COVID Pandemic Updates

February 4, 2022

AHMC COVID Team

Outline

1. Omicron Updates

(Malaysia) Source

3-Minute Omicron Review (1)

(CDC, FDA, NYT, etc)

1. **Infectivity: 2.7-4.2 times that of Delta.**
2. **Incubation Period: Omicron - 3 days, Delta - 4-5 days, original variants - 5 days.**
3. **Viral Load: 1 day shorter than Delta (3 days) to reach their peak viral loads.**
4. **Affected Organs: Omicron affects upper respiratory tract, less in lungs. Omicron may multiply 70x faster in bronchus but 10x lower in lungs versus Delta.**
5. **Cross Protection: Omicron infection seems to protect against Delta, but Delta infection offers little protection against Omicron.**

Source: Japan[1], Denmark[1], UK[1], CDC, Harvard, NYT, bioRxiv (1;2), HKU, AHRI

3-Minute Omicron Review (2)

(CNBC,CDC, medRxiv,NIH, etc)

6. Subvariants: BA.2 1.5x more contagious than BA.1; transmissibility (secondary attack rate) higher for BA.2; BA.2 may become the next dominant strain.

7. Severity: Omicron is less severe; 50% less hospitalization and 75% less ICU admission compared to Delta.

8. NIH Guideline: Changes in treatments for non-hospitalized adults: Paxlovid, Sotrovimab, Remdesivir, and Molnupiravir.

9. Vaccinations: Omicron had more breakthrough infections, but vaccinated are still protected from severe outcomes. 2-dose and 3-dose vaccinations are 82-97% effective against hospitalization with Omicron.

Source: CNBC, CDC, medRxiv, NIH, CDC

3-Minute Omicron Review (3)

(CDC, NYT, ACCPM, etc)

10. New Vaccines: Pfizer and Moderna are developing Omicron-specific vaccines.

11. Testing: Experts now recommend taking a rapid test 2-4 days after exposure (previously 5-7 days) 2 times, one day apart. Antigen tests might be less sensitive to Omicron than PCR tests.

12. New Isolation Rules: Infected people can leave isolation after 5 days if they are asymptomatic or are fever-free (previously 10 days). People should wear masks for an additional 5 days.

Source: CDC, NYT, ACCPM, CDC

3-Minute Omicron Review (4)

(Nature, FT, BHR, etc)

13. Long COVID: Symptoms develop ≥4 weeks after infection. It affects ⅓ (10-60%). Fully vaccinated were less likely to develop Long COVID.

14. U.S. Status: The U.S. had the lowest full-vaccination rate (64%), booster rate (42%), highest new case rate and death rate compared to other wealthy countries.

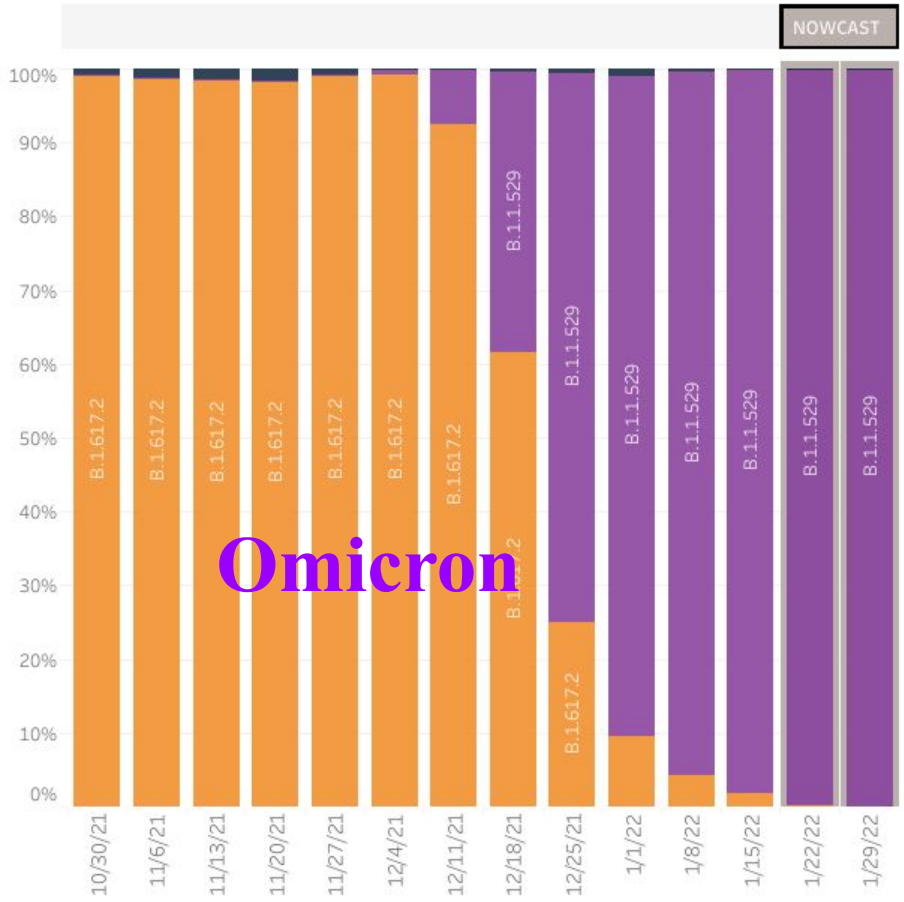
15. Forecasting: BA.2 appears to be overtaking BA.1, but BA.2 does not seem to be more severe.

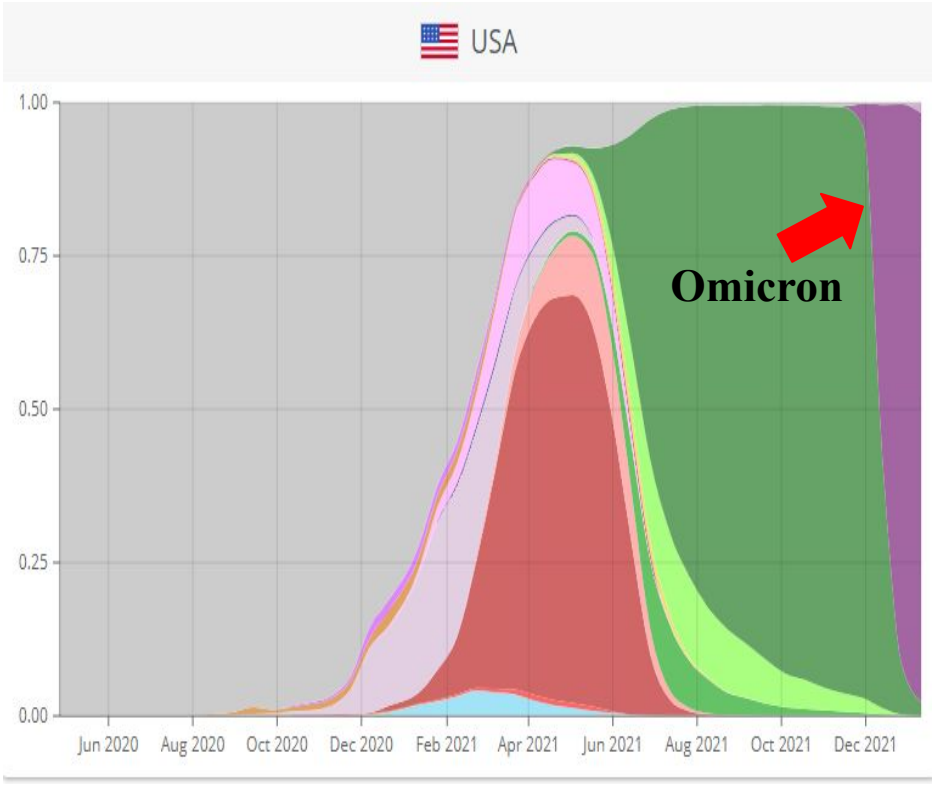
16. Endemicity: Given that the virus is unlikely to disappear completely, COVID-19 will inevitably become an endemic disease, which raises its own set of challenges.

Source: Nature, FT, NYT, BHR, Nature

CDC Data: Omicron Accounts for 99.9% of New Cases in the US (Delta 0.1%)

(CDC; NYT, 2/3/2022)



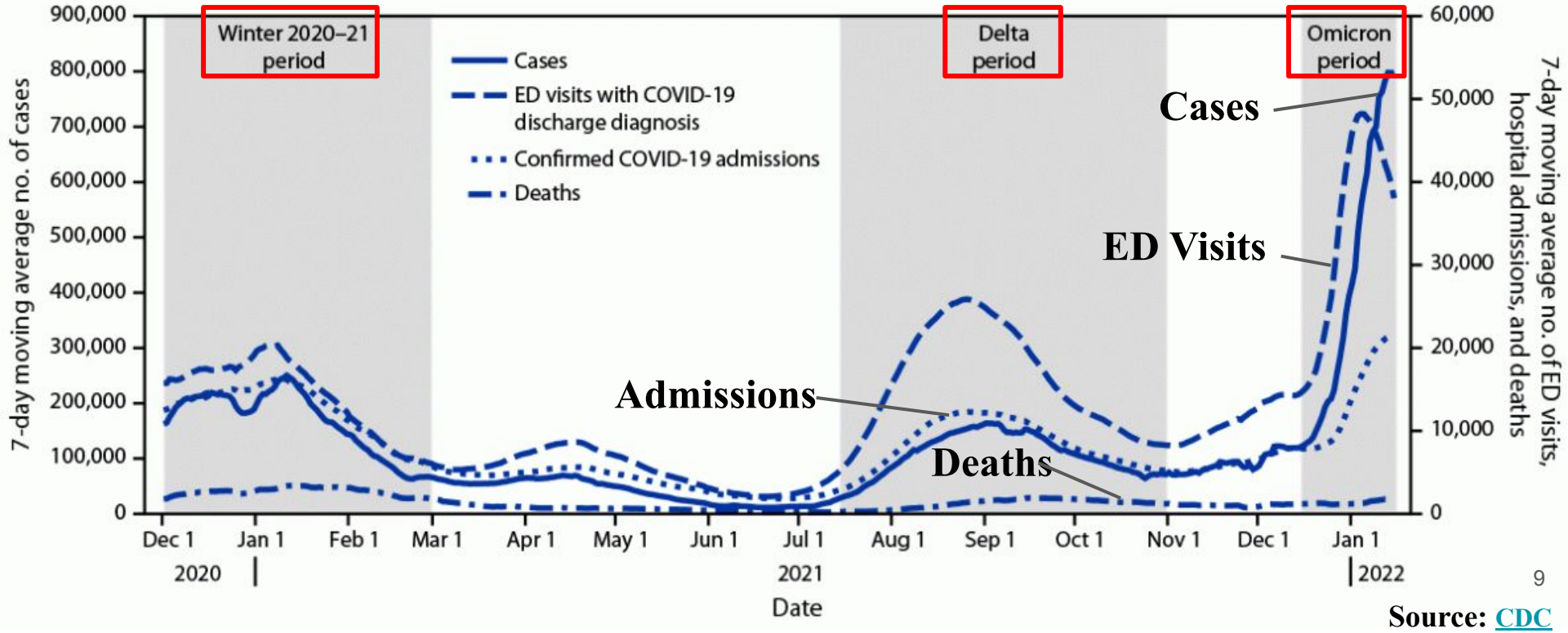


Source: CDC; NYT

CDC New Data Shows Omicron's Impact on ED and Hospitalizations

(CDC, 1/25/2021)

- **Despite Omicron surges, LOS, ICU admission, and death were lower than during previous pandemic peaks**
- **The high volume of hospitalizations still underscores the importance of national emergency preparedness**

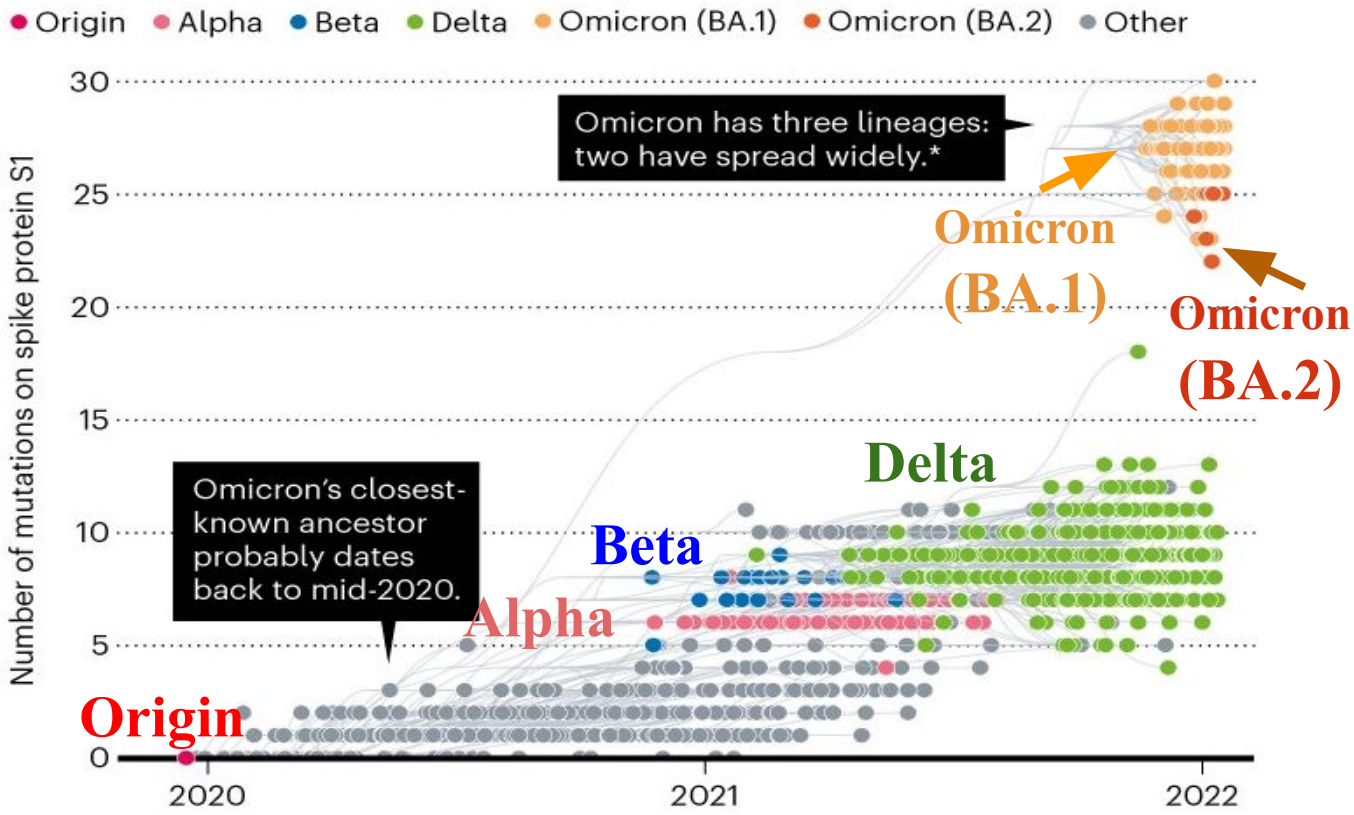


Source: CDC

Where Did Omicron Come From? Three Key Theories

(Nature, 1/28/2022)

1. **Missed series of mutations that eventually led to Omicron.**
2. **Evolved mutations in one person, as part of a long-term infection.**
3. **Emerged unseen in other animal hosts, such as mice or rats.**



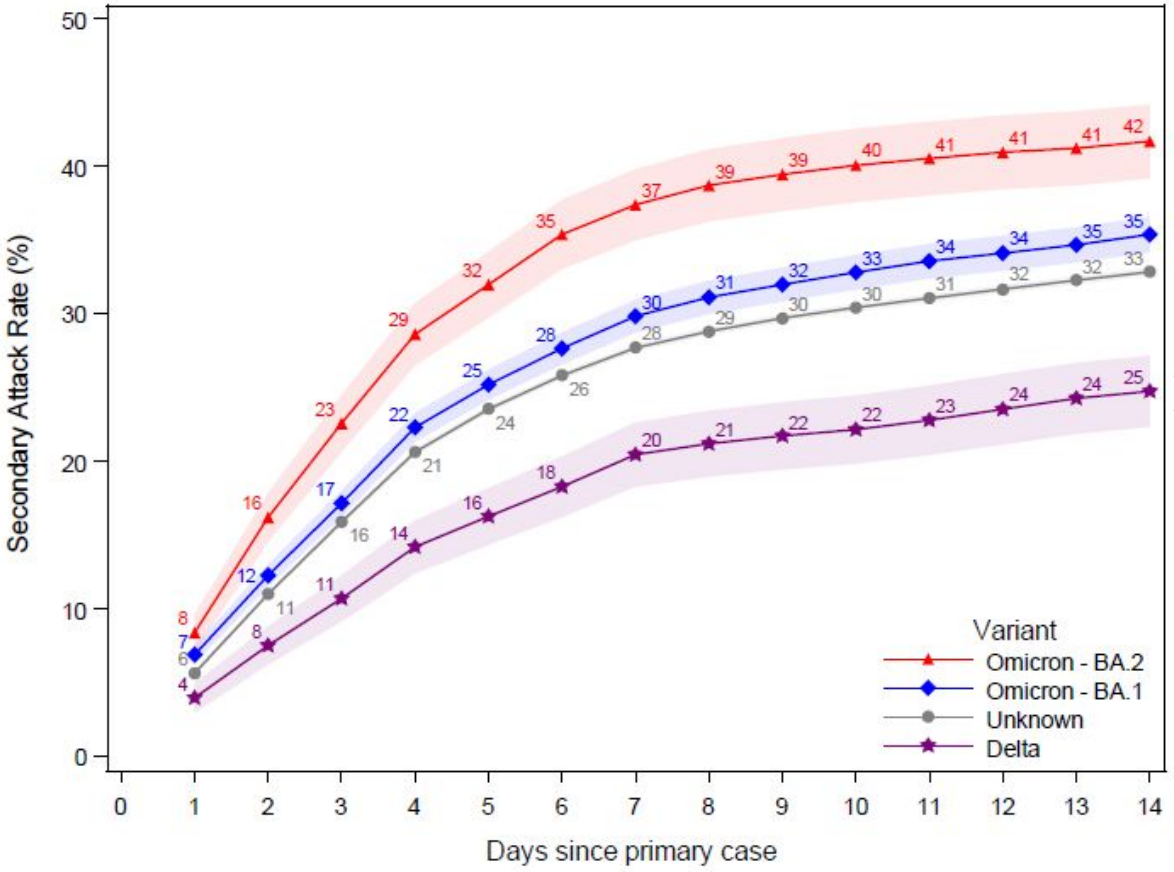
Source: Nature; Nextstrain

Omicron Subvariants Secondary Attack Rates*

BA.2=42%, BA.1=35%, Delta=33%, Unknown Variants of Concern (VOC)=33% at 14 Days Post-Infection (Denmark)

(medRxiv, 1/30/2022)

- **Data (Denmark) from 8,541 primary household cases (25% BA.2 cases), the secondary attack rate (SAR) was estimated as BA.1: 29% (7-35%) and BA.2: 39% (8-42%) in 18 households.**



