 2020-2022 Number of Confirmed & Probable COVID-19 Cases per Week

Current Level of Community Spread<sup>^</sup>: **High**

Tests results through 1/31/22 are included; does not include home test results

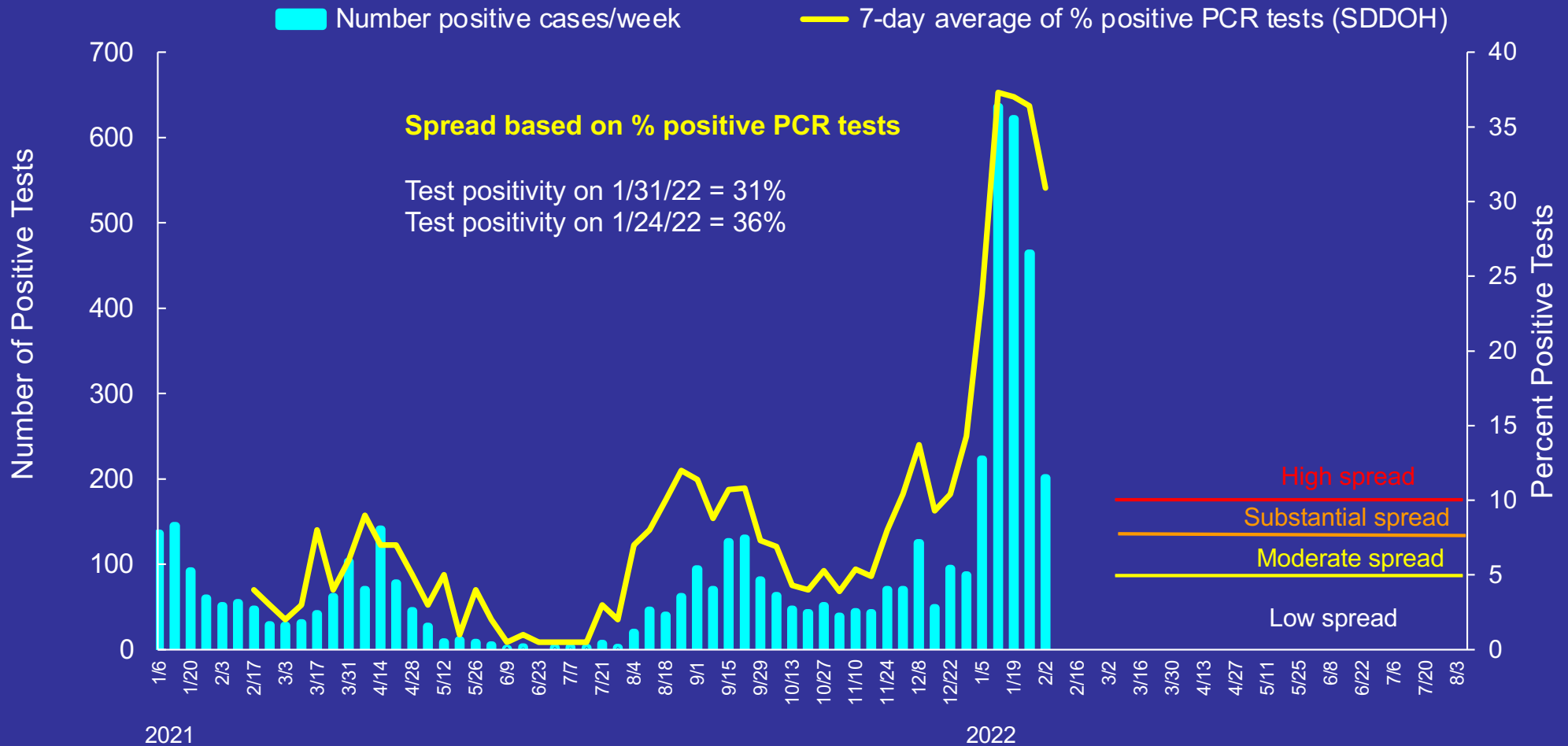


<sup>^</sup> Community spread is updated by SDDOH every Monday and is defined as: *Low*: Less than 10 cases/week/100K (<4) OR a weekly % PCR test positivity rate less than 5%; *Moderate*: 10-49 cases/week/100K (4-17) OR a weekly % PCR test positivity rate of 5-7.9%; *Substantial*: 50-99 cases/week/100K (18-34) OR a weekly % PCR test positivity rate of 8-9.9%; *High*: 100 cases or more/week/100K (35+) OR a weekly % PCR test positivity rate of 10% or more.

# Brookings COVID-19 Situation

## 2021-2022 Weekly Percentage of Test Positivity

Does not include home test results



PCR % test positivity for previous 7 days (spread determined by SDDOH on Mondays): *Low*: % PCR test positivity rate less than 5%; *Moderate*: % PCR test positivity rate of 5-7.9%; *Substantial*: weekly % PCR test positivity rate of 8-9.9%; *High*: weekly % PCR test positivity rate of 10% or more.

Positive cases include PCR & antigen tests.

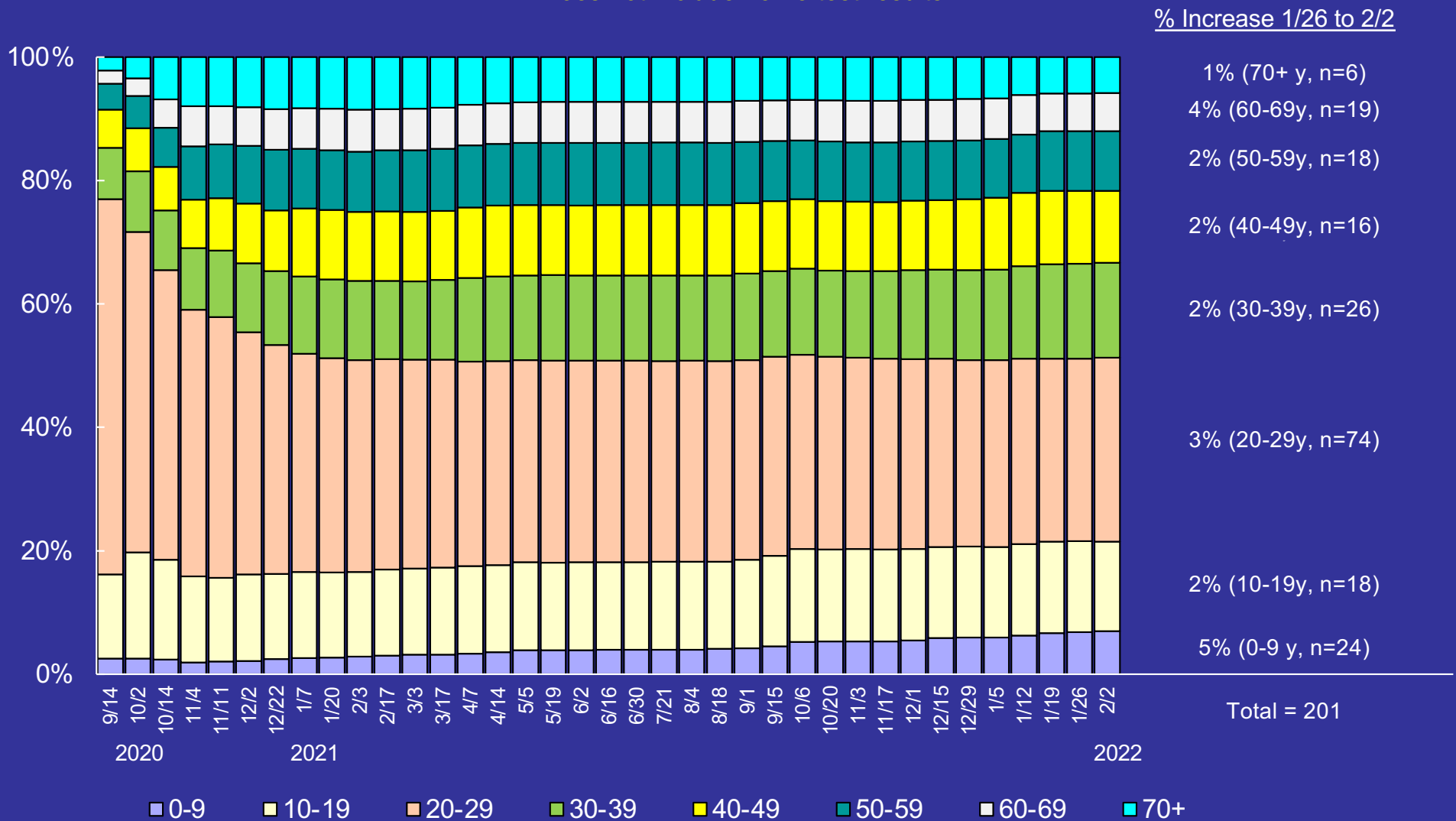
As of 8/18/21, SDDOH no longer posts the number of unique individuals tested.

<https://doh.sd.gov/COVID/Dashboard.aspx>

# Brookings COVID-19 Situation

## Age Distribution of Brookings County Cases Who Have Tested Positive Over Time

Does not include home test results



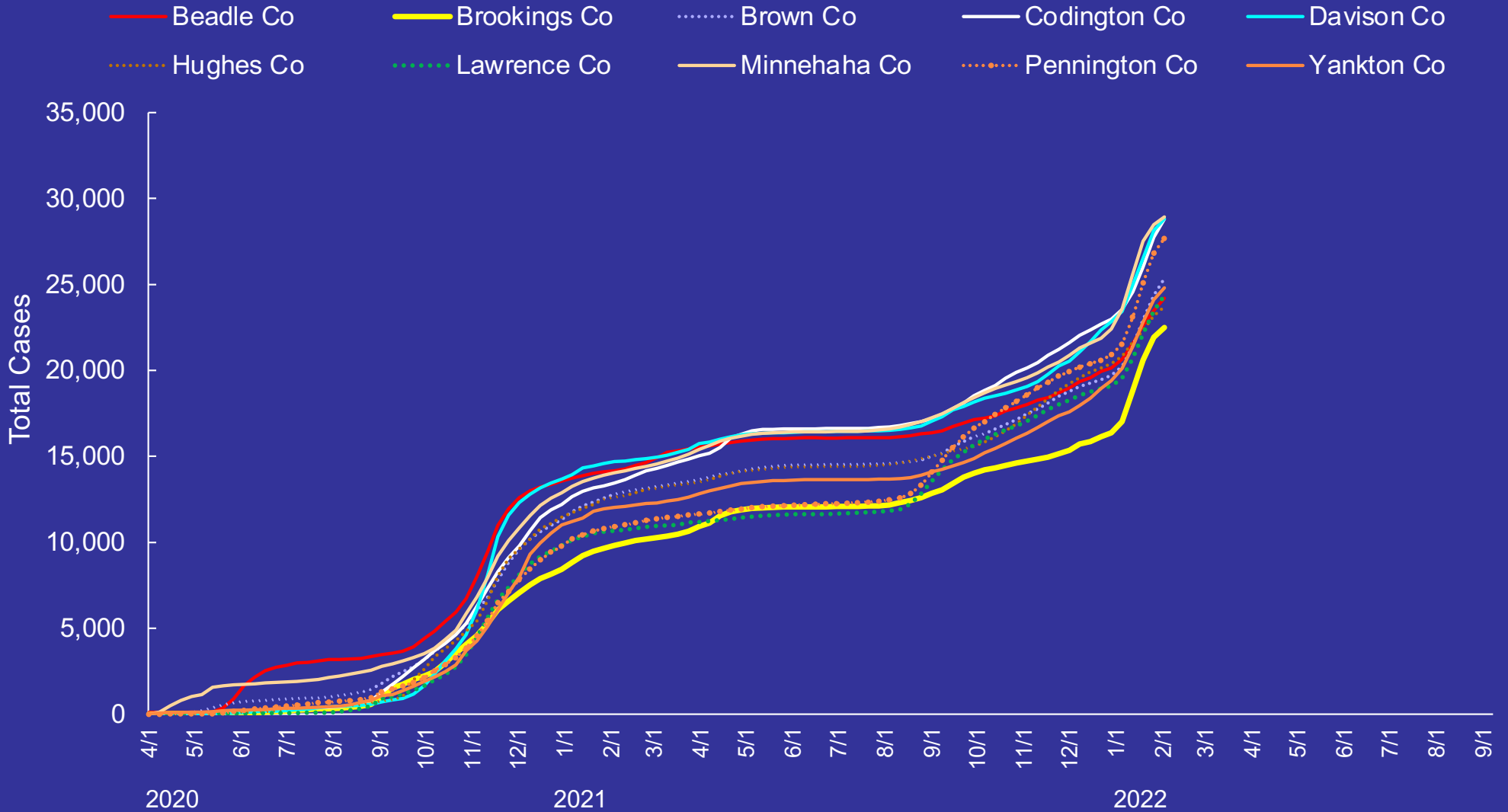
Data prior to 1/1/22 are early & mid-month only; after 1/1/22 it is weekly.

