MI COVID RESPONSE DATA AND MODELING UPDATE

September 7, 2021

Executive Summary – All Indicators Show Increases

Due to the Labor Day Holiday, most metrics are through Friday, Sep 3

Michigan remains at **High Transmission**

Percent Positivity (9.2%) is increasing for 2.5 months (up from 9.1% last week), and **Case Rate** (169.2 cases/million) have increased for 2.5 months (up from 148.7 last week)

Michigan has 39th lowest number of cases (35th last week), and 14th lowest case rate (9th last week) in the last 7 days

99% of positive tests available for sequencing in Michigan were **Delta variant** in the last 4 weeks

Percent of inpatient beds occupied by individuals with COVID (5.8%) has increased for five weeks (up from 5.7% last week).

Michigan has 10th lowest inpatient bed utilization (8th last week), and 9th lowest adult ICU bed utilization (8th last week)

Deaths (1.7 deaths/million) are increasing for five weeks (1.3 deaths/million last week), and there were 118 COVID deaths between Aug 21-27.

Michigan has the 29th lowest number of deaths (T31st last week), and T7th lowest death rate (T12th last week) in the last 7 days

7-day average **state testing rate** is steady at 2,615.4 tests/million/day. **Daily diagnostic tests (PCR)** is 26.1K per day.

10.25 million **COVID-19 vaccine** doses administered, 50.8% of population is fully vaccinated (5.0 million people)

Science Round Up

A few states that have experienced the largest per capita surge from Delta are starting to decline

Modeling projects continued increases in cases, hospitalizations, and deaths for Michigan

Number of reported K-12 school outbreaks increased since last week (11 to 41)

Without appropriate mitigations, large outbreaks occur in schools leading to more children being infected and experiencing severe illness

50.8% of the total population is fully vaccinated yet only account for ~25% of cases, hospitalizations, and deaths

Settings where mitigations have been consistently applied have seen a reduction in overall infection burden

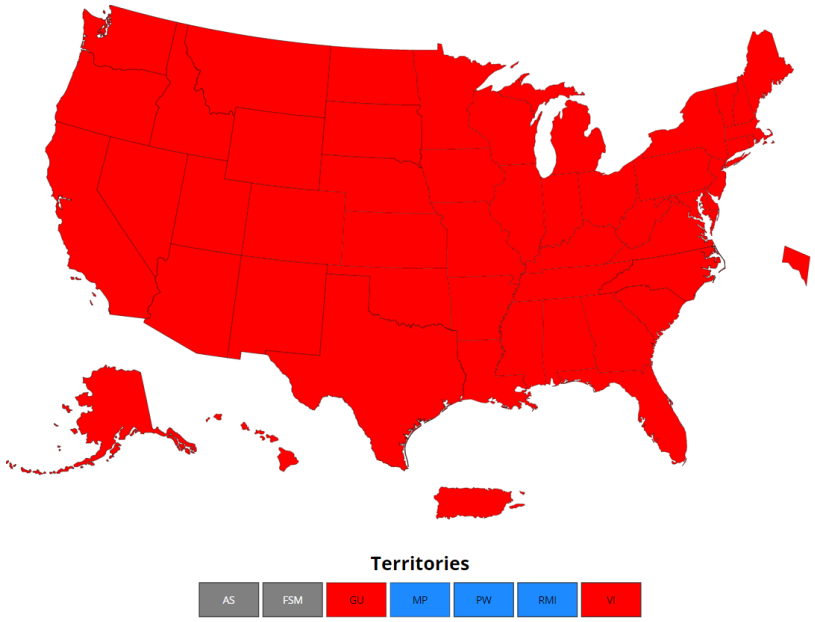
Global and National Comparisons: US cases increasing

What we see today (data through 9/5):

- Globally, 220,863,303 cases and 4,570,927 deaths*
- Countries with the highest case count are U.S. (39,955,163), India (33,027,621), and Brazil (20,890,779)*
- Nearly all US jurisdictions have high community transmission†
- States with the highest seroprevalence (national seroprevalence: 21.6% through end of June)†:

State	Est. Seroprevalence	95% CI
1. Ohio	37.3%	34.3% - 40.4%
2. Illinois	35.4%	31.8% - 39.1%
3. Wisconsin	32.9%	29.4% - 36.8%
4. Texas	32.2%	28.1% - 36.0%
11. Michigan	**27.8%**	**25.0% - 31.2%**

– Other notable states: AL (29.2%), AR (22.9%), GA (14.4%), FL (24.1%), LA (12.7%), MO (26.5%), MS (31.5%), TN (29.2%)



Source: * Johns Hopkins COVID-19 Dashboard; † CDC COVID Data Tracker

Key Messages: COVID-19 is Spreading Faster with Delta

Statewide positivity has increased to 9.2% (last week: 9.1%)

- One week percent change is up 5% (vs. up 6% last week)
- Increasing for two and half months (Jun 26 low of 1.2%)
- Positivity is increasing in most MERC regions; and five regions > 10%

Case rate (169.2 cases/million) increasing for two and half months (last week: 148.7 cases/million)

- One week increase of 9% (vs. 5% increase last week)
- Increasing for two months (Jun 26 low of 15.4 cases/million)
- Cases per million are increasing in most MERC regions

Michigan is at High Transmission level

- More than 90% of the counties in Michigan are at high transmission level
- CDC recommends all individuals, regardless of vaccination status, should mask indoors
- The U.S. is at high transmission level (316.9 cases/100,000 in last 7 days) with 54 states/territories in substantial or high transmission

Number of active outbreaks is up 18% from last week

- One-hundred and six new outbreaks were identified in the past week
- SNF/LTC reported the most total outbreaks this week, while K-12 schools have seen the highest number of new outbreaks (30) this week

Confirmed and probable case indicators

Table Date: 9/3/2021 (7 days from date table was produced: 8/27/2021)

Risk levels: Low | A | B | C | D | E

	CDC Transmission Risk Level	Absolute Cases (per million)	CDC Case Trend	Average Percent Positivity	Positivity Trend	Tests (per million)	% IP Beds Occupied by COVID-19 Cases	% Occupied IP Beds Trend	Absolute Deaths (per million)	Death Trend
Detroit	High	150.8	elevated incidence growth	7.6	Increase - 7wk	2733.9	5.1	Increase - 7wk	1.7	Increase - 2wk
Grand Rapids	High	194.0	elevated incidence growth	11.6	Increase - 9wk	2801.6	6.9	Increase - 7wk	1.4	<20 wkly deaths
Kalamazoo	High	197.1	elevated incidence plateau	11.3	Decrease - 1wk	2192.3	8.2	Increase - 5wk	1.8	<20 wkly deaths
Saginaw	High	179.2	elevated incidence growth	11.5	Increase - 9wk	1990.3	5.0	Increase - 6wk	2.6	<20 wkly deaths
Lansing	High	166.5	elevated incidence growth	8.7	Increase - 3wk	2345.7	9.2	Increase - 7wk	1.5	<20 wkly deaths
Traverse City	High	158.5	elevated incidence plateau	8.5	Decrease - 1wk	2113.6	5.8	Increase - 6wk	1.3	<20 wkly deaths
Jackson	High	205.4	elevated incidence growth	11.7	Increase - 1wk	2404.2	10.7	Increase - 1wk	2.8	<20 wkly deaths
Upper Peninsula	High	239.8	elevated incidence growth	11.5	Increase - 6wk	1713.1	3.8	Increase - 3wk	0.5	<20 wkly deaths
Michigan	High	169.2	elevated incidence growth	9.2	Increase - 9wk	2615.4	5.8	Increase - 7wk	1.7	Increase - 5wk

Cases Low: <7 | A: 7-20 | B: 20-40 | C: 40-70 | D: 70-150 | E: >=150

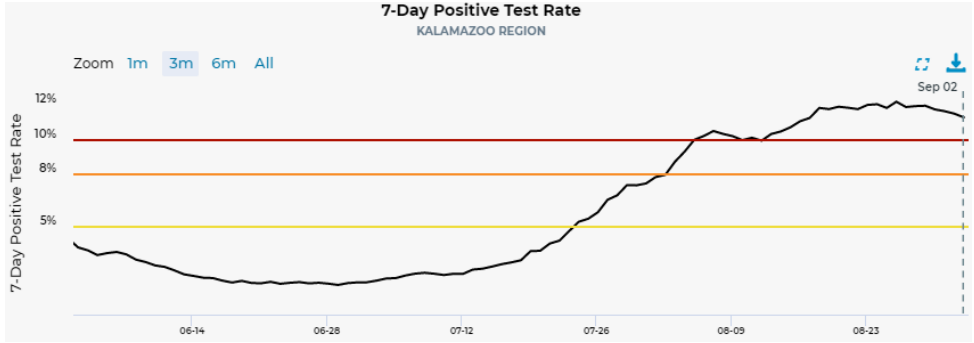
Positivity Low: <3% | A: 3-7% | B: 7-10% | C: 10-15% | D: 15-20% | E: >=20%

Regional Time Trends

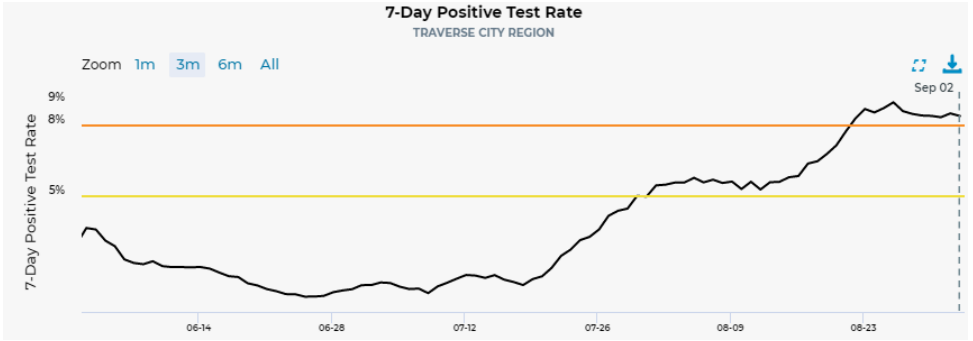
- Positivity for two regions on the postage stamp showed potential plateau trends:
  - Kalamazoo Positivity Trend
  - Traverse Positivity Trend
- These same two regions have elevated incidence plateau
- Both regions have seen stairstep trends with plateaus followed by further increases in positivity
- Positivity in both regions are above the substantial threshold (Kalamazoo is high)
- **At this point, cumulative data do not suggest that the delta surge in Michigan is subsiding**

Positivity

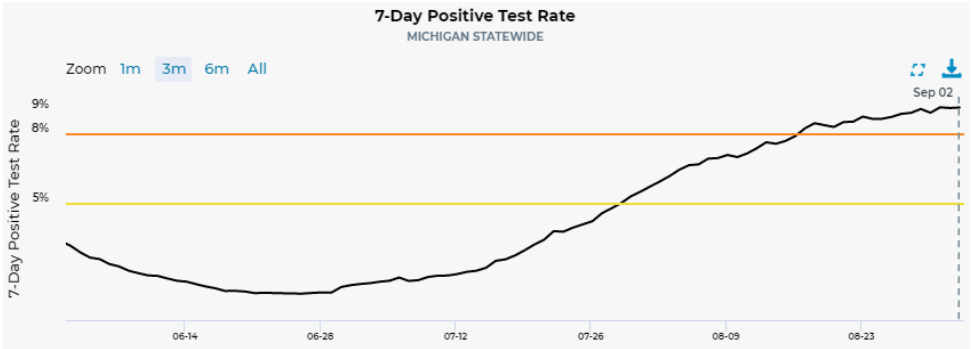
Kalamazoo Region



Traverse City Region



State of Michigan

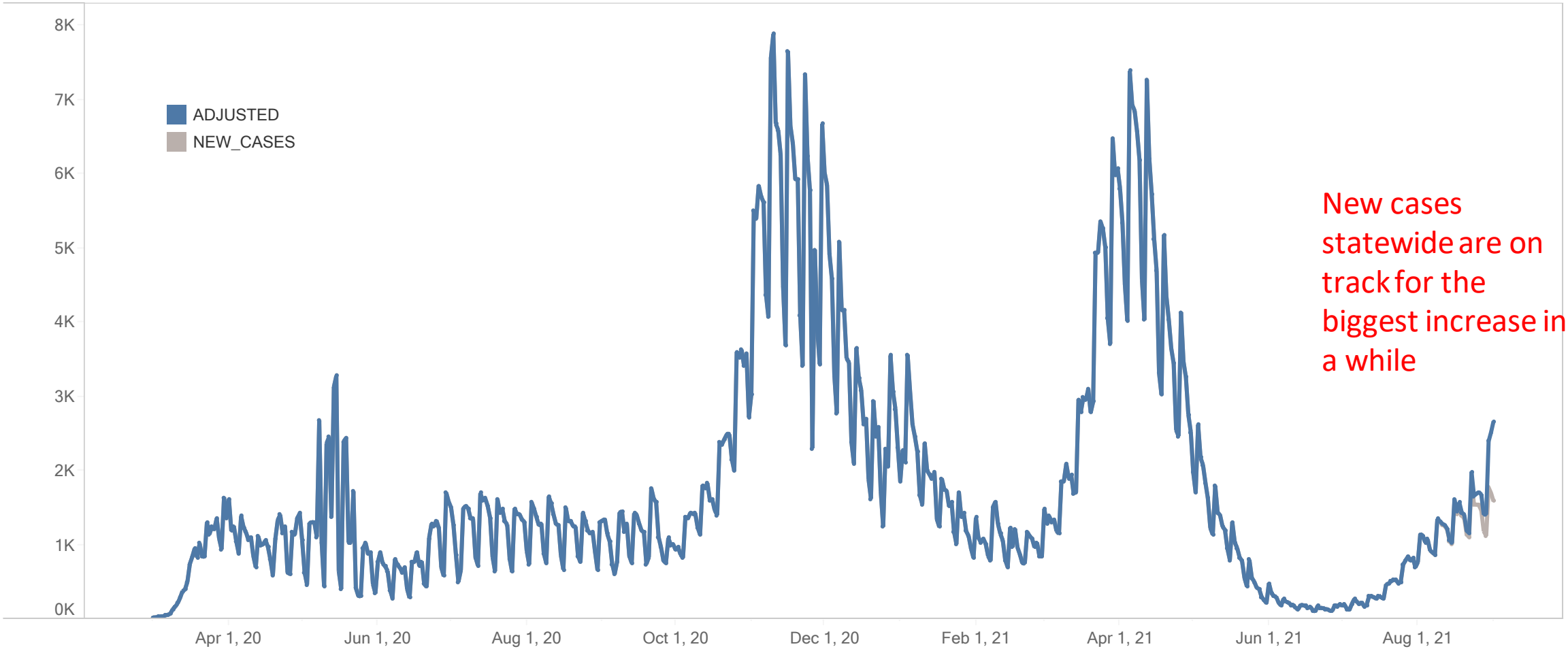


All charts represent data from 06/02/21 – 09/02/21

Source: MI Start Map; MDOC excluded

Michigan lag adjusted COVID+ cases by onset date

New confirmed cases by onset actual and adjusted as of September 3, 2021 (-2 days)



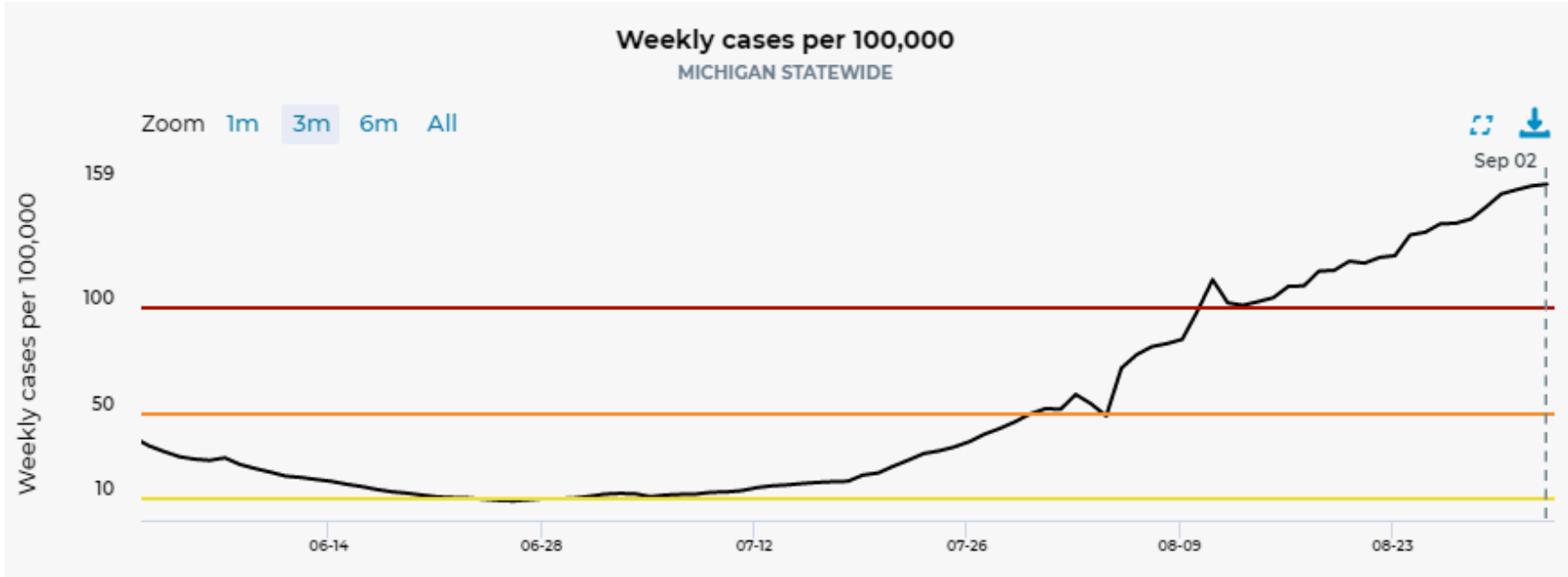
Overview of metrics for individuals < 18