Omicron BA.2

Omicron BA.1

Delta

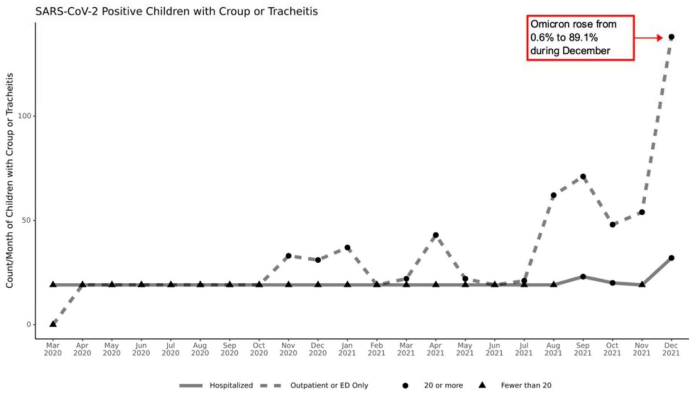
***Secondary attack rate: probability that an infection occurs among susceptible people within a specific group (ie, household or close contacts)**

Source: medRxiv

Acute Upper Airway Disease (UAI) Increased in Children with Omicron (medRxiv, 1/30/2022)

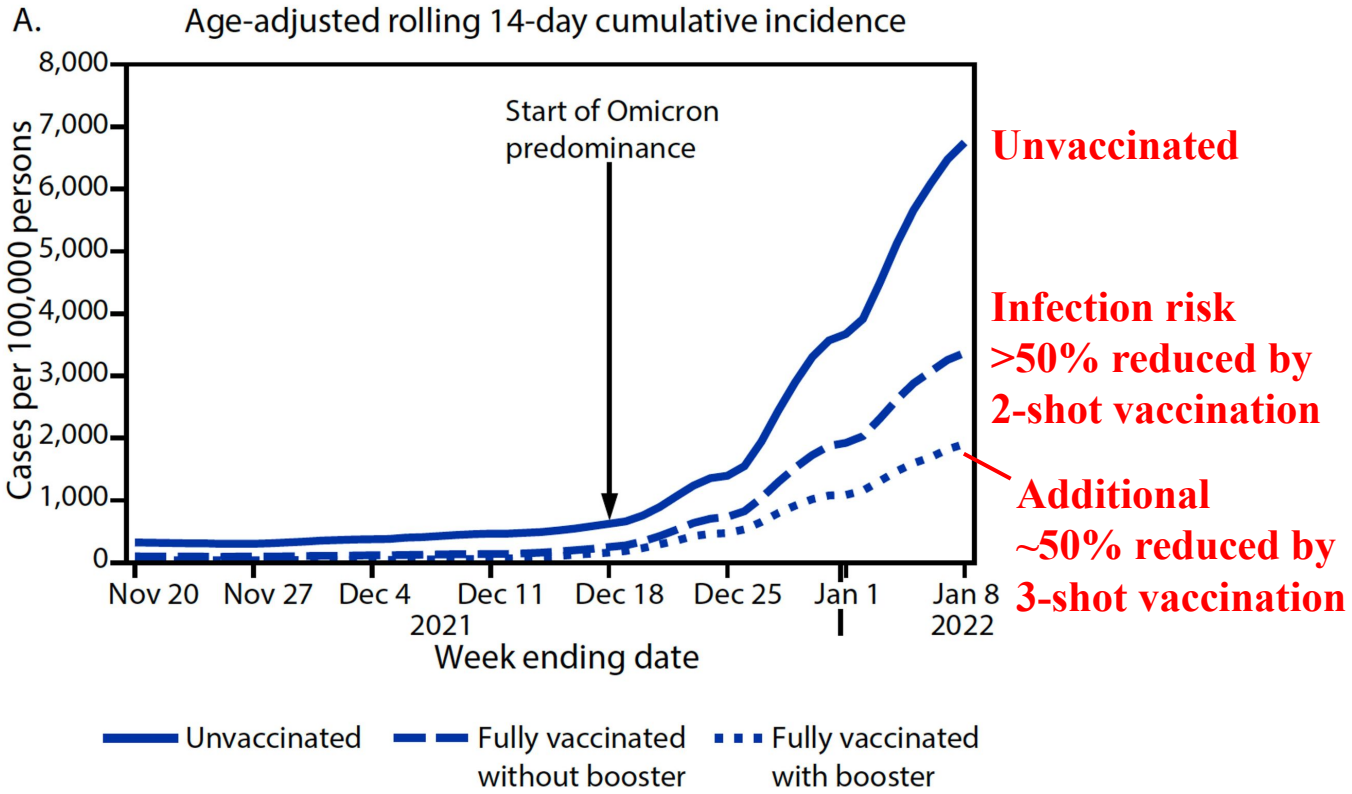
- **Laryngotracheobronchitis (commonly known as croup or tracheitis) diagnoses have increased since the beginning of Omicron, particularly among young children.**
- **Because the Omicron strain replicates more efficiently in the conducting airways, children (<19 years) with smaller airway calibers are at increased risk.**
- **Of 15,806 hospitalized children with infection, 1.5% (234/15,806) had an UAI diagnosis and were more likely to be male, younger, white, have asthma and develop severe disease as compared to those without UAI.**

Source: medRxiv



Infection Rate Among Adults Aged ≥18 Years Vaccination Status Before and During Omicron - Reduced by 50% with 2-shot - Reduced ny additional 50% with 3-shot

Data from November 7, 2021–January 8, 2022
(CDC, 2/1/2022)

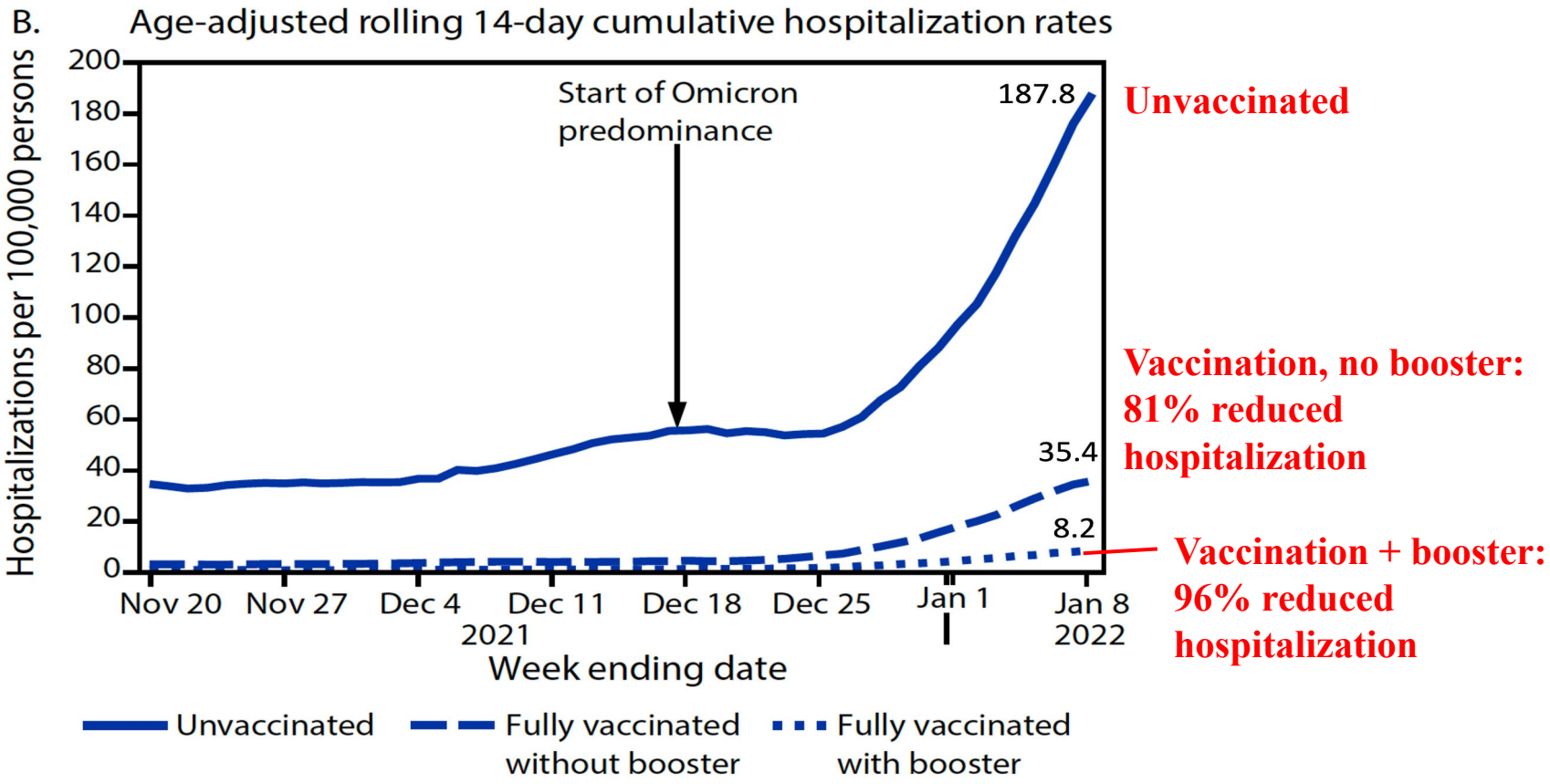


Source: CDC

Hospitalization Among Adults Aged ≥18 Years by Vaccination Status Before and During Omicron

- 81% reduced hospitalization with 2-shot
- 96% reduced hospitalization with 3-shot

Data from November 7, 2021–January 8, 2022
(CDC, 2/1/2022)



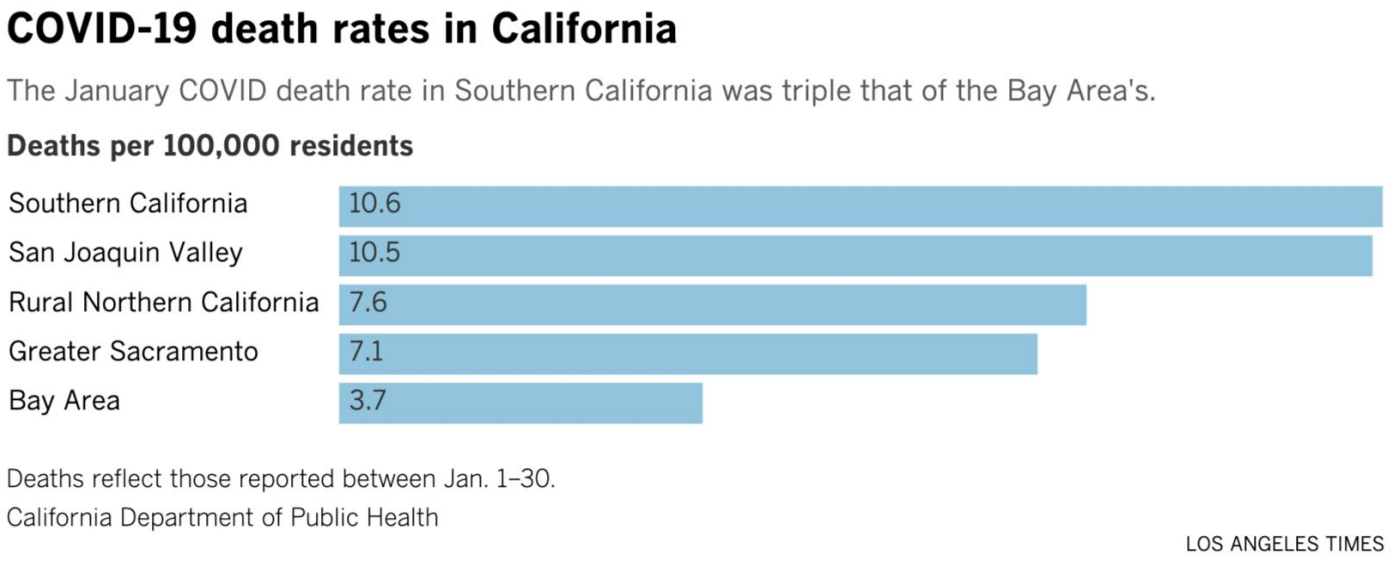
Source: CDC

Why Omicron Hit Southern California(SoCal) Harder Than the Bay Area

- Death rate of SoCal is higher than bay area

(Los Angeles Times, 2/1/2022)

- **During the Omicron wave, higher vaccination levels and hospitals being able to maintain capacity have contributed to significantly lower death rates in the San Francisco Bay Area compared to SoCal.**
  - **SoCal: 2,400 deaths since 1/1/22 => 11 deaths per 100k residents**
  - **Bay Area: 300 deaths since 1/1/22 => 4 deaths per 100k residents**



Source: LA Times

Will BA.2 Impact Omicron Forecasts?

- It's still unclear how BA.2 will affect forecasts

(Becker's Hospital Review, 2/1/2022)

- **U.S. cases have been declining for more than two weeks, though that decline may slow as the BA.2 variant becomes more widespread.**

- **Average daily cases in the U.S. was 184.1 per 100,000 people as of Jan. 30, down from a peak of 247.6 per 100,000 on Jan. 15.**

- **The forecast projects the case rate will continue to decrease through Feb. 13; however, modeling shows a bump may occur on the way down in early February.**

- **Early research suggests the subvariant may spread more quickly than the original strain, which could prolong the current surge.**

Source: BHR

BA.2 Severity Likely Same as Original Omicron Strain

(Becker's Hospital Review, 2/2/2022)

- **The Omicron subvariant BA.2 appears to have the same severity as the original Omicron strain.**
- **BA.2 appears to be overtaking BA.1 but does not show cause for alarm yet. Based on data from Denmark (where BA.2 is dominant), BA.2 does not seem to be more severe than BA.1.**
- **BA.2 is more transmissible than BA.1, though vaccinated people are less likely to spread it to others.**
- **Relative risk of severe disease from Omicron appears lower than Delta. Vaccination remains profoundly protective against severe disease, including for Omicron and its subvariants.**

Source: BHR

Will Omicron End the Pandemic?
- Endemic Doesn't Mean Harmless
(Nature, 1/31/2022)

- **Endemic means people who can get sick balances out the 'basic reproduction number' of the virus; it says nothing about the severity of a disease.**
- **Thinking that endemicity is both mild and inevitable is more than wrong, it is dangerous: it sets humanity up for many more years of disease, including unpredictable waves of outbreaks.**
- **Given that the virus is unlikely to disappear completely, COVID will inevitably become an endemic disease, which raises its own set of challenges.**

Source: Nature (1, 2)

2. New Cases and Deaths

(U.S.) Source

Pediatric Hospitalization Rates by Age Group

- Increased 10X fold from December 2021 to January 2022

(NYT, 1/11/2022)

Age Group	0-4	5-11	12-17	Total
Admissions, Week of December 4, 2021	4	2	1	7
Admissions, Week of January 1, 2022	58	5	16	79
Fold Increase	13.5X	1.5X	15X	10X

Source: LACDPH

The Incarcerated and Homeless Had Higher Admission Rates, LOS, and Readmissions

(JAMA, 1/13/2022)

- **Homeless patients hospitalized had less invasive mechanical ventilation use (10%) and mortality (5.4%) than the general population**
- **Male (81% and 70%), younger (median age 56 vs 55), and non-Hispanic Black (25% and 28%, respectively) associated with higher admission rates in both groups**
- **Expanding medical respite may reduce hospitalizations or shorten the length of stay for COVID for people experiencing incarceration or homelessness**

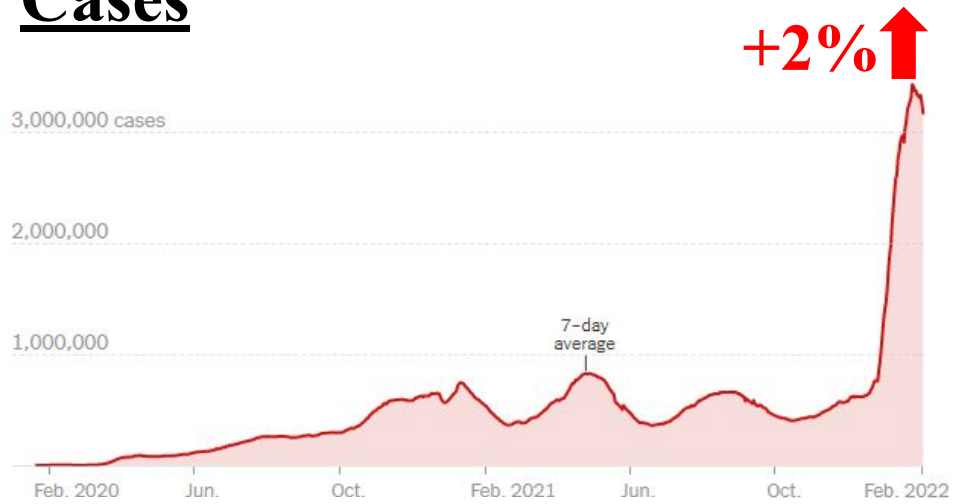
	General Population	Incarceration	Homelessness
Admission rate (P<0.001)	49.7%	63.5%	64.5%
LOS	8	9	11
30 days Readmissions	4.6%	5.9%	8.5%

Source: JAMA

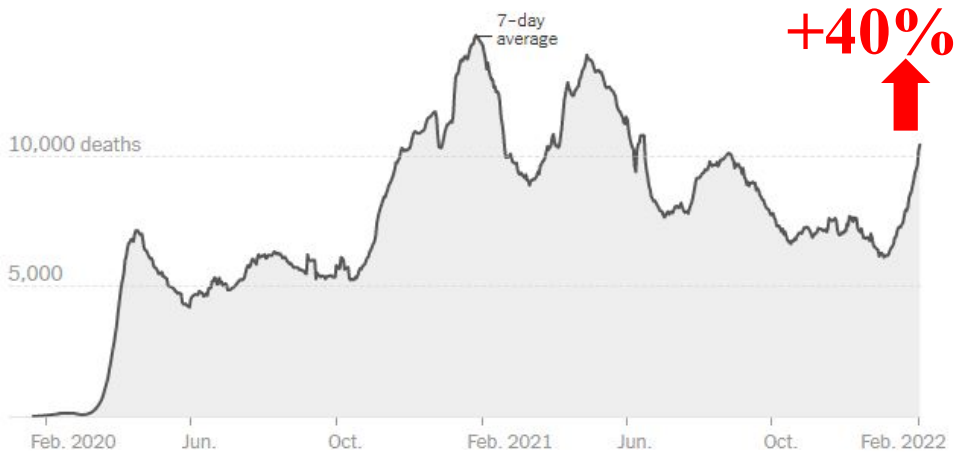
Global New Cases and Deaths 14 Days Changes

(NYT, 2/3/2022)