Data Source: South Dakota Department of Health

# Counties with Top 10 Most Populated Cities

## Cumulative Cases per 100,000 Population by Week

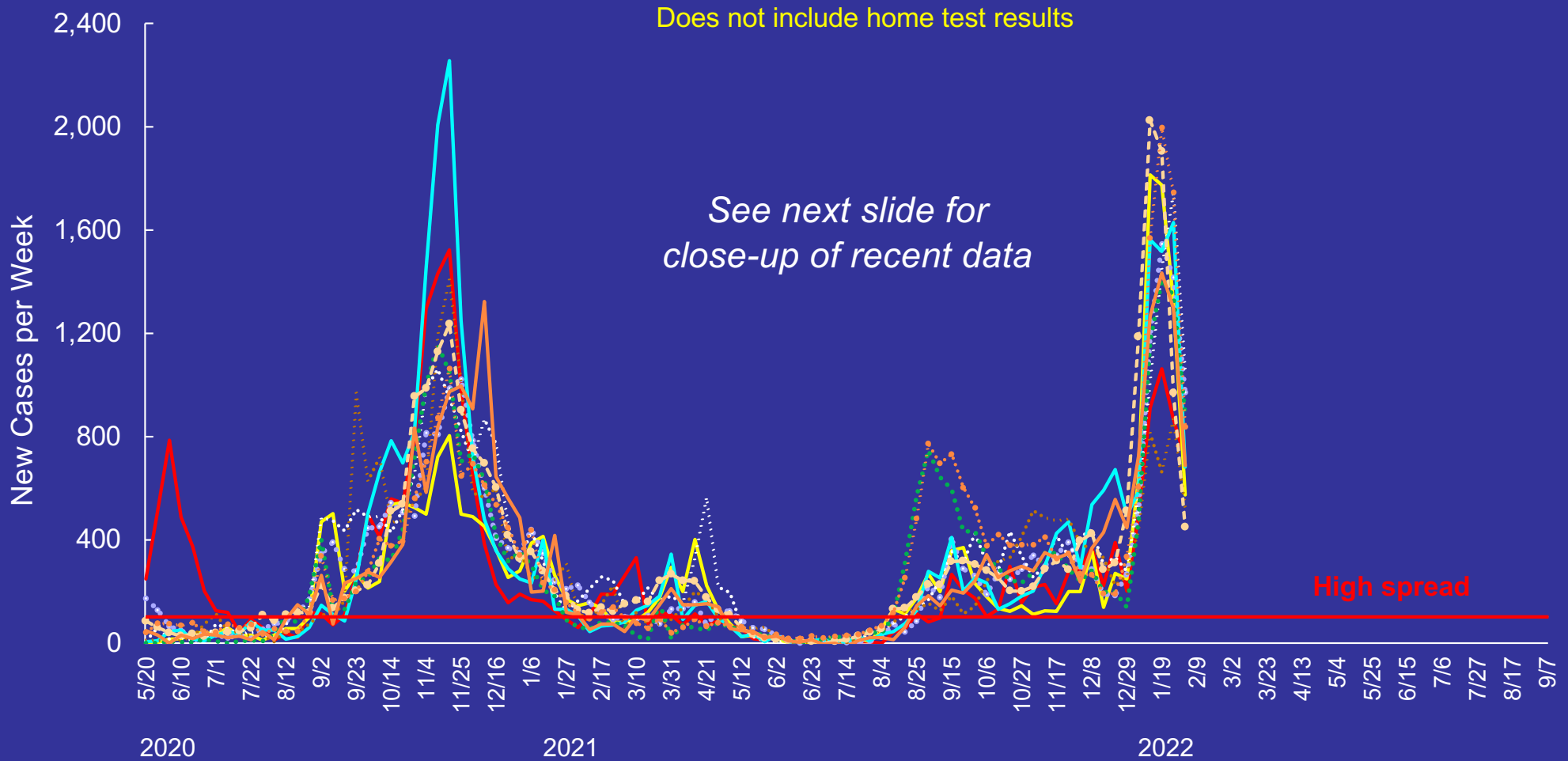
Does not include home test results



# Counties with Top 10 Most Populated Cities

## New Cases per Week per 100,000 Population

- Beadle Co
- Brookings Co
- ..... Brown Co
- ..... Codington Co
- Davison Co
- ..... Hughes Co
- ..... Lawrence Co
- - - Minnehaha Co
- ..... Pennington Co
- Yankton Co

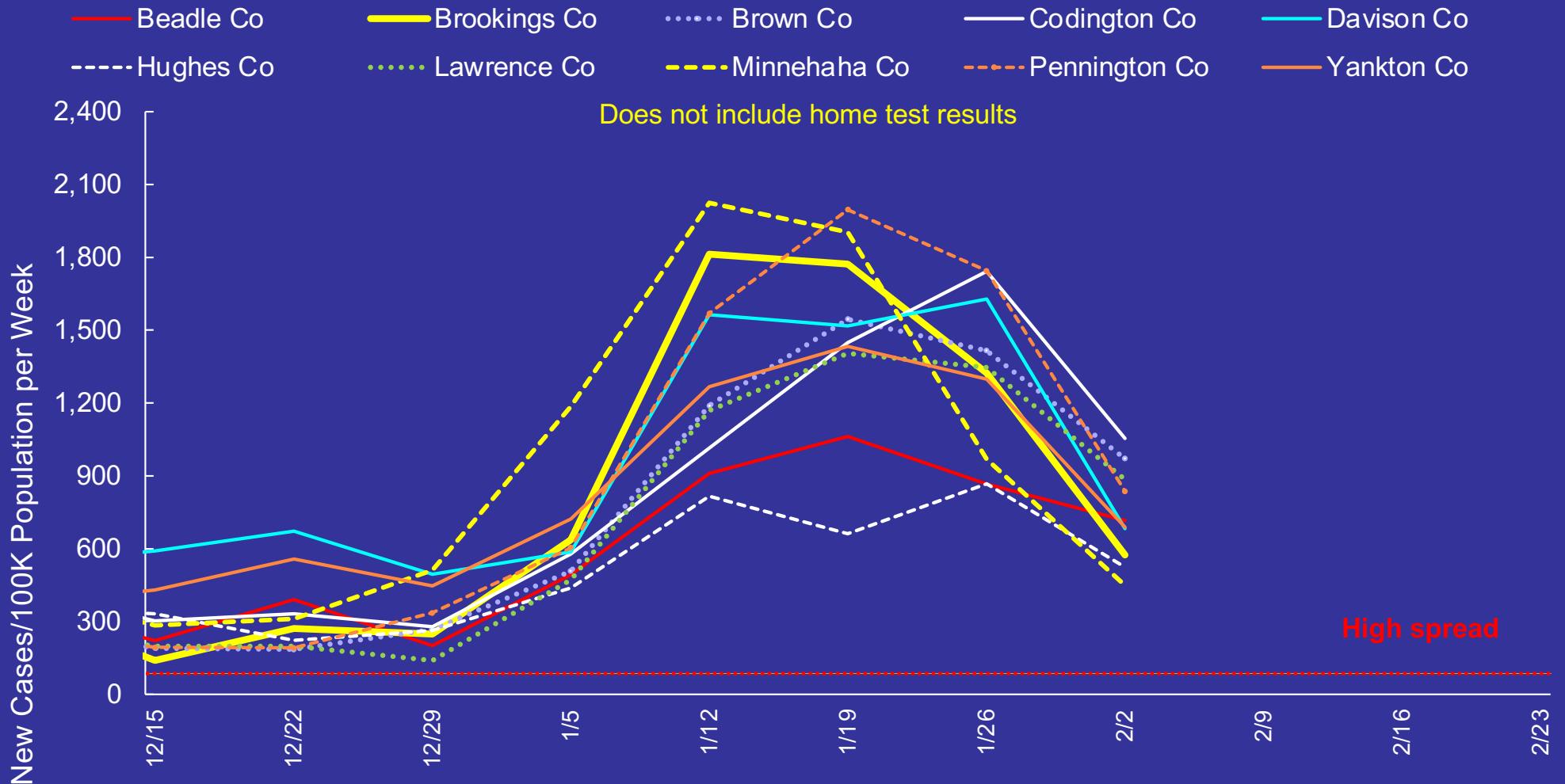


Spread based on new cases/week: high = 100+/100K population. 2019 Census county population estimates used.

Data from <https://doh.sd.gov/COVID/Dashboard.aspx>

# Counties with Top 10 Most Populated Cities

New Cases per Week per 100,000 Population, 2021-2022

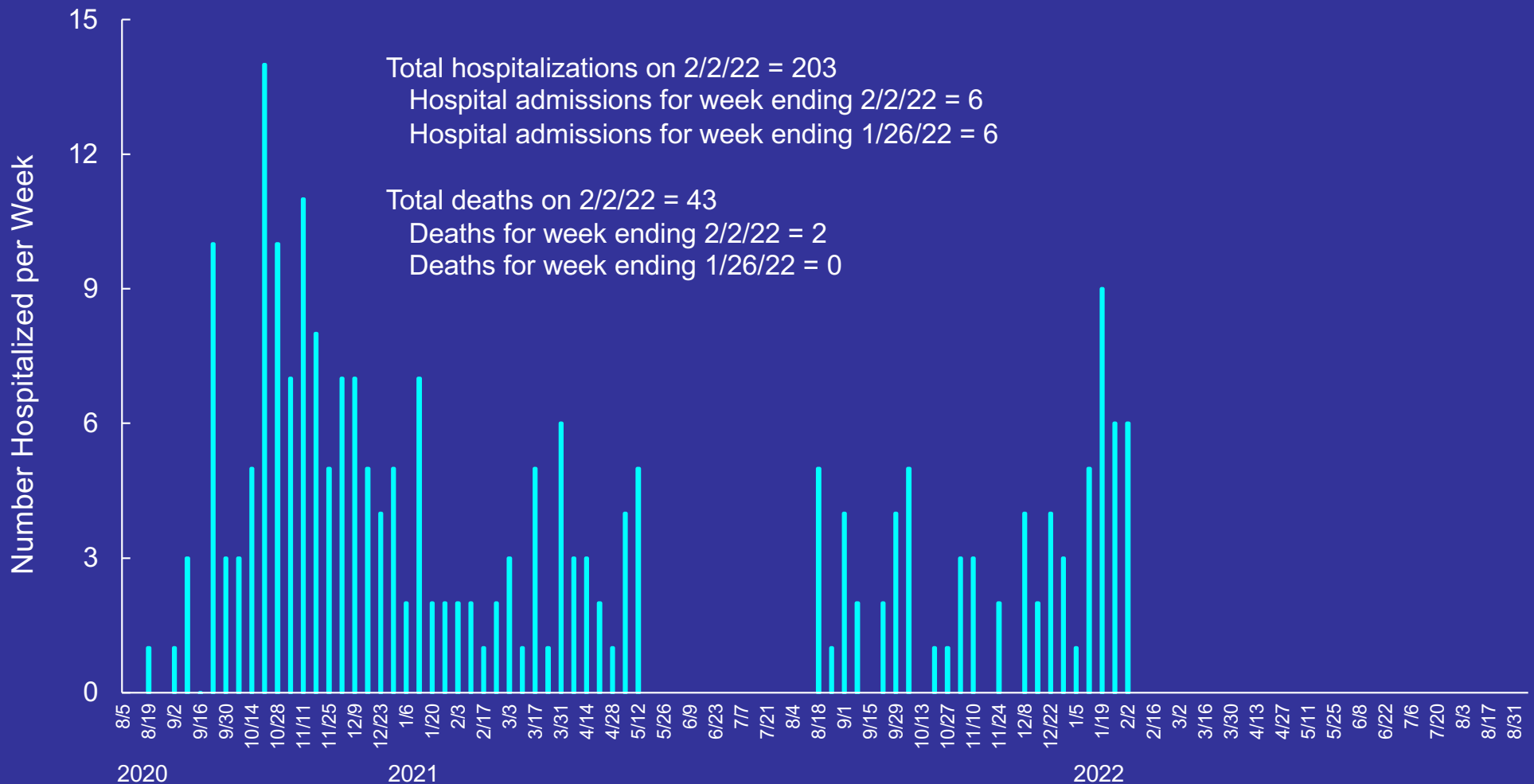


^ Community spread based on new cases is defined as: *Low*: Less than 10 cases/week/100K; *Moderate*: 10-49 cases/week/100K; *Substantial*: 50-99 cases/week/100K; *High*: 100 cases or more/week/100K. 2019 Census county population estimates used.