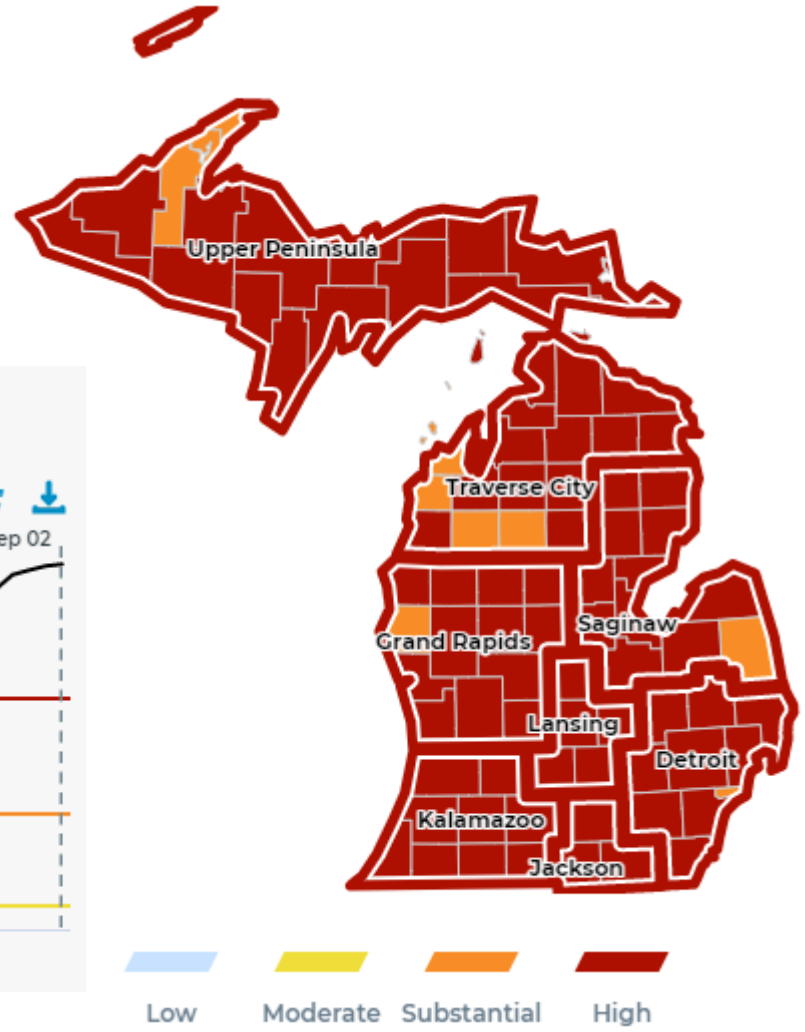
	Region	Population (<12 yrs)	Population (<18 yrs)	Cumulative Case Count (<12 yrs)	7-day Average Daily Case Count (<12 yrs)	7-day Average Daily Case Rate per Million (<12 yrs)	7-day Average Daily Pediatric Hospitalization Count (<18 yrs)	7-day Average Daily Pediatric Hospitalization Rate per Million (<18 yrs)	7-day Average Daily Death Count (<12 yrs)
1	Detroit	735529	1134247	31580	94.0	127.8	23.0	20.3	0
2	Grand Rapids	230120	350652	10752	38.4	166.9	9.0	25.7	0
3	Kalamazoo	140422	214801	5912	21.6	153.8	2.0	9.3	0
4	Saginaw	78759	122834	3517	9.1	115.5	1.1	9.0	0
5	Lansing	78140	119915	3521	13.6	174.0	3.9	32.5	0
6	Traverse City	53099	83462	1718	5.0	94.2	0.3	3.6	0
7	Jackson	41274	64091	1638	4.7	113.9	0.3	4.7	0
8	Upper Peninsula	34645	53875	1566	6.6	190.5	0.3	5.6	0
99	Michigan	1391988	2143877	60264	193.4	138.9	39.9	18.6	0

Note: Data as of 9/3; case data 8/27, hospitalization data 9/3. Hospitalization data is for pediatric patients (<18)

Michigan at High Transmission Level and continuing to increase

Dashboard | CDC | MI Start Map for most recent data by reporting date

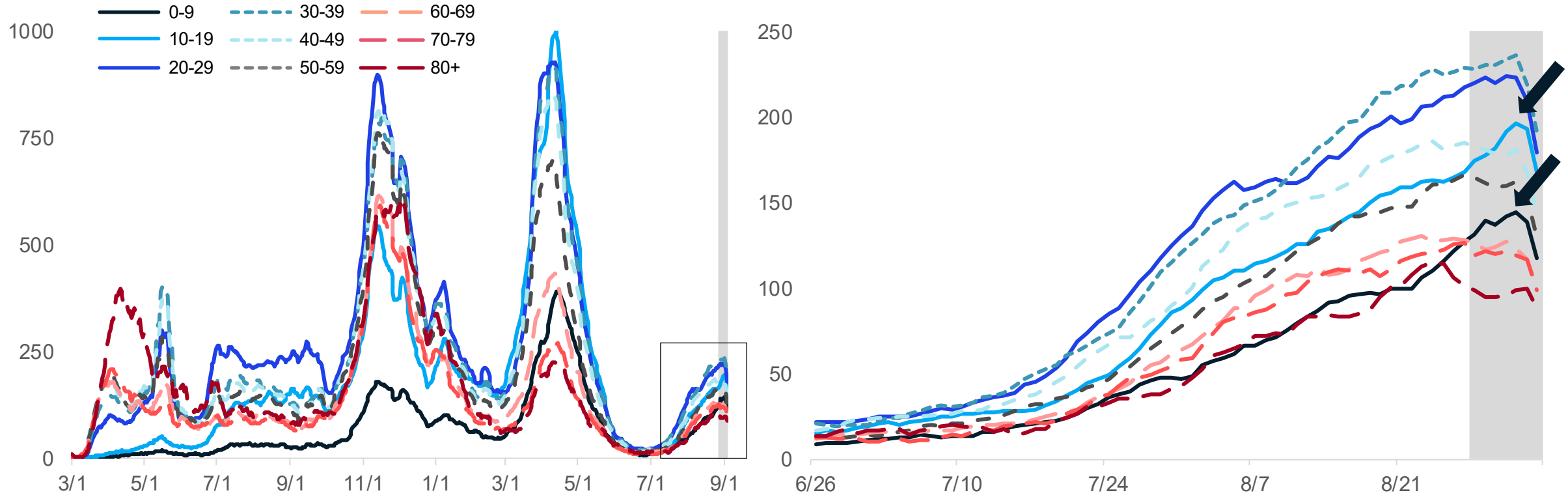




Source: MI Start Map; data through 9/3/2021

Case Rate Trends are Increasing for All Age Groups

Daily new confirmed and probable cases per million by age group (7-day rolling average)



- Case rate trends for all age groups are increasing
- Case rates for all age groups are between 95 and 205 cases per million (through 8/16)
- Case rate trends are highest for 30-39-year-olds followed by 20-29, 40-49, 10-19, and 50-59

Note: Case information sourced from MDHHS and reflects date of onset of symptoms
Source: MDHHS – Michigan Disease Surveillance System

Number of Cases and CaseRates are Increasing for Most Age Groups

Daily new confirmed and probable cases per million by age group (7-day rolling average)

Age Group	Average† daily cases	Average† Daily Case Rate	One Week % Change (Δ#)
0-9	**147.3**	**127.8**	**28% (+32)**
10-19	210.9	168.0	8% (+15)
20-29	**300.0**	**217.5**	9% (+24)
30-39	278.1	**229.3**	7% (+18)
40-49	218.4	**185.2**	5% (+10)
50-59	224.9	166.5	13% (+27)
60-69	163.7	128.3	5% (+7)
70-79	97.0	126.5	14% (+12)
80+	42.1	101.7	1% (+1-5)
Total¶	1694.6	169.2	12% (+150)

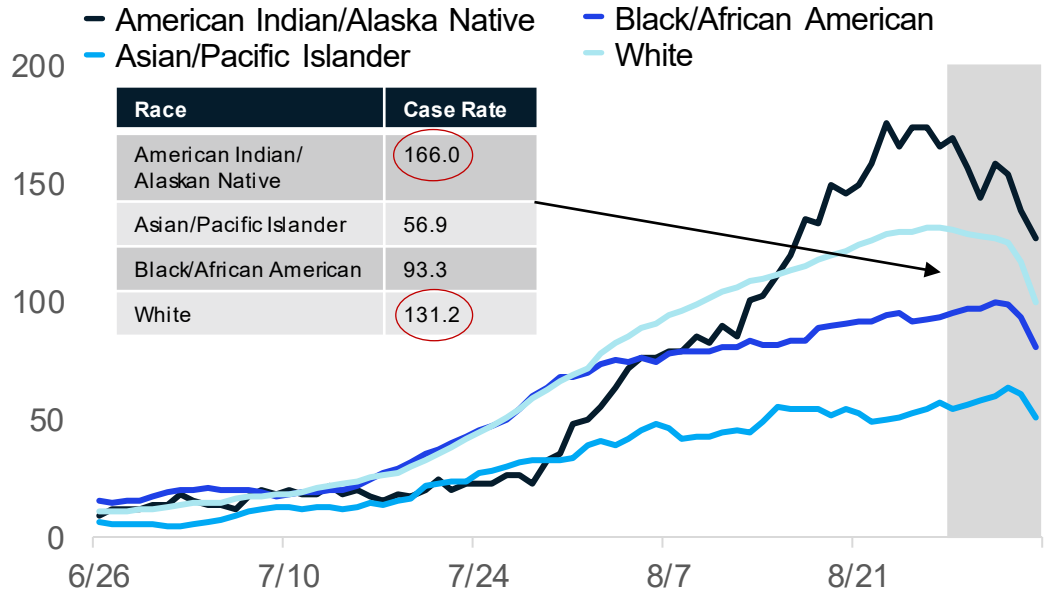
† Rolling 7-day average; ¶ Total may not reflect state due to missing age data
Note: Case information sourced from MDHHS and reflects date of onset of symptoms
Source: MDHHS – Michigan Disease Surveillance System
Data through 9/3/2020

- Largest one-week growth among those under 10 years of age

- Average daily number of cases (300.0) is highest for those aged 20-29
- Avg. daily case rate (229.3 cases/mil) is currently highest for 30-39
- Case rates for all age groups are between 100-230 cases per million
- Case rate trends are increasing for all age groups
- Case rates bottomed out on June 26, 2021

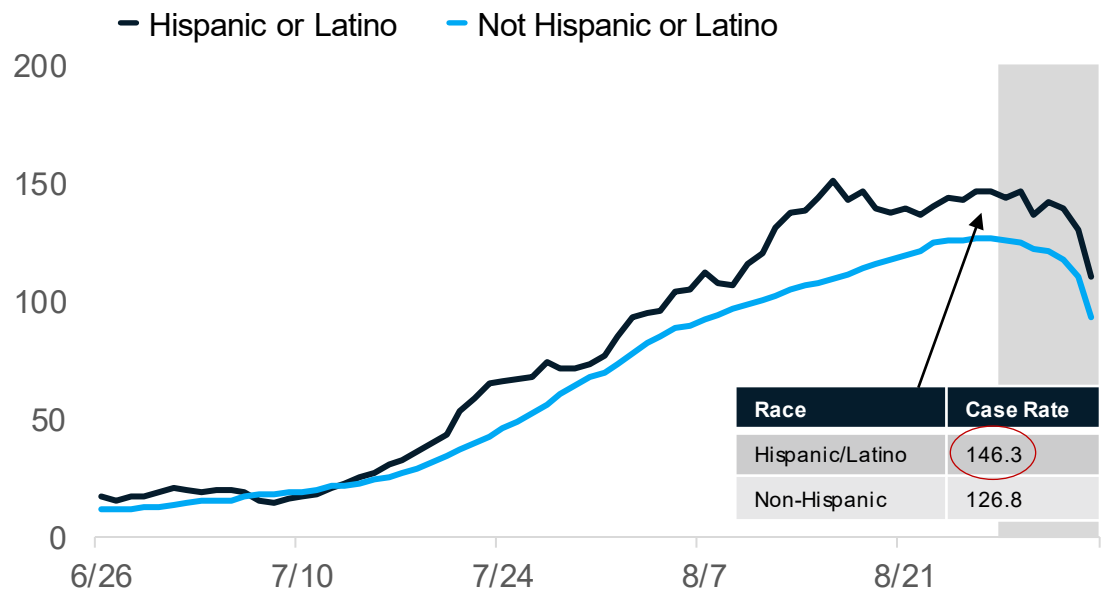
Racial and Ethnic Case Rates are Increasing

Daily new confirmed and probable cases per million (7 day rolling average) by race category



Race	Case Rate
American Indian/ Alaskan Native	166.0
Asian/Pacific Islander	56.9
Black/African American	93.3
White	131.2

Daily new confirmed and probable cases per million (7 day rolling average) by ethnicity category



Race	Case Rate
Hispanic/Latino	146.3
Non-Hispanic	126.8

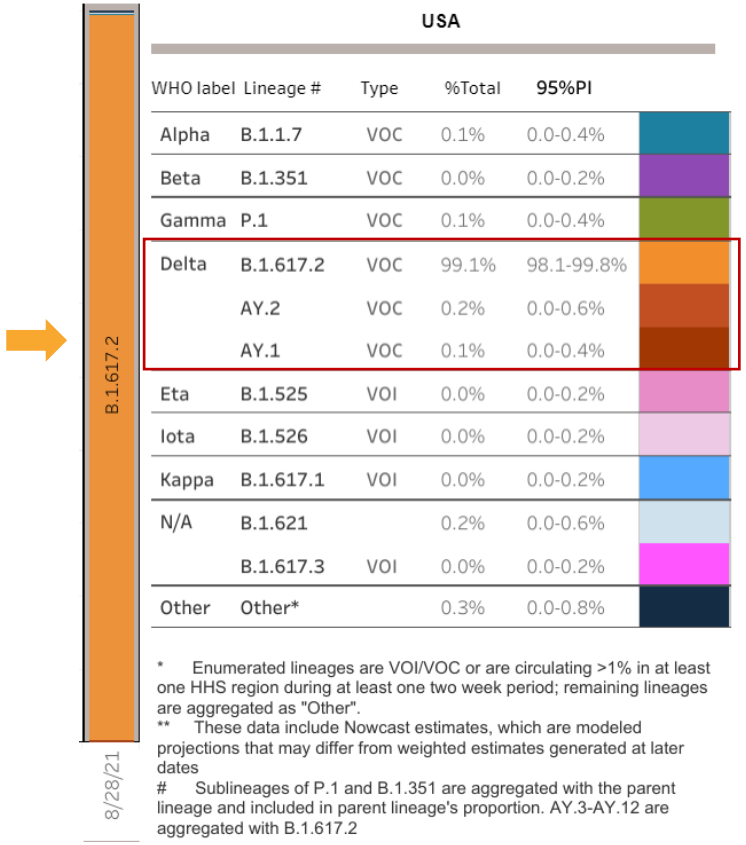
Updates since last week:

- Cases per million are increasing for all races and ethnicities
- **Hispanics, American Indian/Alaskan Native, and Whites have the highest case rates**
- In the past 30 days, 20% (↔) of race data and 25% (↑1%) ethnicity data was either missing or reported as unknown

Note: Case information sourced from MDHHS and reflects date of death of confirmed and probable cases.
Source: MDHHS – Michigan Disease Surveillance System

Identified COVID-19 Cases Caused by All Variants of Concern (VOC) in US and Michigan

Variants Circulating in United States, Aug 22 – Aug 28 (NOWCAST)



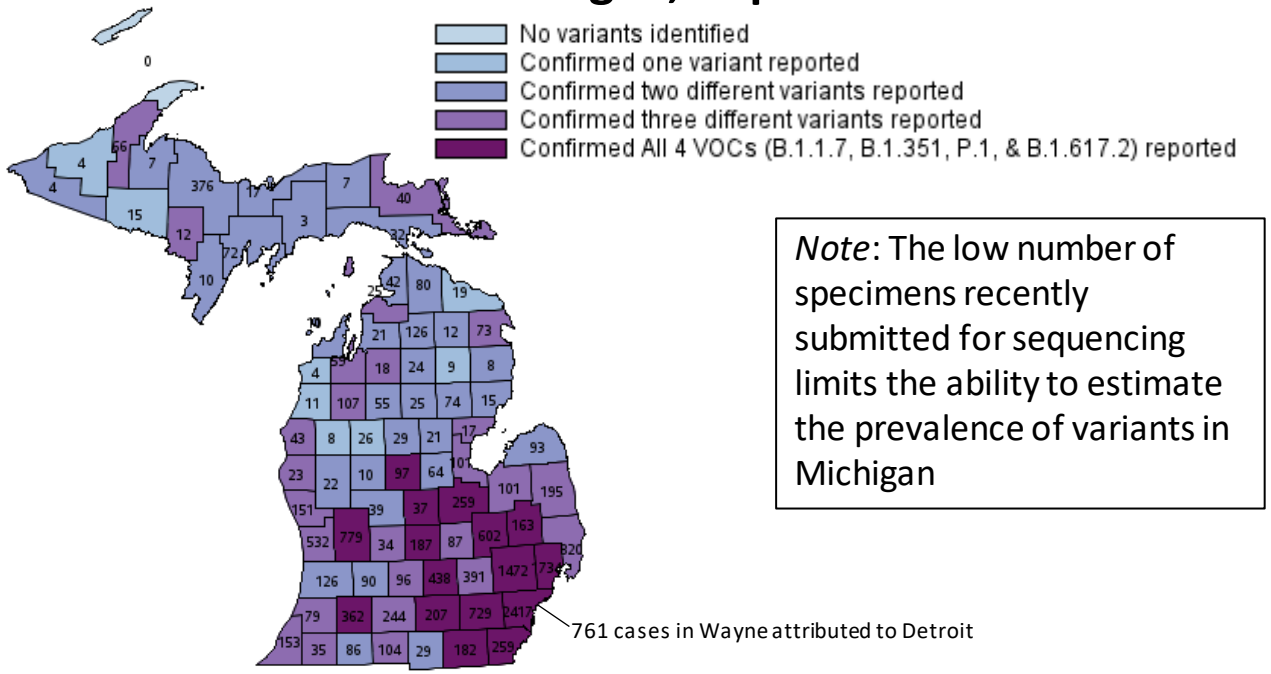
USA

WHO label	Lineage #	Type	%Total	95%PI
Alpha	B.1.1.7	VOC	0.1%	0.0-0.4%
Beta	B.1.351	VOC	0.0%	0.0-0.2%
Gamma	P.1	VOC	0.1%	0.0-0.4%
Delta	B.1.617.2	VOC	99.1%	98.1-99.8%
	AY.2	VOC	0.2%	0.0-0.6%
	AY.1	VOC	0.1%	0.0-0.4%
Eta	B.1.525	VOI	0.0%	0.0-0.2%
Iota	B.1.526	VOI	0.0%	0.0-0.2%
Kappa	B.1.617.1	VOI	0.0%	0.0-0.2%
N/A	B.1.621		0.2%	0.0-0.6%
	B.1.617.3	VOI	0.0%	0.0-0.2%
Other	Other*		0.3%	0.0-0.8%