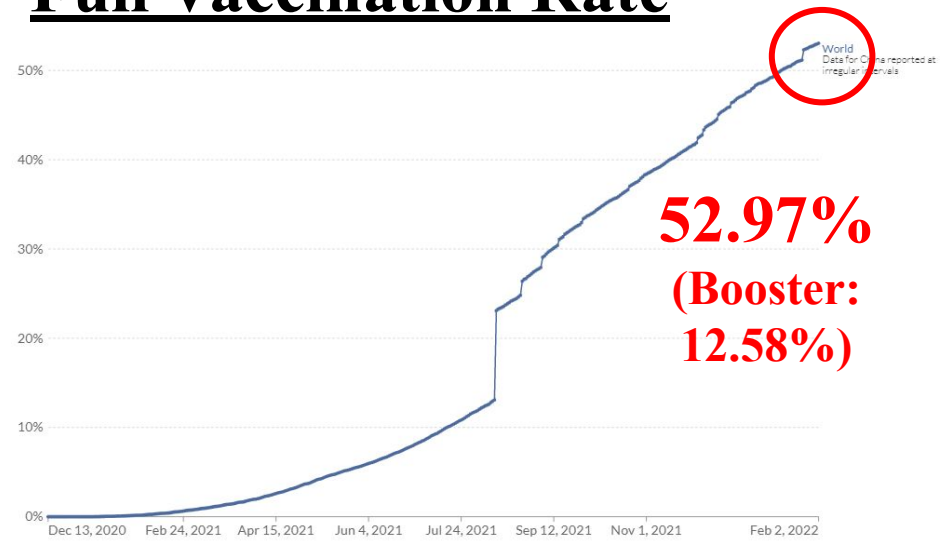
Cases



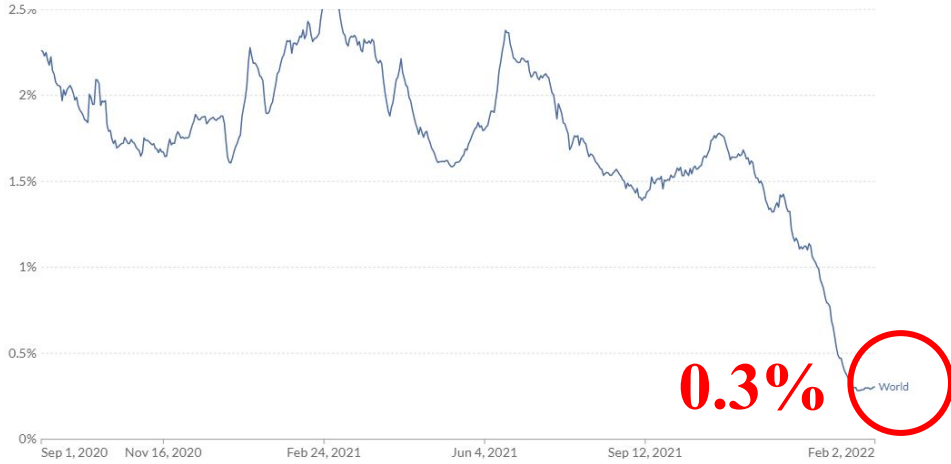
Deaths



Full Vaccination Rate



Case Fatality Rate (CFR)



Source: NYT; Our World in Data

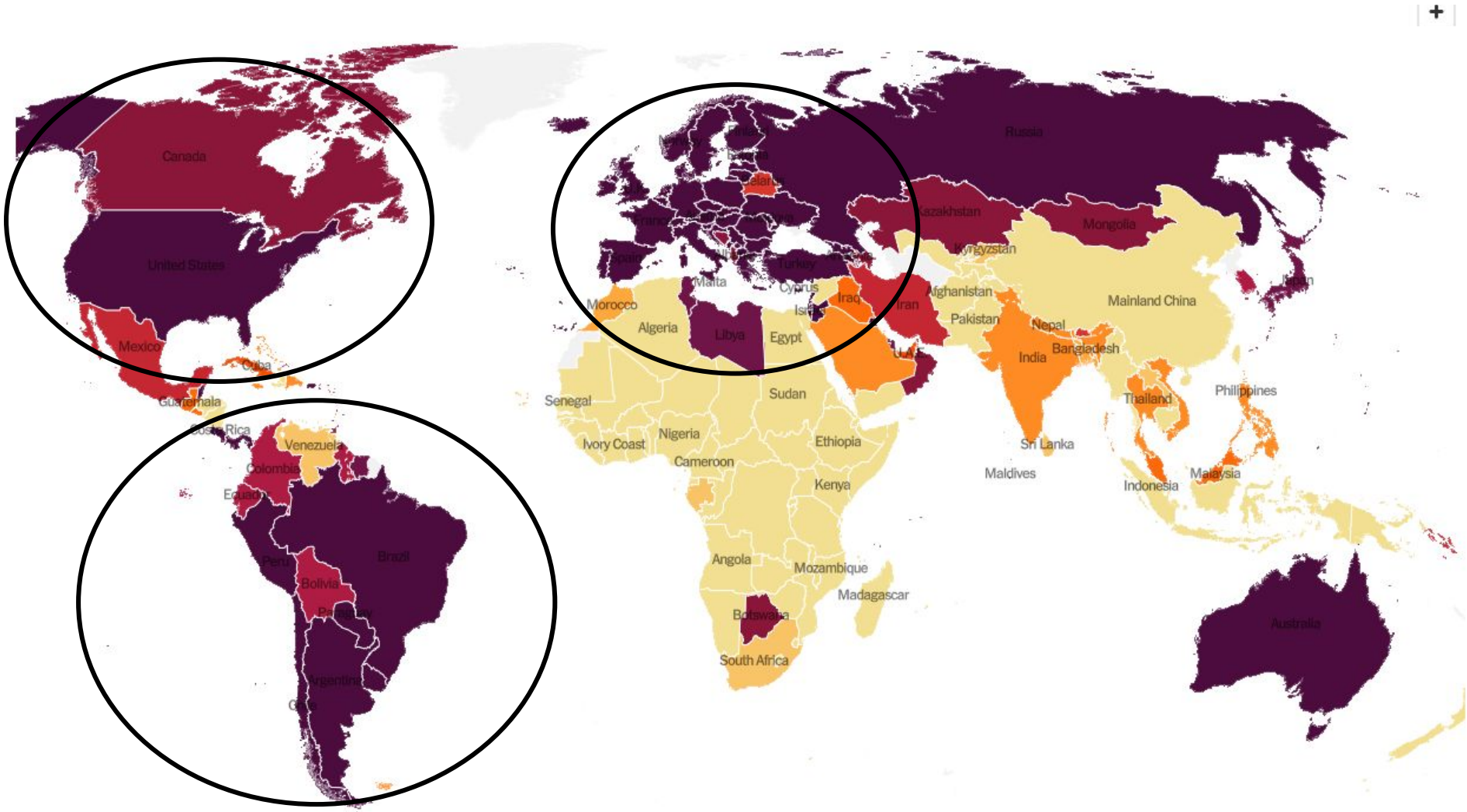
Top 10 Countries with Highest COVID Daily New Cases and 14-Day Changes (Worldometers & NYT, 2/3/2022)

#	Country	Daily New Cases	Total Cases	14-Day Change
1	France	315,363	19,872,989	-4% ⬇
2	USA	302,177	76,882,290	-49% ⬇
3	Germany	223,322	10,303,100	98% ⬆
4	Brazil	188,552	25,813,685	80% ⬆
5	India	172,433	41,803,318	-25% ⬇
6	Russia	141,883	12,128,796	313% ⬆
7	Italy	119,259	11,236,010	-32% ⬇
8	Turkey	110,682	11,833,165	42% ⬆
9	UK	92,578	17,519,661	-6% ⬇
10	Spain	86,222	10,125,348	-34% ⬇

Source: Worldometers; NYT

Global COVID-19 Hotspots

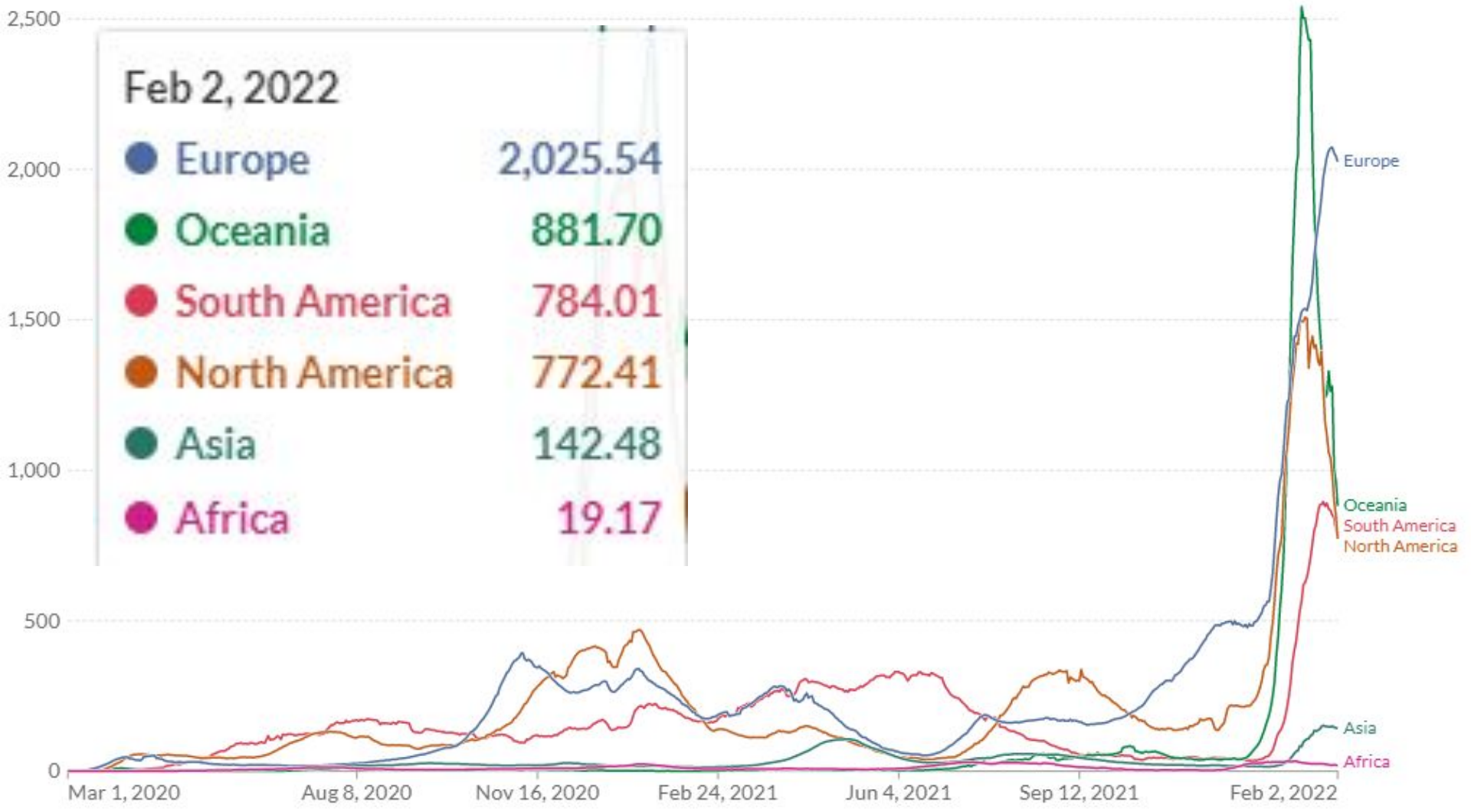
(NYT, 2/3/2022)



Source: NYT

Global Cases for Six Continents

(Our World in Data, 2/3/2022)

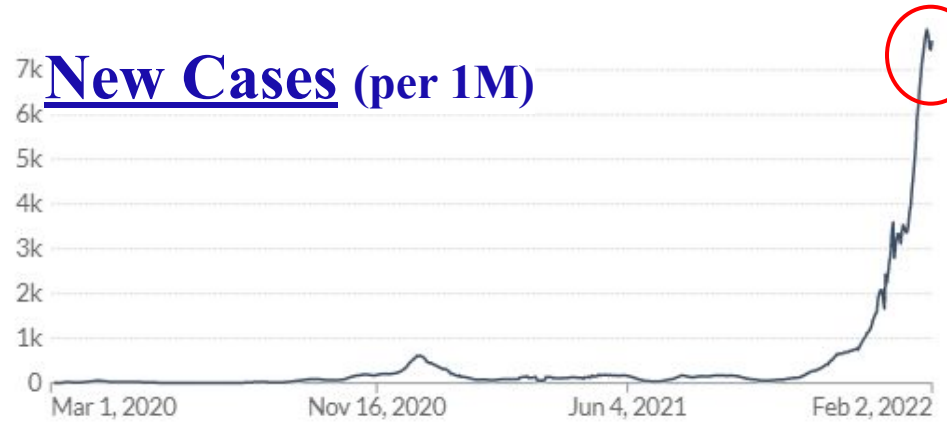


Source: Our World in Data

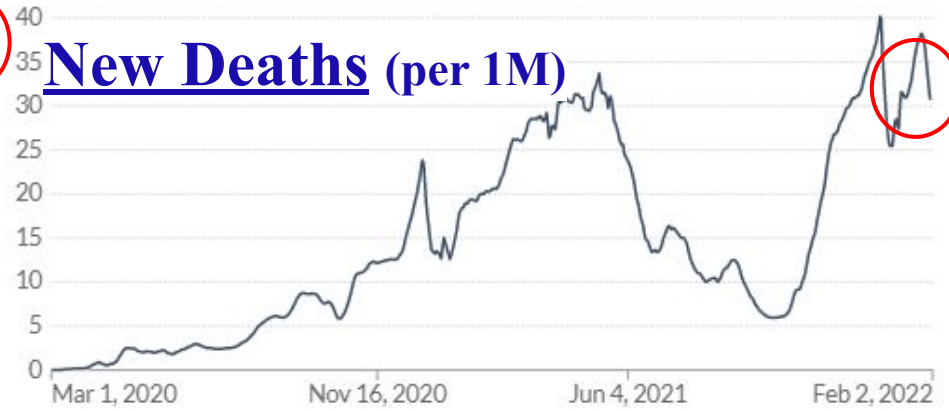
Current Trends in Denmark

- **Case Fatality Rate: 0.05%**
- **Fully Vaccinated: 81.39%**
- **Variant Proportion: Omicron (100%)**

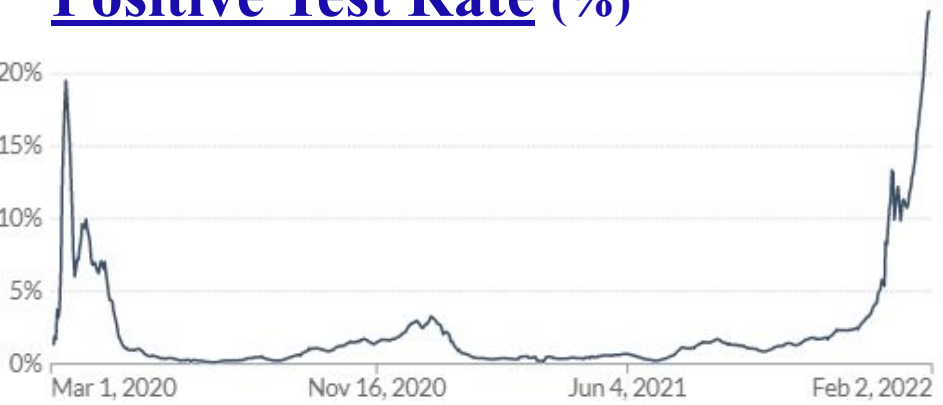
New Cases (per 1M)



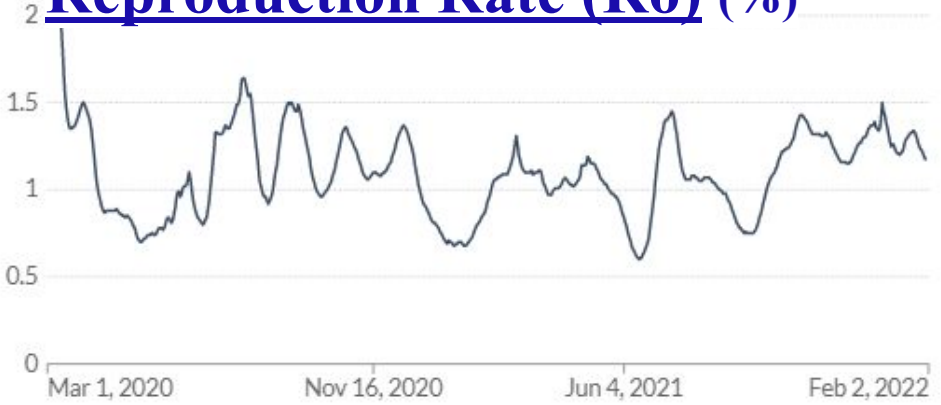
New Deaths (per 1M)



Positive Test Rate (%)



Reproduction Rate (Ro) (%)



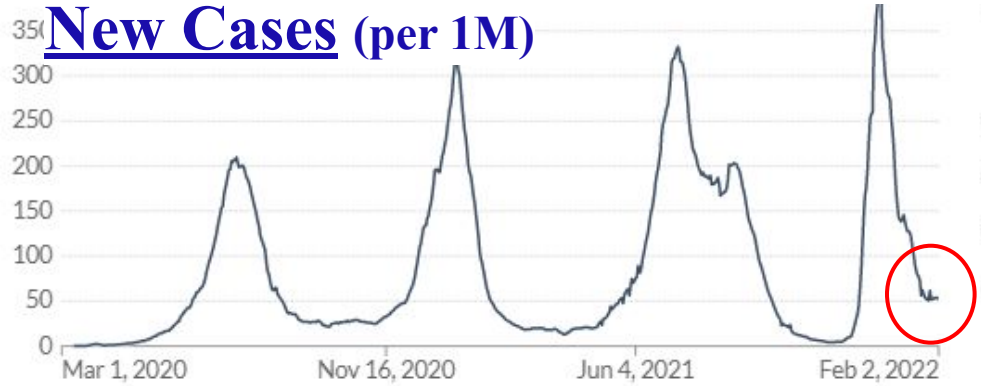
(Our World in Data, 2/3/2022)

Source: Our World in Data, NYT

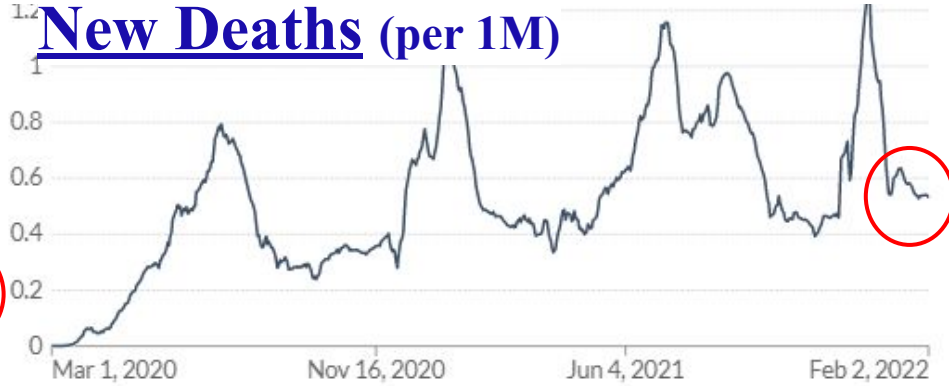
Current Trends in South Africa

- Case Fatality Rate: 4.4%
- Fully Vaccinated: 27.7%
- Variant Proportion: Omicron (98.26%), Delta (1.74%)

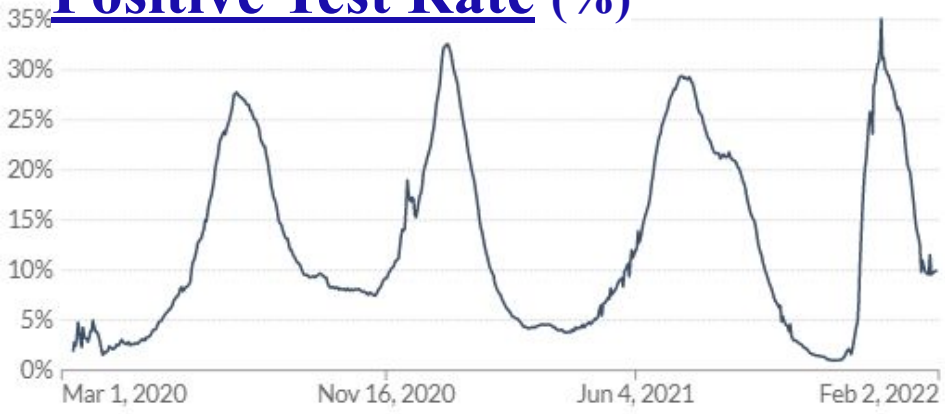
New Cases (per 1M)