# Brookings COVID-19 Situation

## 2020-2022 Number of New Hospitalizations per Week

Hospitalization data incomplete after 1/25/22

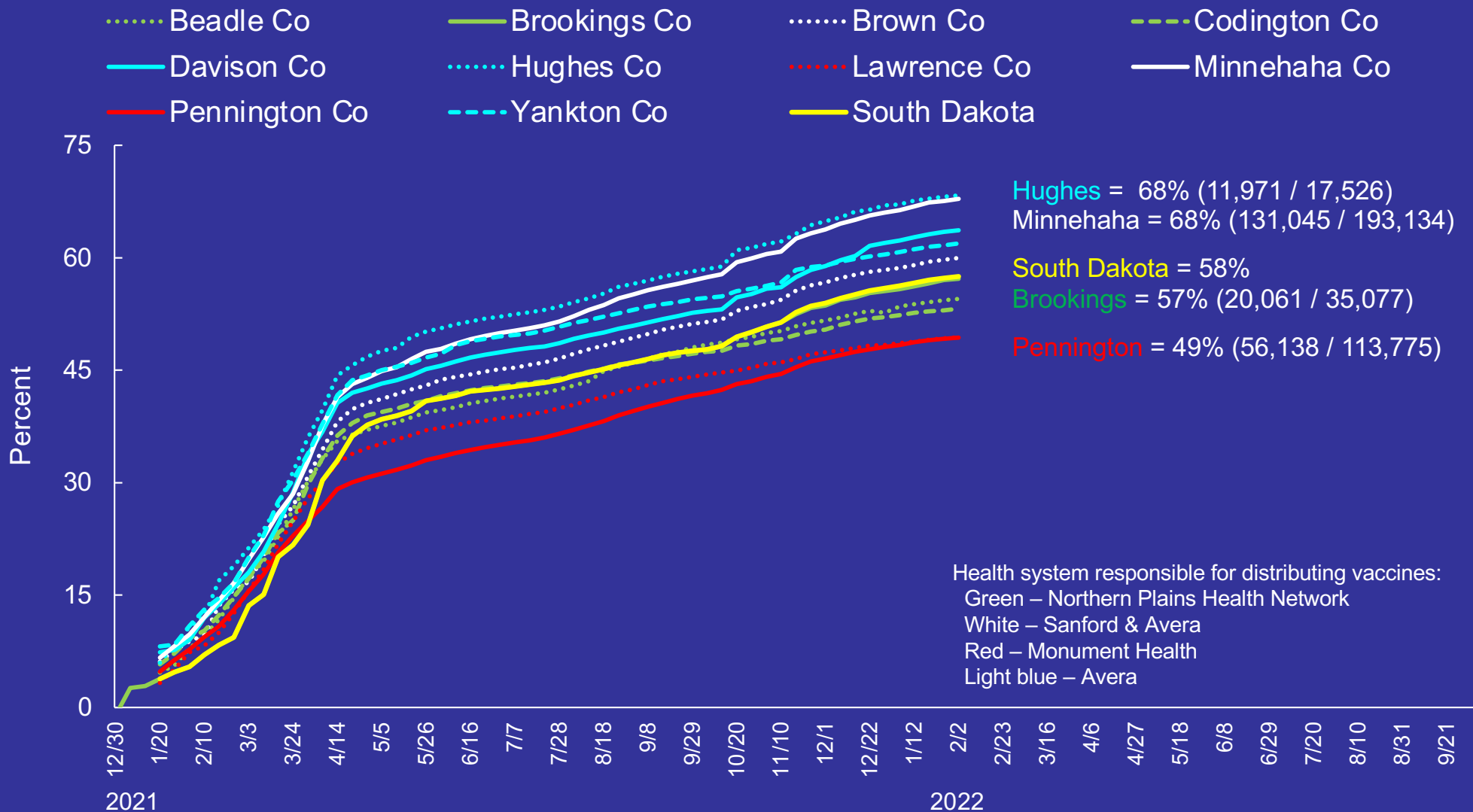


Includes only Brookings County residents. Between 5/26 & 7/14/21, the SDDOH cleaned the hospitalization database (removing duplicates, out-of-state residents, etc.), leading to a lower total number of hospitalizations. During this period, new admissions were not able to be calculated. As of August 11, 2021 there were a total of 130 hospitalizations.



# Counties with Top 10 Most Populous Cities

## 2021-2022 Percent of Population Receiving at Least One Vaccine



Based on total population per 2019 US Census.  
 Does not include vaccinations via IHS and VA.  
 Changes noted on dashboard as of 10/14/21 due to data cleaning.

# COVID-19 Situation

## South Dakota

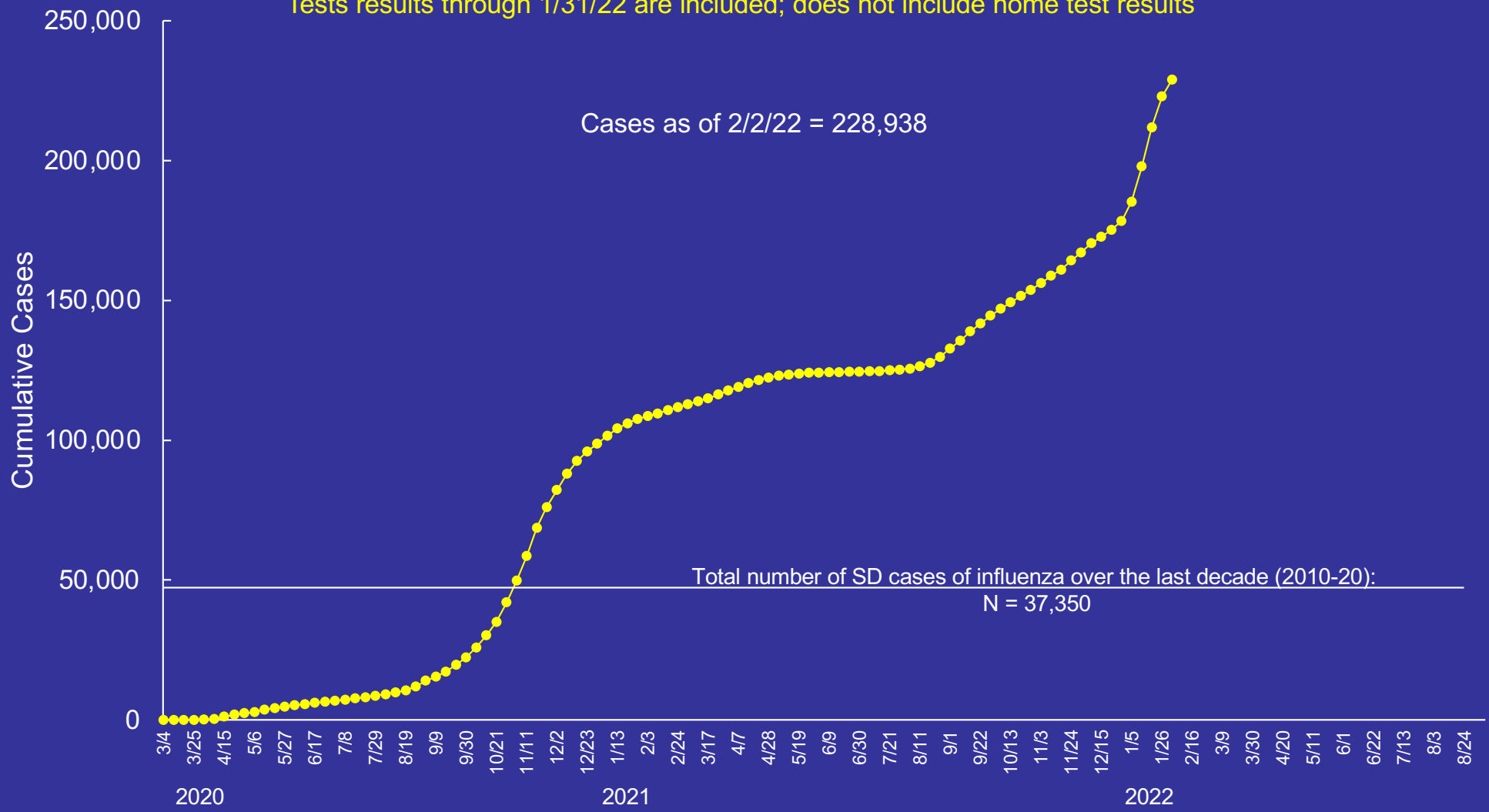
February 2<sup>nd</sup>

- 228,938 positives (191,060 confirmed)
- 28,789 active cases
- 10,131 ever hospitalized
- 355 currently hospitalized (72 in ICU)
- 2,665 deaths

# South Dakota COVID-19 Situation

## 2020-2022 Cumulative Number of Confirmed & Probable Cases by Week

Tests results through 1/31/22 are included; does not include home test results



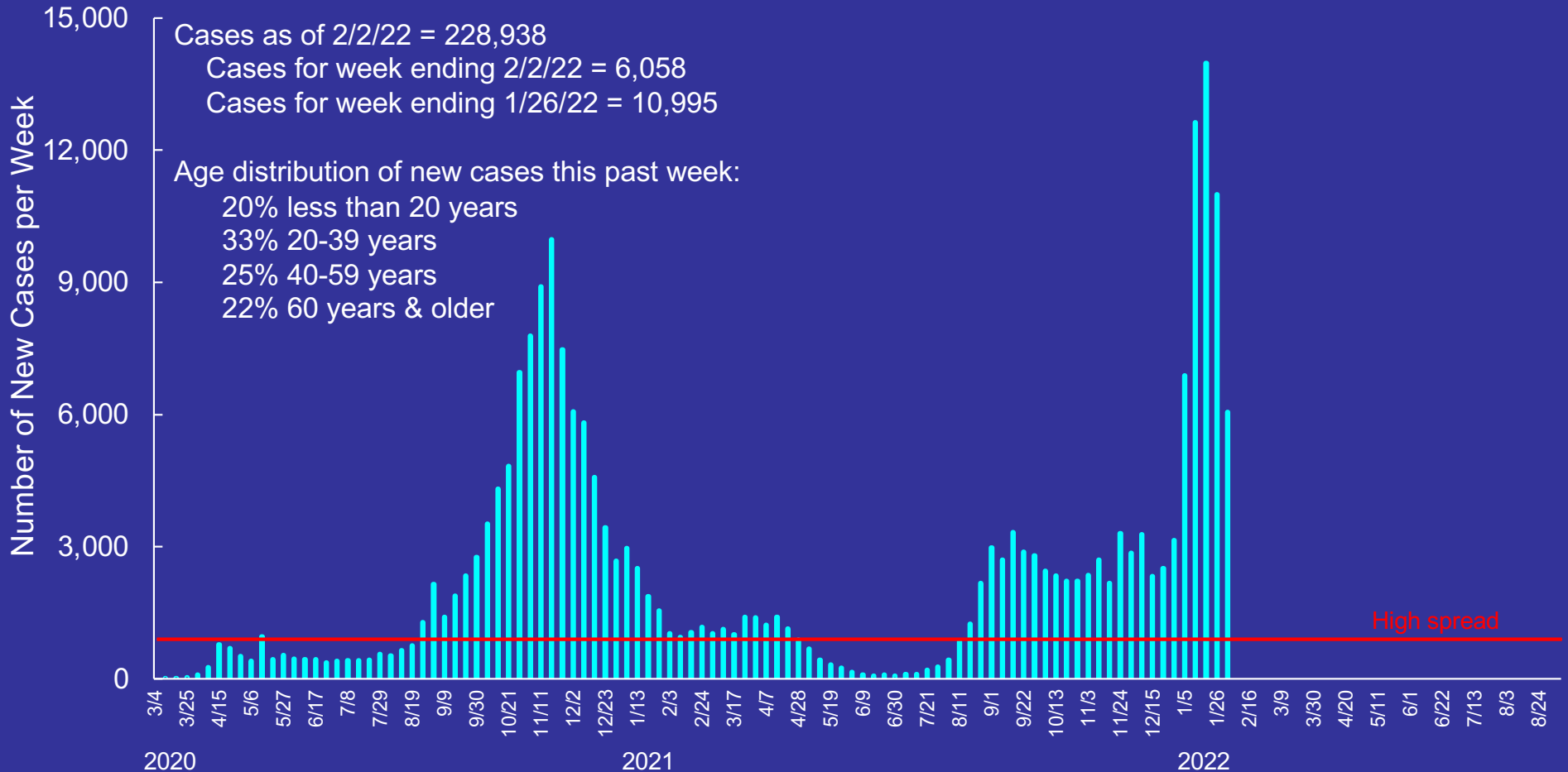
State residents only. Includes confirmed cases by PCR & probable cases by antigen testing.

# South Dakota COVID-19 Situation

## 2020-2022 Confirmed & Probable Cases per Week

Current Level of Community Spread<sup>^</sup>: **High**

Tests results through 1/24/22 are included; does not include home test results



<sup>^</sup> Community spread is updated by SDDOH every Monday and is defined as: *Low*: Less than 10 cases/week/100K (<88) OR a weekly % PCR test positivity rate less than 5%; *Moderate*: 10-49 cases/week/100K (89-433) OR a weekly % PCR test positivity rate of 5-7.9%; *Substantial*: 50-99 cases/week/100K (434-883) OR a weekly % PCR test positivity rate of 8-9.9%; *High*: 100 cases or more/week/100K (884+) OR a weekly % PCR test positivity rate of 10% or more.

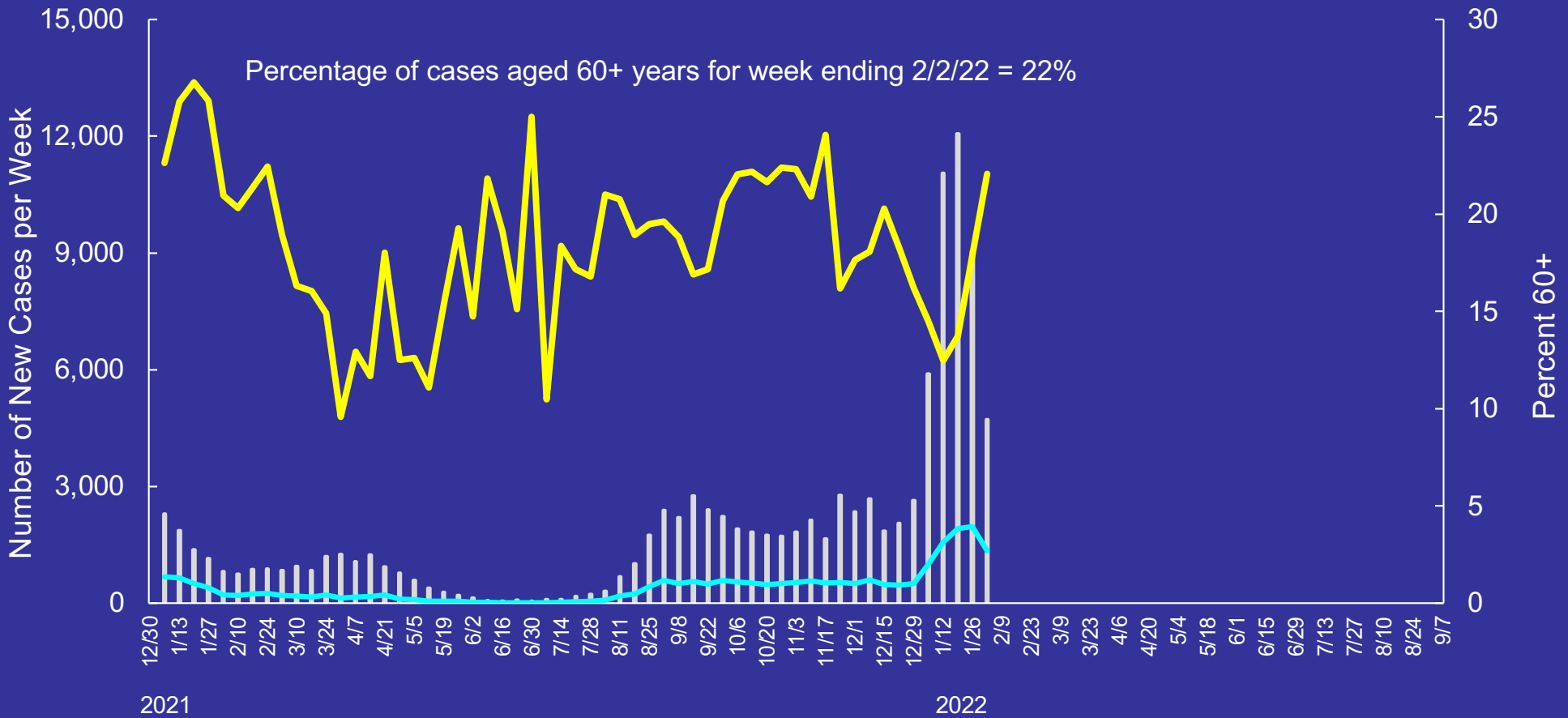
# South Dakota COVID-19 Situation

## Age Distribution

2021-2022 Number of Confirmed & Probable Cases by Age per Week

Does not include home test results

< 60 Years
  60+ Years
  Percent 60+ Years



20% of SD population is aged 60+ years.