* Enumerated lineages are VOI/VOC or are circulating >1% in at least one HHS region during at least one two week period; remaining lineages are aggregated as "Other".
** These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates
# Sublineages of P.1 and B.1.351 are aggregated with the parent lineage and included in parent lineage's proportion. AY.3-AY.12 are aggregated with B.1.617.2

Data last updated Sep 3, 2021
Source: https://covid.cdc.gov/covid-data-tracker/#variant-proportions and MDSS

Variants of Concern in Michigan, Sep 3



Note: The low number of specimens recently submitted for sequencing limits the ability to estimate the prevalence of variants in Michigan

Variant	MI Reported Cases¶	# of Counties	% Specimens in last 4 wks
B.1.1.7 (alpha)	13,695*	81	0.5%
B.1.351 (beta)	88	24	0%
P.1 (gamma)	335	35	0.2%
B.1.617.2 (delta)	**1,806 (↑453)**	**74 (↑1)**	**99.3%**

* 534 cases within MDOC; ¶ 37 cases with county not yet determined

Emerging COVID-19 Variants

WHO Variant Tracking Update

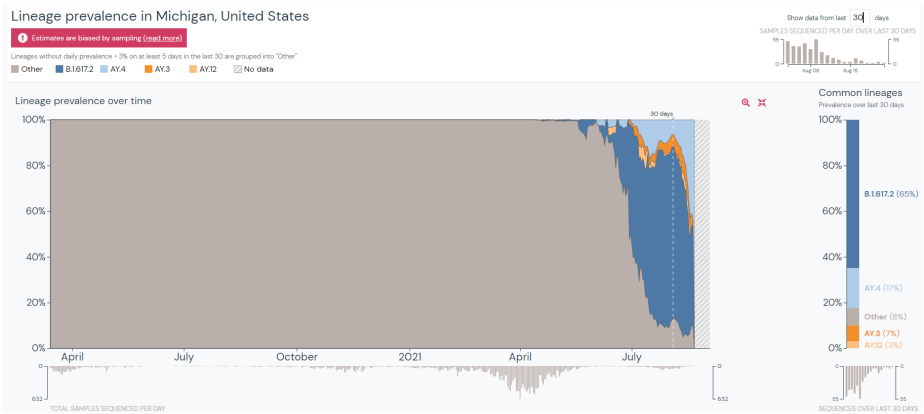
- WHO announced the variant B.1.621 (Mu) as a **variant of interest** on August 30, 2021
- Mu was first identified in Colombia in January
- The Mu variant evolved several potential properties of immune escape
  - Preliminary data show that Mu has a capacity to reduce the neutralization capacity of convalescent and vaccine sera similar to that seen for Beta (B.1.351) variant

- WHO also reported that it is monitoring the C.1.2
  - C.1.2 is neither a variant of concern nor a variant of interest
  - C.1.2 was first identified in South Africa in May and was added the WHO monitor list on September 1, 2021

Variant Cases in Michigan*

- There are currently 10 cases who have been identified to be infected with the Mu variant plus 1 additional epi link
  - All but cases acquired the Mu variant within Michigan
    - No cases reported international travel
  - 2 (18%) of cases required hospitalization
  - 2 (18%) of cases were breakthrough infections
  - 6 (55%) cases reported symptoms

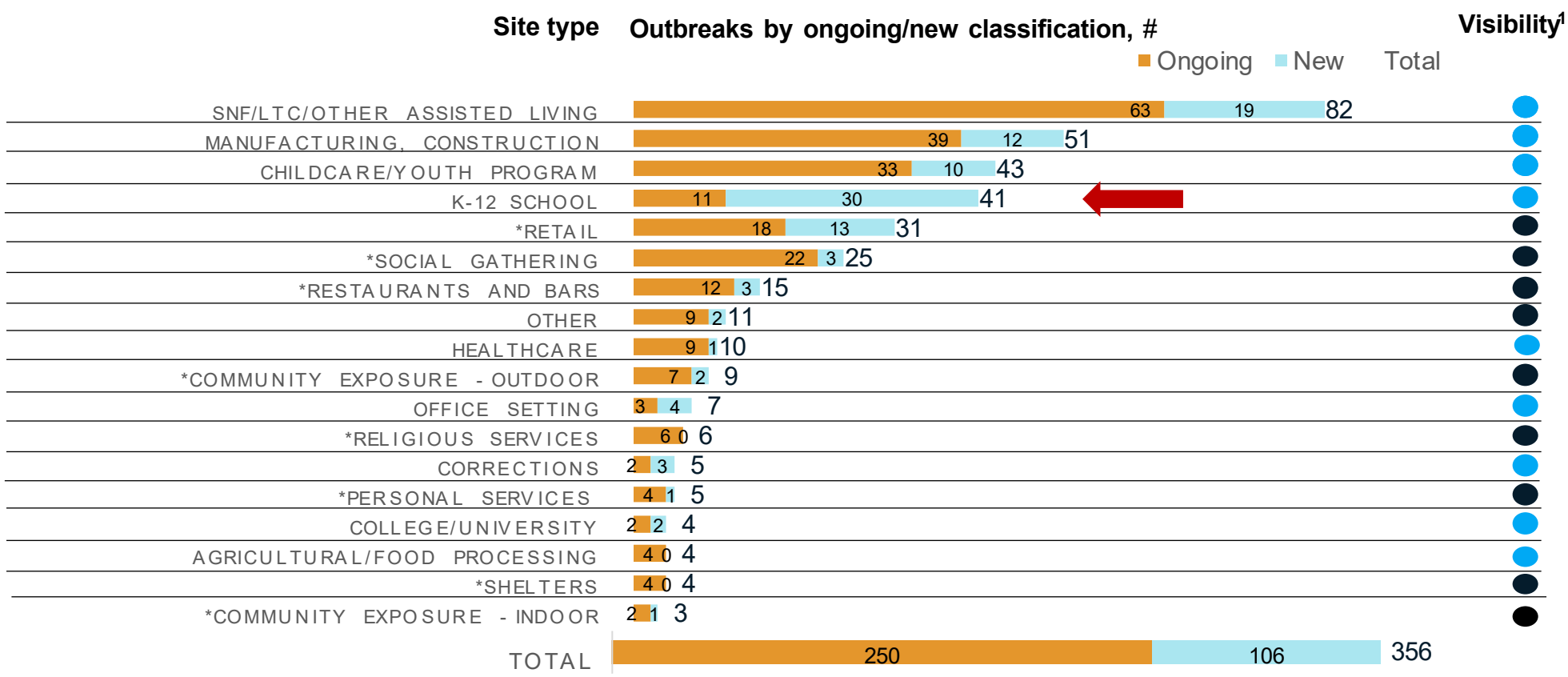
- There are currently no cases identified with the C.1.2 variant



* Only **variants of concern** are routinely reported in this weekly update
Data last updated Sep 6, 2021
Source: MDSS, WHO, outbreak.info

Number of Outbreaks Reported has Increased

Number of outbreak investigations by site type, week ending Sep 2



Total number of active outbreaks is **up 18%** from previous week, with 106 new outbreaks identified (26 more than last week)

K-12 schools reported the greatest number of new outbreaks (30) this week, followed by SNF/LTC (19), retail (13), manufacturing/ construction (12), and youth/ childcare (10), and ten other settings with at least 1 new outbreak in the last week.

1. Based on a setting's level of control and the extent of time patrons/residents spend in the particular setting, different settings have differing levels of ability to ascertain whether a case derived from that setting

NOTE: Many factors, including the lack of ability to conduct effective contact tracing in certain settings, may result in significant underreporting of outbreaks. This chart does not provide a complete picture of outbreaks in Michigan and the absence of identified outbreaks in a particular setting in no way provides evidence that, in fact, that setting is not having outbreaks.

Source: LHD Weekly Sitreps

Key Messages: COVID-19 and Healthcare Capacity and COVID Severity

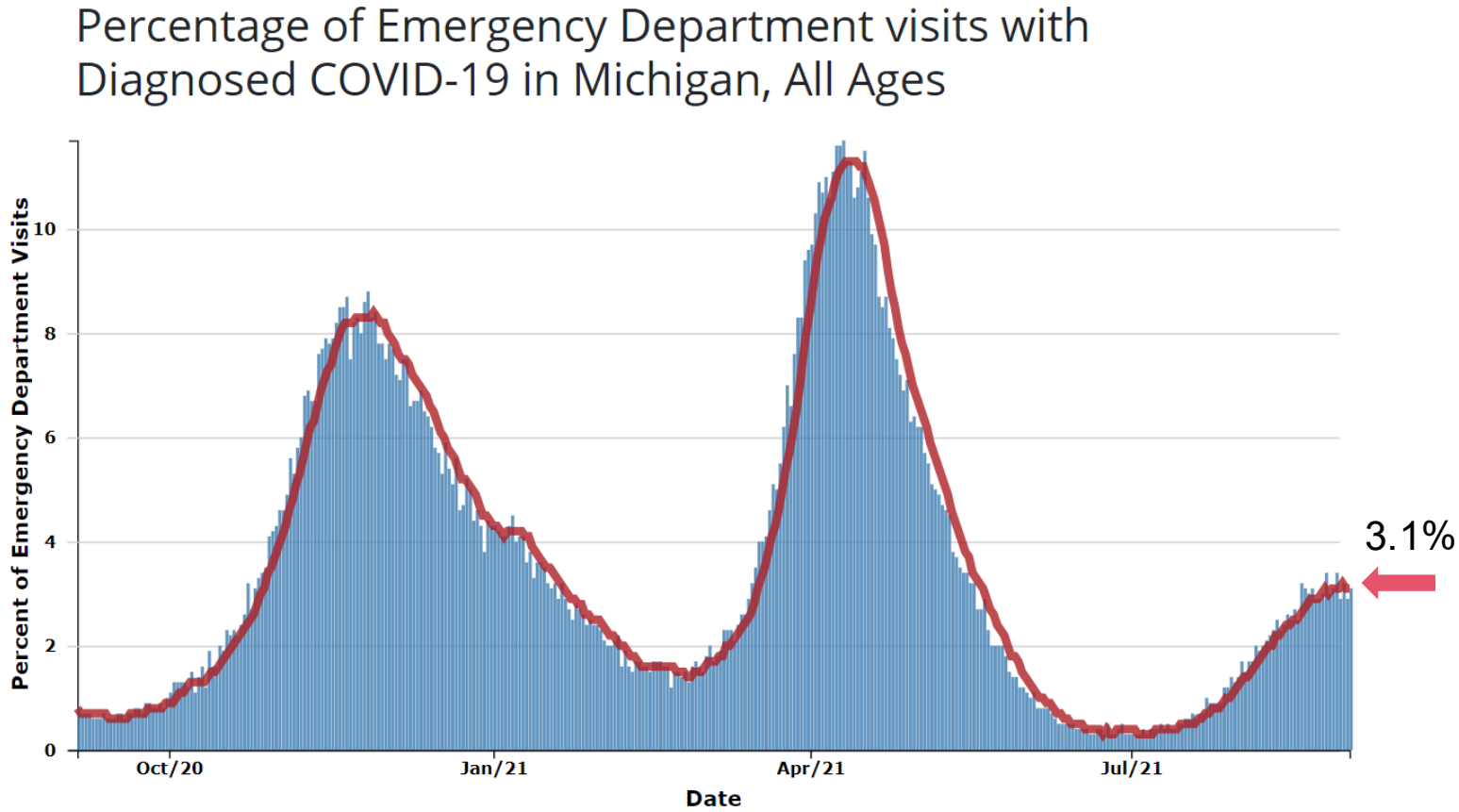
Hospitalizations and ICU utilization are increasing

- 3.1% of ED visits are for COVID-like illness (CLI) (up from 2.9% last week)
- Hospital admissions are increasing for most age groups this week
- Hospitalizations up 5% since last week (vs. 10% increase week prior)
- Several regions (Region 1, 3, 5, 6, 8) experienced an increasing in hospitalization trends this week
  - Hospitalization for COVID-19 is highest in Regions 1, 3, and 6
  - Fastest growth is in Regions 1 and 6
- Volume of COVID-19 patients in intensive care has increased 9% since last week (vs. 28% increase last week)

Death rate is 1.7 daily deaths per million people

- Death rate has increased five weeks
- 293% increase since Jul 22 low
- 30-day proportion of deaths among those under 60 years of age is steady from the prior week

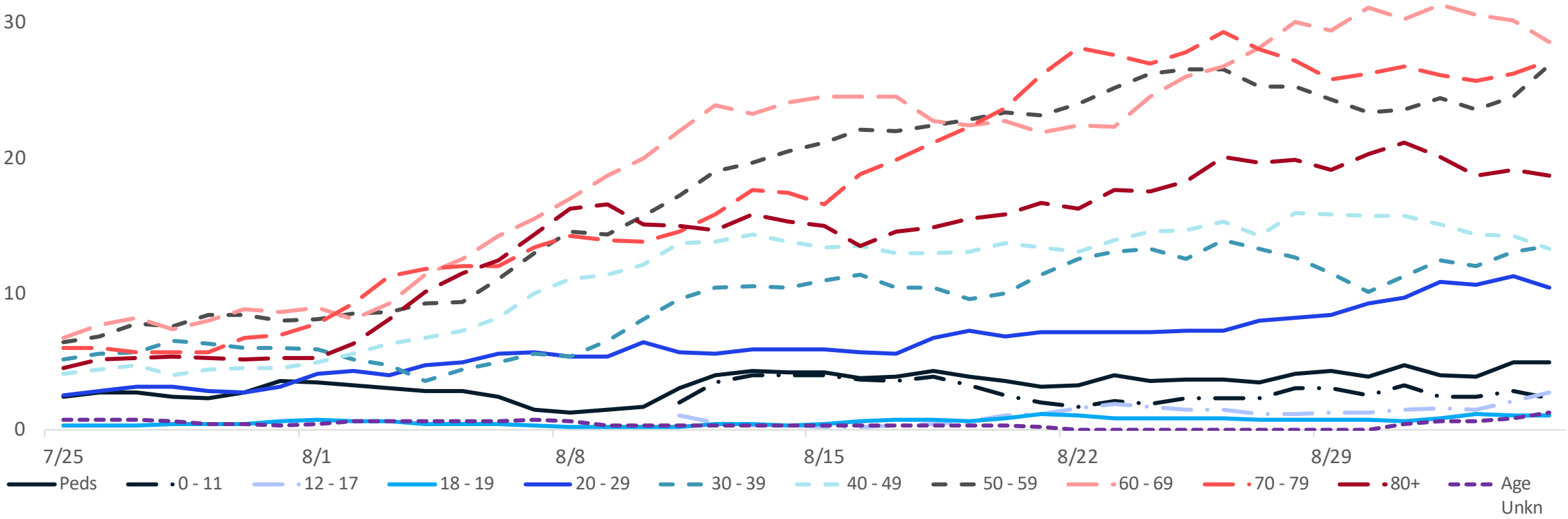
Michigan Trends in Emergency Department (ED) Visits for COVID-19-Like Illness (CLI)



- Trends for ED visits have increased to 3.1% since last week (up from 2.9% week prior)
- Trends vary by age groups with all age groups seeing an increase
- Over past week, those 50-64 years saw highest number of avg. daily ED CLI visits (4.0), but those between 25 and 74 all above state average

Source: https://covid.cdc.gov/covid-data-tracker/#ed-visits

Average Hospital Admissions Are Increase for all Age Groups

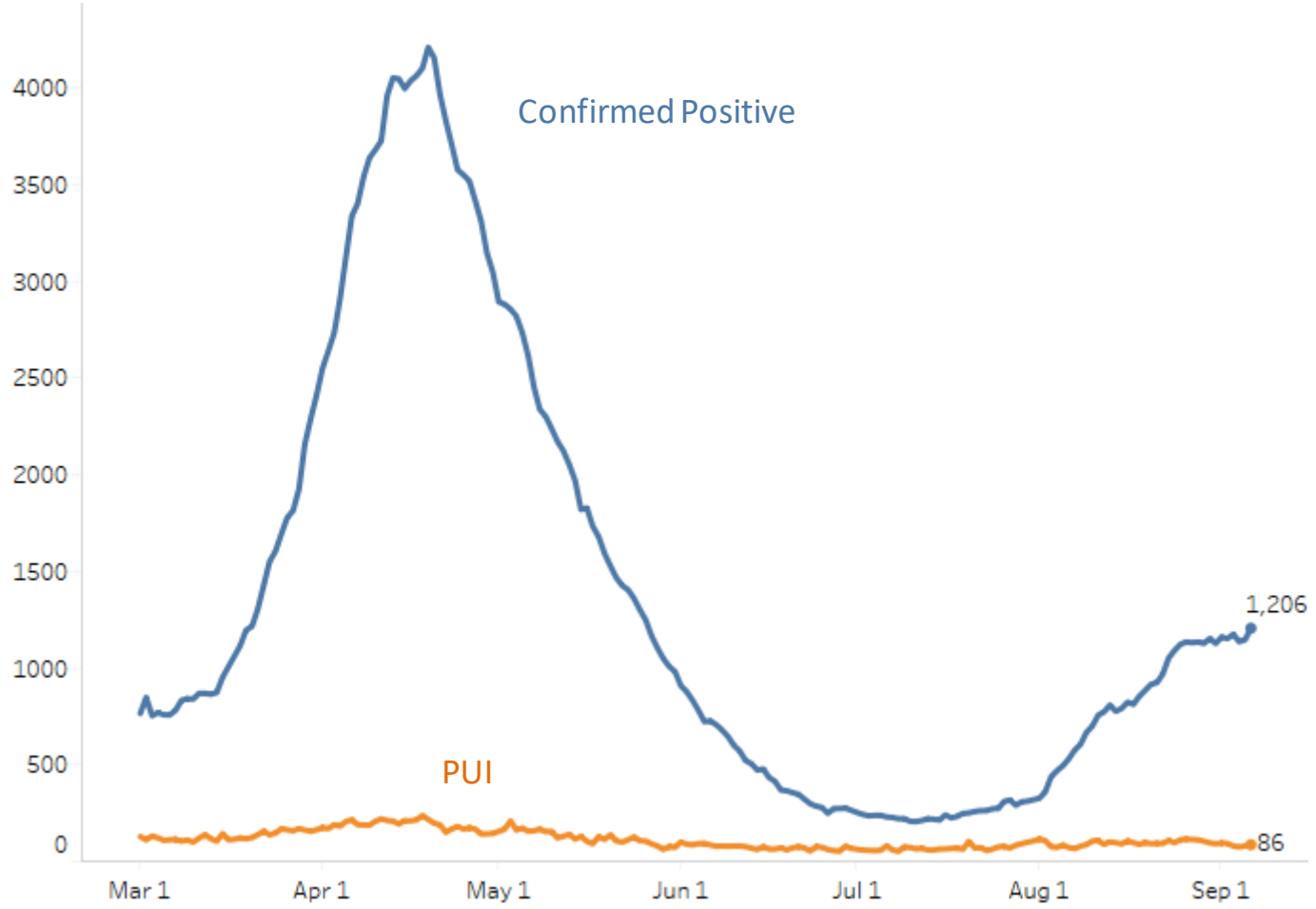


- Trends for daily average hospital admissions have increased 2% since last week (vs. 16% increase prior week)
- Most age groups experienced a one week increase in daily hospital admissions with largest increases for those under 30
- Over the past week, those 60-69 years have seen the highest number of avg. daily hospital admissions (29 admissions)

Source: CHECC & EM Resource

Statewide Hospitalization Trends: Total COVID+ Census

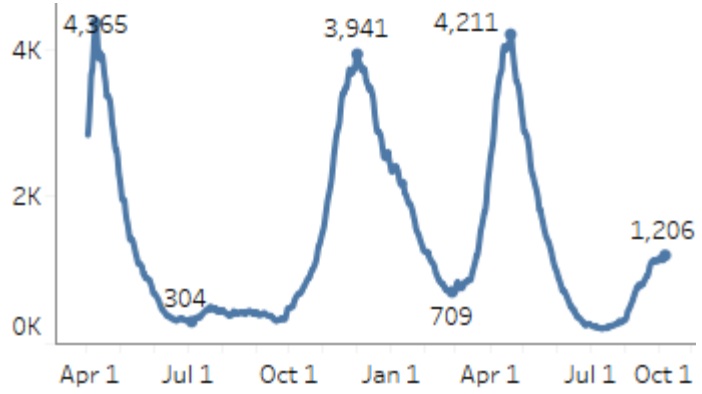
Hospitalization Trends 3/1/2021 – 9/6/2021
Confirmed Positive & Persons Under Investigation (PUI)



The COVID+ census in hospitals has increased by only 5% from the last week (previous week was up 10%).