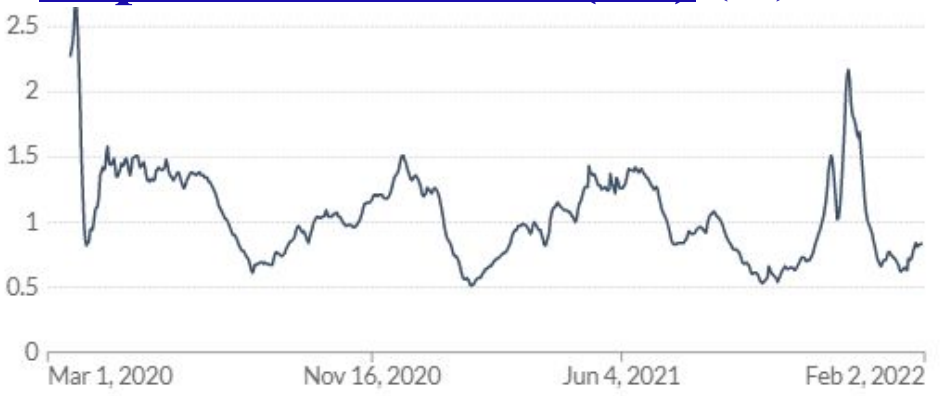
New Deaths (per 1M)



Positive Test Rate (%)



Reproduction Rate (Ro) (%)



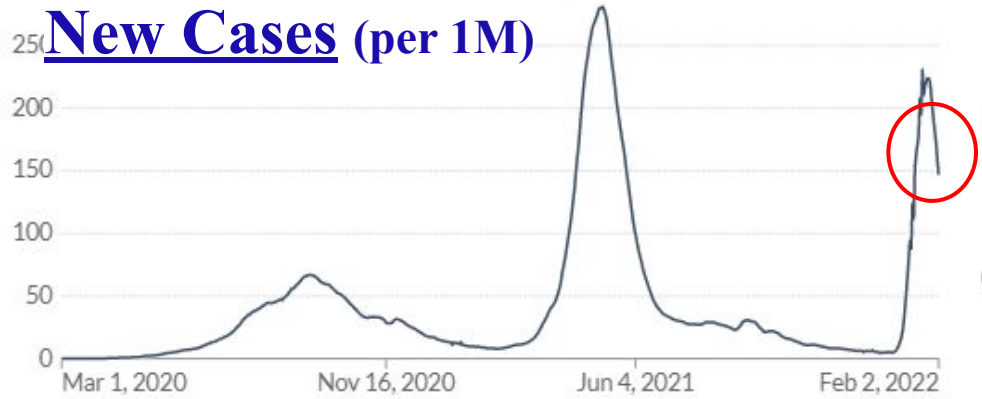
(Our World in Data, 2/3/2022)

Source: Our World in Data, NYT

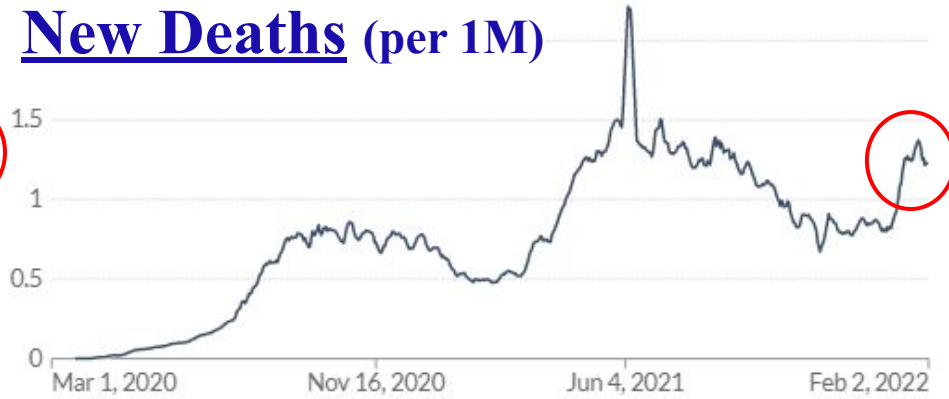
Current Trends in India

- Case Fatality Rate: 0.34%
- Fully Vaccinated: 51.53%
- Variant Proportion: Omicron (98.75%), Delta (1.25%)

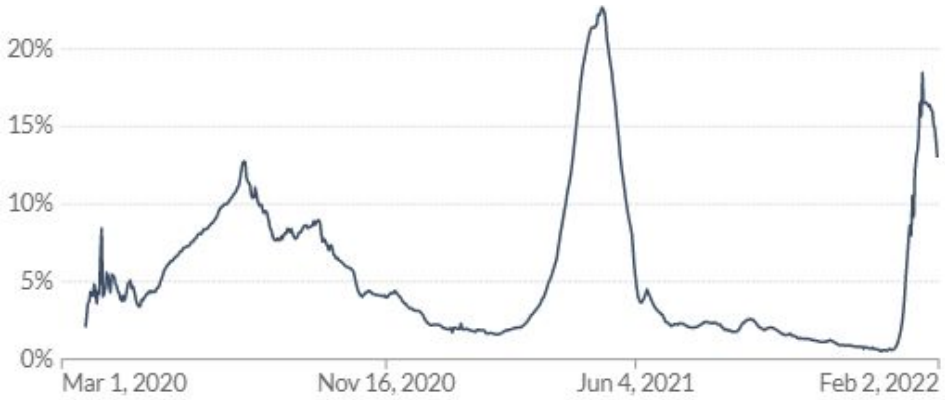
New Cases (per 1M)



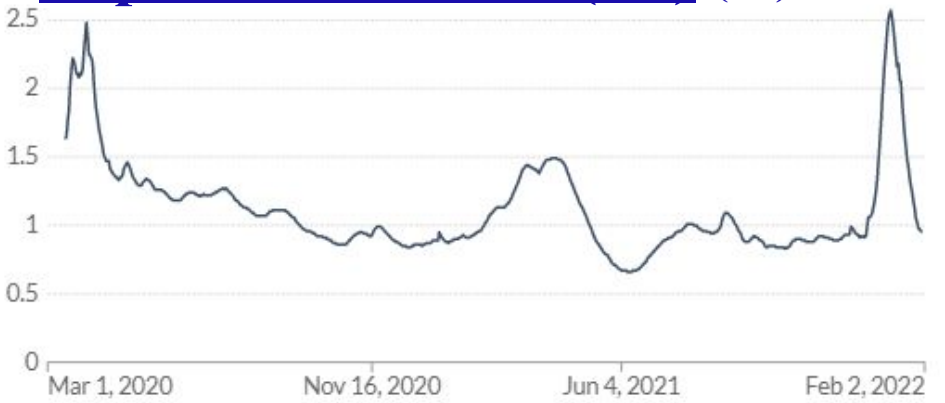
New Deaths (per 1M)



Positive Test Rate (%)



Reproduction Rate (Ro) (%)



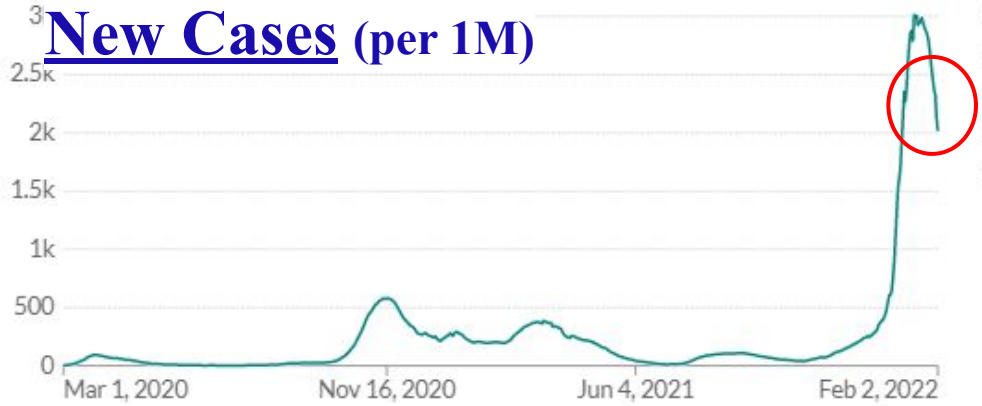
(Our World in Data, 2/3/2022)

Source: Our World in Data

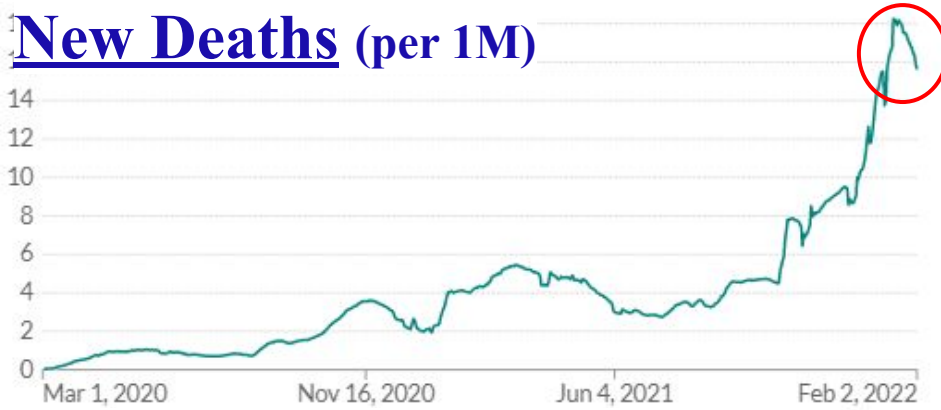
Current Trends in Italy

- Case Fatality Rate: 0.21%
- Fully Vaccinated: 76.6%
- Variant Proportion: Omicron (87.02%), Delta (8.4%)

New Cases (per 1M)



New Deaths (per 1M)



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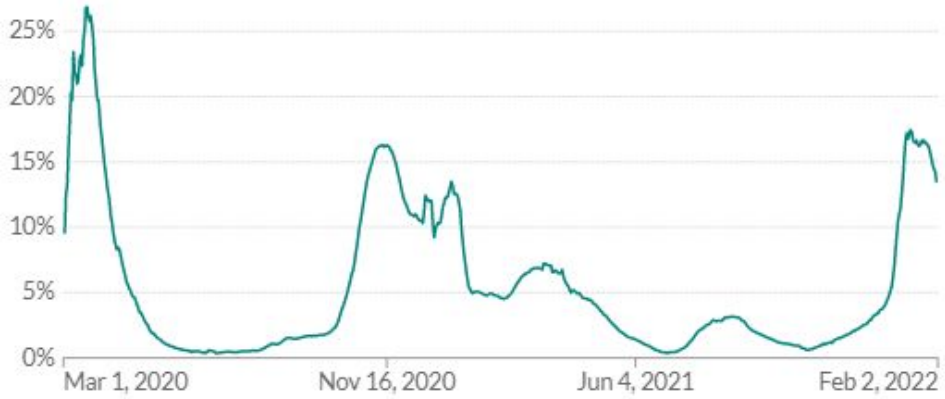

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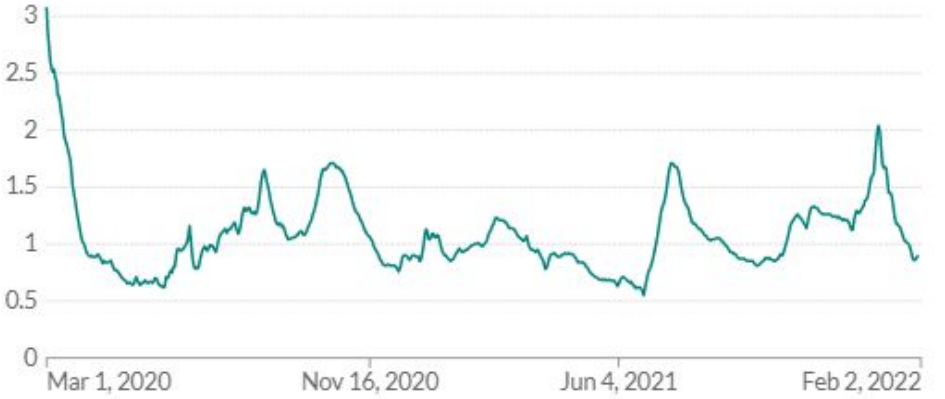


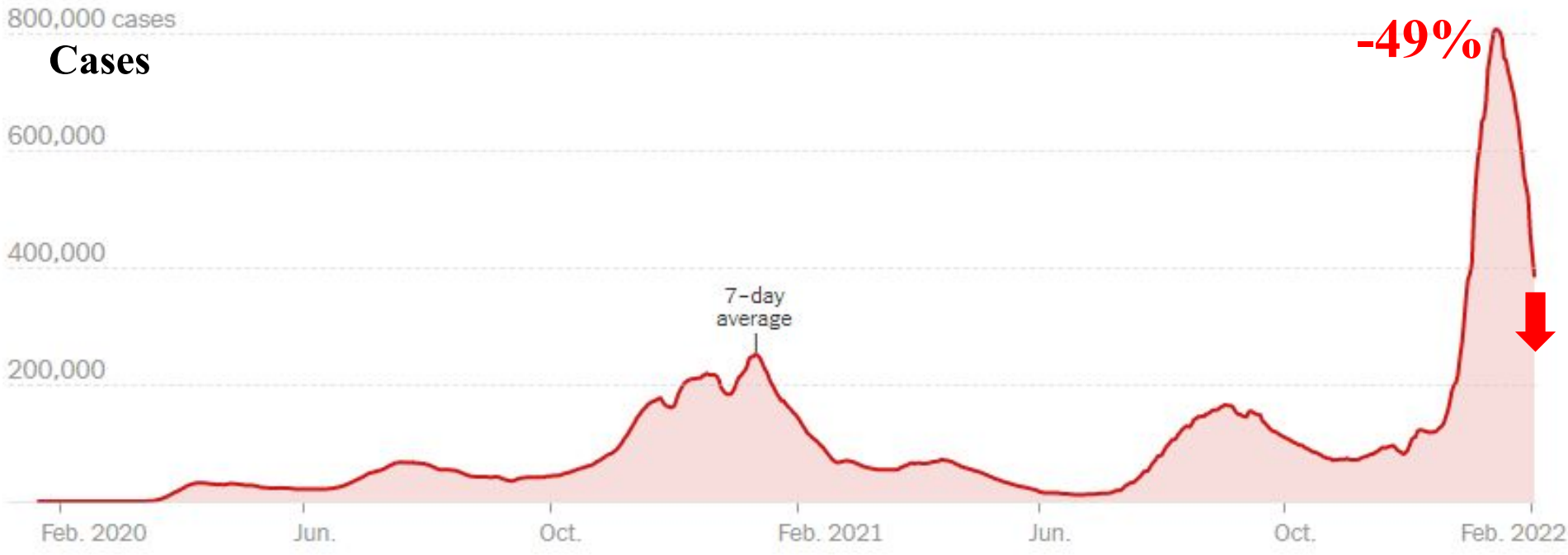
(Our World in Data, 2/3/2022)

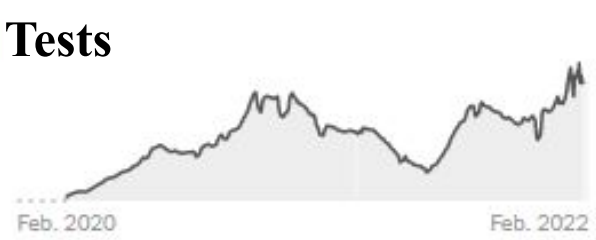
Source: Our World in Data

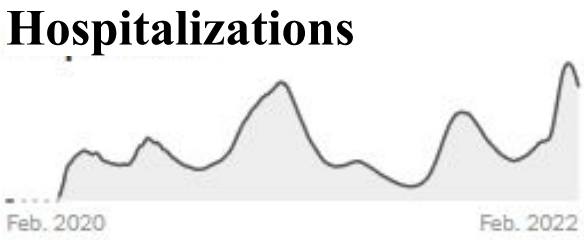
US Trend and 14-Day Change

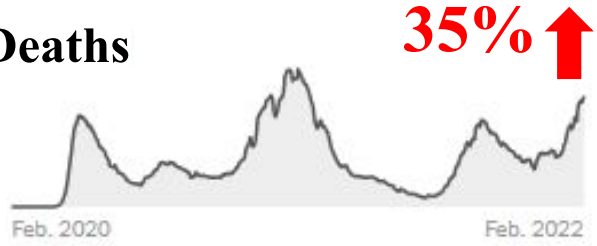
- Increase in cases (-49%) and deaths (+35%)

(NYT, 2/3/2022)









CFR: 0.35% (2/3/2022)

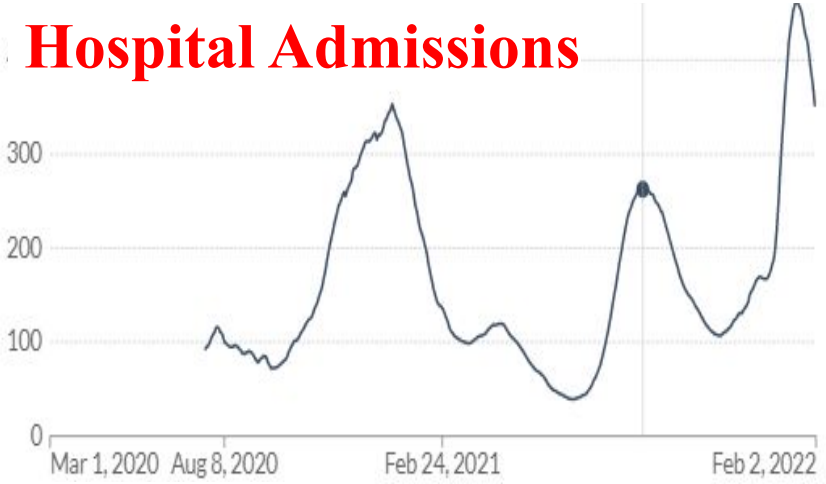
Source: NYT

US Trend in New Cases, Hospital Admissions, ICU Patients, and New Deaths

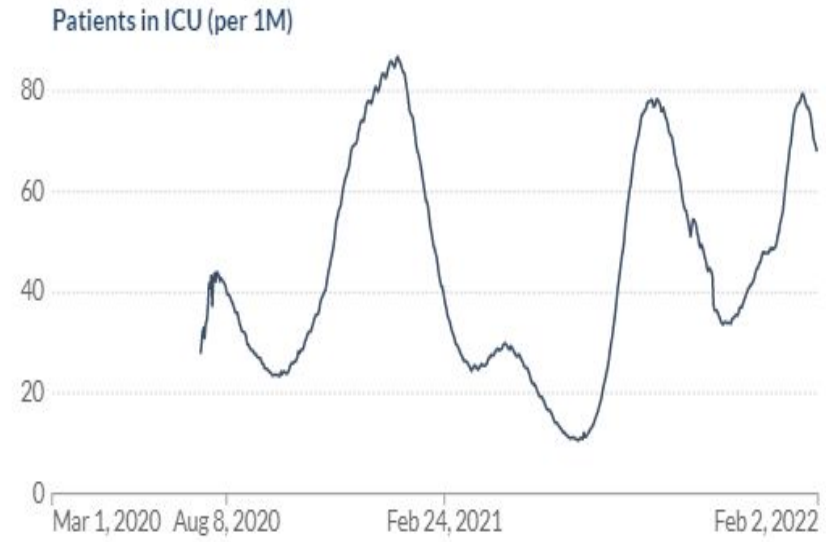
(Our World in Data, 2/3/2022)