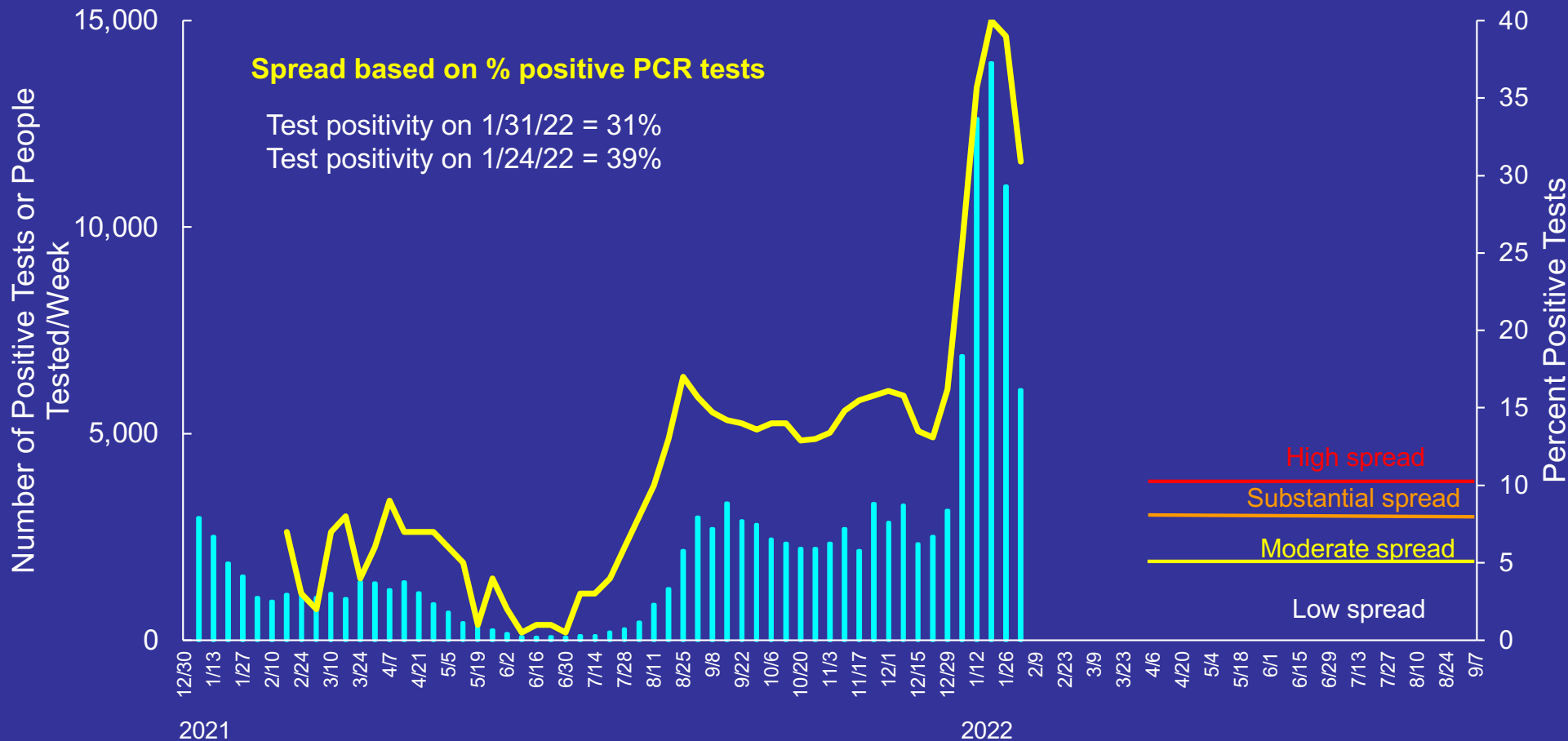
<https://doh.sd.gov/COVID/Dashboard.aspx>

# South Dakota COVID-19 Situation

## 2021-2022 Weekly Percentage Test Positivity

■ Number Positive Cases/week
 — 7-day average of % positive PCR tests (SDDOH)

Does not include home test results



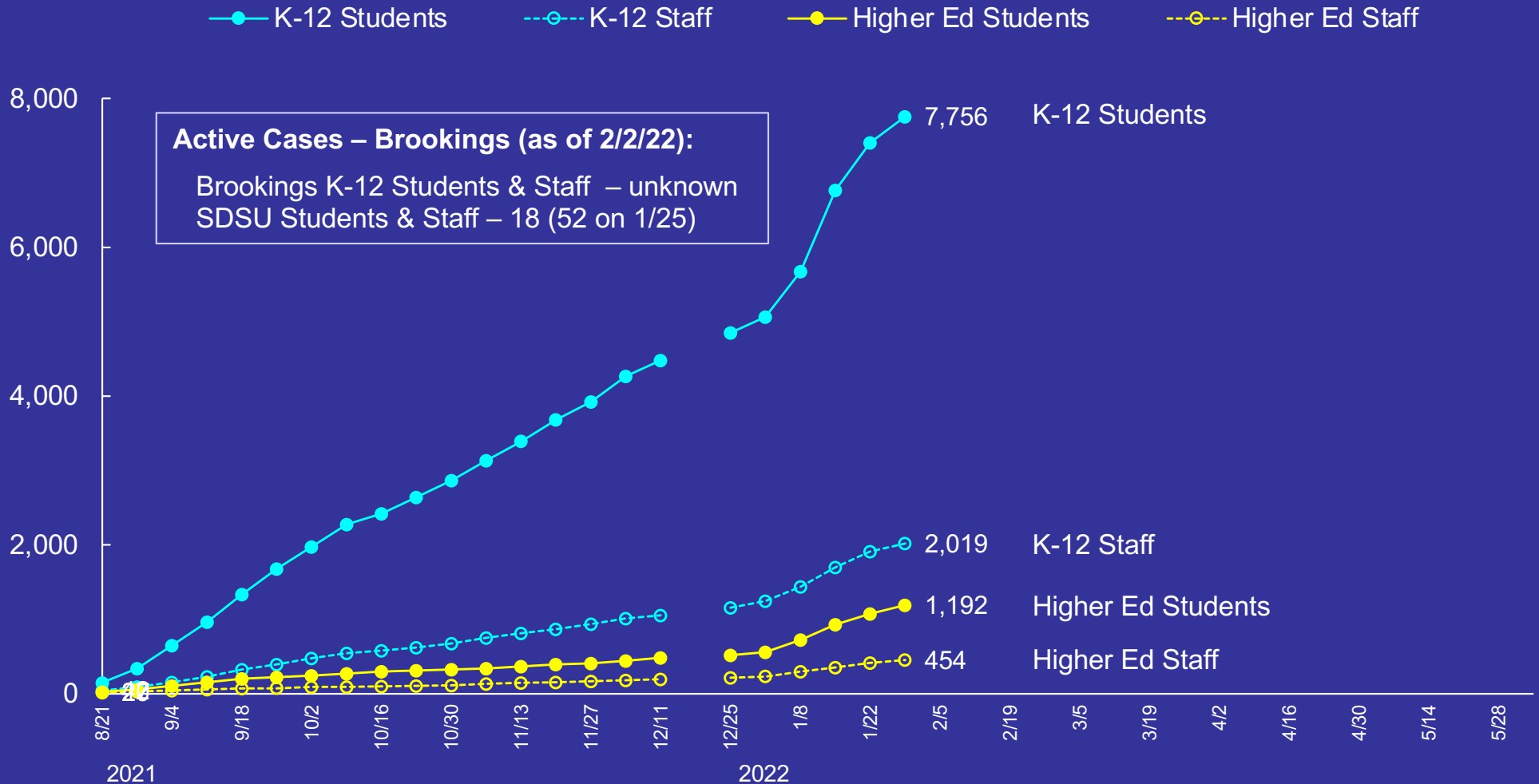
PCR % test positivity for previous 7 days (level of spread determined by SDDOH on Mondays): *Low*: % PCR test positivity rate less than 5%; *Moderate*: % PCR test positivity rate of 5-7.9%; *Substantial*: % PCR test positivity rate of 8-9.9%; *High*: % PCR test positivity rate of 10% or more.

Positive cases include PCR & antigen tests.

<https://doh.sd.gov/COVID/Dashboard.aspx>

# South Dakota COVID-19 Situation

## Cumulative Number of COVID-19 Cases by Week 2021-2022 School Year



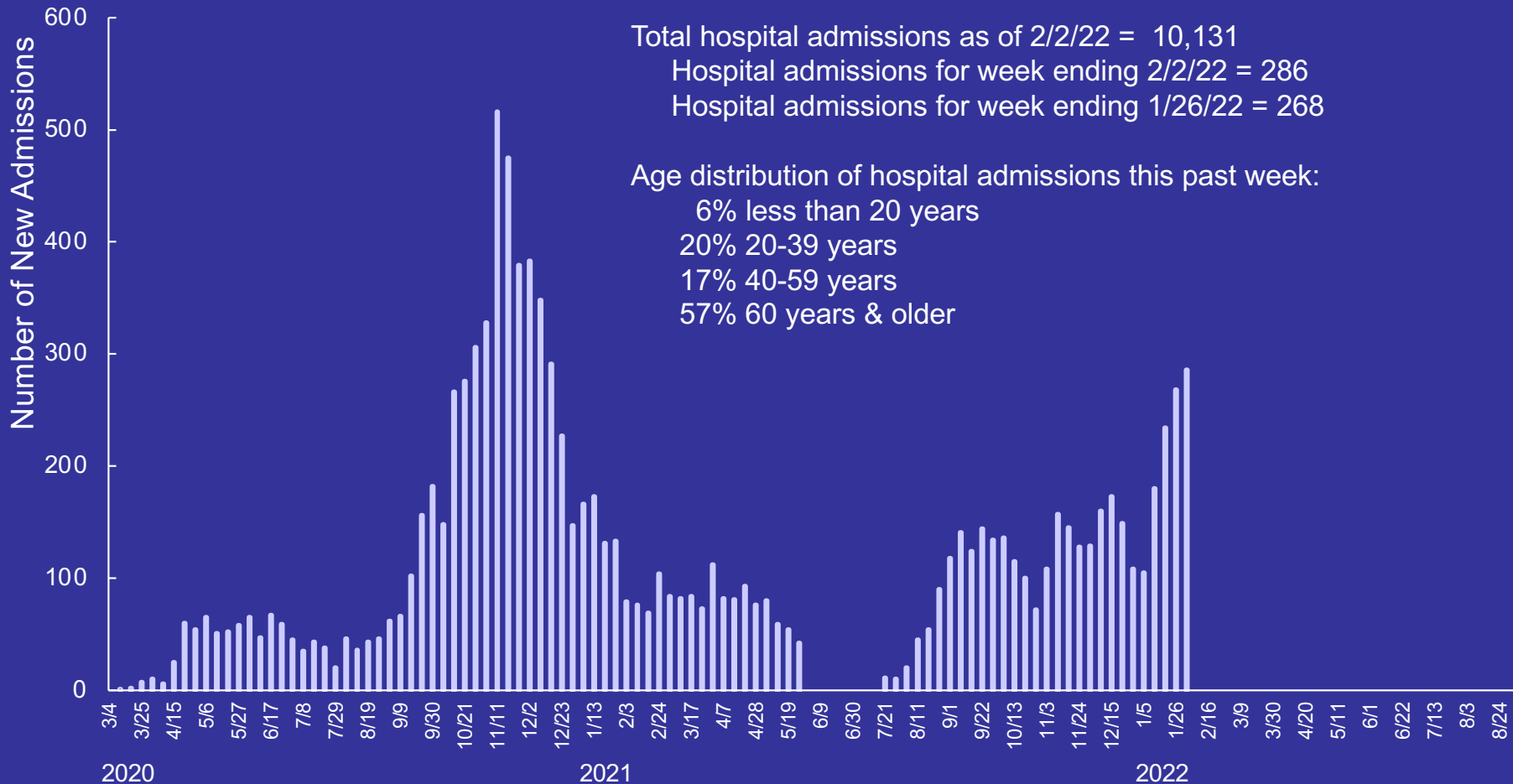
Brookings data sources: SDSU data is self-reported (<https://www.sdstate.edu/covid-19/covid-19-dashboard>)  
 State data are from: [https://doh.sd.gov/documents/COVID19/School-College\\_COVID\\_cases.pdf](https://doh.sd.gov/documents/COVID19/School-College_COVID_cases.pdf)

# South Dakota COVID-19 Situation

## 2020-2022 Weekly Hospitalization Data

■ New Admissions/week

Hospitalization data after 1/25/22 are incomplete



Total hospital admissions as of 2/2/22 = 10,131

Hospital admissions for week ending 2/2/22 = 286

Hospital admissions for week ending 1/26/22 = 268

Age distribution of hospital admissions this past week:

6% less than 20 years

20% 20-39 years

17% 40-59 years

57% 60 years & older

New admissions include only state residents; does not include patients on home health care.