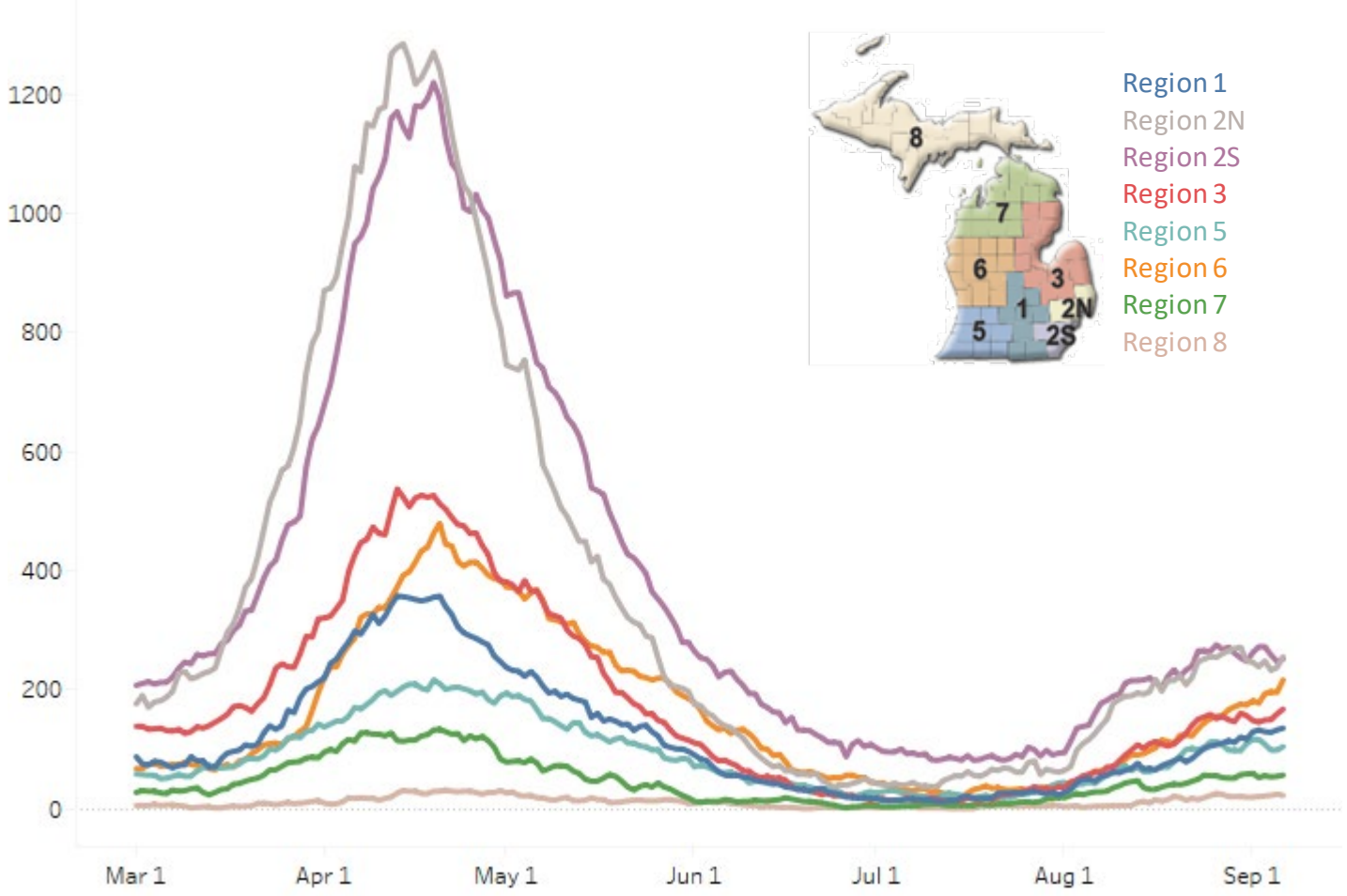
Growth in overall hospitalizations has slowed over the past 2 weeks.

Hospitalized COVID Positive Long Term Trend (beginning March 2020)



Statewide Hospitalization Trends: Regional COVID+ Census

Hospitalization Trends 3/1/2021 – 9/6/2021
Confirmed Positive by Region



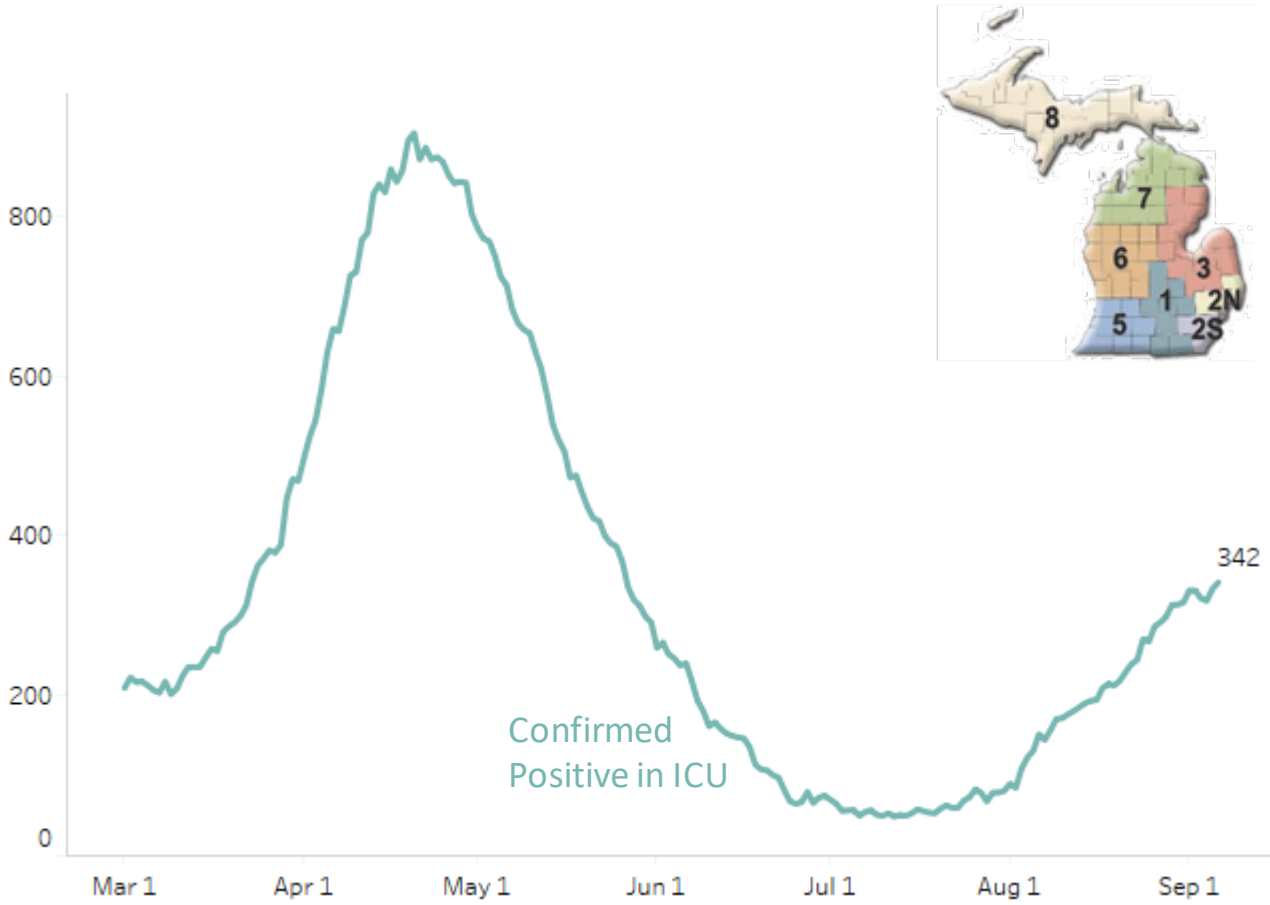
There are notable regional variations in COVID+ hospitalizations trends this week.

Region 6 has the fastest growth followed by regions 1 and 8. Regions 2S, 2N, and 7 all show slight decreases.

All regions except Region 8 have above 100/M population COVID+ hospitalized.

Region	COVID+ Hospitalizations (% Δ from last week)	COVID+ Hospitalizations / MM
Region 1	135 (13%)	125/M
Region 2N	255 (-6%)	115/M
Region 2S	251 (-1%)	113/M
Region 3	167 (4%)	147/M
Region 5	104 (7%)	109/M
Region 6	216 (23%)	147/M
Region 7	56 (-2%)	112/M
Region 8	22 (10%)	71/M

Statewide Hospitalization Trends: ICU COVID+ Census



Overall, the census of COVID+ patients in ICUs has increased by 9% from last week.

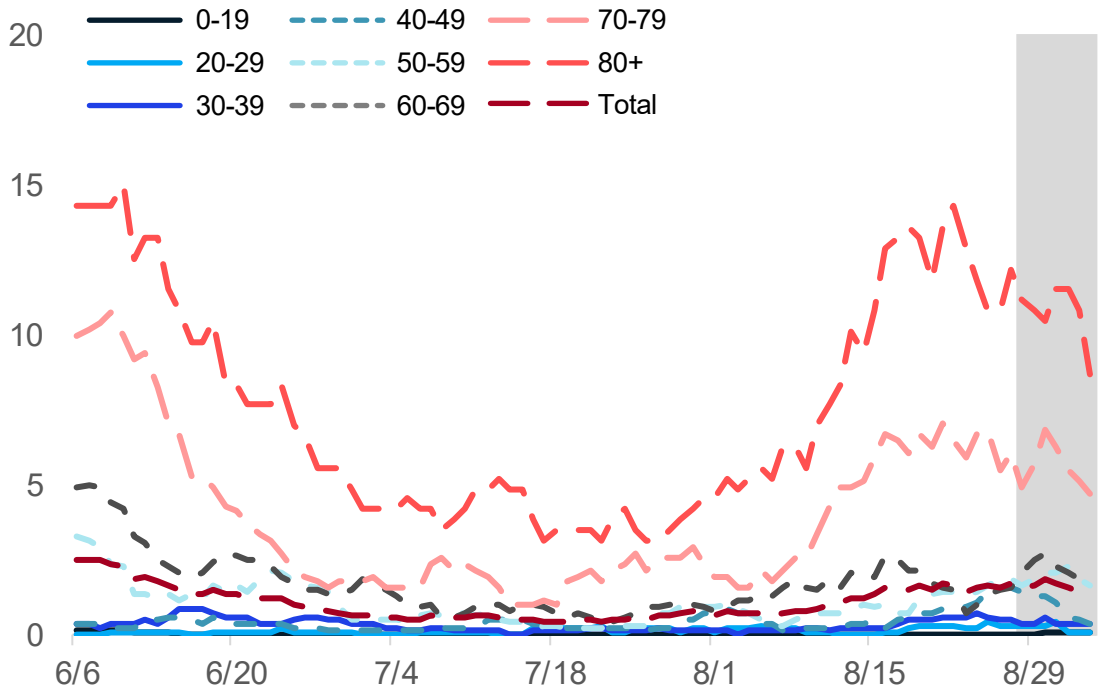
Regions 1 and 6 have the largest growth in ICU hospitalizations from last week. Region 3 had a notable decrease.

Regions 1 and 3 have adult ICU occupancy over 85% and >20% of ICU beds occupied by COVID+ patients.

Region	Adult COVID+ in ICU (% Δ from last week)	Adult ICU Occupancy	% of Adult ICU beds COVID+
Region 1	39 (34%)	91%	22%
Region 2N	68 (10%)	73%	12%
Region 2S	75 (1%)	82%	11%
Region 3	38 (-12%)	88%	11%
Region 5	27 (0%)	71%	14%
Region 6	58 (38%)	80%	24%
Region 7	27 (-4%)	80%	18%
Region 8	10 (11%)	66%	16%

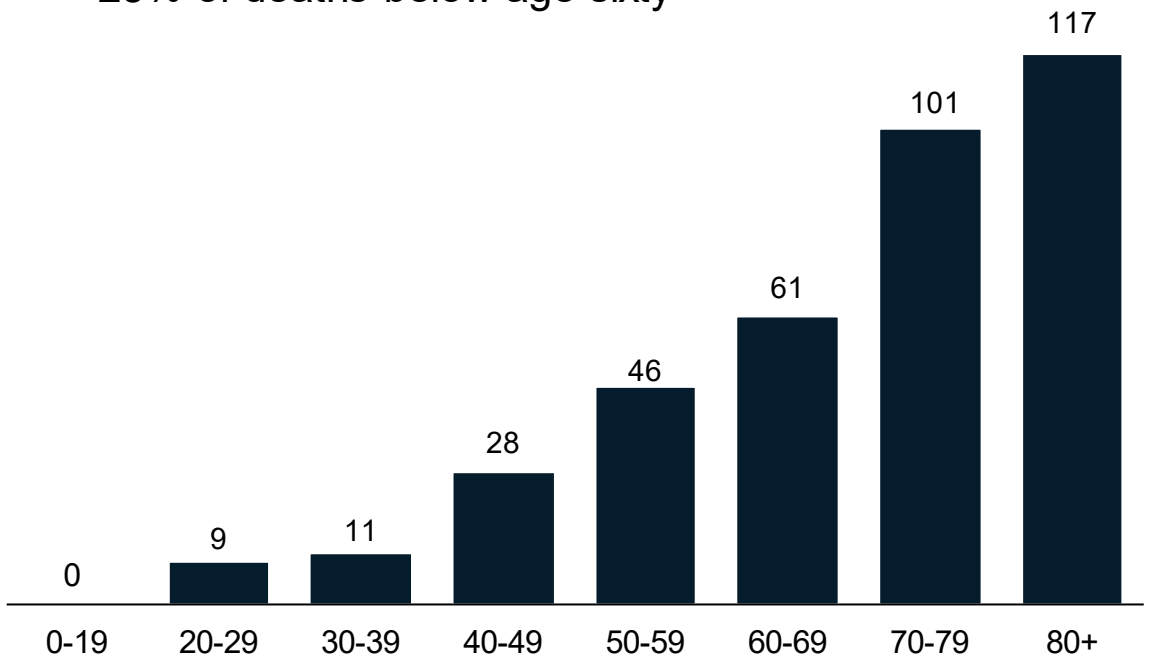
Average and total new deaths, by age group

Daily confirmed and probable deaths per million by age group (7 day rolling average)



Total confirmed and probable deaths by age group (past 30 days, ending 8/27/2021)

- 25% of deaths below age sixty

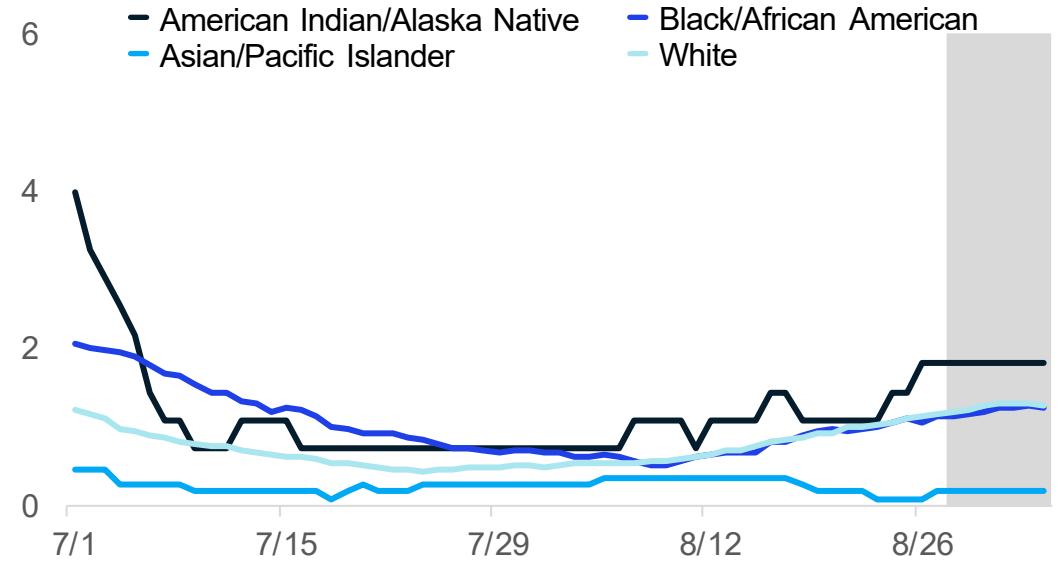


- Overall trends for daily average deaths are increasing since last week
- Through 8/27, the 7-day avg. death rate is more than 6.0 daily deaths per million people for those over the age of 70