New Cases

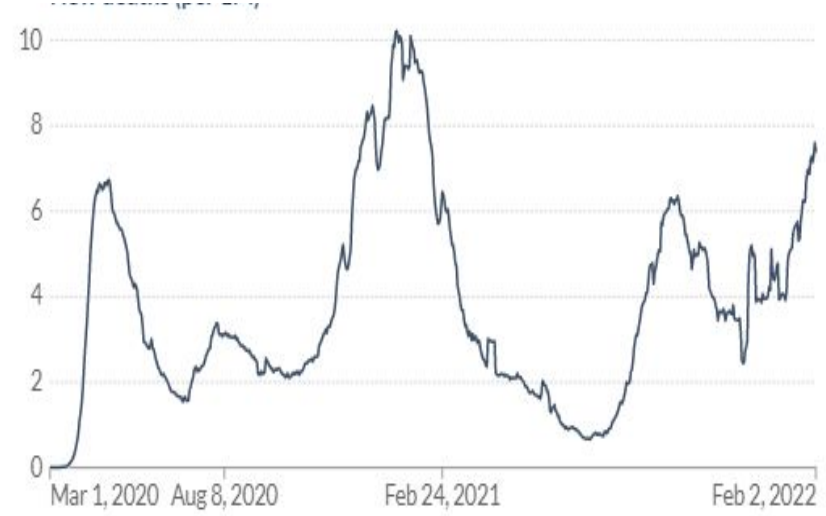
Hospital Admissions



ICU Patients



New Deaths

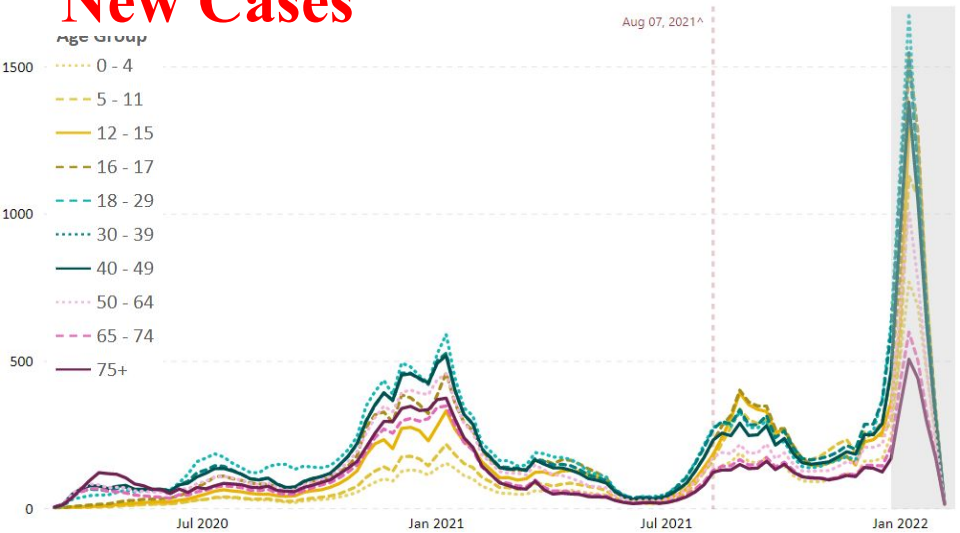


Source: Our World in Data, CDC

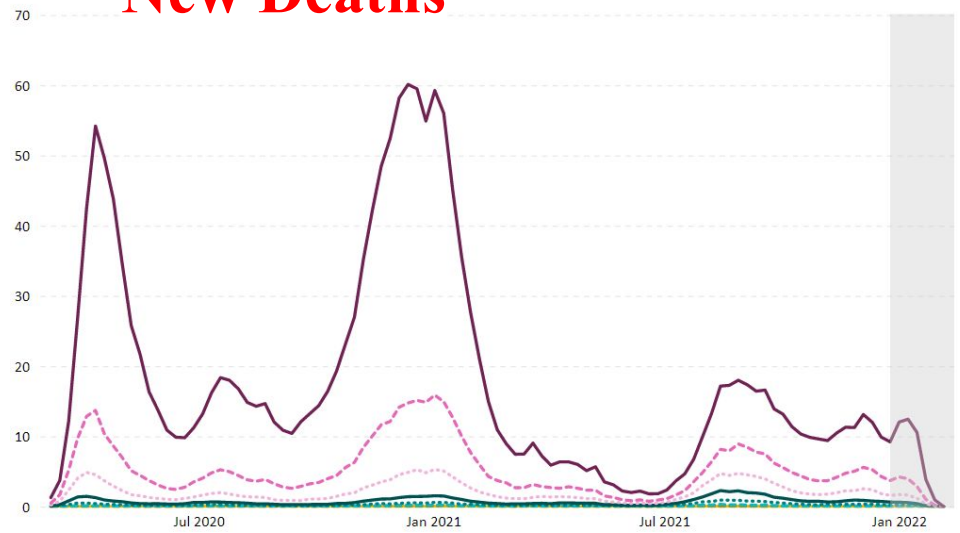
US Trend in New Cases, New Deaths, and Hospital Admissions by Age

(CDC, 2/3/2022)

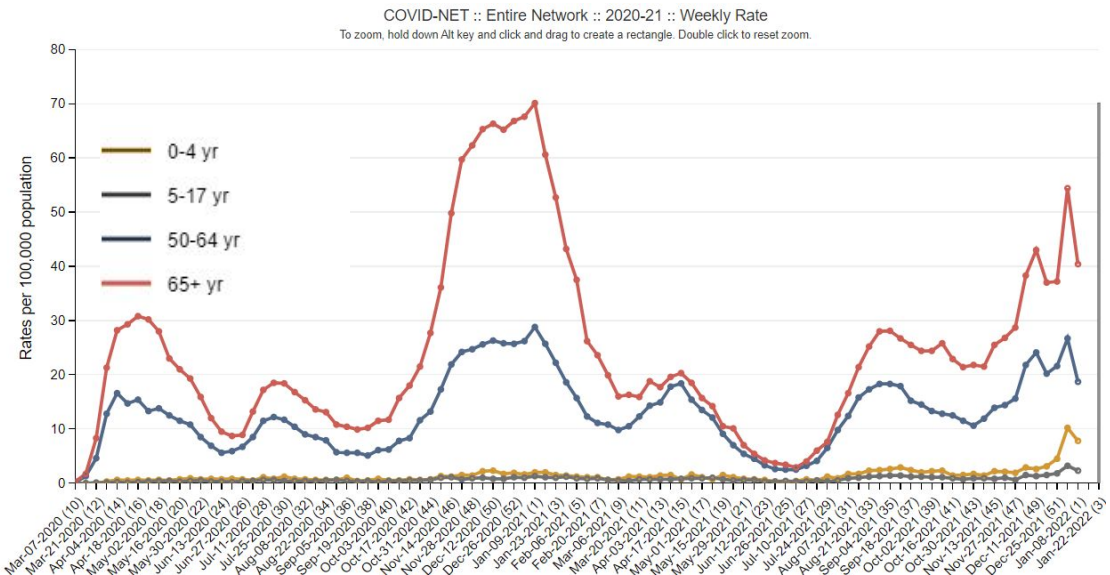
New Cases



New Deaths



Hospitalizations



Source: CDC

Top 10 US States with Highest Daily New Cases

(NYT, 2/3/2022)

#	States	Daily New Cases	One or More Shots	Fully Vaccinated	14 Days Change
1	California	61,249	81%	69%	-44% ⬇
2	Texas	33,138	70%	59%	-49% ⬇
3	Florida	21,715	77%	65%	-52% ⬇
4	North Carolina	16,874	81%	59%	-45% ⬇
5	Washington	13,196	78%	70%	-16% ⬇
6	Arizona	12,434	70%	59%	-39% ⬇
7	Tennessee	11,460	61%	53%	-24% ⬇
8	Michigan	11,333	65%	58%	-44% ⬇
9	Georgia	10,686	64%	53%	-34% ⬇
10	New York	10,568	88%	74%	-74% ⬇

Source: NYT (Cases); NYT (Vaccines)

Hospital Utilizations in the US

- ICU bed use decreased 5.09% for COVID in the past 14 days

(HHS, 2/3/2022)

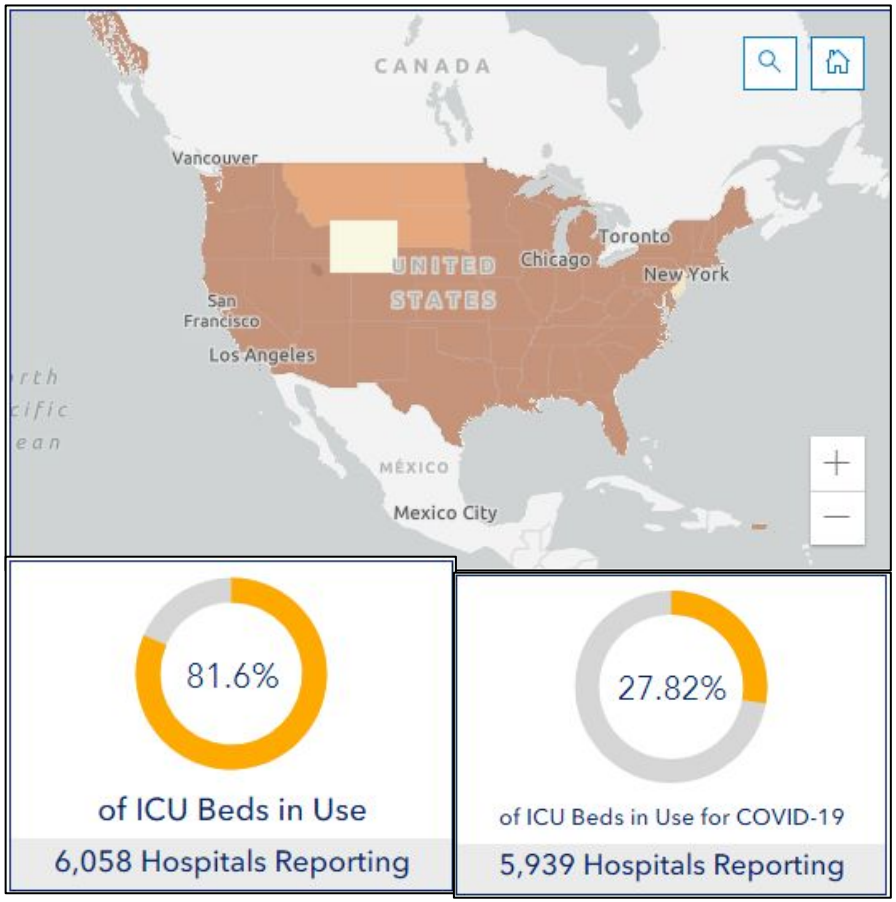
ICU Bed Use

- **81.6% ICU beds in use**
  (6,058 Hospitals Reporting)
- **27.82% ICU beds in use for COVID-19 (14 days ago 32.91%)**
  (5,939 Hospitals Reporting)

Inpatient Bed Use

- **78.79% inpatient beds in use**
  (6,060 Hospitals Reporting)
- **16.28% Inpatient beds in use for COVID-19 (14 days ago 21.3%)**
  (5,940 Hospitals Reporting)

HHS ICU Bed Dashboard

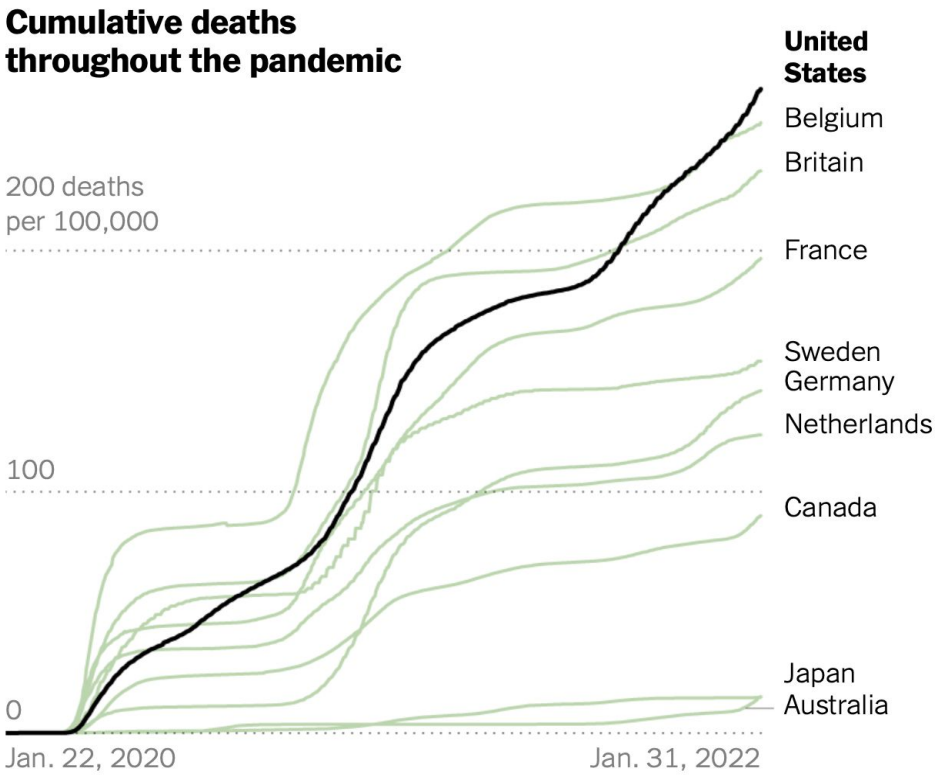


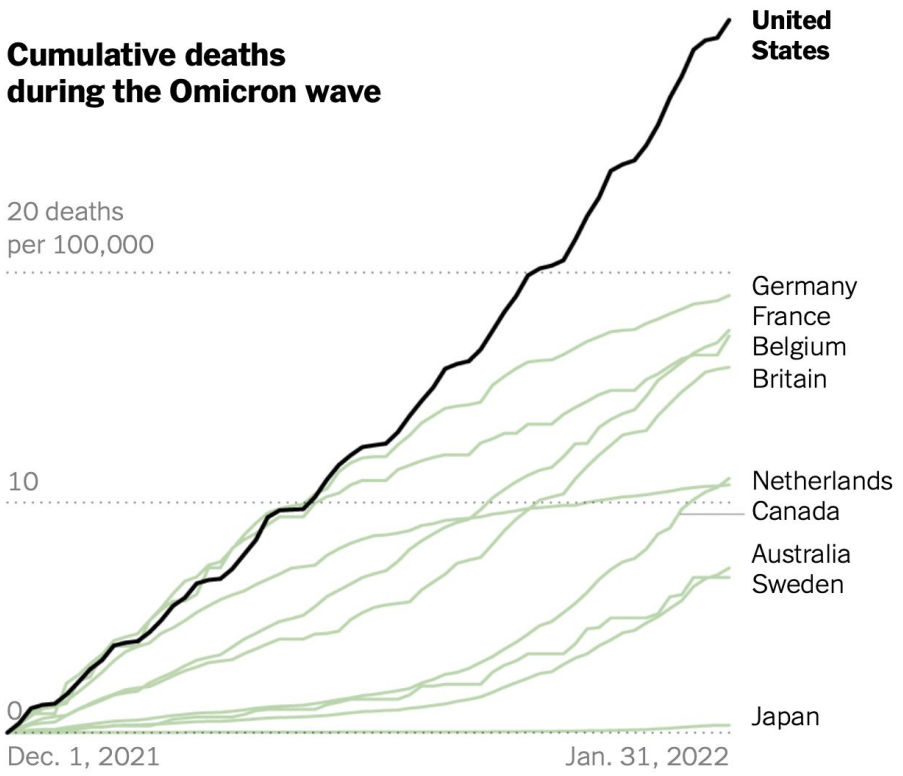
Source: HHS

U.S. Leads in Deaths and Lags in Vaccinations Among Wealthy Nations (1/2)

(New York Times, 2/2/2022)

- Several countries had higher per capita deaths earlier in the pandemic, but the U.S. death toll now exceeds that of peer nations.



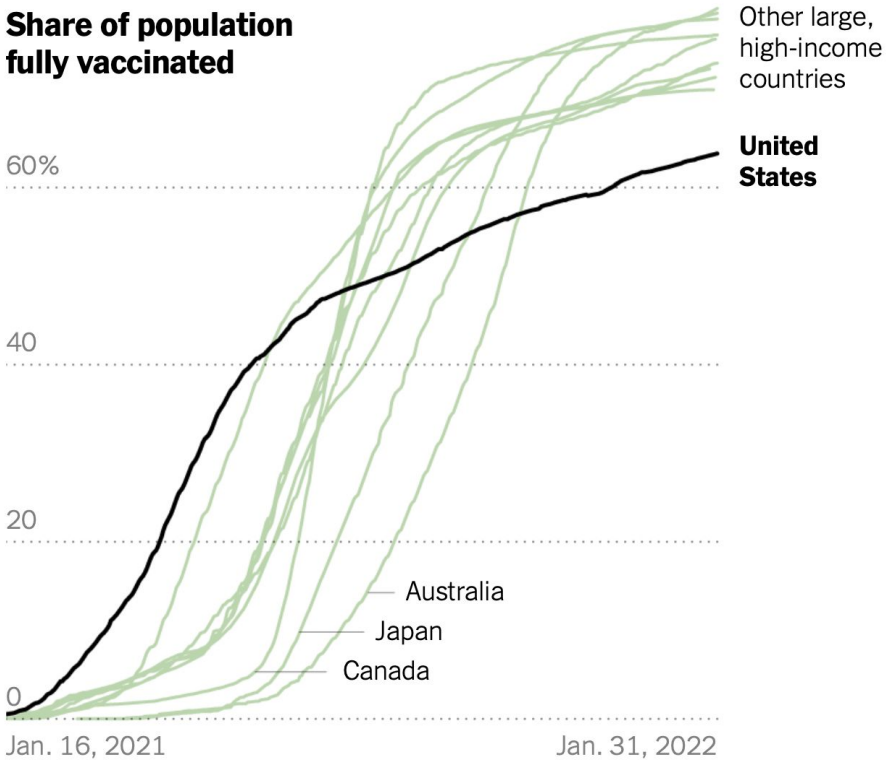


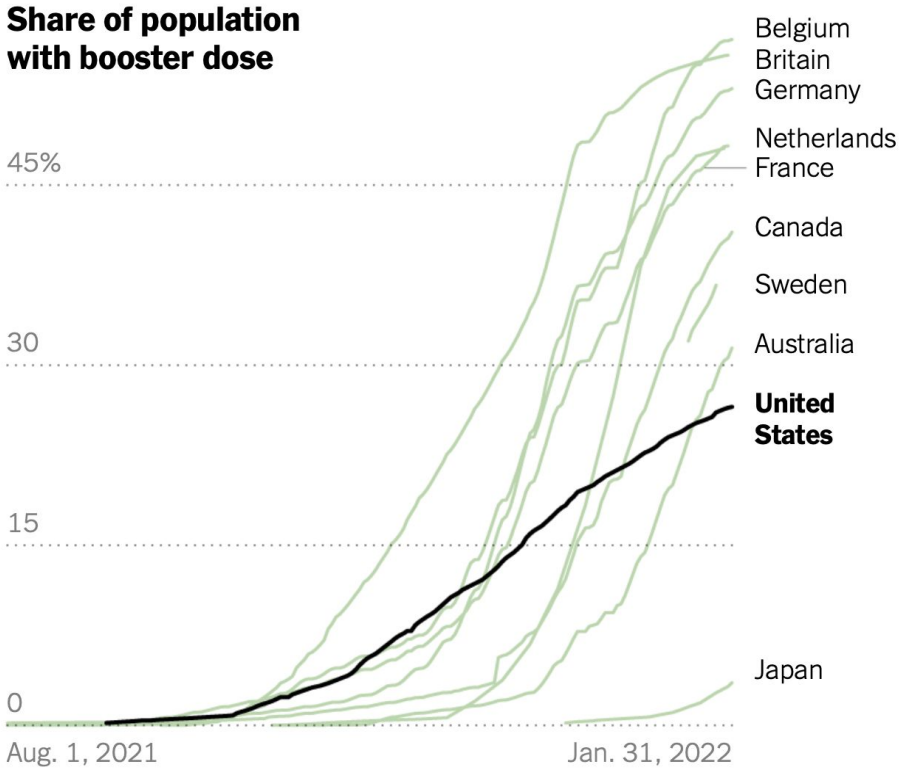
Source: NYT

U.S. Leads in Deaths and Lags in Vaccinations Among Wealthy Nations (2/2)

(New York Times, 2/2/2022)

- Despite beginning vaccinations months earlier than countries like Japan and Australia, a smaller share of people in the United States are now fully vaccinated.