Between 5/26 and 7/14/21, the SDDOH cleaned the hospitalization database (removing duplicates, out-of-state residents, etc.), leading to a lower total number of hospitalizations. During this period, new admissions were not able to be calculated.

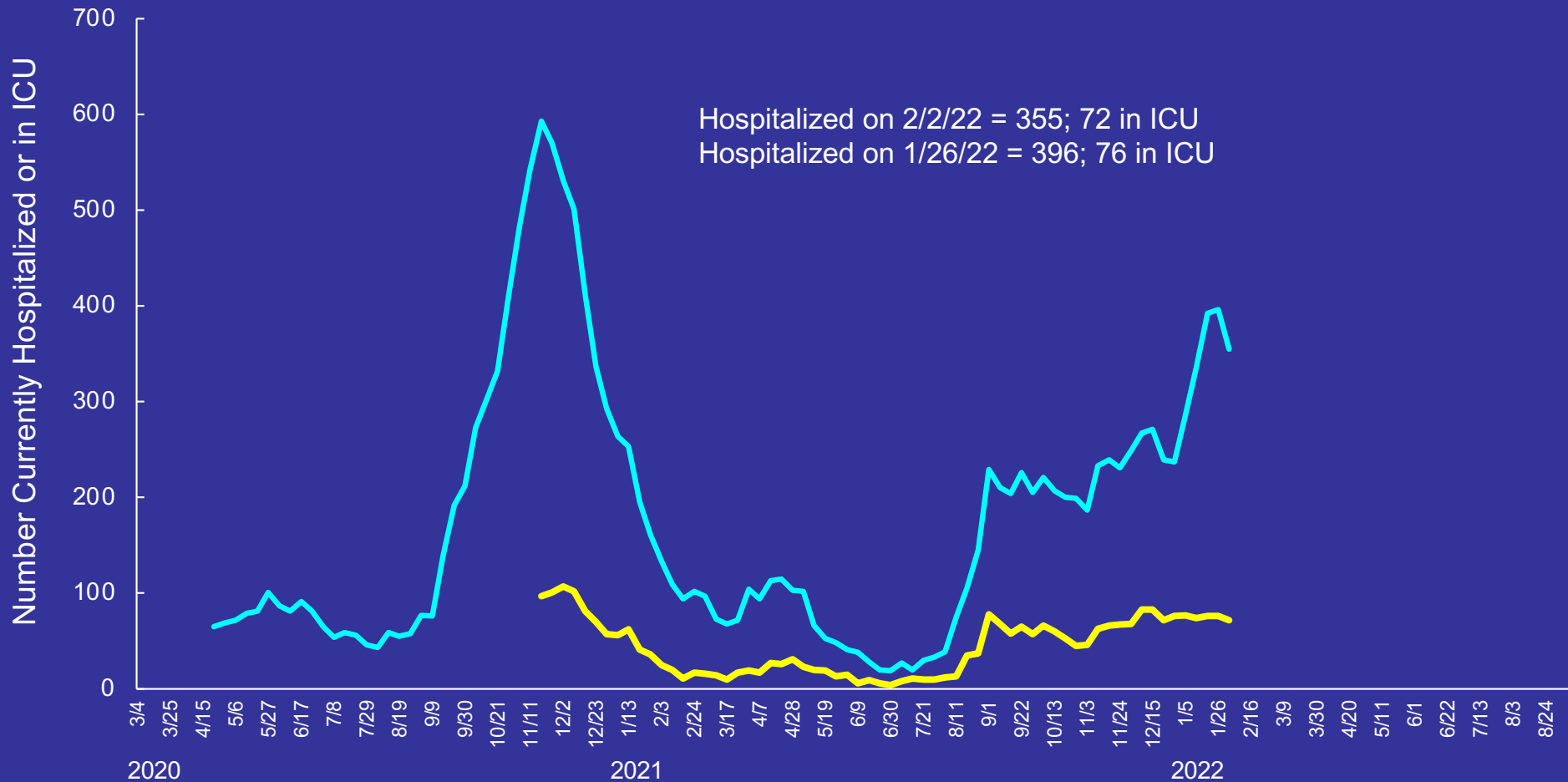


# South Dakota COVID-19 Situation

## 2020-2022 Weekly Hospitalization Data

— Currently Hospitalized in SD      — Number in ICU

Hospitalization data after 1/25/22 are incomplete



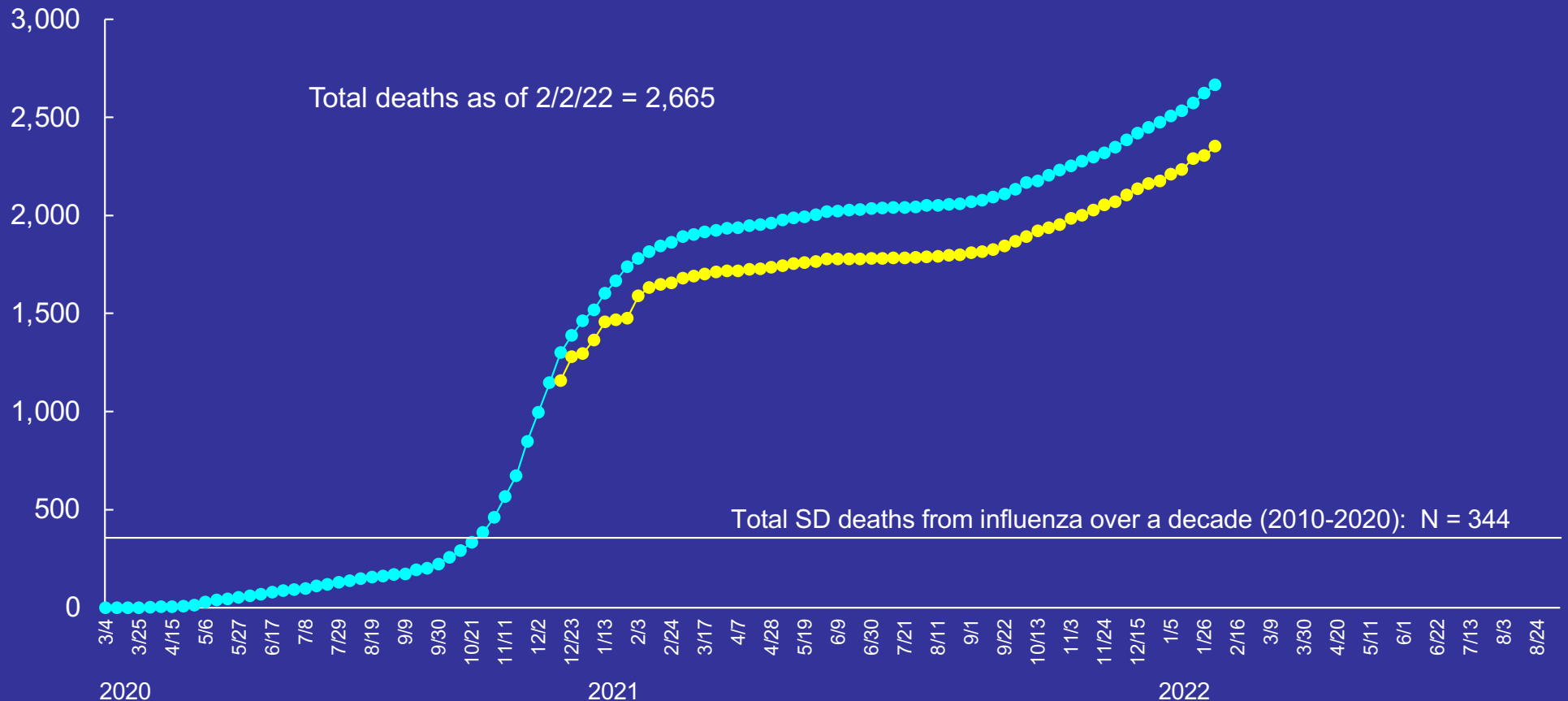
Currently hospitalized includes state and out-of-state residents and transfers in from other states, but not residents transferred out-of-state. Between 5/26 and 7/14/21, the SDDOH cleaned the hospitalization database (removing duplicates, out-of-state residents, etc.), leading to a lower total number of hospitalizations. During this period, new admissions were not able to be calculated.

# South Dakota COVID-19 Situation

## 2020-2022 Cumulative Number of Deaths by Week

—●— Deaths among people with COVID      —●— Deaths caused by COVID

Death data incomplete after 1/25/22

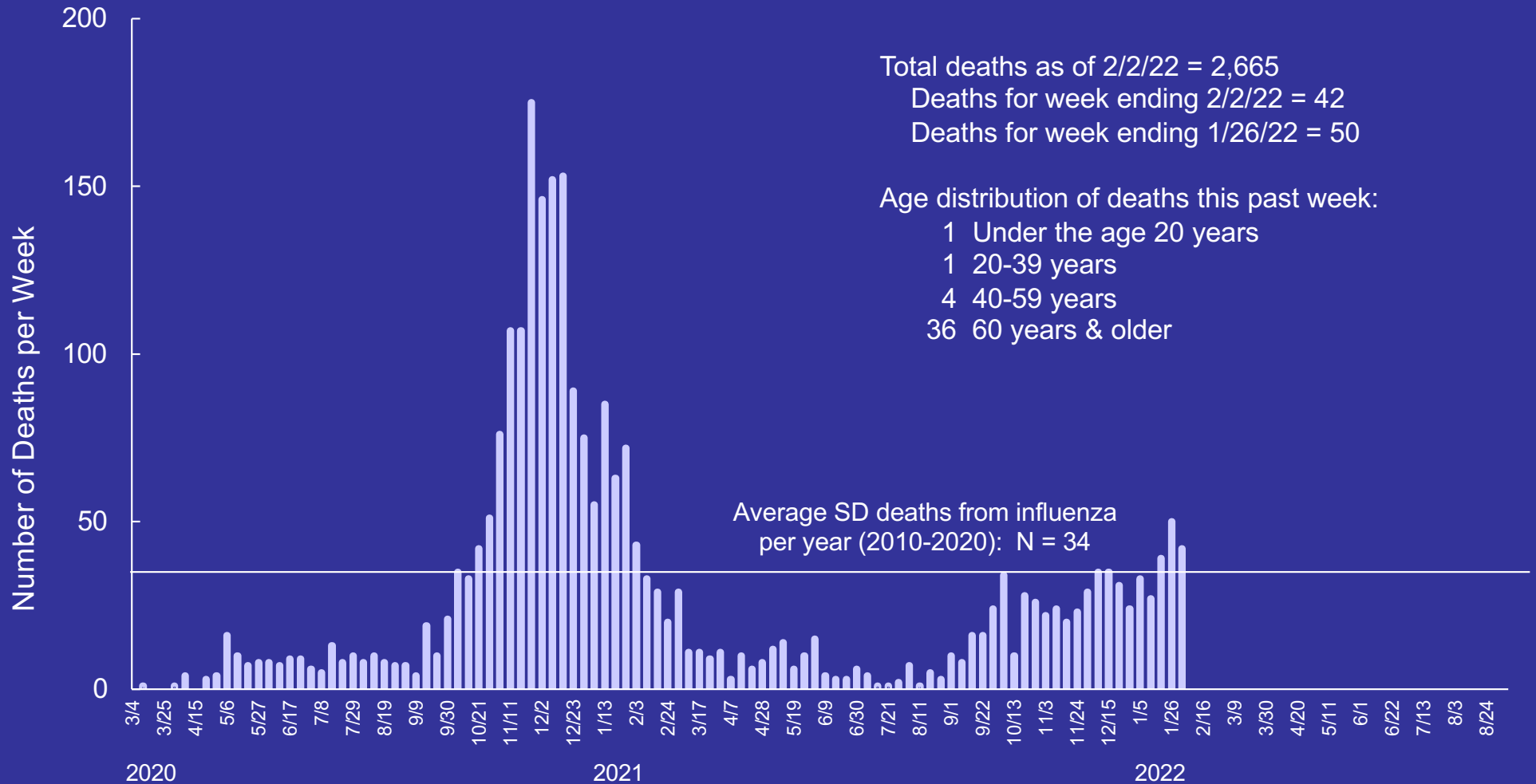


Dept of Health does not report deaths until a certified death record is filed. By law, a death record must be filed within 5 days of the date of death. Deaths caused by COVID based on death certificates where COVID is cause of death or contributing cause. Deaths among people with COVID include death certificates stating COVID as well as data from national surveillance system that identifies COVID cases and deaths within 20 days of infection that do not include COVID on death certificate. See DOH dashboard, death tab for detailed definitions.