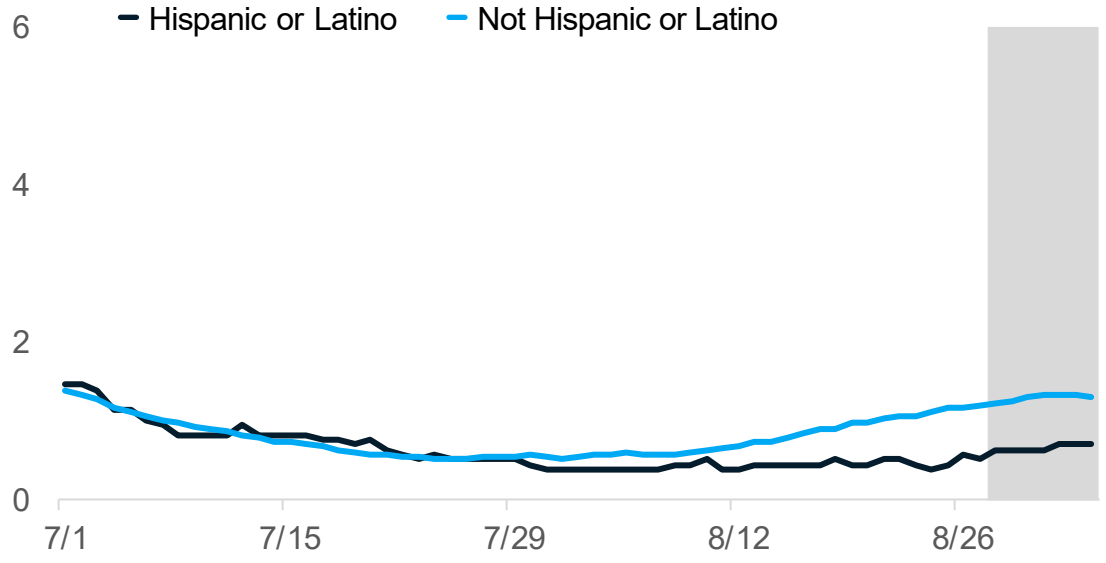
Note: Death information sourced from MDHHS and reflects date of death of confirmed and probable cases.
Source: MDHHS – Michigan Disease Surveillance System

30-day rolling average daily deaths per million people by race and ethnicity

Average daily deaths per million people by race



Average daily deaths per million people by ethnicity



- Additional reviews of vital records death data were performed the weeks of 7/6 and 8/9 to search for race and ethnicity
- This review has resulted in an adjustment of deaths for American Indian and Alaskan Natives from previous weeks
- **Currently, American Indian/Alaskan Natives have the highest death rate**

Note: Death information sourced from MDHHS and reflects date of death of confirmed and probable cases.
Source: MDHHS – Michigan Disease Surveillance System

COVID-19 Vaccination

Administration (doses administered)

- 5,357 first doses administered each day (7-day rolling average*)
- Most administered frequently by pharmacies, local health departments, and hospitals

Coverage (people vaccinated)

5.07 million people in the state are fully vaccinated

82.9% of people aged 65 and older have completed the series (+0.2%)

55.5% of total population initiated (+0.3%)

- 66.7% (+0.3) of aged 18+ have had first dose of vaccine; 87.3% (+0.2) of aged 65+ have had first dose
- 5,070,925 people in Michigan have completed vaccination series (5,040,341 and 4,992,872 in last 2 weeks)
- Initiation highest among Asian, Native Hawaiian or Pacific Islander and American Indian/Alaskan Native individuals (MI COVID Vaccine Dashboard 9/2/21)
- 35,922 Additional Doses for Immunocompromised Individuals administered since 8/31
- Less than 1% of Vaccinated Individuals Later Tested Positive for COVID-19 (Number of cases who are fully vaccinated (n= 20,987)

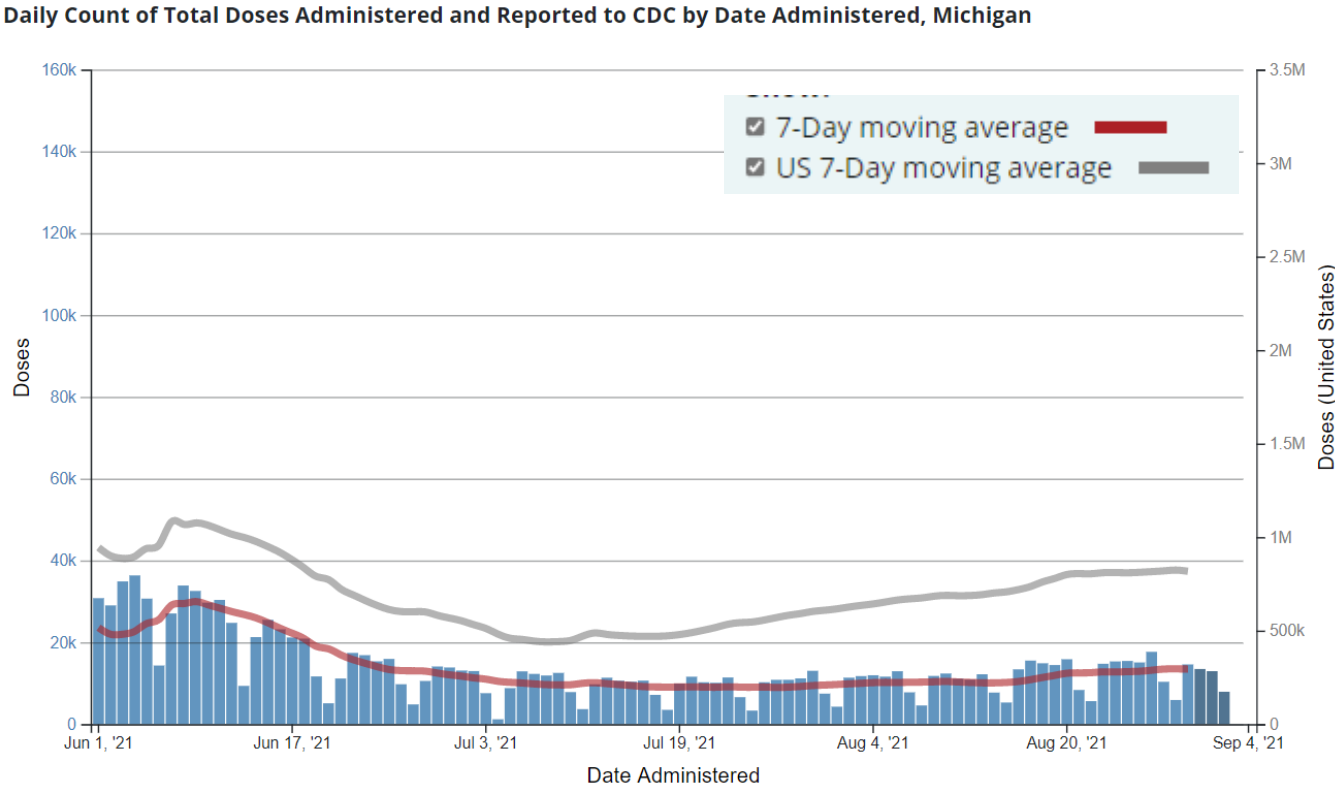
*https://covid.cdc.gov/covid-data-tracker/#vaccination-trends_vacctrends-onedose-daily

Doses administered in Michigan remains steady as national administration is slightly increasing (data through 9/6/2021)

13,032,980 doses delivered to providers and 10,249,429 doses administered*

MI 7-day rolling average ending September 2nd
- 37,499 first doses administered †
- 12,686 total doses/day on average †
- 5,357 first doses/day on average †

Total doses (between 8/29-9/4) were most frequently administered¶ by:
- Pharmacies (31K)
- LHD (3.5K) and hospitals (3.2K)
- Family practice (2.2K), FQHCs (1.8K), Health Center (777) and Pediatric (690)



Source: *CDC COVID Data Tracker > Vaccinations in the US, † CDC COVID Data Tracker > Vaccination Trends; ¶ MCIR COVID-19 Vaccine Dashboard

Over 5 Million Michiganders fully vaccinated and 50.8% of total population fully vaccinated

5.07 million people in the state are fully vaccinated*

82.9% of people aged 65 and older have completed the series (+0.2%)*

55.5% of total population initiated (+0.3%)*

35,922 additional doses¶

Race/Ethnicity¶ for those 12 years and older:

- Initiation coverage highest among those of Non-Hispanic (NH) Asian, Native Hawaiian or Pacific Islander Race (54.3%), then NH American Indian (51.7%), NH White (47.5%), NH Black or African American Races (36.9%).
- Initiation is at 49.0% for those of Hispanic ethnicity
- Completion follows the same pattern
- 19.9% data missing or unknown

Vaccination Coverage in Michigan as of 9/5/21

Age Group	% At Least One Dose	% Fully Vaccinated	Number Fully Vaccinated
Total Population	55.5%	**50.8%**	5,070,925
≥ 12 years	64.5%	59.0%	5,070,818
≥ 18 years	66.7%	61.3%	4,808,320
≥ 65 years	87.3%	82.9%	1,463,203

Source: *CDC COVID Data Tracker > Vaccinations in the US, ¶ MCIR COVID-19 Vaccine Dashboard

Potential COVID-19 Vaccination Breakthrough Cases

Michigan part of CDC's nationwide investigation (COVID-19 Breakthrough Case Investigations and Reporting | CDC)

Michigan Data (1/1/21 through 8/31/21):

- **20,987 cases met criteria based on a positive test 14 or more days after being fully vaccinated**
- **Less than 1% of people who were fully vaccinated met this case definition**
  - **Includes 302 deaths (266 in persons ages 65 years or older)**
  - **945 cases were hospitalized**

- Vaccine breakthrough cases are expected. COVID-19 vaccines are effective and are a critical tool to bring the pandemic under control. However, no vaccines are 100% effective at preventing illness. Some fully vaccinated people will get sick, and some will even be hospitalized or die from COVID-19. However, there is evidence that vaccination may make illness less severe for those who are vaccinated and still get sick. The risk of infection, hospitalization, and death are all much lower in vaccinated compared to unvaccinated people.
- More than 173 million people in the United States have been fully vaccinated as of August 30, 2021. Like with other vaccines, vaccine breakthrough cases will occur, even though the vaccines are working as expected. Asymptomatic infections among vaccinated people will also occur.
- Current data suggest that COVID-19 vaccines authorized for use in the United States offer protection against most SARS-CoV-2 variants circulating in the United States. However, variants will cause some vaccine breakthrough cases.

Science Round Up

Deeper look at trends: What happening in other states and comparison to past surges

- A few states that have experienced the largest per capita surge are starting to decline
  - The Delta surge in many states, including Michigan, continue to see increases
- The reproduction number (R_t) in Michigan may be slowing, although burden of pandemic continues to be high in Michigan
- CDC models project continued increases in cases, hospitalizations, and deaths for Michigan
- As the public health pandemic response has improved in Michigan, the burden has also diminished

What do we know about schools

- Delta variant can be highly transmissible in schools, and failure to comply with mitigation measures consistently increases likelihood of potential outbreaks
- Number of reported outbreaks increased since last week (11 to 41), including increases in High Schools (7 to 14), Middle/Jr High (0 to 6), Pre K-Elementary (3 to 19), and Administrative (1 to 2).

Update on breakthrough cases and boosters

- 50.8% of the population is fully vaccinated yet only account for ~25% of cases, hospitalizations, and deaths
- Without appropriate mitigations, we see large outbreaks in schools and children experiencing severe COVID-19 illness

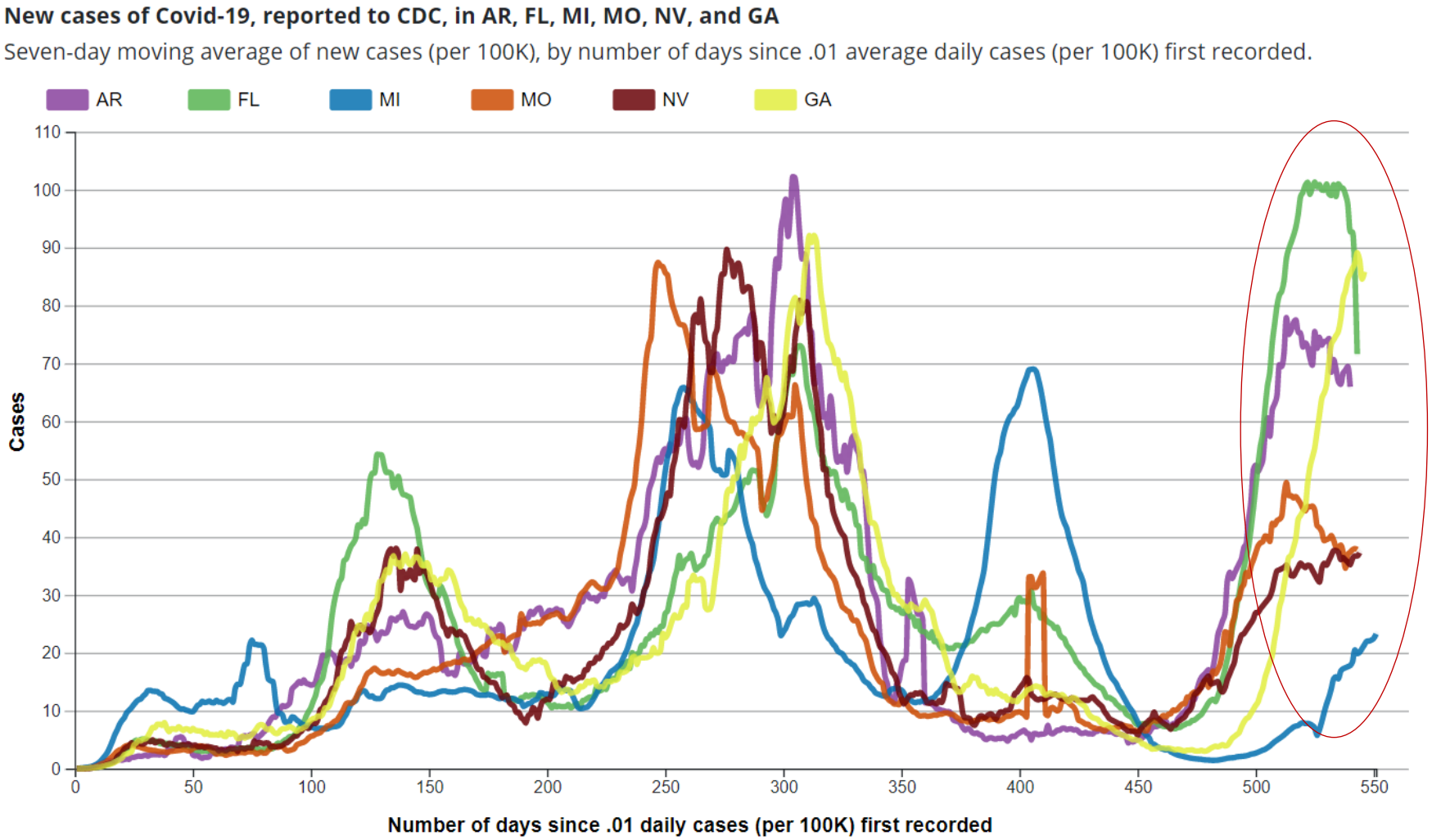
Importance of Continue Mitigation

- Reduction of the severity of infections (individuals) and magnitude of people infected
- Settings where mitigations have been consistently applied have seen a reduction in overall infection burden

Deeper look at trends: What happening in other states and comparison to past surges

COVID-19 Case Rates: States with High Delta Comparison

- Average daily incidence per 100,000 cases in Michigan is currently lower than other states experiencing a surge in delta cases
- Several states impacted by delta are beginning to see a decline in case rate
  - Including LA and FL

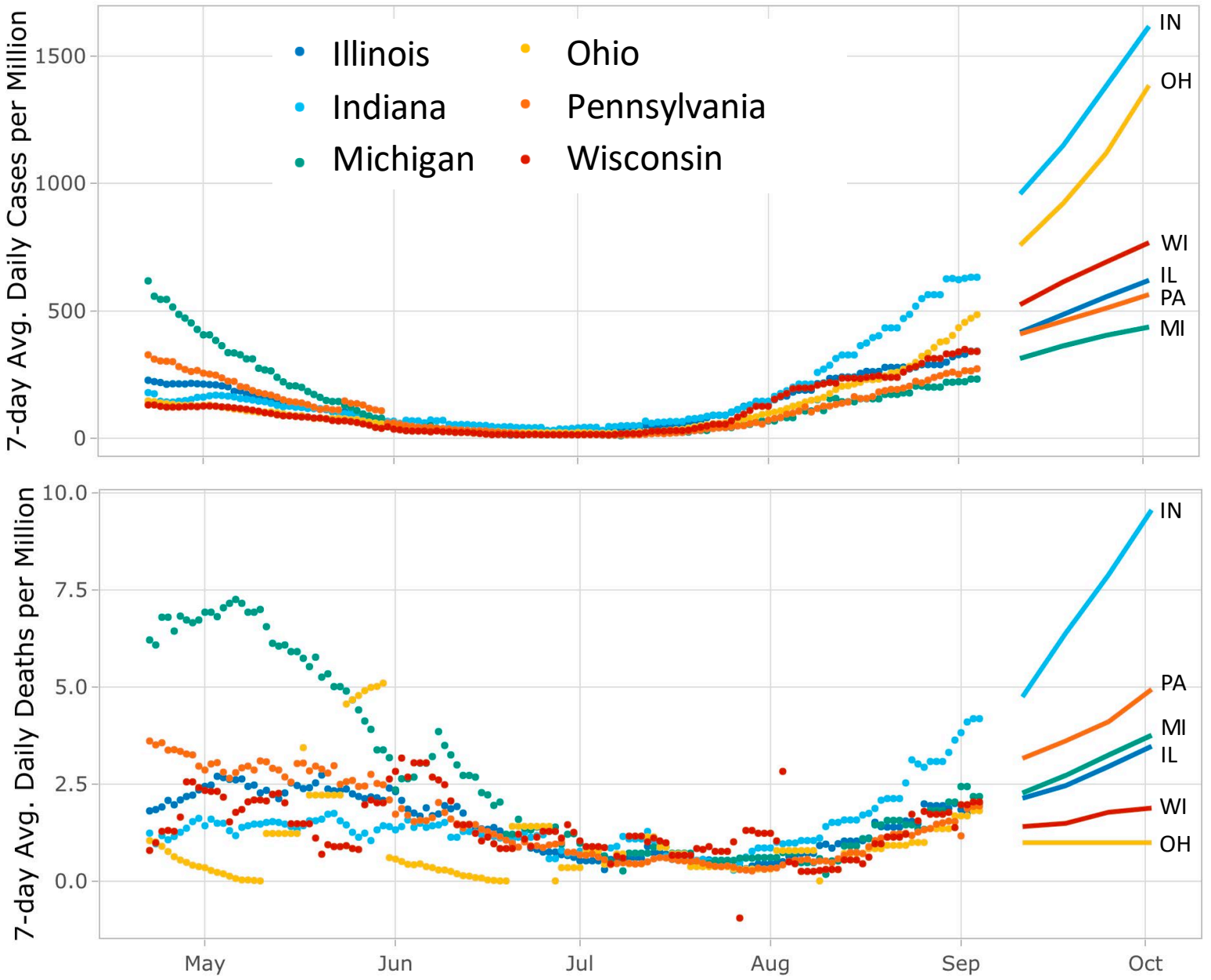


Source: CDC COVID Data Tracker – State Trend Comparison

Ridge regression model projects continued increases for Michigan and neighboring states