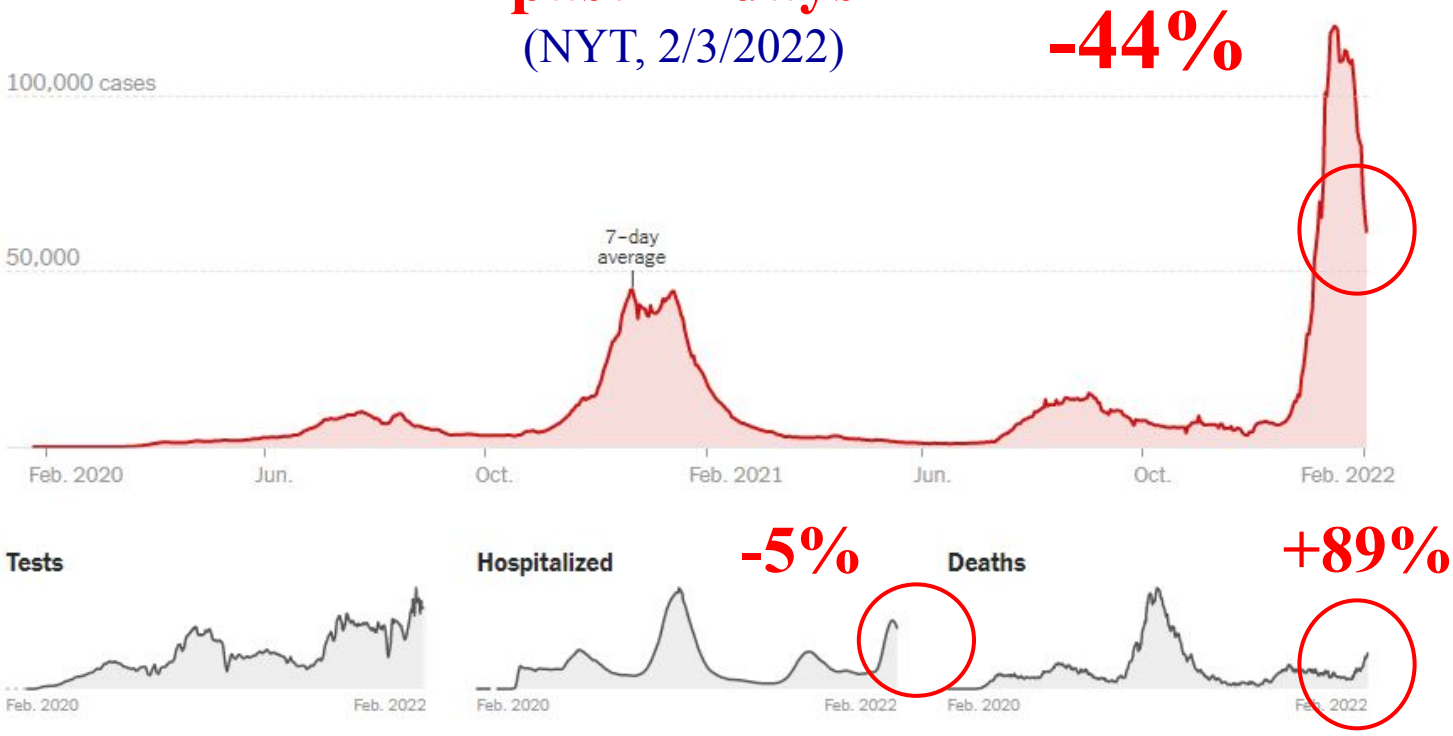


Source: NYT

California New Cases Trend

- Decrease in cases (-44%) and increase in deaths (+89%) in the past 14 days

(NYT, 2/3/2022)



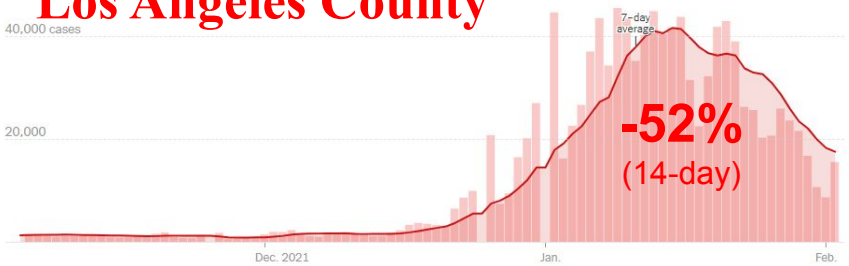
	DAILY AVG. ON FEB. 2	14-DAY CHANGE	TOTAL REPORTED
Cases	61,249	-44%	8,484,152
Tests	380,032	+10%	—
Hospitalized	14,305	-5%	—
Deaths	197	+89%	80,732

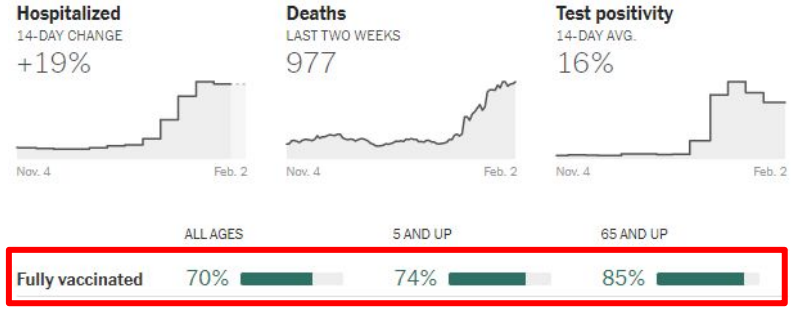
Source: NYT

90-Day County Trends in AHMC Service Area

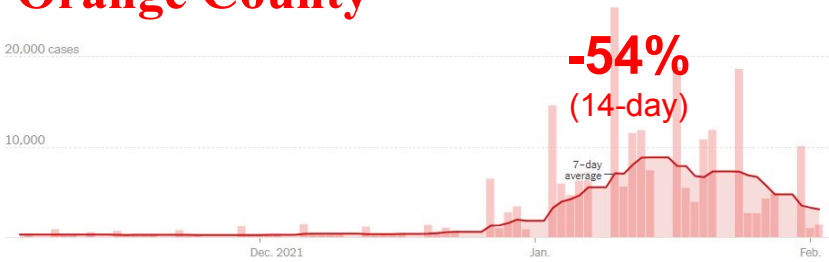
(NYT, 2/3/2022)

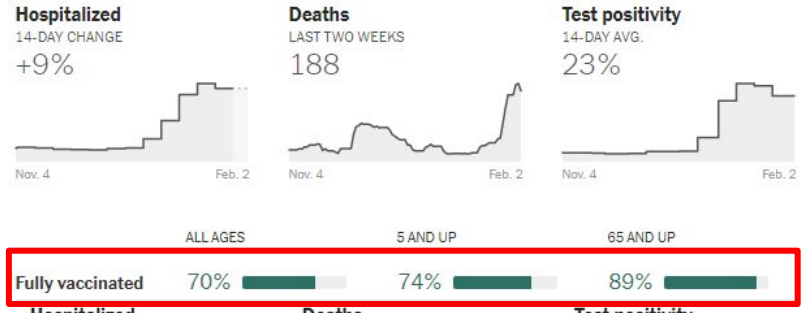
Los Angeles County



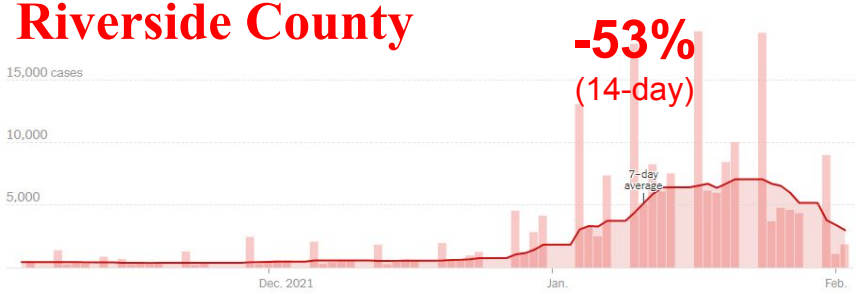


Orange County

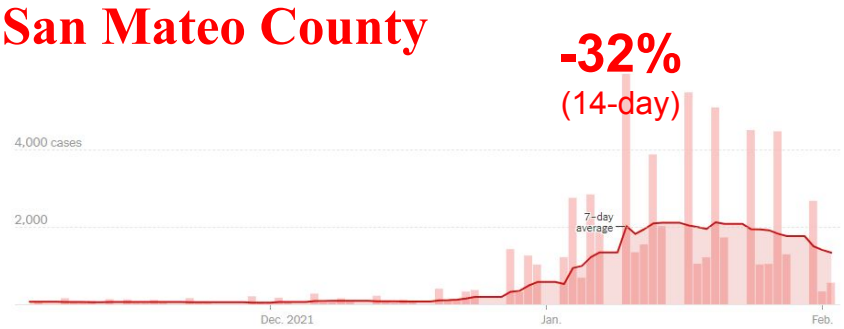


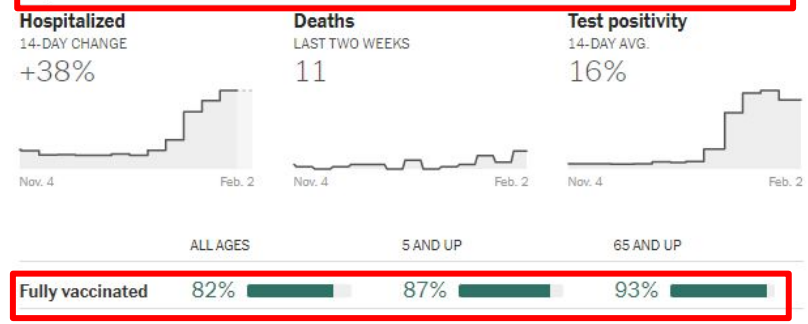


Riverside County



San Mateo County



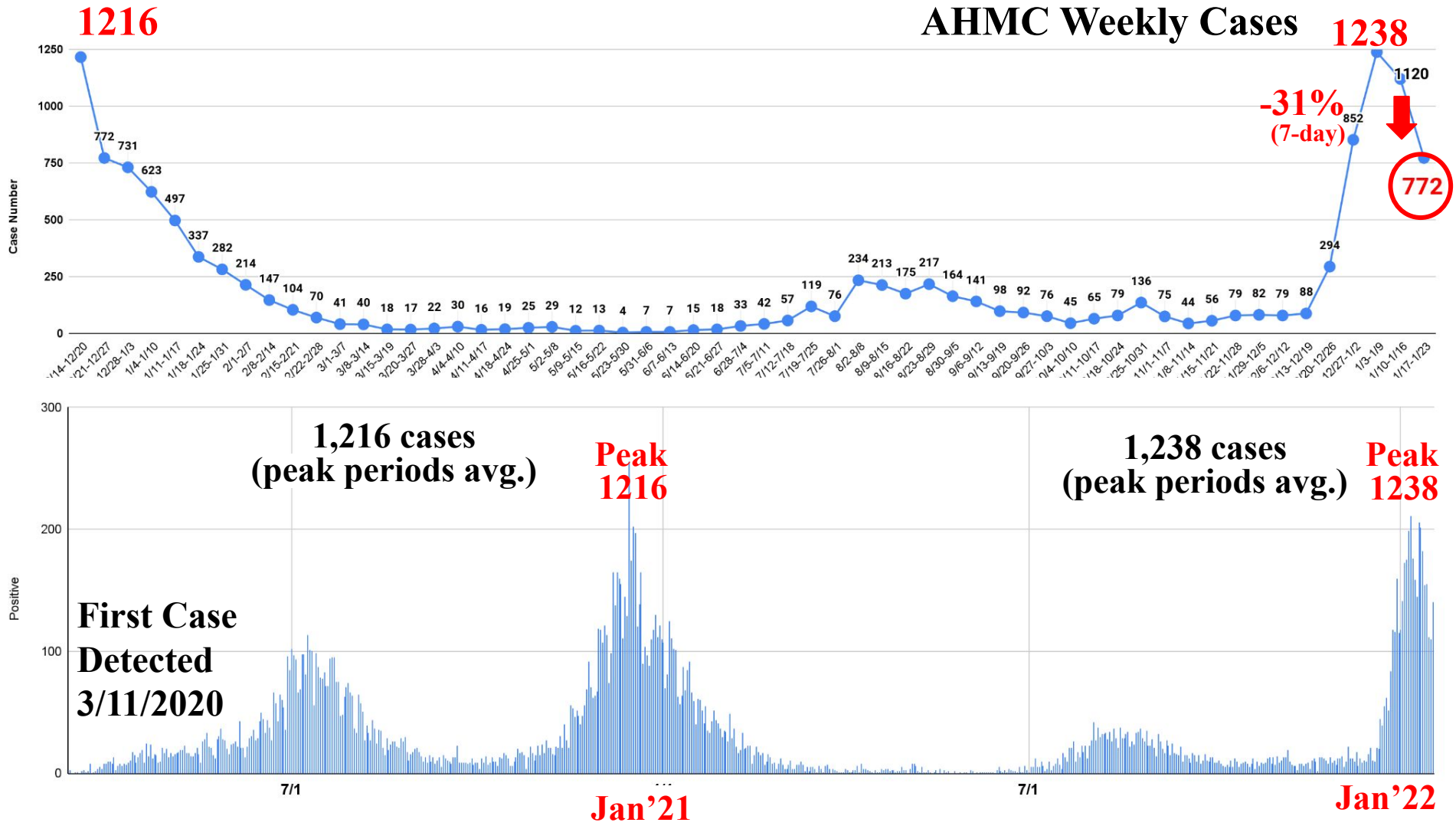


Source : NYT

AHMC Weekly and Accumulated Cases

- Comparison of Peak Weekly Cases from Two Waves in Jan'21 and Jan'22

(Data as of 2/3/2022)



3. Vaccines and Variants

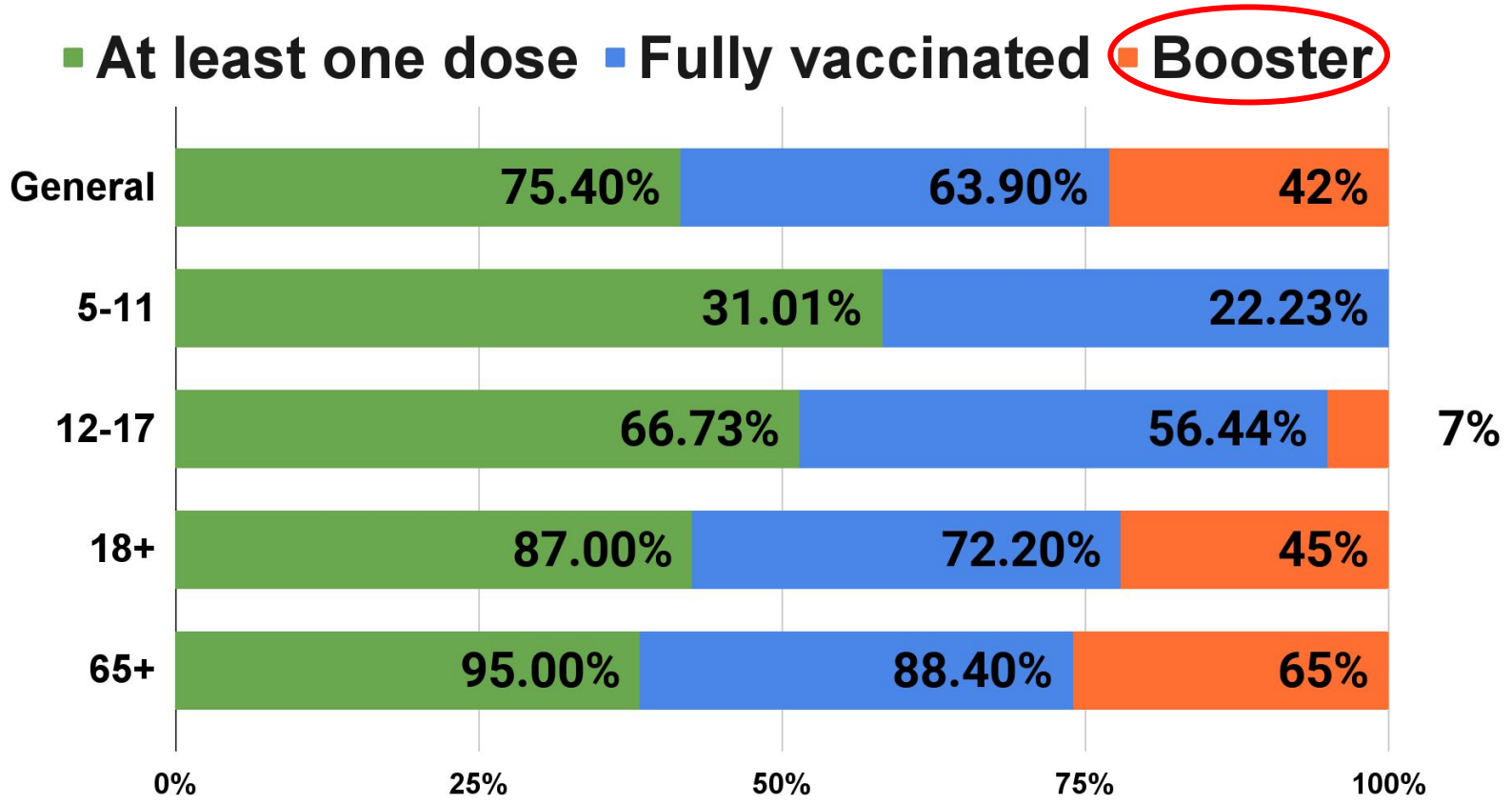
(U.K.) Source

COVID-19 Vaccinations in the US

Pfizer, Moderna, and J&J

- Booster accounts for 41.8% in general population and 64.6% in 65+ y/o

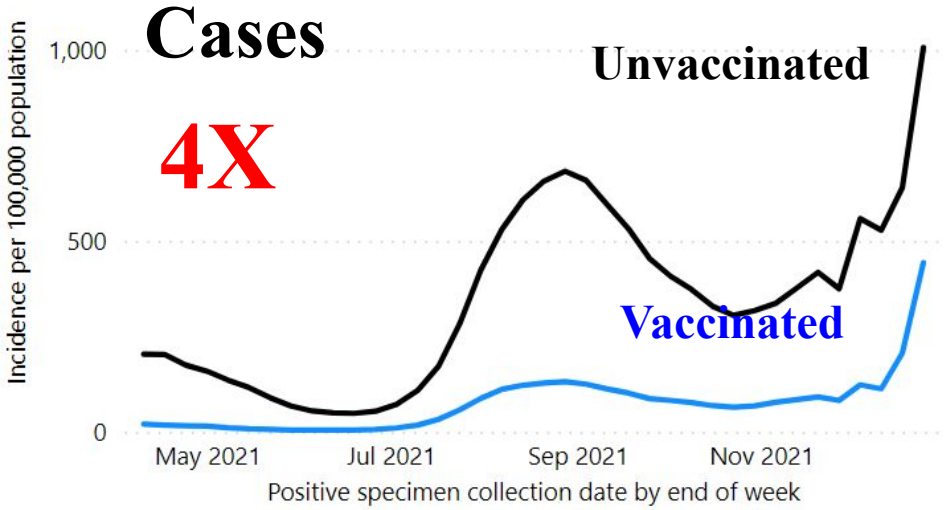
(CDC, 2/3/2022)