# South Dakota COVID-19 Situation

## 2020-2022 Number of Deaths per Week among People with COVID-19

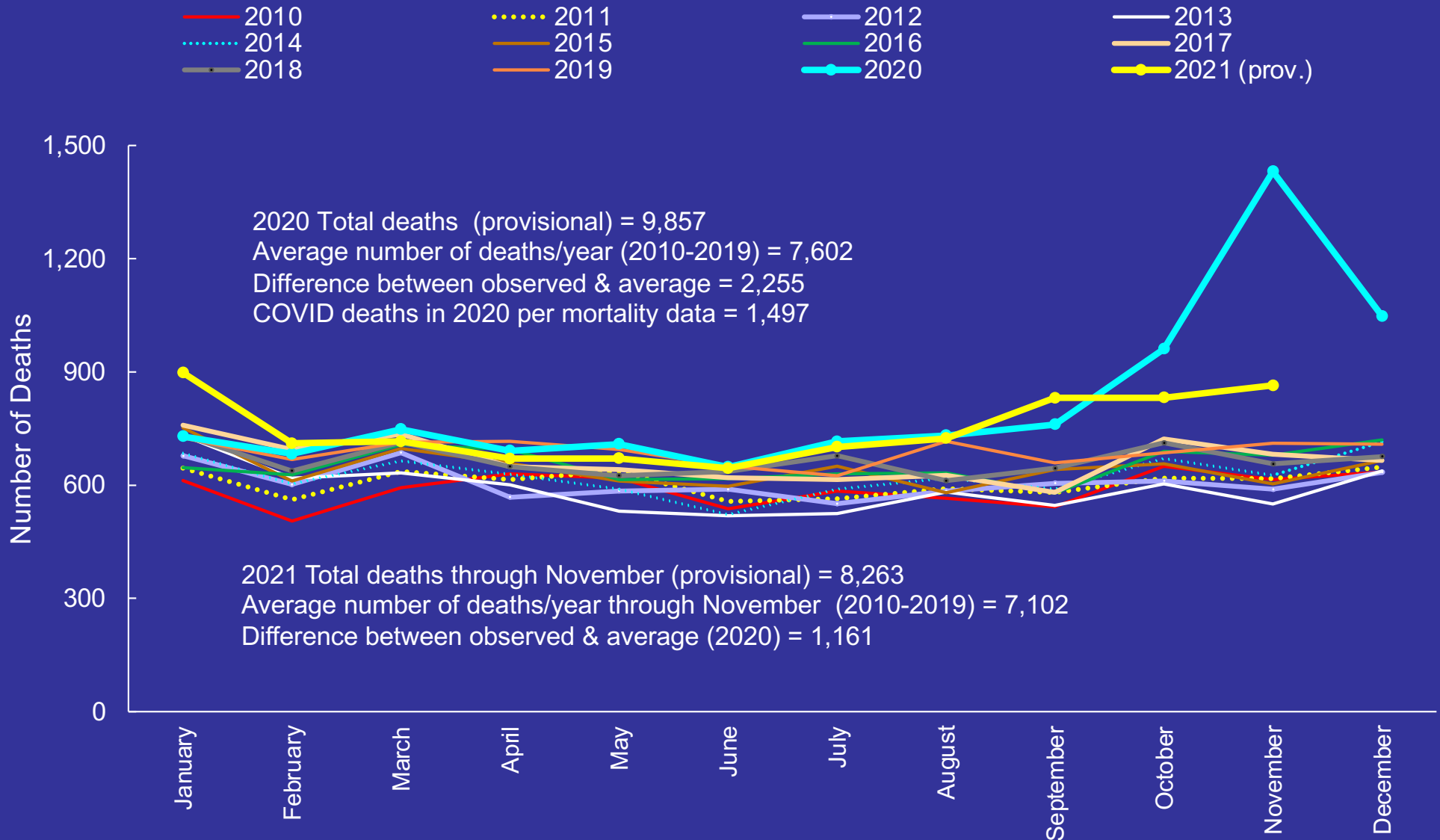
Death data incomplete after 1/25/22



Data are date death is posted to DOH dashboard.  
 See DOH dashboard, death tab for detailed definitions.

# South Dakota Deaths

## Number of Deaths by Year and Month



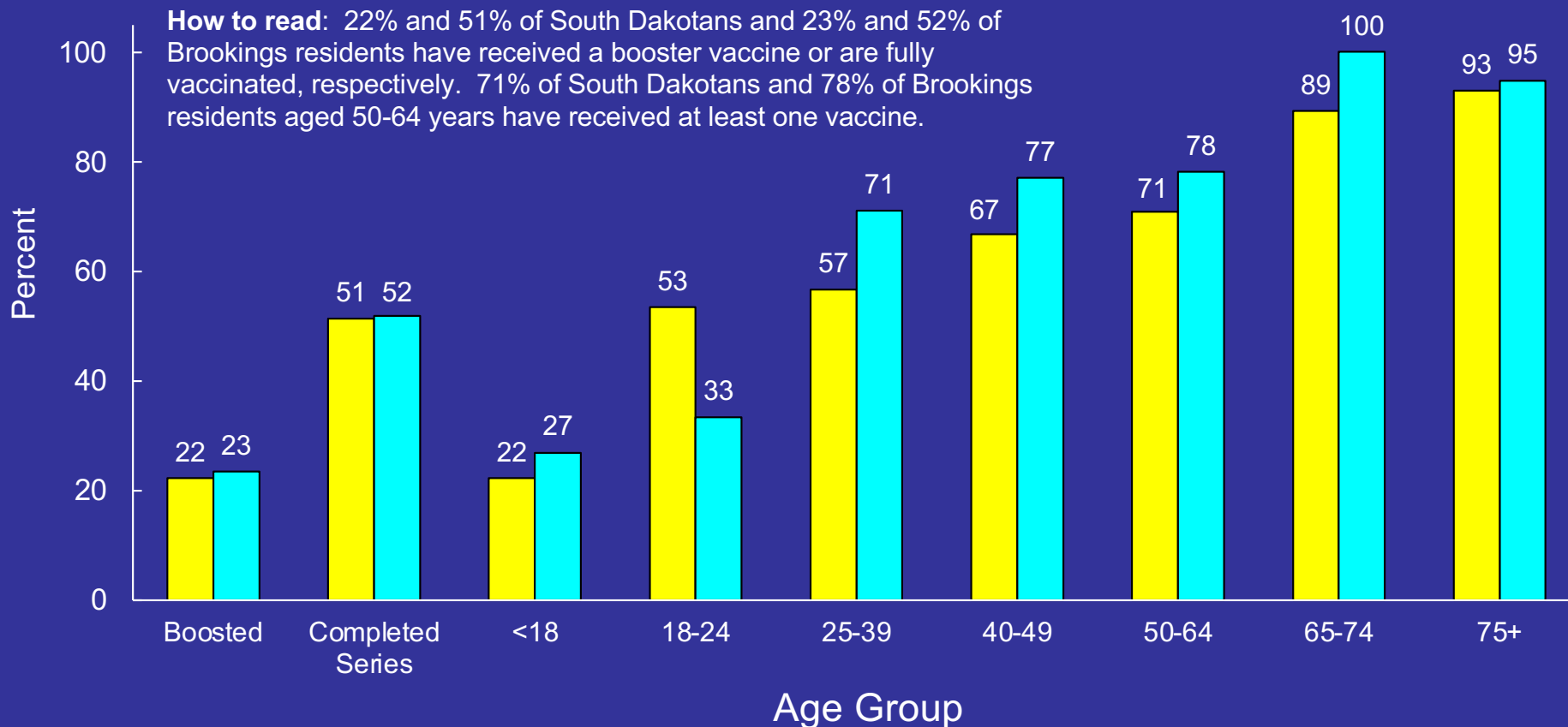
2021 deaths are provisional.  
 Data as of 1/15/22

<https://doh.sd.gov/statistics/>  
<https://doh.sd.gov/documents/statistics/Mortality-Report-2021-Provisional.pdf>

# South Dakota COVID-19 Situation

## Percent of Population Receiving at Least One Vaccine by Age as of February 2, 2022

■ South Dakota ■ Brookings Co

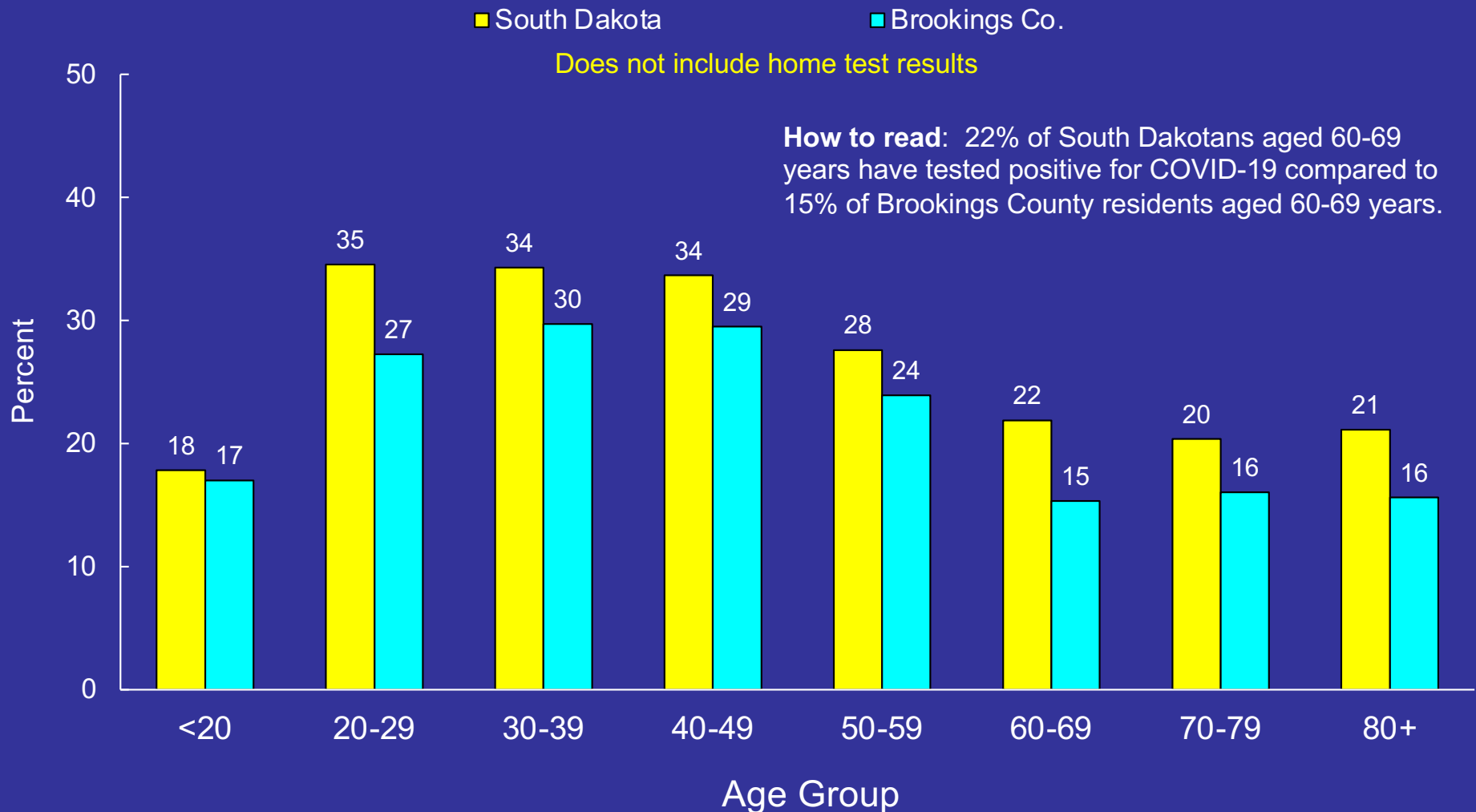


Does not include data from Veterans Affairs (VA) and Indian Health Services (IHS).  
2019 US Census data used for denominators.

70% of state population aged 5 years and older has received at least one dose, including VA & IHS.