- Cases and deaths are projected to continue increasing across the Midwest
- Uncertainty range includes potential for sustained or slowed growth (not shown)

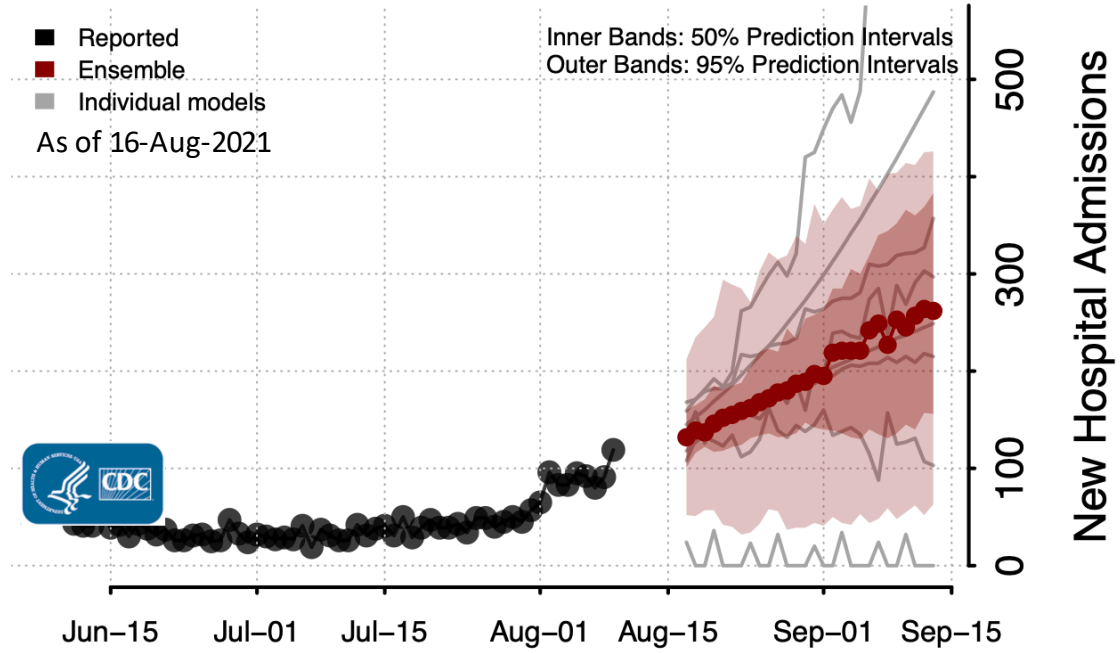
- Line is the ridge regression model projection, and the shaded region represents the 95% (not shown for ease of viewing) confidence region (2.5% and 97.5% quantiles).
- Projections are based on previous data on cases, hospitalizations, and deaths, as well as data on mobility and vaccinations.
- Cases are plotted by report date.
- For full projections, see dataepi.org

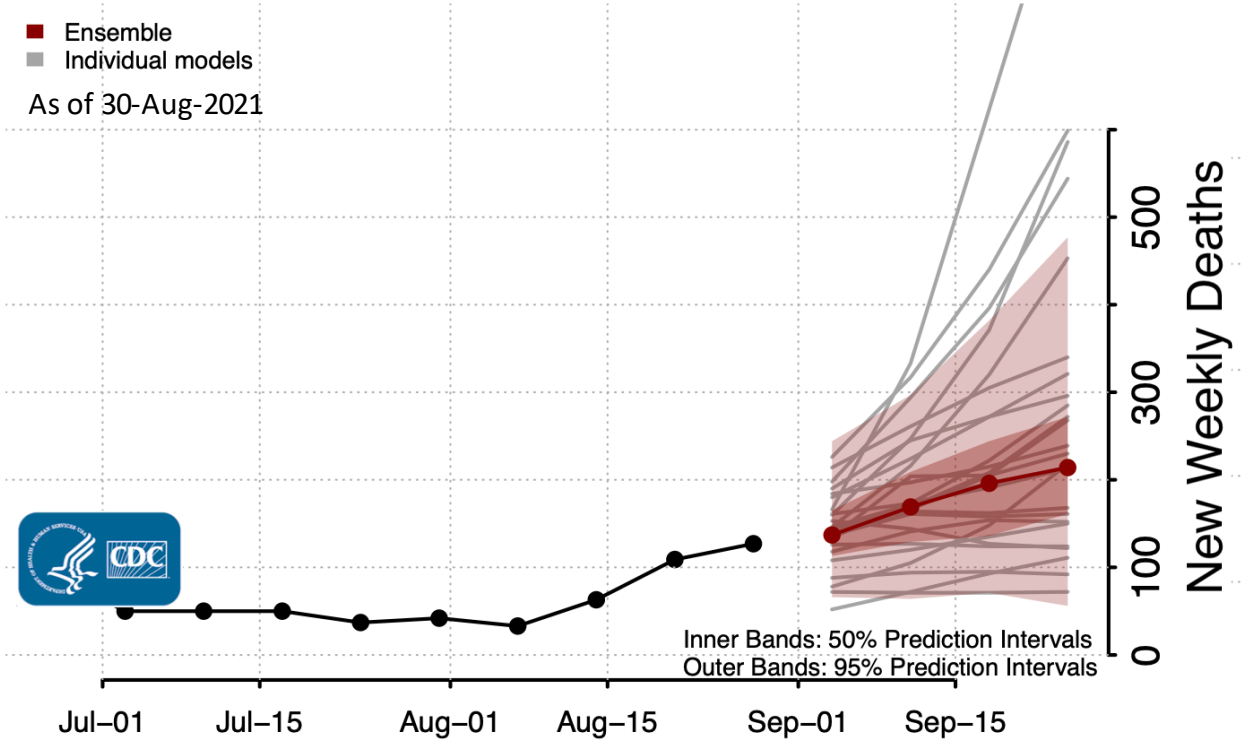


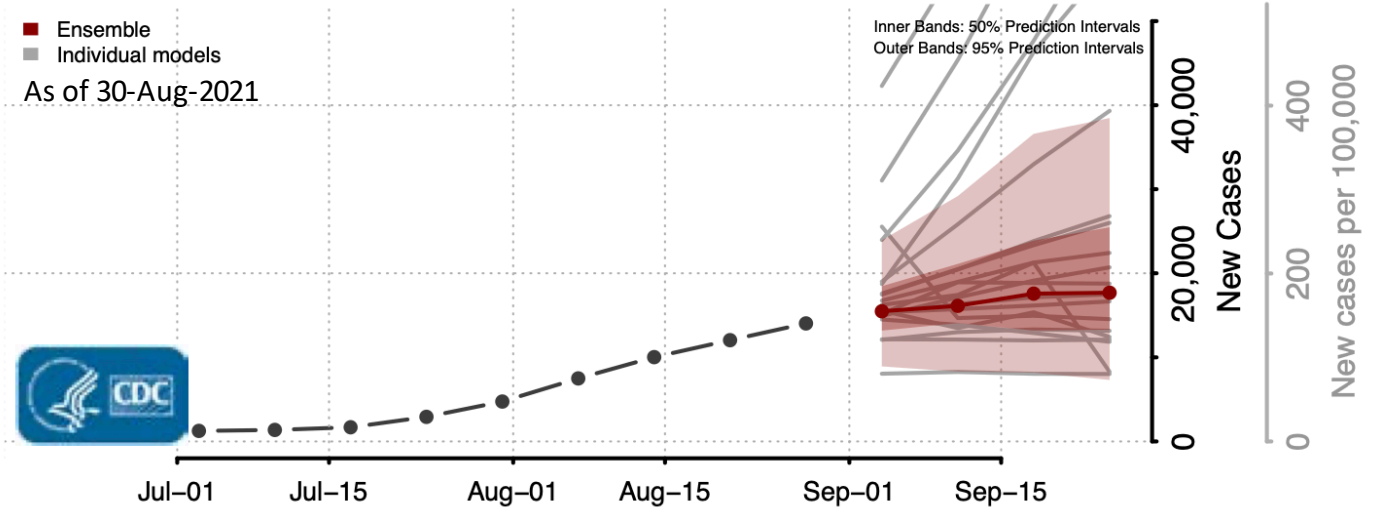
Sources: Data from MDHHS/JHU, [UM Ridge Regression Model]

CDC models project continued increases in hospitalizations, cases, and deaths for Michigan

Uncertainty ranges from flat to increasing—suggests slowing but still increasing



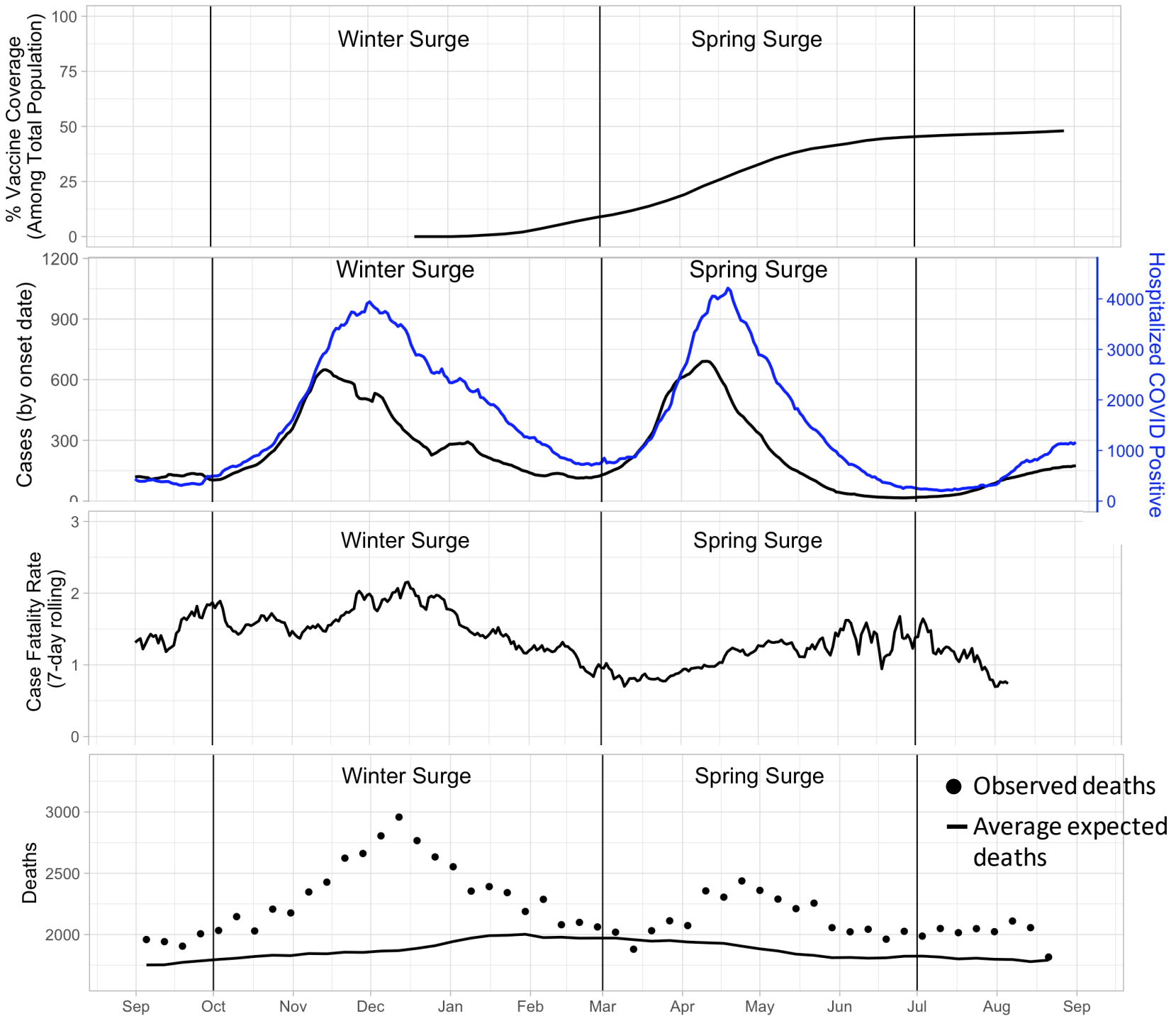




Data Sources: [CDC mathematical model forecasting](), [CovidComplete Data Center]() model forecast evaluations. Individual models shown as grey lines, ensemble shown in red

Although the winter and spring surges had similar peak cases and hospitalizations, the spring surge had fewer excess deaths above expected

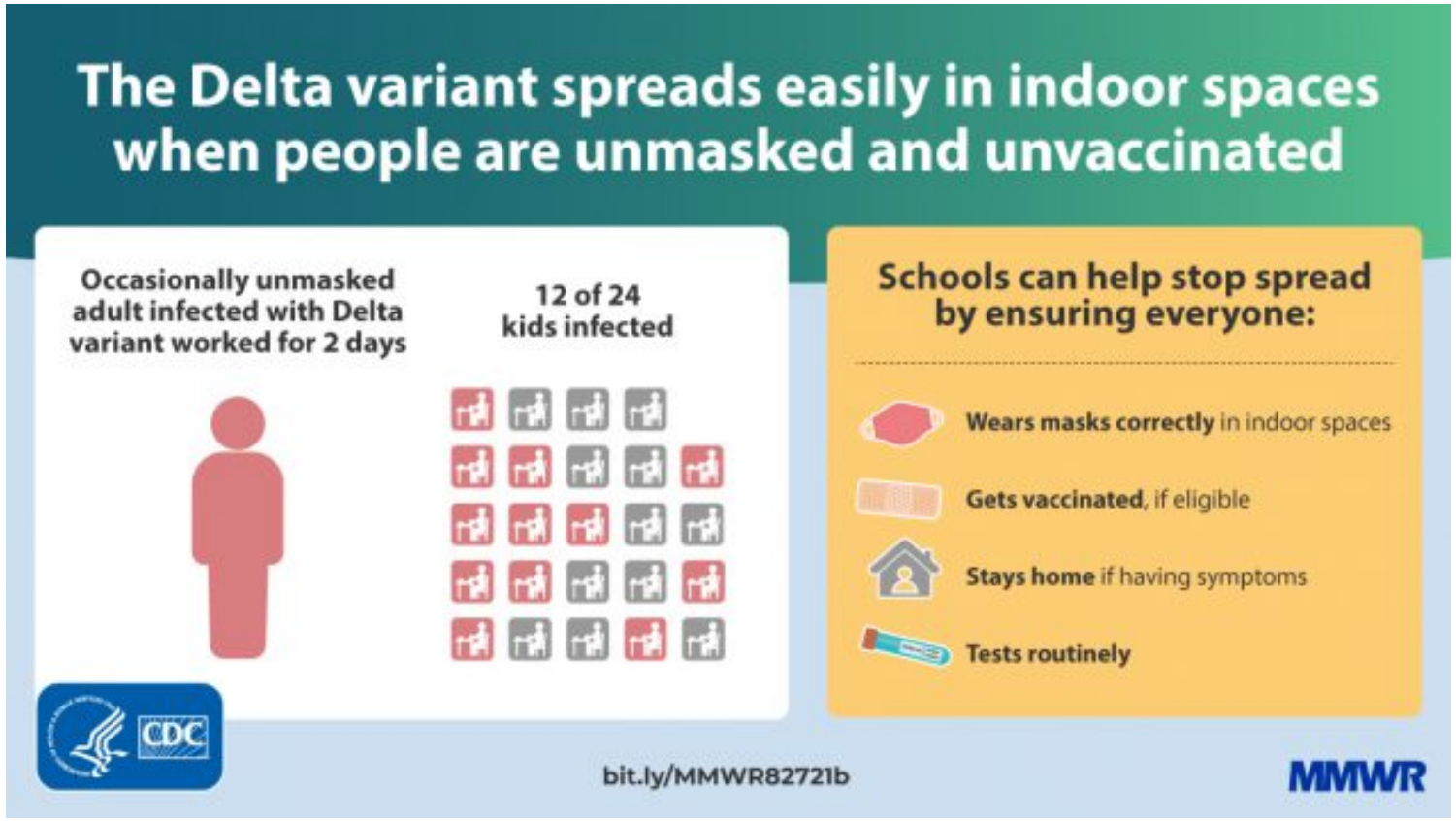
- By the spring surge, early vaccination efforts had reached the most vulnerable age groups