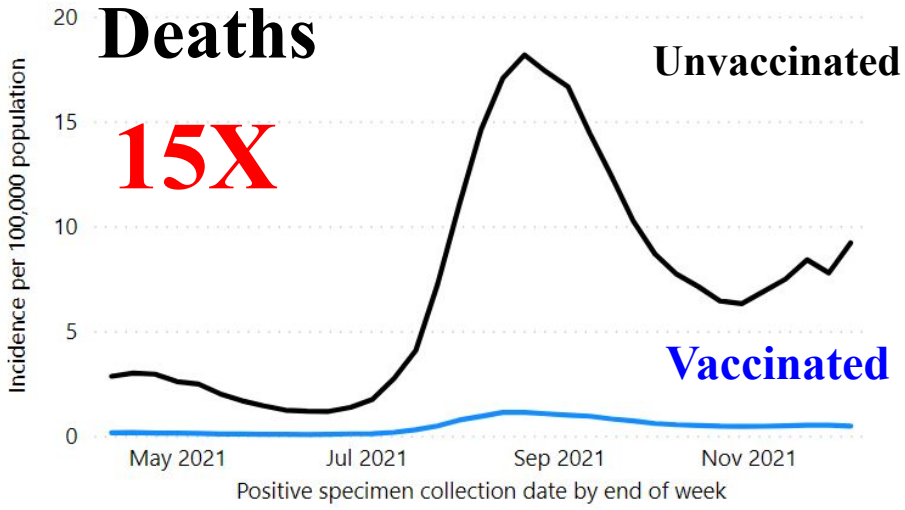


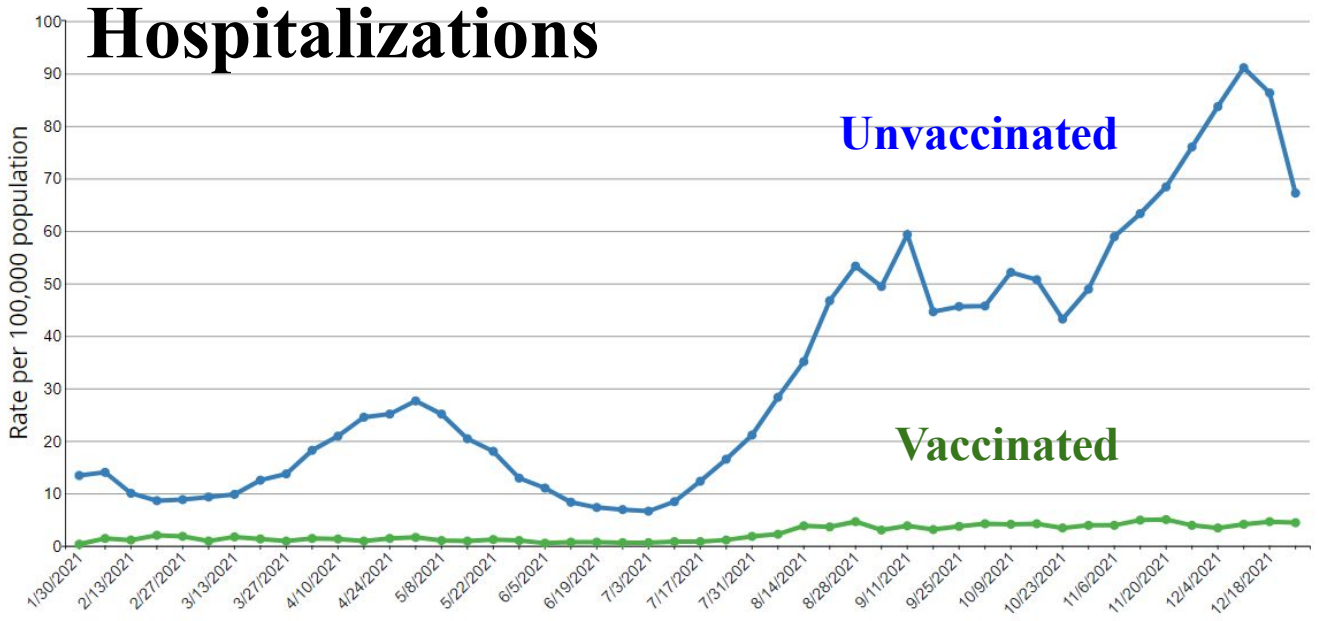
Source: CDC

Rates of Case, Death, and Hospitalization by Vaccination Status

(CDC, 2/3/2022)



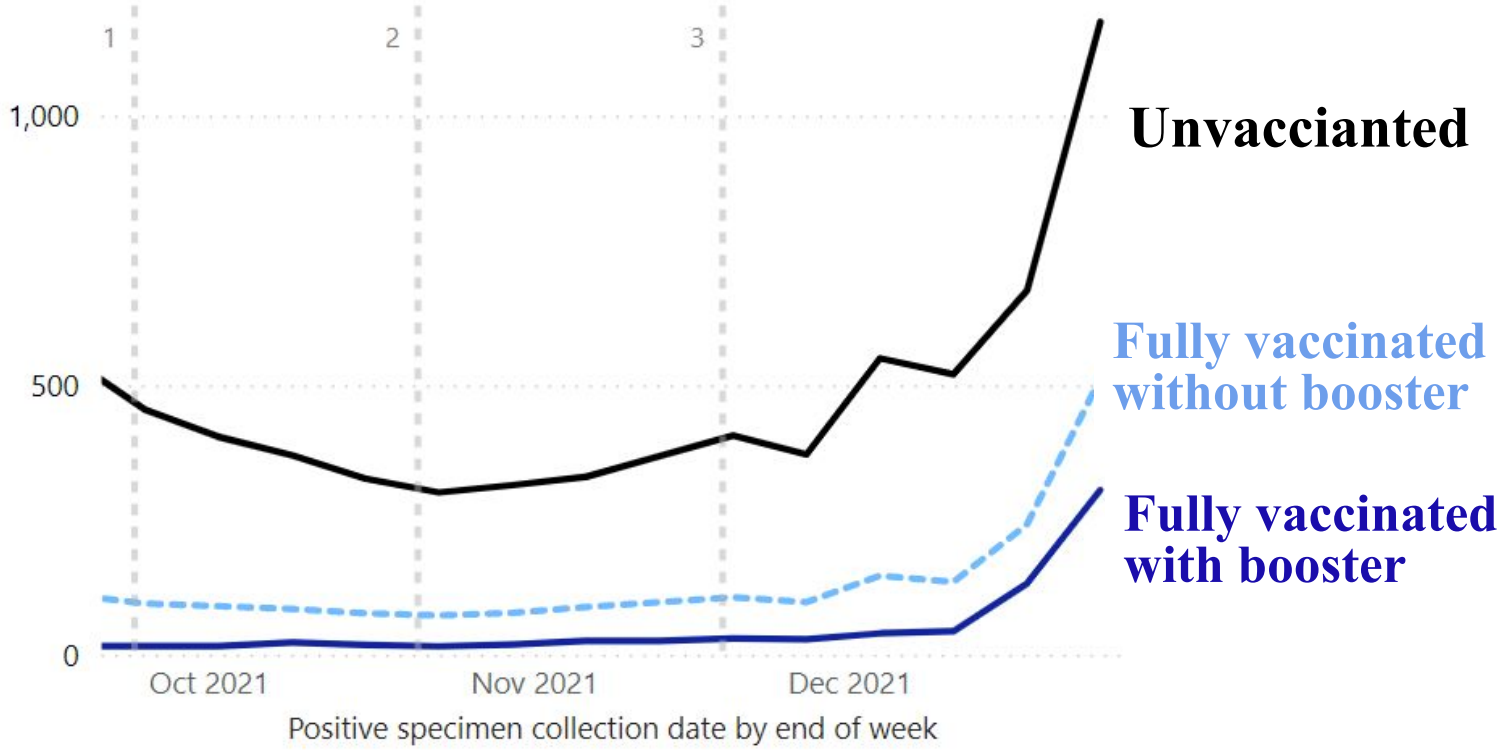




Source: CDC

Rates of Case and Death by Vaccination Status (Booster)

(CDC, 2/3/2022)



In November, unvaccinated adults aged 18 years and older had:

13X

Risk of Testing Positive for COVID-19

AND

68X

Risk of Dying from COVID-19

compared to fully vaccinated adults with booster doses*

Source: CDC

Los Angeles County COVID-19 VACCINES ELIGIBILITY: Provider Summary Table

(LACDPH, 1/25/2022)

Vaccine	Dose	Age		
		5-11	12-17	18+
mRNA vaccines: Pfizer[1]/ Comirnaty & Moderna[2]	**Primary 2-dose series**[3]	Pfizer only[1]	Pfizer only	✓
	Third primary dose ("additional dose")[3,4] recommended for moderate to severely immunocompromised persons ***at least 28 days*** after 2nd dose	Pfizer only[1]	Pfizer only	✓
	Booster dose recommended[3,5] ***5 months*** after a Moderna or Pfizer primary series		Pfizer only	✓
Janssen/ Johnson & Johnson (J&J)	*J&J vaccine is an alternate vaccine option for persons with contraindications to both mRNA vaccines or who prefer to get a J&J vaccine.*			
	Primary single-dose series[3]			✓
	Booster dose recommended[3,5] *(mRNA vaccine preferred)* ***2 months*** after the 1st dose			✓
* Fully Vaccinated with Alternative Series[6]	**Third primary dose ("additional dose")**[3] recommended for moderate to severely immunocompromised persons ***at least 28 days*** after 2nd dose		Pfizer only	Pfizer only
	Booster dose recommended[3] ***5 months*** after the 2nd dose (after 3rd dose if immunocompromised)		Pfizer only	Pfizer only

* **Only the Pfizer COVID-19 vaccine is authorized as a booster or additional dose for people who did not receive an FDA authorized/approved COVID-19 vaccine series(LACDPH, 1/25/2022)**

Source:LACDPH

Moderna Vaccine Granted Full FDA Approval

(FDA, 1/31/2022)

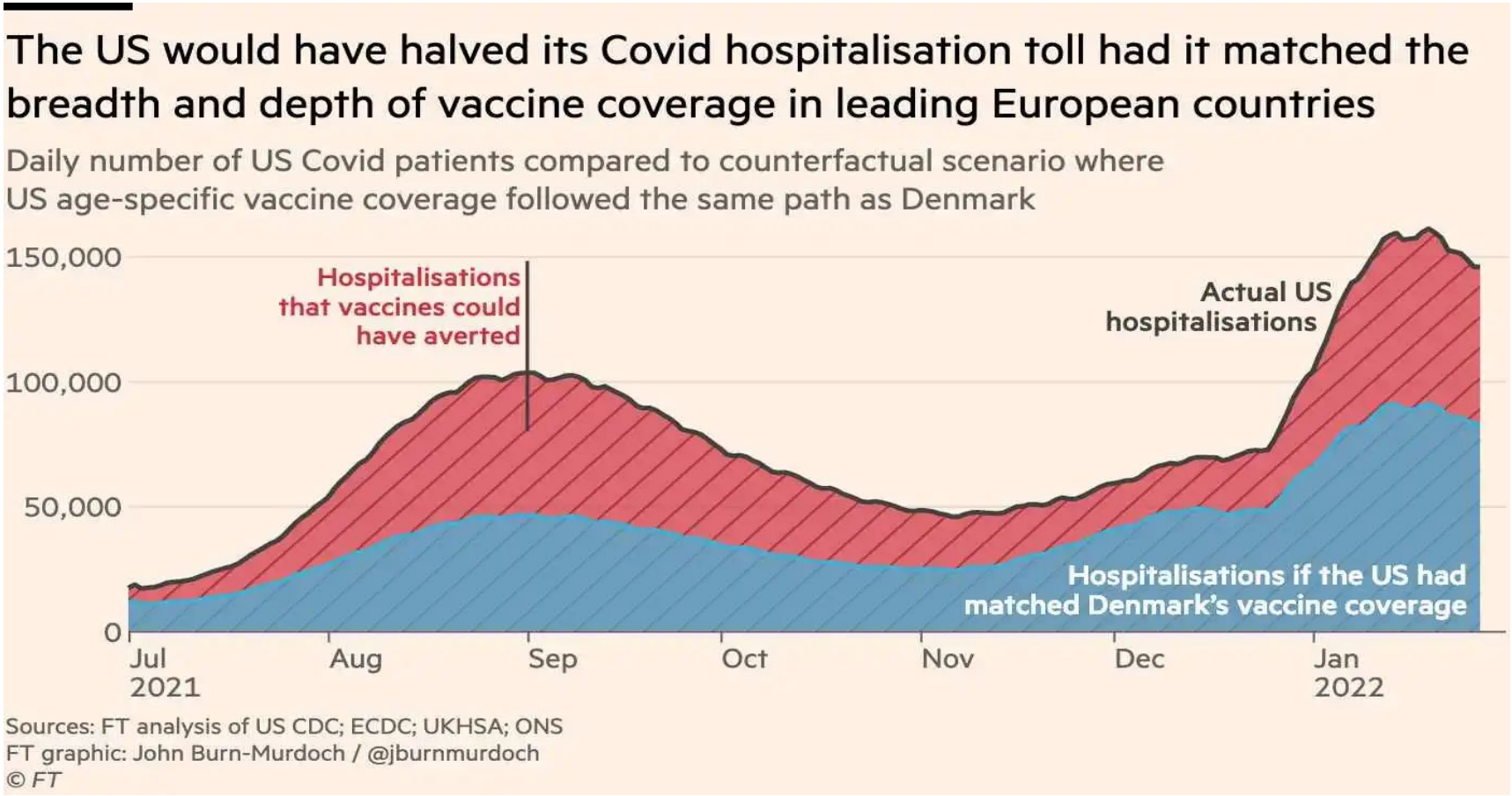
- **The U.S. Food and Drug Administration approved a second vaccine.**
- **The vaccine has been known as the Moderna COVID-19 Vaccine; but will now be marketed as Spikevax.**
- **Spikevax meets the FDA's rigorous standards for safety, effectiveness and manufacturing quality required for approval.**
- **The Moderna vaccine has been available under EUA for individuals 18 years of age and older since Dec. 18, 2020.**
- **The formulation remains the same and can be used interchangeably with the EUA Moderna vaccine.**

Source: FDA

The Impact of Low US Vaccination Rates (1/5)

(Financial Times, 1/30/2022)

The number of patients in US hospitals on January 19 would have peaked at 91,000 instead of 161,000 if the US had the same rates of vaccine coverage in each age-group as Denmark, 100,000 if the US had matched the UK, and 109,000 if the US had matched Portugal.

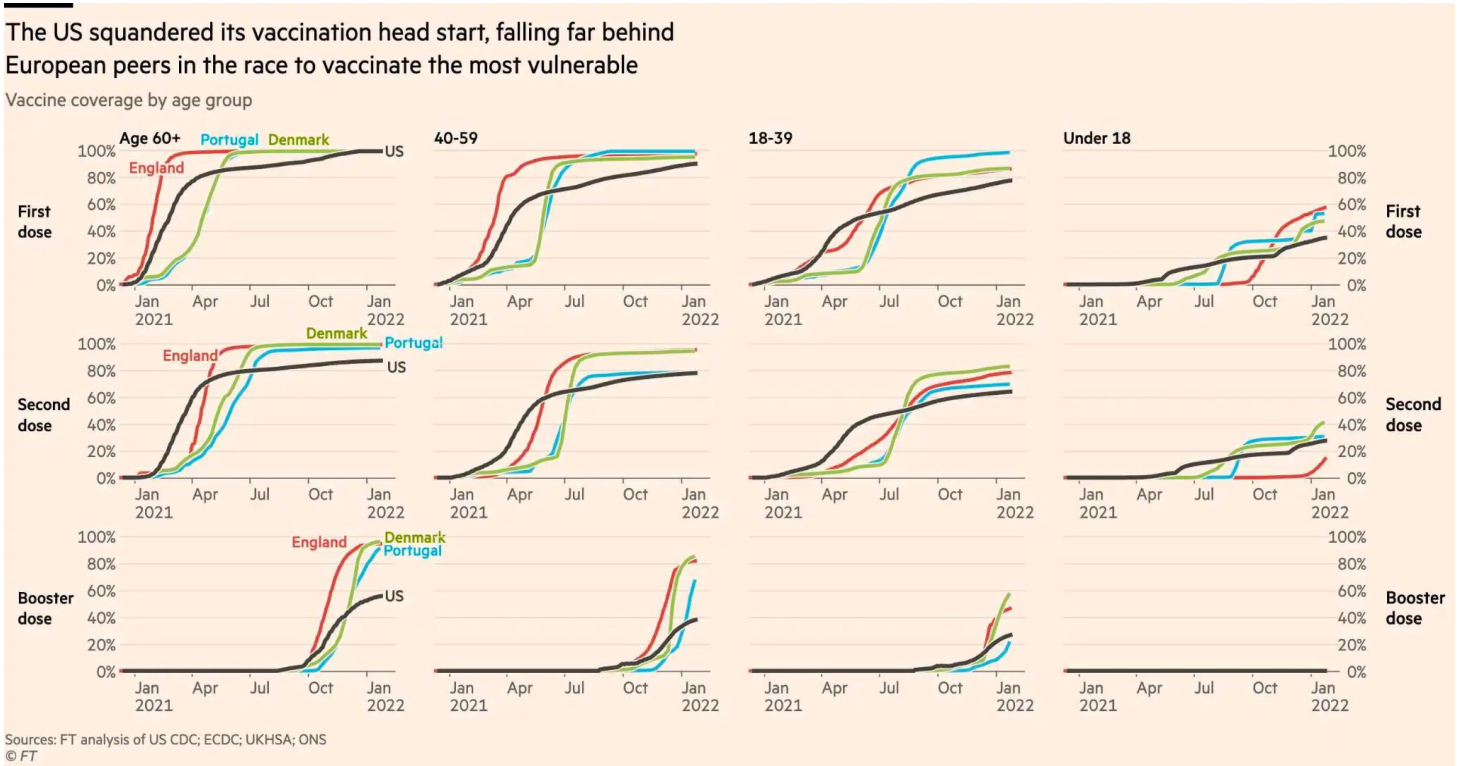


Source: Financial Times

The Impact of Low US Vaccination Rates (2/5)

(Financial Times, 1/30/2022)

- **The US fell behind in the vaccination race despite an early lead. On 03/10/2021, 36% of US over-60s had received two doses — far ahead of Denmark (8%) and England (6%).**
- **Six months later, that lead had turned into a deficit: 18% of US seniors were still yet to receive a second dose on 09/10/2021, compared to just 2% in Denmark and England.**