# South Dakota COVID-19 Situation

## Percent of South Dakota & Brookings Population Ever Testing Positive by Age as of February 2, 2022

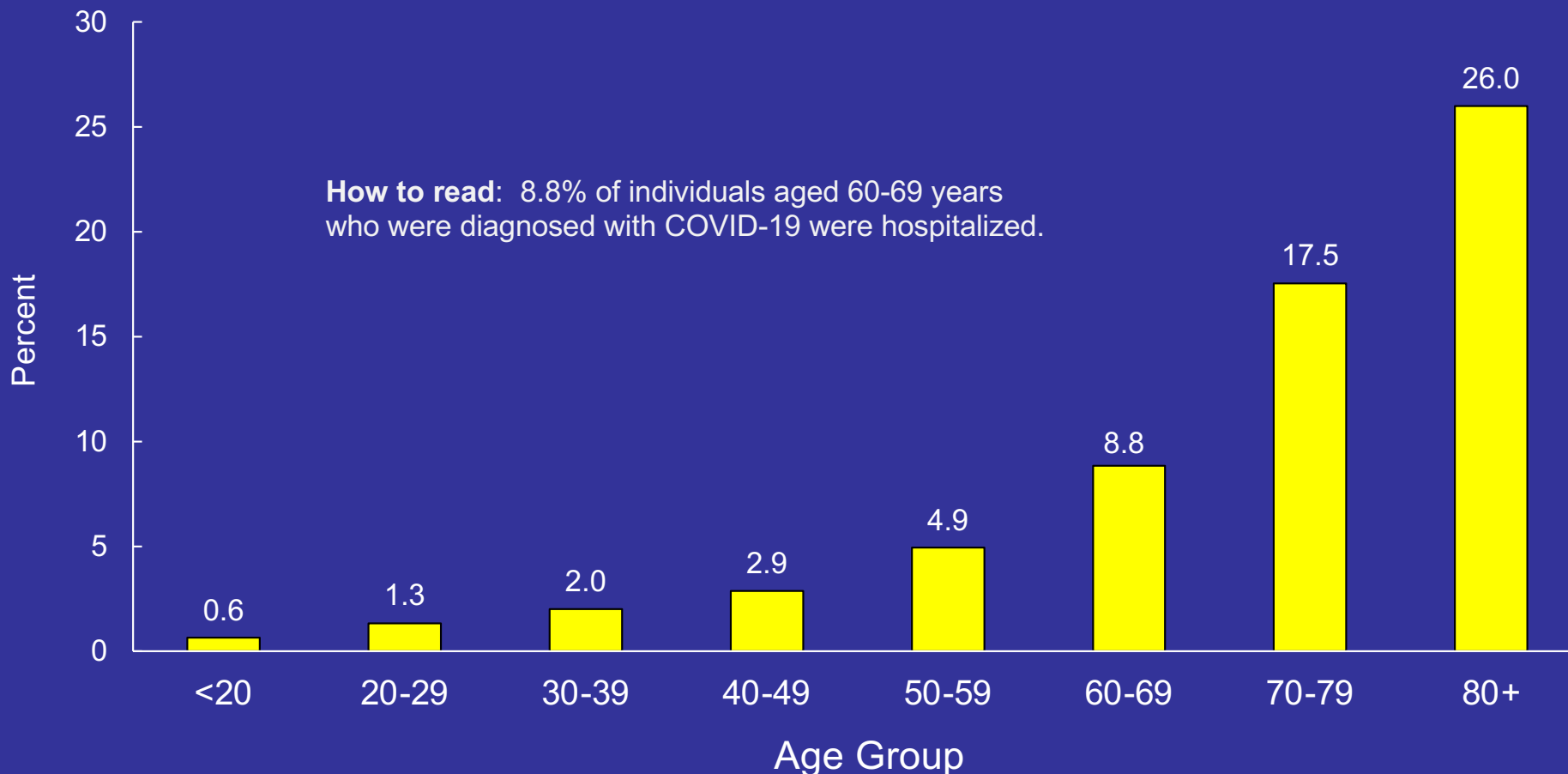


Overall, the percent of population testing positive is:  
26% for South Dakota  
23% for Brookings County

2019 SD Pop (US Census)  
<https://doh.sd.gov/COVID/Dashboard.aspx>  
Brookings data from SD Department of Health

# South Dakota COVID-19 Situation

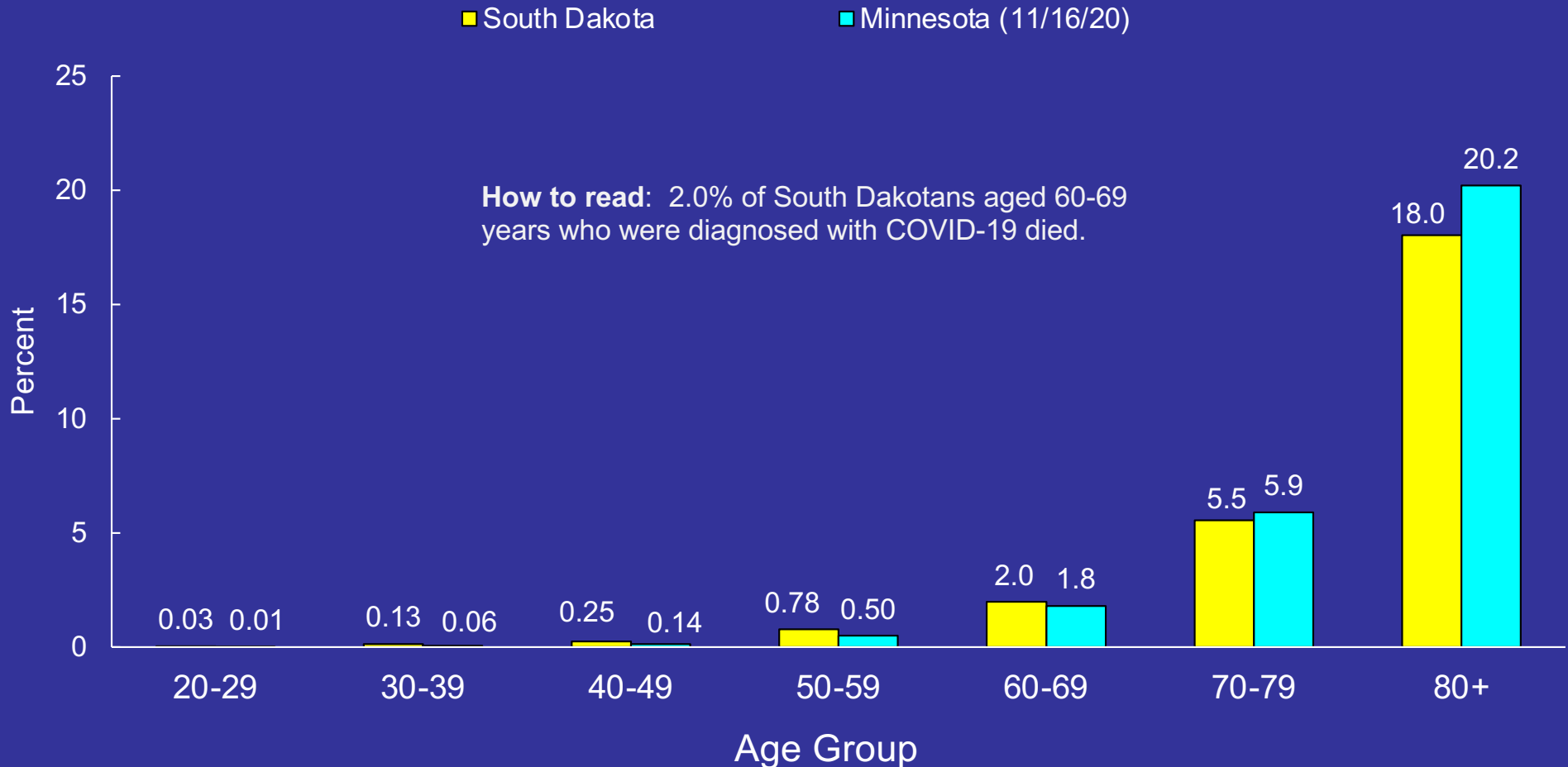
Percent of Cases Ever Hospitalized by Age  
as of February 2, 2022



Overall, 4.5% of South Dakotans who tested positive have been hospitalized.  
Calculated as (ever hospitalized/tested positive)\*100 using South Dakota data.  
Numbers ever hospitalized on SDDOH dashboard decreased between 5/26/21 and 7/7/21.

# South Dakota COVID-19 Situation

Case Fatality Rates by Age as of February 2, 2022



Overall case fatality rate for South Dakota is 1.3%.

Case fatality rate calculated as  $\text{COVID deaths} / (\text{COVID deaths} + \text{recovered}) * 100$  (<https://doh.sd.gov/COVID/Dashboard.aspx>)

Minnesota data:  $\text{CFR} = (\text{deaths}/\text{cases}) * 100$  (<https://www.health.state.mn.us/diseases/coronavirus/stats/covidweekly46.pdf>)

Data not given for ages <20 years (3 deaths to date, both posted 9/17/22 and later).



# COVID-19 Situation

## U.S. & World

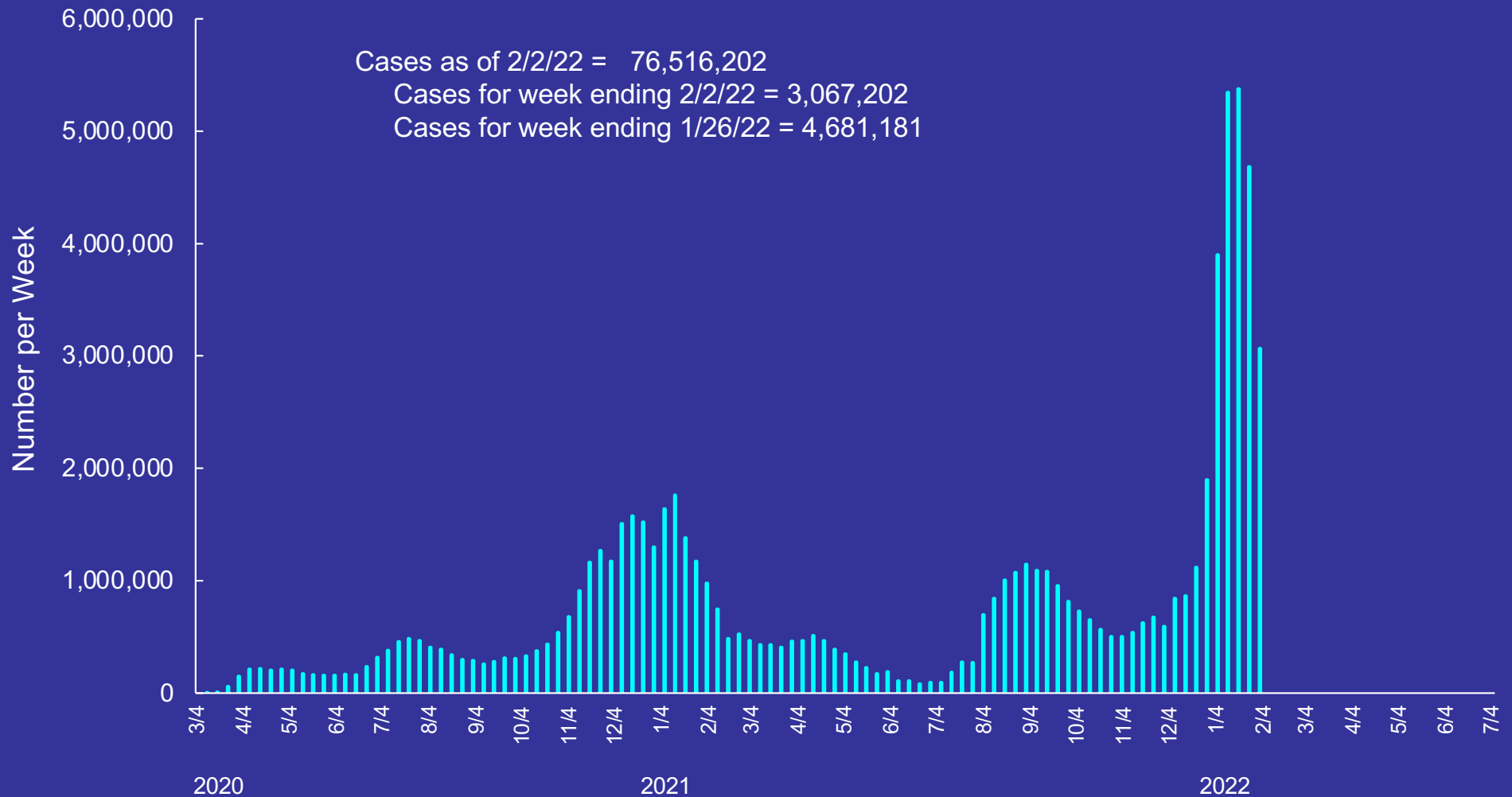
Numbers of American deaths to keep in mind:

- 7,054 in Iraq & Afghanistan
- 41,000 average annual U.S. deaths from influenza (2014-2019)
- 116,516 in World War I
- 405,399 in World War II
- 521,915 in World Wars I & II combined
- 580,135 in World Wars I & II and Vietnam War combined
- 600,135 in World Wars I & II, Vietnam & Korean Wars combined
- 675,000 in 1918 Influenza Pandemic
- 750,000 in Civil War
- **913,924 Current COVID-19 Pandemic (2019 – present)**

# U.S. COVID-19 Situation

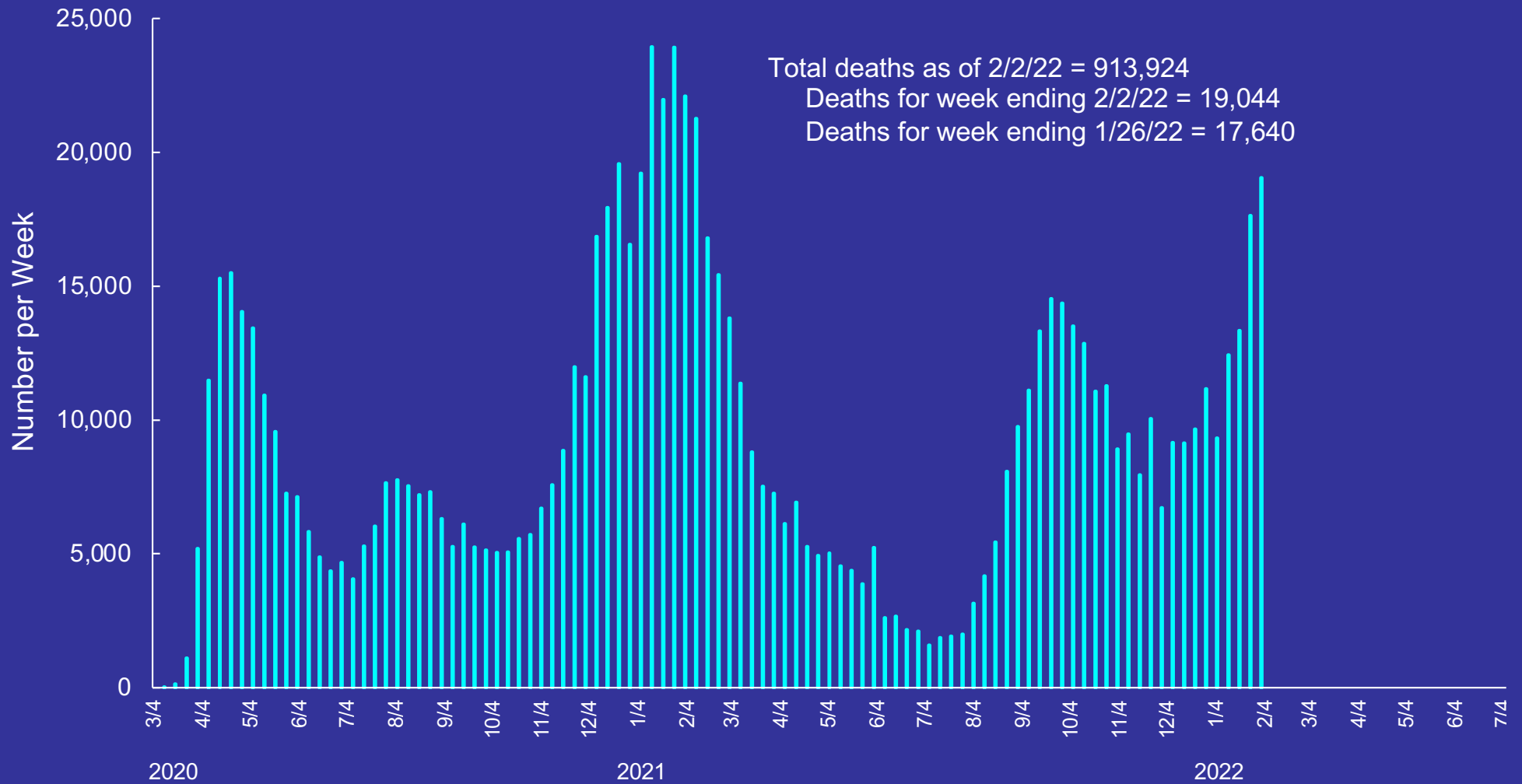
## Number of Newly Diagnosed Cases per Week