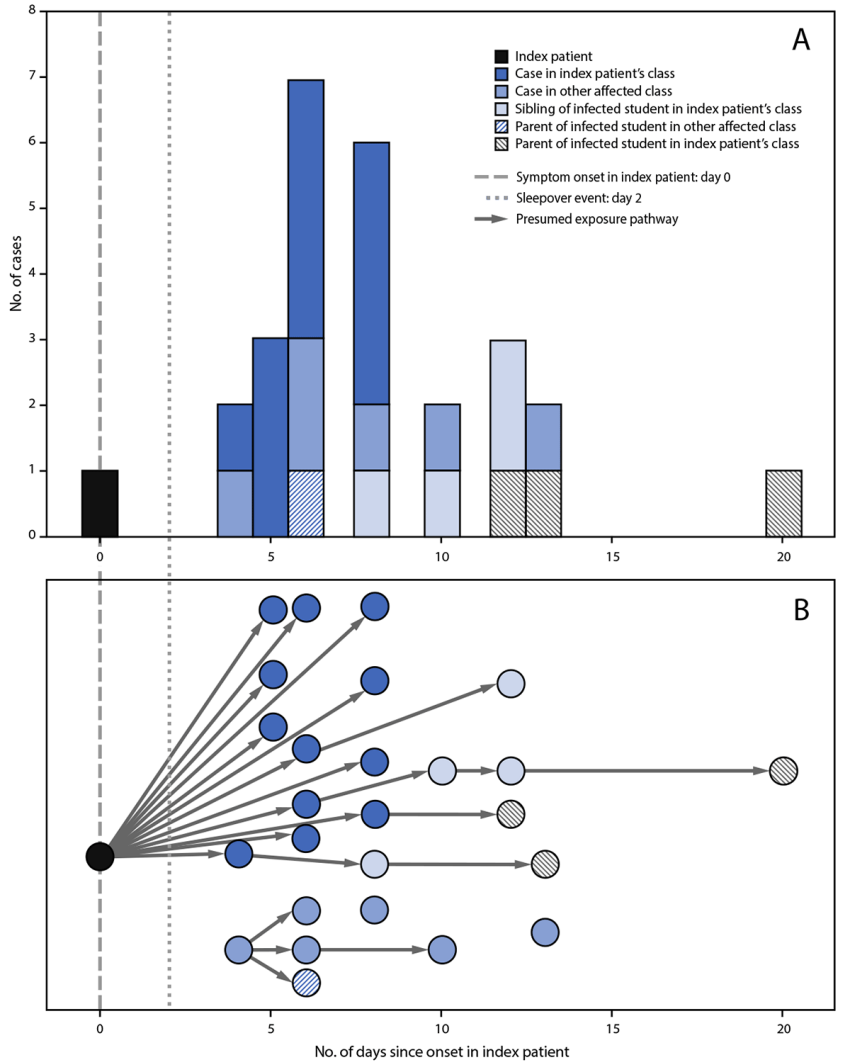


Sources: CDC, MDHHS

What do we know about COVID impact on schools

Outbreak Associated with SARS-CoV-2 B.1.617.2 (Delta) Variant in an Elementary School





- 22 of the 24 students were ineligible for vaccine due to age; 12 kids infected
- Students in the first two rows were more likely be infected
- In addition to vaccination, consistent and correctly adhering to multiple nonpharmaceutical prevention strategies, including masking, are important to ensure safe school instruction

Source: Lam-Hine (2021) Outbreak Associated with SARS-CoV-2 B.1.617.2 (Delta) Variant in an Elementary School — Marin County, California, May–June 2021

August hospitalizations increased 4x in states with low vaccination levels compared to those with high vaccination levels

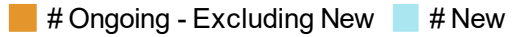
- Severe COVID-19 illness can occur in children and adolescents
- Between August 14 – August 27, 2021, COVID-19 related **ED visits** in the states with the lowest vaccination coverage were **3.4 times** that in the states with the highest vaccination coverage
- Between August 14 – August 27, 2021, COVID-19 related **hospital admissions** in the states with the lowest vaccination coverage were **3.7 times** that in the states with the highest vaccination coverage
- Between August 2020 and August 2021, the proportion of COVID-19 patient who were children or adolescents ranged from 10% to 25%*
- ***Broad, community-wide vaccination of all eligible persons* is critical to protect pediatric populations from SARS-CoV-2 and severe COVID-19 illness**

* Select hospital included for hospital COVID-19 surveillance
Source: MMWR, 2021

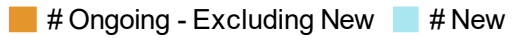
K-12 school outbreaks, recent and ongoing, week ending Sep 2

Number of reported outbreaks increased since last week (11 to 41), including increases in High Schools (7 to 14), Middle/Jr High (0 to 6), Pre K-Elementary (3 to 19), and Administrative (1 to 2).

Region	Number of reported cases, #	Number of outbreaks	Range of cases per outbreak
Region 1	31 45	14	2-14
Region 2n	2 9	4	2-4
Region 2s	- 11	3	2-6
Region 3	6 65	9	2-23
Region 5	6 5	4	2-4
Region 6	0 14	4	2-6
Region 7	0 0	0	0-0
Region 8	4 5	3	2-5
Total	49 154	**41**	**2-23**



Grade level	Number of reported cases, #	Number of outbreaks	Range of cases per outbreak
Pre-school - elem.	1(93	19	2-23
Jr. high/middle school	0 31	6	2-10
High school	37 25	14	2-14
Administrative	5 2	2	2-5
Total	52 151	**41**	**2-23**



Many factors, including the lack of ability to conduct effective contact tracing in certain settings, may result in significant underreporting of outbreaks. This chart does not provide a complete picture of outbreaks in Michigan and the absence of identified outbreaks in a particular setting in no way provides evidence that, in fact, that setting is not having outbreaks.
Source: LHD Weekly Sitreps

Update on breakthrough cases

Cumulative COVID-19 Cases by Vaccination Status, Michigan, Jan 15 – Aug 31

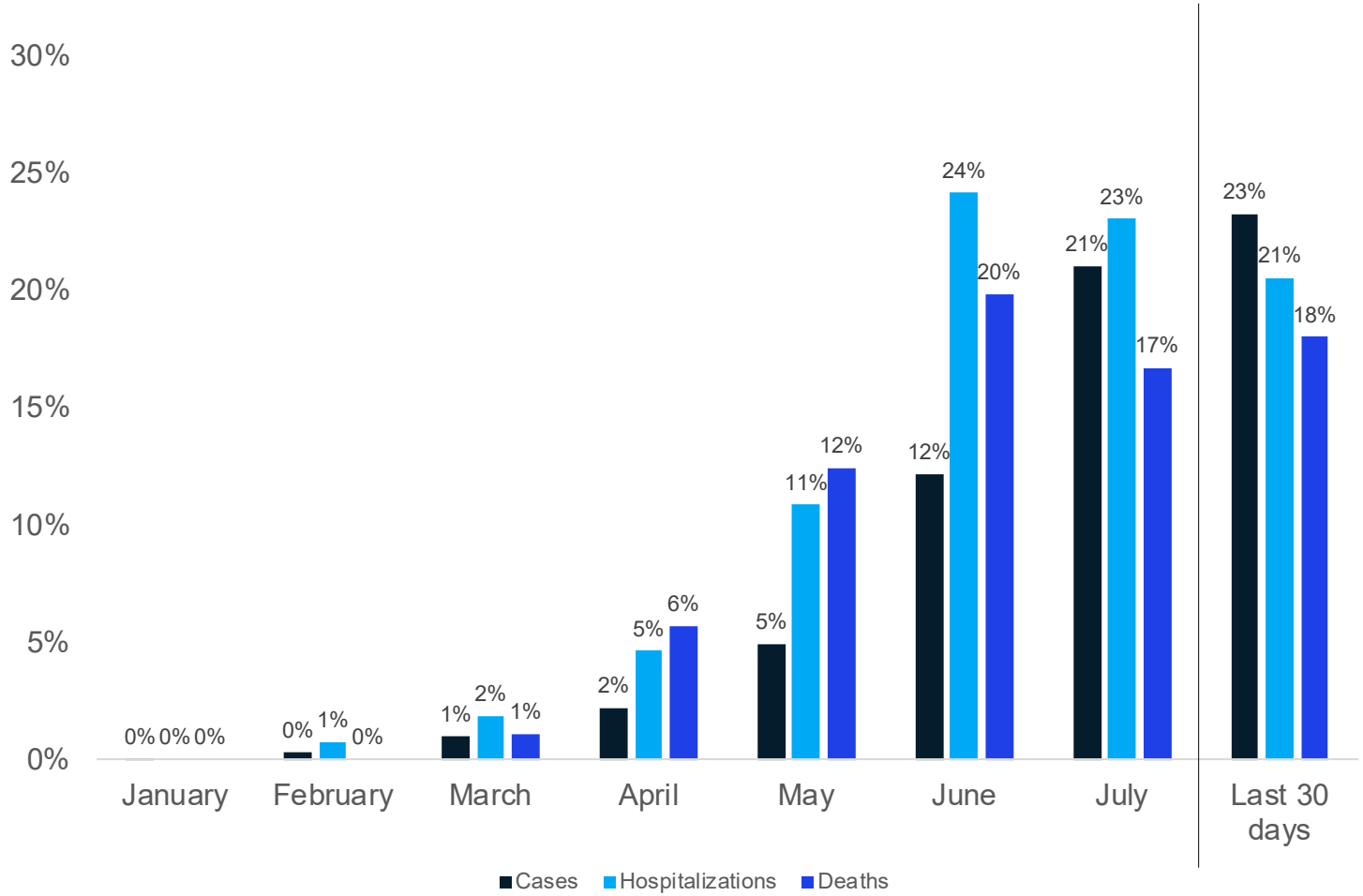
Fully Vaccinated People (4,720,133)		
Cases	**Hospitalization**	**Deaths**
Percent of Cases In People Not Fully Vaccinated (426,978 / 447,965) **95.3%**	Percent of Hospitalizations In People Not Fully Vaccinated (12,160 / 13,105) **92.8%**	Percent of Deaths In People Not Fully Vaccinated (4,911 / 5,213) **94.2%**
426,978 Total Cases Not Fully Vaccinated	**12,160** Total Hospitalized Not Fully Vaccinated	**4,911** Total Deaths Not Fully Vaccinated
Total Breakthrough Cases **20,987**	Total Breakthrough Hospitalizations **945**	Total Breakthrough Deaths **302**
0.445% Percent of Fully Vaccinated People who Developed COVID-19 (20,987 / 4,720,133)	**0.020%** Percent of Fully Vaccinated People Who Were Hospitalized for COVID-19 (945 / 4,720,133)	**0.006%** Percent of Fully Vaccinated People Who Died of COVID-19 (302 / 4,720,133)
4.7% Percent of Cases Who Were Fully Vaccinated (20,987 / 447,965)	**7.2%** Percent of Hospitalizations Who Were Fully Vaccinated (945 / 13,105)	**5.8%** Percent of Deaths Who Were Fully Vaccinated (302 / 5,213)
Total Cases: **447,965**	Total Hospitalizations: **13,105**	Total Deaths: **5,213**

Michigan Disease Surveillance System may underestimate the frequency of COVID-19 hospitalizations:
- Case investigation and follow-up is more difficult for individuals who get vaccinated (e.g., they are too ill to speak to investigators, don't answer their phone, or otherwise).
- These hospitalizations include individuals who are hospitalized for issues other than COVID19 (the same as breakthrough COVID-19).
- Individuals who get hospitalization will lag after infection and may occur after case investigation.

Trends in Breakthrough Cases, Hospitalizations, and Deaths

- 50.8% of the population is fully vaccinated yet only account for ~20-25% of cases, hospitalizations, and deaths
- As the fully vaccinated population has increased, so have the percent of breakthrough incidents; but breakthrough burden remains lower

In the last 30 days (Aug 1 – Aug 30), 10,359 (23%) of 44,623 cases, 269 (21%) of 1,312 hospitalizations, and 32 (18%) of 178 deaths were among fully vaccinated individuals



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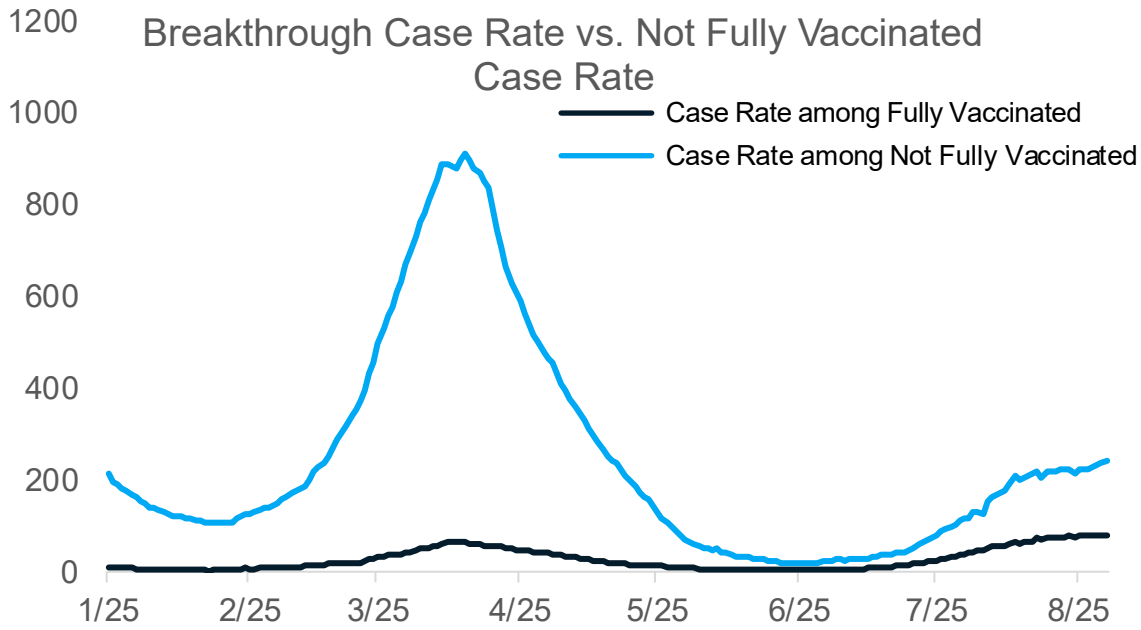
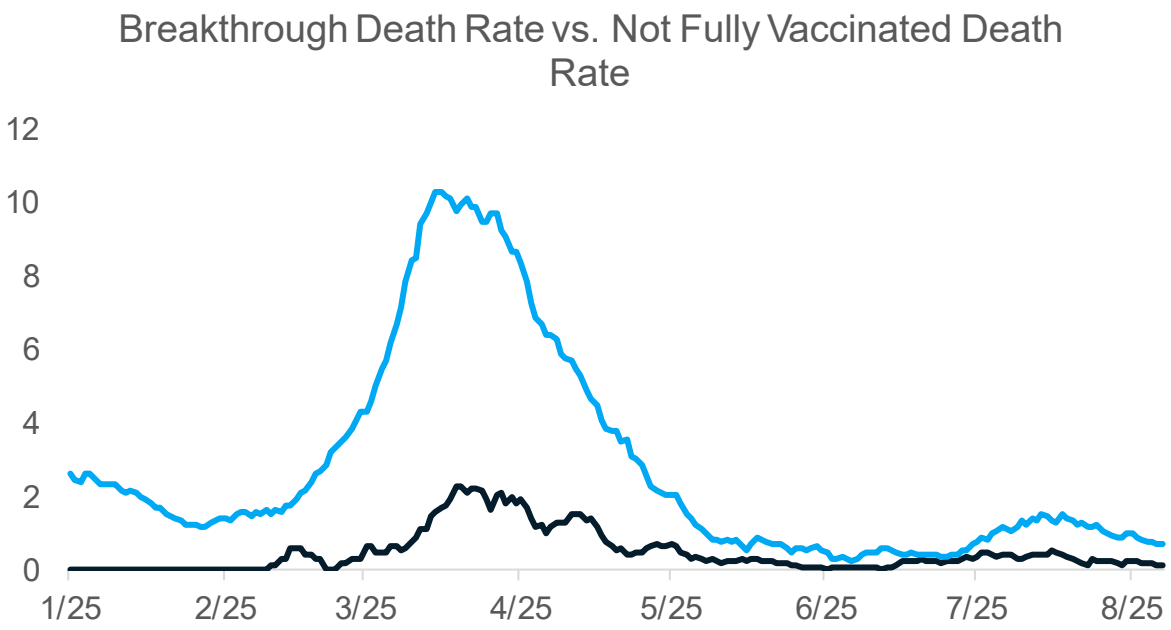
COVID-19 Vaccination Breakthrough Cases and Deaths





- Trends over time show that both case and death rates among the Fully Vaccinated are lower than the Not Fully vaccinated rates in Michigan
- The *proportion* of breakthrough cases and deaths among all cases and deaths has shown some increases as more people become fully vaccinated
  - However, the risk of infection and death remains significantly lower among the fully vaccinated

Why do we still need mitigation measures?

Why do we still need mitigation measures?

Factors we normally talk about

☑ **Protect unvaccinated individuals**

- Under twelves
- Immunocompromised

☑ **Avoid overwhelming the health system**

- Stagger (or space out) infections
- Don’t let your entire population get infected at once

☑ **Protect vulnerable populations**

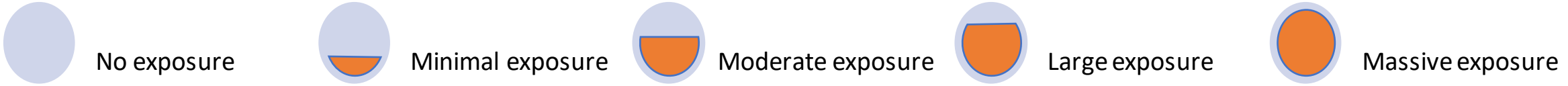
- Infections may still be severe in high-risk groups; elderly, underlying conditions

Exposure and Infection

"Aren't we all going to get infected anyway?"