Does not include home test results



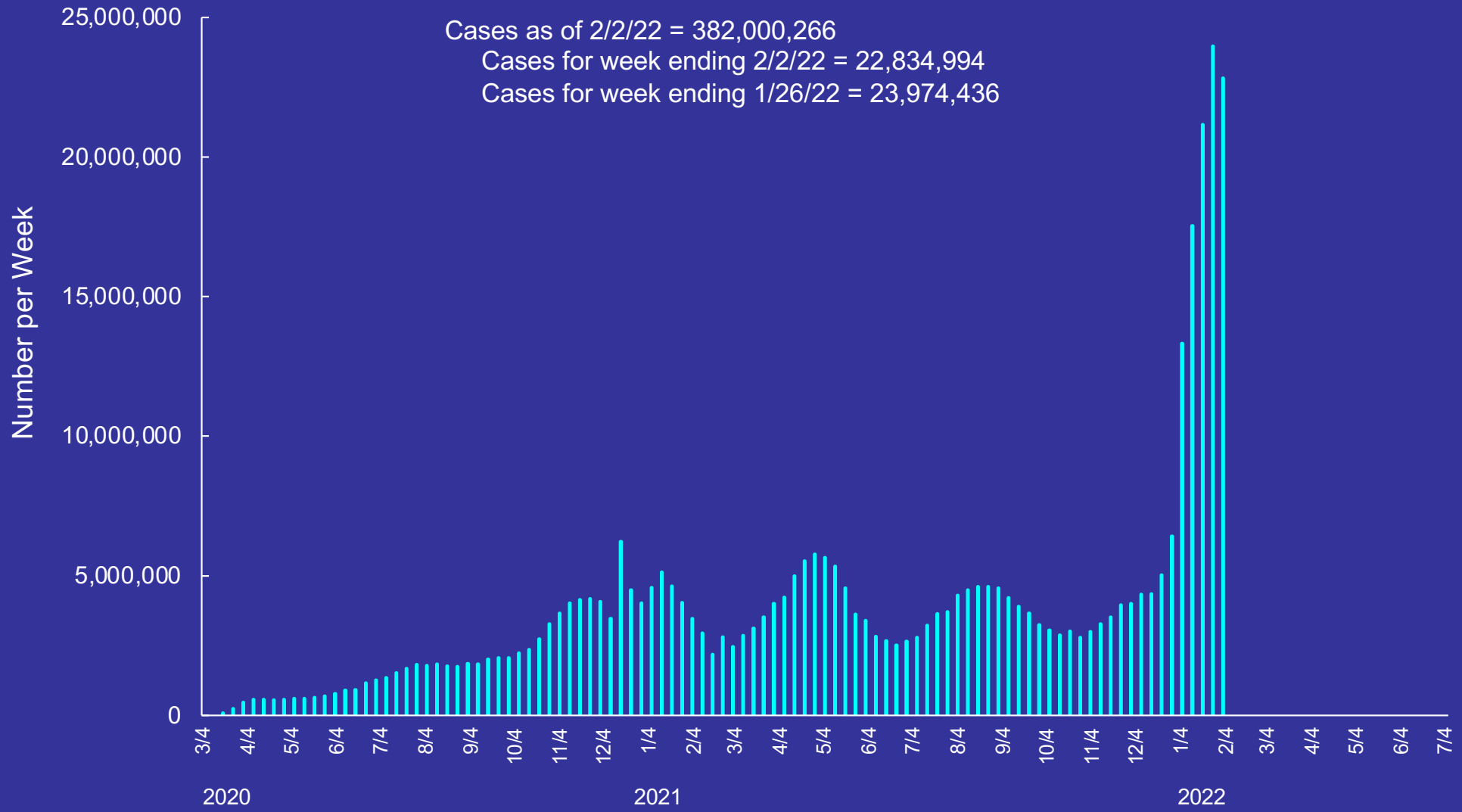
# U.S. COVID-19 Situation

## Number of Deaths per Week from COVID-19



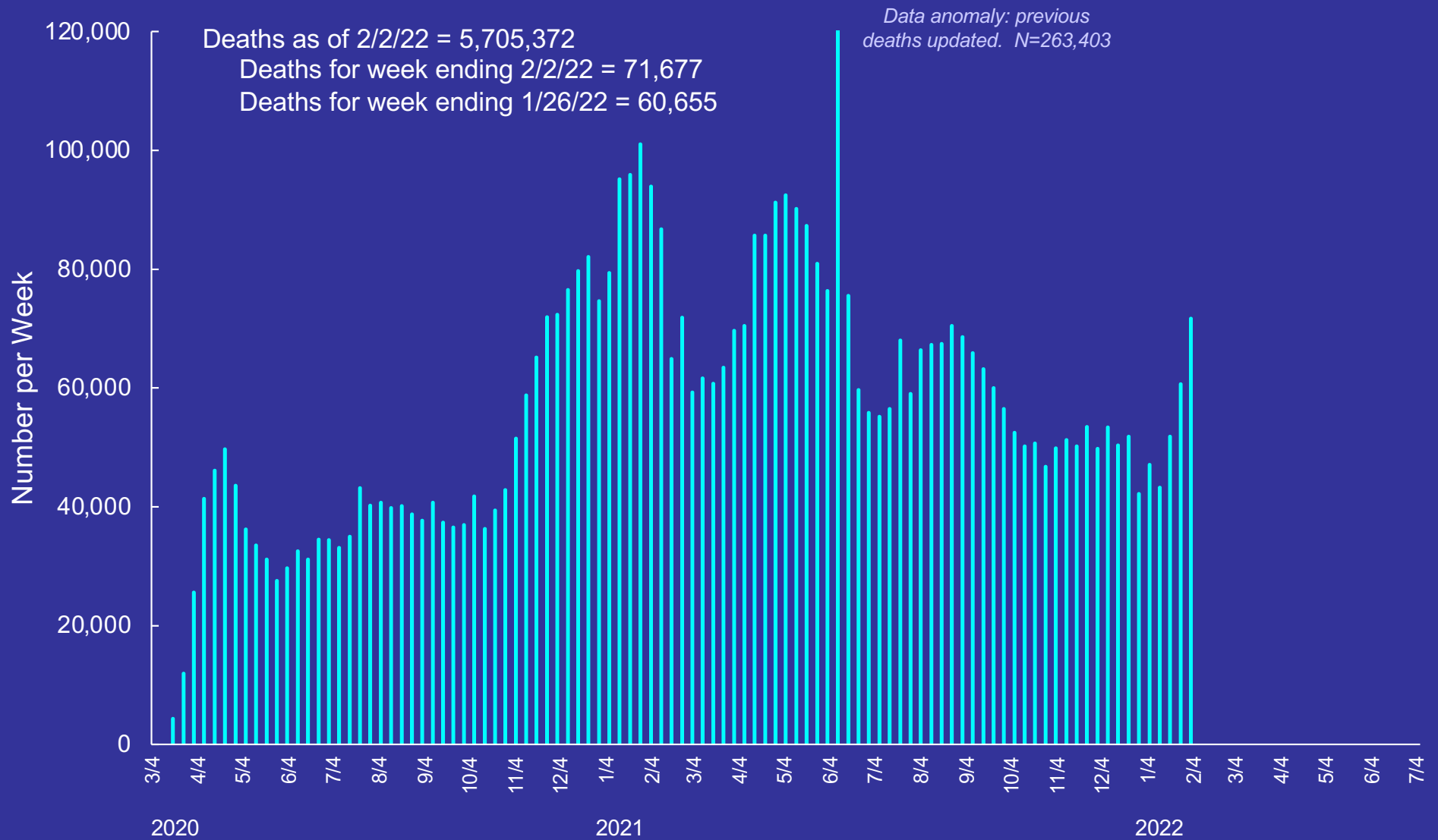
# World COVID-19 Situation

## Number of Newly Confirmed Cases per Week



# World COVID-19 Situation

## Number of Deaths from COVID per Week

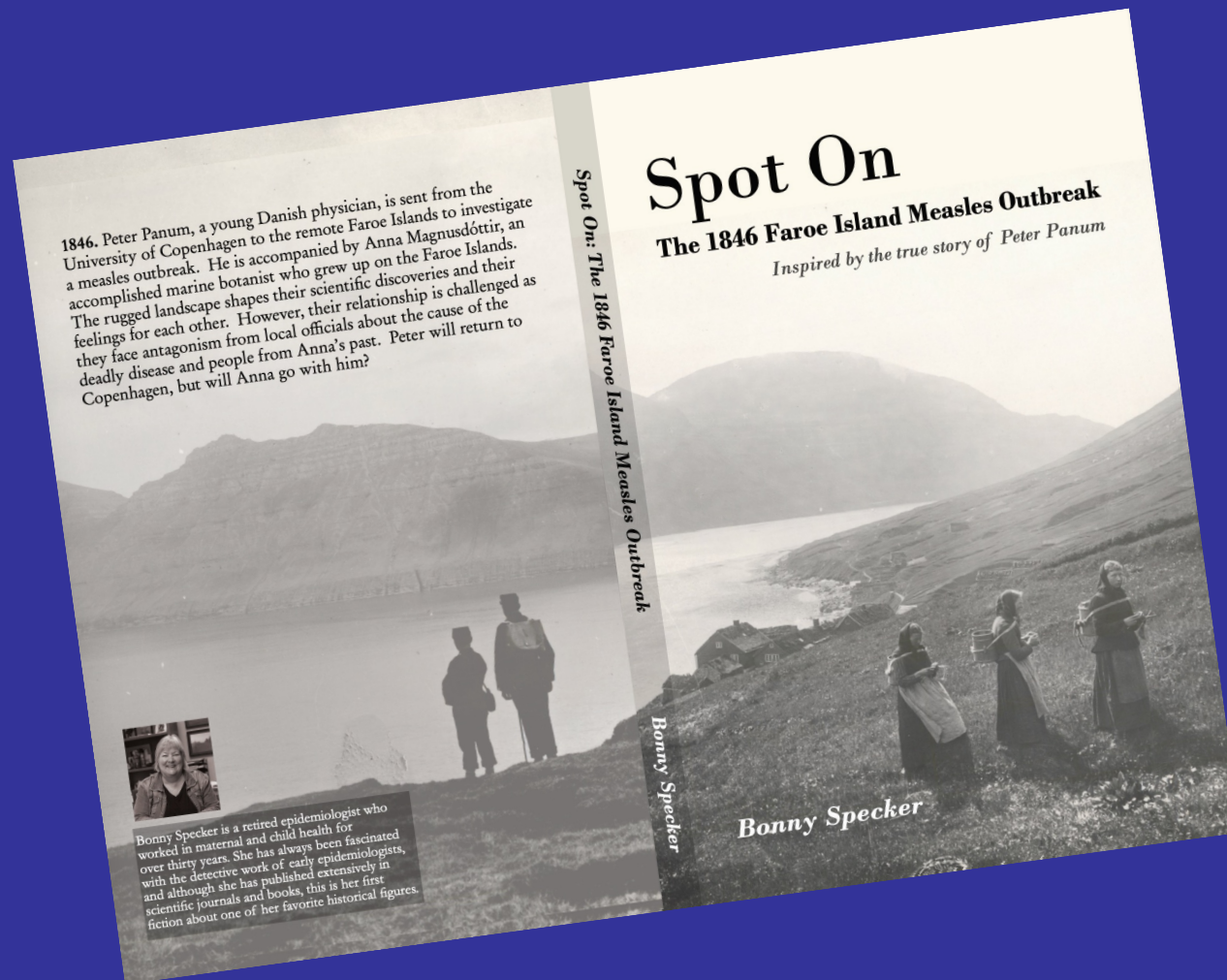


# What It Evolved Into

- How else can the public be educated about basic epidemiological principles and history?

***Retirement!***

# What It Evolved Into



...with a little romance, maybe people will read about epidemiology and learn!