A. How many people tend to think about infection and exposure

B. A more nuanced view (must also take into account individual factors)



No exposure
No disease

Minimal exposure
Asymptomatic infection

Moderate exposure
Mild symptoms

Large exposure
Severe symptoms

Massive exposure
Overwhelming symptoms

Amount of exposure matters

We can reduce the severity of infections: **the inoculum effect**

→ Vaccination, masking and distancing reduce the viral dose

Individual	Exposed to small viral dose	Milder disease than someone exposed to large viral dose
Communities	Masks, distancing, vaccination	Less disease spread, fewer severe cases

- Van Damme W, Dahake R, van de Pas R, Vanham G, Assefa Y. COVID-19: Does the infectious inoculum dose-response relationship contribute to understanding heterogeneity in disease severity and transmission dynamics?. *Med Hypotheses*. 2021;146:110431. doi:10.1016/j.mehy.2020.110431
- María Pilar Guallar, Rosa Meiriño, Carolina Donat-Vargas, Octavio Corral, Nicolás Jouvé, Vicente Soriano. Inoculum at the time of SARS-CoV-2 exposure and risk of disease severity. International Journal of Infectious Diseases. Volume 97. 2020. Pages 290-292. ISSN 1201-9712. https://doi.org/10.1016/j.ijid.2020.06.035.
- Fain B, Dobrovolny HM. Initial Inoculum and the Severity of COVID-19: A Mathematical Modeling Study of the Dose-Response of SARS-CoV-2 Infections. Epidemiologia. 2020; 1(1):5-15. https://doi.org/10.3390/epidemiologia1010003
- Gandhi M, Beyrer C, Goosby E. Masks Do More Than Protect Others During COVID-19: Reducing the Inoculum of SARS-CoV-2 to Protect the Wearer. J Gen Intern Med. 2020 Oct;35(10):3063-3066. doi: 10.1007/s11606-020-06067-8. Epub 2020 Jul 31. PMID: 32737790; PMCID: PMC7393808.
- Michel Bielecki, Roland Züst, Denise Siegrist, Daniele Meyerhofer, Giovanni Andrea Gerardo Crameri, Zeno Stanga, Andreas Stettbacher, Thomas Werner Buehrer, Jeremy Werner Deuel, Social Distancing Alters the Clinical Course of COVID-19 in Young Adults: A Comparative Cohort Study, Clinical Infectious Diseases, Volume 72, Issue 4, 15 February 2021, Pages 598–603, https://doi.org/10.1093/cid/ciaa889

Outbreak at a Swiss Army Base

Slow spread was occurring, but infections were more likely to be mild

Company 1
154 soldiers
Social distancing and masking

- No symptomatic cases
- 13+ asymptomatic cases

Companies 2&3
354 soldiers
No measures before first case

- 102 symptomatic cases (29%)
- 113+ asymptomatic cases

Michel Bielecki, Roland Züst, Denise Siegrist, Daniele Meyerhofer, Giovanni Andrea Gerardo Crameri, Zeno Stanga, Andreas Stettbacher, Thomas Werner Buehrer, Jeremy Werner Deuel, Social Distancing Alters the Clinical Course of COVID-19 in Young Adults: A Comparative Cohort Study, Clinical Infectious Diseases, Volume 72, Issue 4, 15 February 2021, Pages 598–603, https://doi.org/10.1093/cid/ciaa889

Clusters of COVID-19 in Madrid

1st Cluster

25 women living in a large house

High ceilings, good ventilation, social distancing

Uninfected = 3
Asymptomatic = 4
Mild = 18
Severe = 0

2nd cluster

12 women living in an apartment

Crowded and poor compliance with social distancing

Uninfected = 0
Asymptomatic = 2
Mild = 4
Severe = 6

3rd Cluster

10 adults meeting in a small conference room for 3 hours

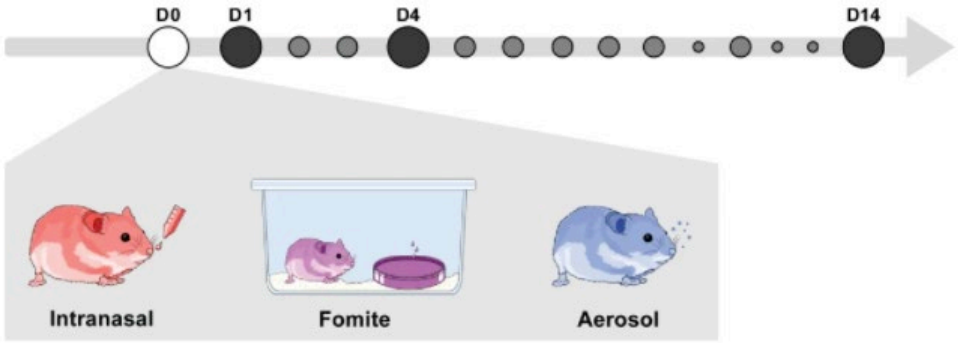
No masks, no distancing

Uninfected = 0
Asymptomatic = 0
Mild = 5
Severe = 5

María Pilar Guallar, Rosa Meiriño, Carolina Donat-Vargas, Octavio Corral, Nicolás Jouvé, Vicente Soriano. Inoculum at the time of SARS-CoV-2 exposure and risk of disease severity. International Journal of Infectious Diseases. Volume 97. 2020. Pages 290-292. ISSN 1201-9712. https://doi.org/10.1016/j.ijid.2020.06.035.

Type of exposure matters

Reducing aerosolized particles can prevent severe disease

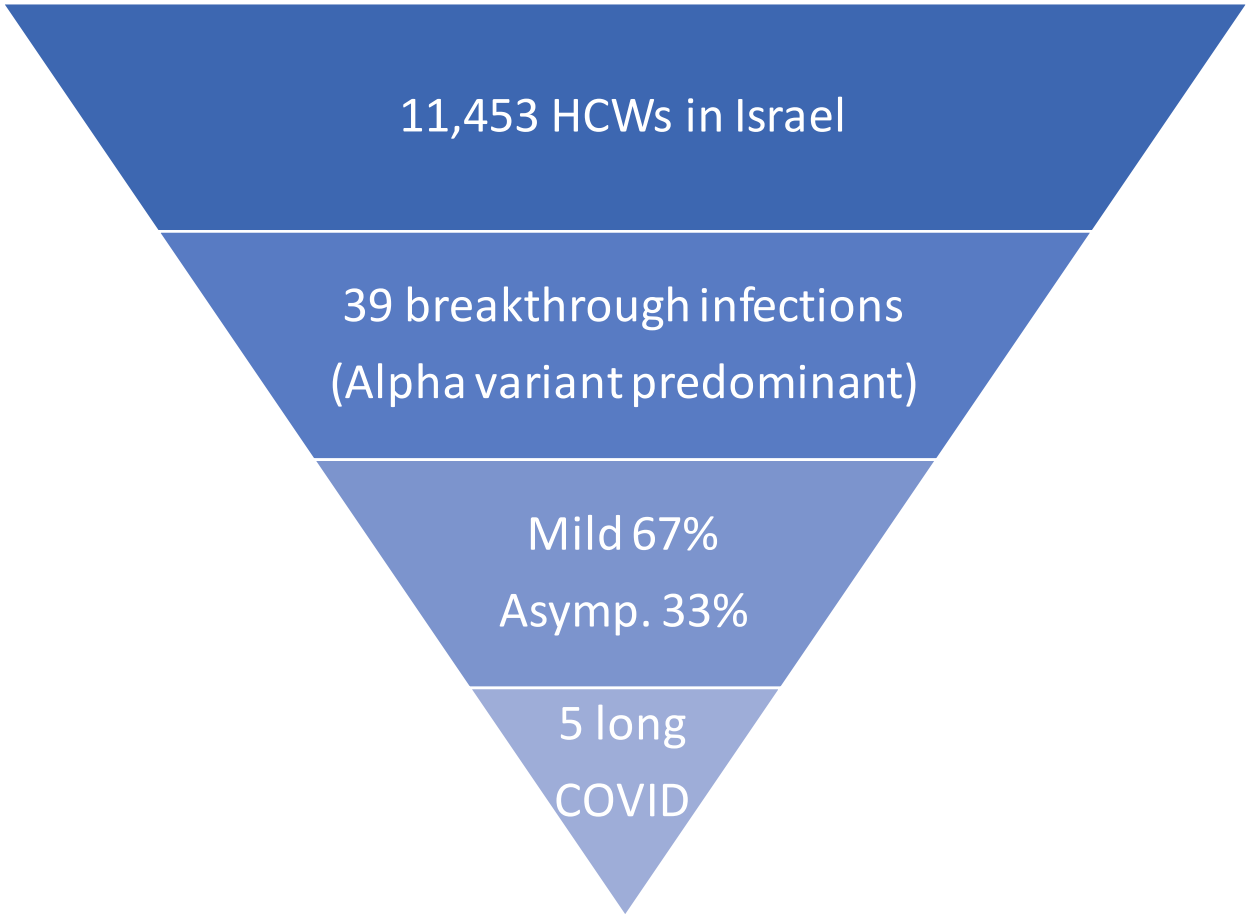


- Different routes of exposure present with distinct disease patterns
  - Intranasal and aerosol inoculation →
    - severe respiratory disease
    - higher viral load
    - early shedding
  - Fomite exposure →
    - milder disease
    - delayed shedding

Port, J.R., Yinda, C.K., Owusu, I.O. *et al.* SARS-CoV-2 disease severity and transmission efficiency is increased for airborne compared to fomite exposure in Syrian hamsters. *Nat Commun* **12,** 4985 (2021). https://doi.org/10.1038/s41467-021-25156-8

It is better to get infected after vaccination instead of before

This data needs to be reevaluated in light of Delta

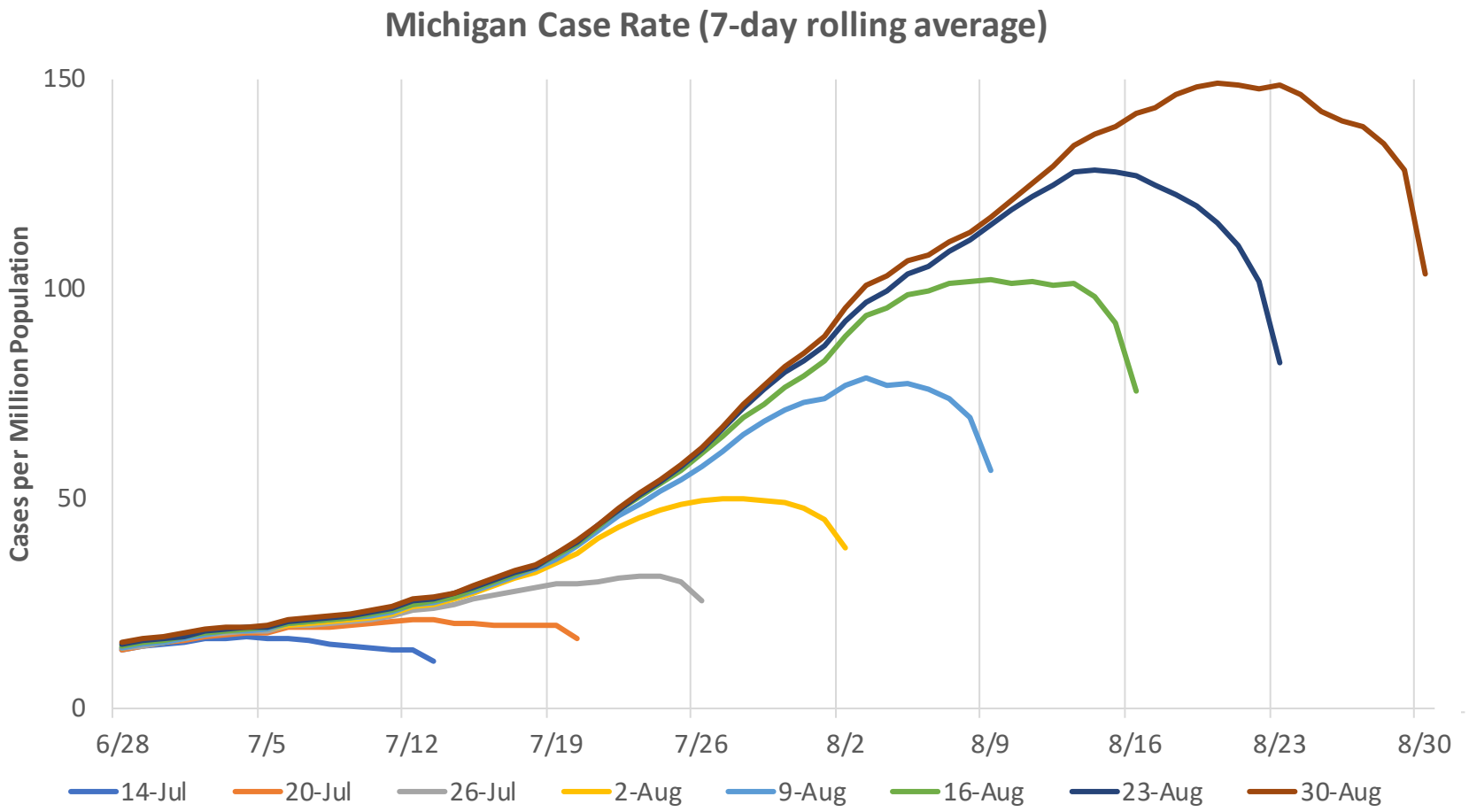


Bergwerk M et al. Covid-19 breakthrough infections in vaccinated health care workers. *N Engl J Med* 2021 Jul 28; [e-pub]. (https://doi.org/10.1056/NEJMoa2109072)

Appendix

Backfill of case data by onset date is lagging by two weeks

- Over the last 8 weeks, it has taken longer for cases to be reported to local public health which means that the graphs are not as accurate for recent days
- More cases are reported to local public health with an earlier onset date (i.e., between 7 and 14 days prior)
- The likely explanation is that fewer individuals are seeking a COVID-19 test earlier in their disease progression

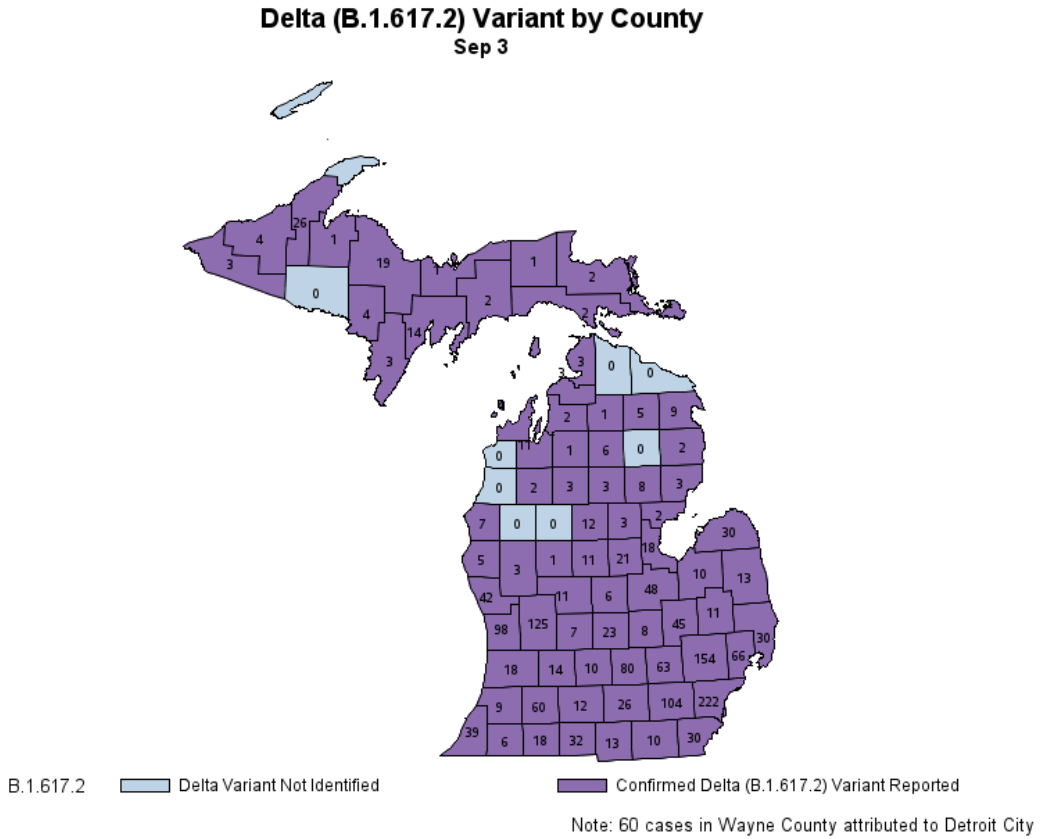


Source: MI Start Map; MDOC excluded

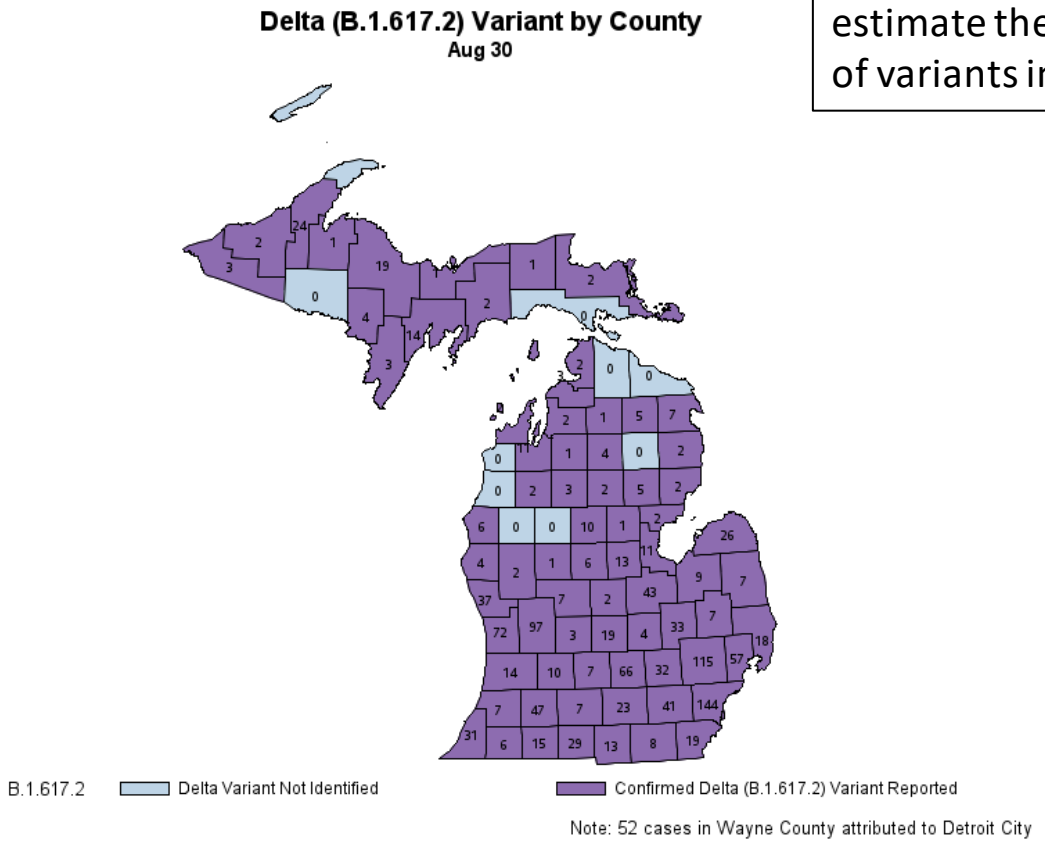
Identified COVID-19 Delta Variants by County

Note: The low number of specimens recently submitted for sequencing limits the ability to estimate the prevalence of variants in Michigan

This week (Sep 3, 2021)



Last week (Aug 30, 2021)



Data last updated Sep 3, 2021
Source: MDSS