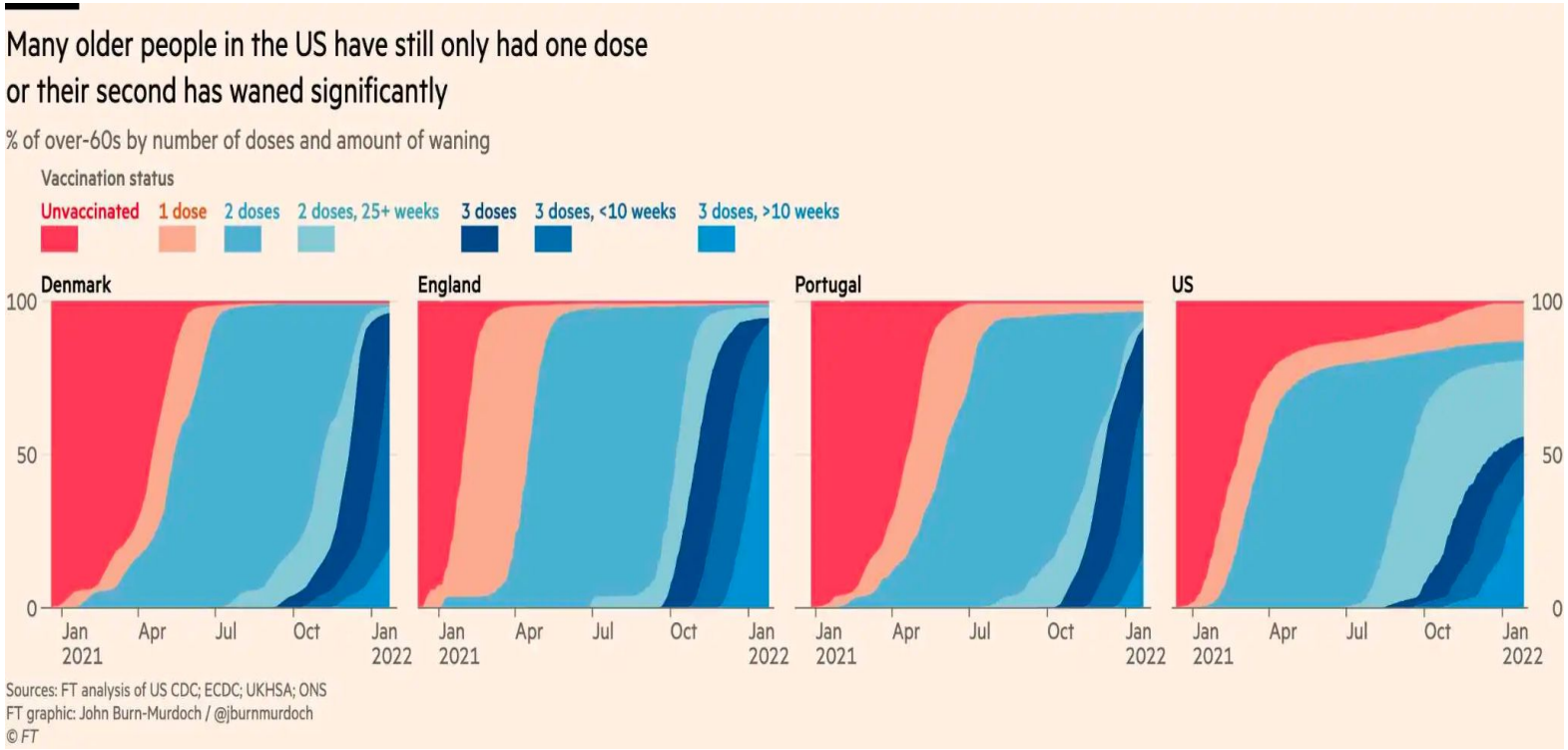


Source: Financial Times

The Impact of Low US Vaccination Rates (3/5)

(Financial Times, 1/30/2022)

- **As Omicron spread, the US was closing the gap on its European peers in terms of first doses, but a lackluster booster campaign presented new problems.**
- **On 12/20/2021, 30% of people in the US over-65 had gone six months since receiving a second dose, compared with just 2% in Portugal; 5% in England; and 7% in Denmark.**

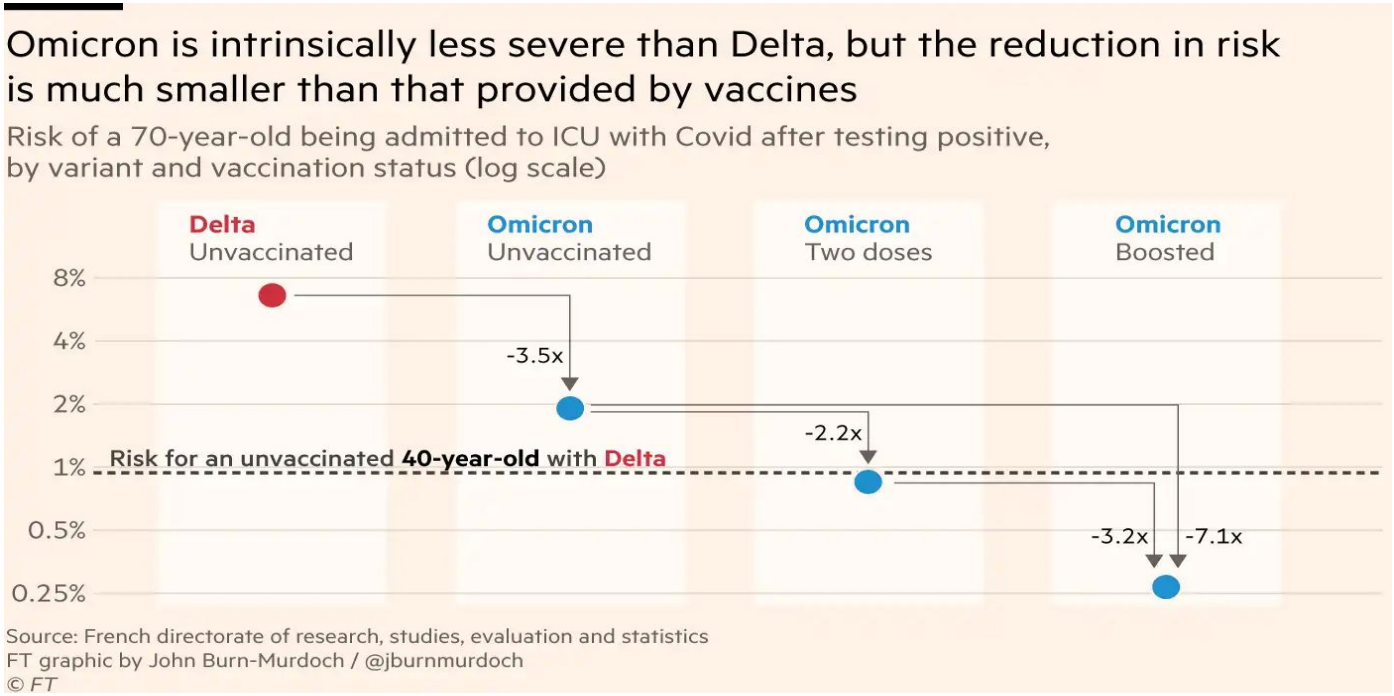


Source: Financial Times

The Impact of Low US Vaccination Rates (4/5)

(Financial Times, 1/30/2022)

- **An unvaccinated 70-year-old who tests positive for Omicron is still about 2x likely to end up in an ICU as an unvaccinated 40-year-old with Delta.**
- **However, the risk is cut in half from 1.9% to 0.9% if they have received two vaccine doses.**
- **A booster dose takes their risk down three-fold again to just 0.3%, one-third of the risk of the unvaccinated 40 year-old with Delta.**

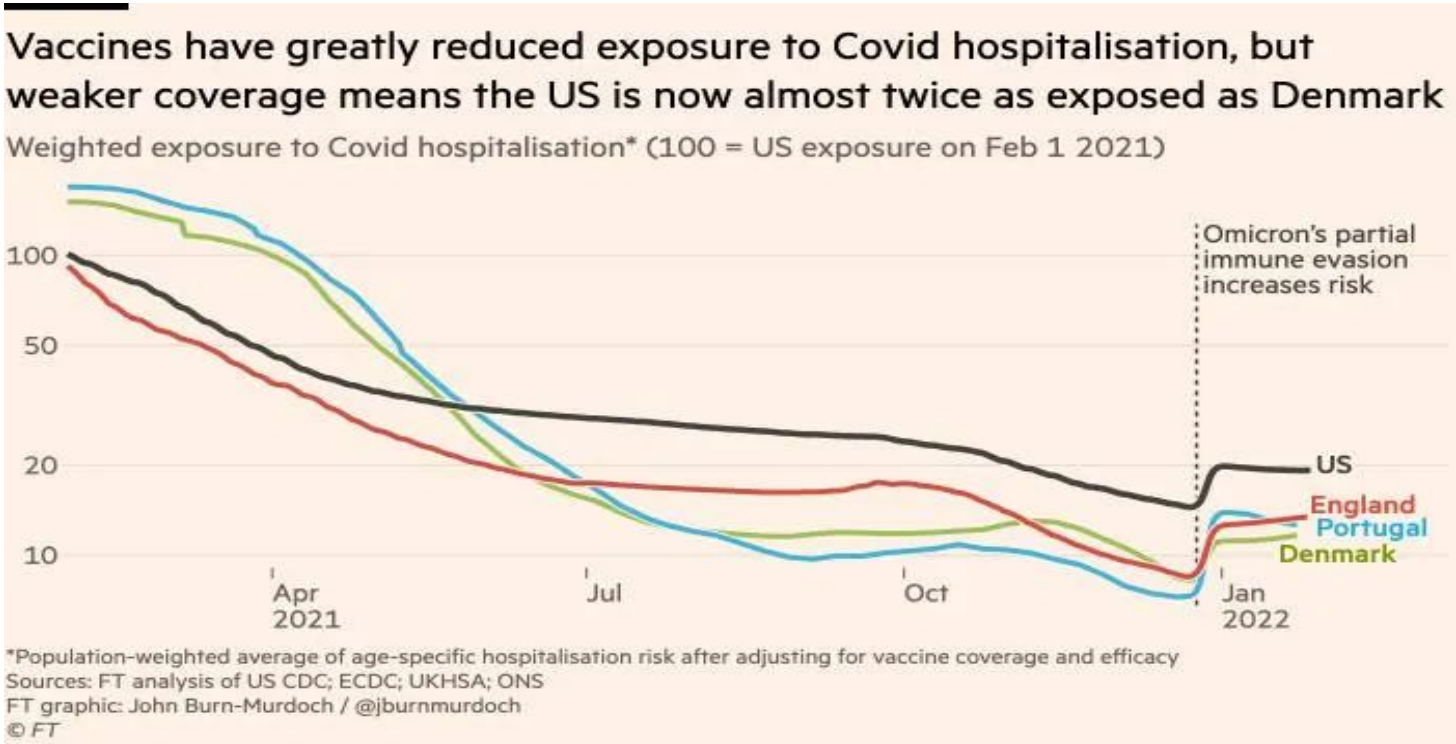


Source: Financial Times

The Impact of Low US Vaccination Rates (5/5)

(Financial Times, 1/30/2022)

- **Unvaccinated Americans (>18 years) were 16x more likely to be hospitalized compared to the fully vaccinated.**
- **Americans between 50-64 years who were vaccinated and had a booster jab were 46x less likely to be hospitalized.**
- **Lower vaccination coverage for Americans leaves them almost twice as exposed compared to some European countries.**



Source: Financial Times

Moderna Begins a Study of a Booster Designed to Counter Omicron

(New York Times, 1/26/2022)

- **Moderna's new study will examine the safety and effectiveness of a single Omicron-specific booster dose in about 600 adults.**

- **The performance of the shot will be assessed in two groups of volunteers:**
  - **A group who have received two doses of mRNA-1273.**
  - **A group who have received two doses of mRNA-1273 + booster.**

- **Moderna confirmed that Omicron-fighting antibodies for the current booster begins to fade considerably after about six months, but still protect from the worst outcomes of a breakthrough infection.**

- **There is no current timetable for when the Omicron-specific booster study will be completed.**

Source: New York Times

Pfizer Begins Clinical Trials for Vaccine Specific to Omicron

(Pfizer, 1/25/2022)

- **The study will evaluate up to 1,420 participants (ages 18-55) across the three cohorts:**

- **Cohort #1 (n = 615): Received 2 doses of the current Pfizer vaccine 90-180 days prior to enrollment; in the study, participants will receive 1 or 2 doses of the Omicron-based vaccine**

- **Cohort #2 (n = 600): Received 3 doses of the current Pfizer vaccine 90-180 days prior to enrollment; in the study, participants will receive 1 dose of the current Pfizer vaccine or the Omicron-based vaccine**

- **Cohort #3 (n=205): Unvaccinated participants will receive 3 doses of the Omicron-based vaccine**

- **There is no current timetable for when the Omicron-specific booster trial will be completed.**

Source: Pfizer

Boosting with Different Vaccines Found to Be Safe and Immunogenic

- Homologous and heterologous boosting will increase protective efficacy against symptomatic infection

(NIH, 1/26/2022)

- **Early trial finds boosting with any of the three EUA vaccines in the US will stimulate an immune response in persons who have previously received a primary series of any of these vaccines.**
- **Homologous boosting provided a wide range of immunogenicity responses, and heterologous boosting provided similar or higher levels.**
- **Reactogenicity and adverse events were similar across booster groups, suggesting that an immune response will be generated for each of these boosters regardless of the primary vaccination.**

Source: NIH

Study: NEJM

Myocarditis Cases Reported After mRNA-Based COVID Vaccination

- The overall risk is low

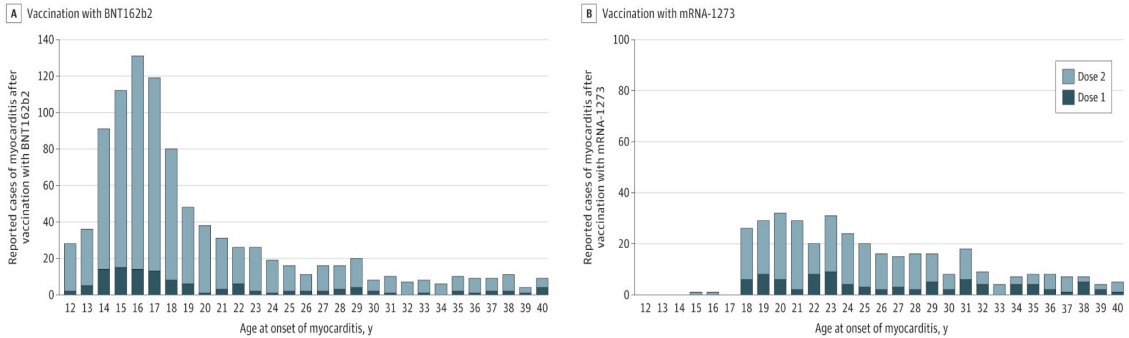
(JAMA, 1/25/2022)

- **Risk of myocarditis after receiving mRNA-based vaccines was increased across multiple age and sex strata and was highest after the 2nd vaccination in young males.**

- **Of 1626 eligible reports, 1195 (73%) were <30 years old, 543 (33%) were <18 years old, and the median age was 21 years. Of the reports of myocarditis with dose information, 82% (1265/1538) occurred after the 2nd vaccination dose.**

- **While the overall risk is low, the onset of myocarditis should be considered in the context of the benefits of COVID-19 vaccination.**

- **Earlier studies have shown young males infected with the virus to be up to 6x more likely to develop myocarditis as those who have received the vaccine. (medRxiv 7/27/2021)**



Source: JAMA

4. Update on Treatments and Studies

(India) Source

COVID-19 Monoclonal & Antiviral Therapy for Non-Hospitalized Patients

(CDPH, 2/3/2022)

Outpatient therapy

- **Paxlovid (Pfizer)**
- **Sotrovimab (GSK)**
- **Remdesivir (Veklury-Glead Sciences)**
- **Molnupiravir (Merk)**

Pre-exposure prophylaxis

- **Evusheld(AstraZeneca)**

Supplies of Paxlovid, Molnupiravir, Evusheld, and Sotrovimab are currently limited

Drug and Treatment Tracker

The status of 34 COVID-19 drugs and treatments

(NYT, FDA as of 2/1/2022)

- **1/31/2022: The FDA's approval of Spikevax (Moderna) to prevent COVID**
- **1/24/2022: Regeneron's REGEN-COV is not recommended against the Omicron variant**
- **1/21/2022: Remdesivir is authorized to treat non-hospitalized patients**
- **1/19/2022: Bamlanivimab and etesevimab are not recommended against the Omicron variant**

Source: NYT, FDA

FDA Limits Use of Two COVID Antibody Treatments Due to Omicron

-Bamlanivimab & Etesevimab (Eli Lilly) and Casirivimab & Imdevimab (REGEN-COV) are not effective for Omicron variant

(FDA, 1/24/2022)

- **The FDA removed two monoclonal antibody therapies- Bamlanivimab and Etesevimab (administered together) and REGEN-COV (Casirivimab and Imdevimab)**
- **Due to these treatments are highly unlikely to be active against the Omnicron variant**
- **Several treatments remain effective against omicron — sotrovimab, a monoclonal antibody made by GlaxoSmithKline and Vir Biotechnology**

Source: FDA, BHR

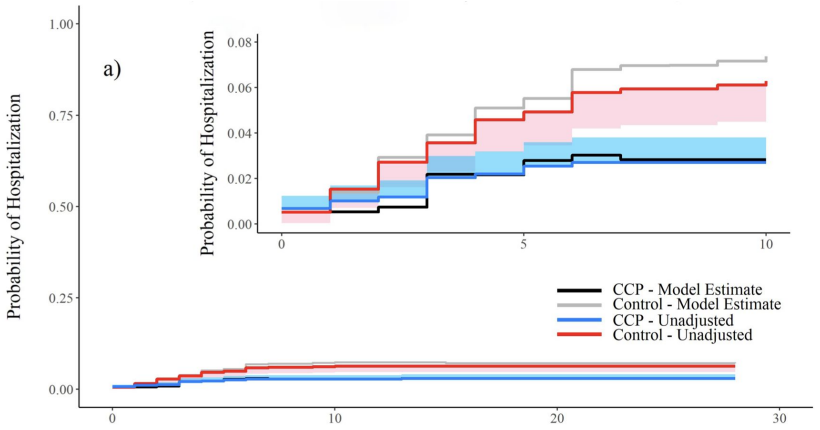
Early Use of Convalescent Plasma Reduces Hospitalization by 54% for Outpatients

(Johns Hopkins Medicine, 1/21/2022)

- **Convalescent plasma as an early outpatient treatment option may help avoid hospitalization, but FDA approval still pending.**
- **1,181 randomized patients (>18 y.o.) received one dose each of either polyclonal high-titer convalescent plasma or placebo control plasma.**
- **17 patients out of 592 (2.9%) who received the convalescent plasma required hospitalization within 28 days, while 37 out of 589 (6.3%) who received placebo control plasma did. Risk for hospitalization went down 54%.**

Source: Johns Hopkins

Study: medRxiv



Hyperimmune Intravenous Immunoglobulin Does Not Improve Outcomes for Hospitalized Adults

(NIH, 1/27/2022)

- **The combination of remdesivir plus a highly concentrated solution of antibodies is not more effective than remdesivir alone for treating adults hospitalized with the disease.**

- **Participants who received hIVIG plus remdesivir had no improvement in other clinical outcomes during the 28-day follow-up period compared to those who received remdesivir alone.**

- **There was no overall difference in safety at day seven for people who received hIVIG plus remdesivir compared to those who received remdesivir alone.**

Source: NIH

World's First COVID 'Human Challenge' Trial

(Research Square, 2/2/2022)

- **There were 36 volunteers (18-29 years) deliberately infected with a low dose of a pre-Alpha strain of COVID-19. Volunteers had no prior infection or vaccination.**

- **Participants became infectious after 2 days. Levels of the virus in the nose and throat peaked after 5 days, though they remained infectious for an average of 9 days and a maximum of 12 days after exposure.**

- **The results support guidance that people should quarantine for 10 days after they first feel symptoms or have a positive test result.**

  - **70% of infected participants lost their senses of smell or taste to varying degrees.**
  - **Most common respiratory symptoms included sore throat, runny nose and sneezing. Fever was less common.**
  - **0% developed the persistent cough that had once been a hallmark of infection.**

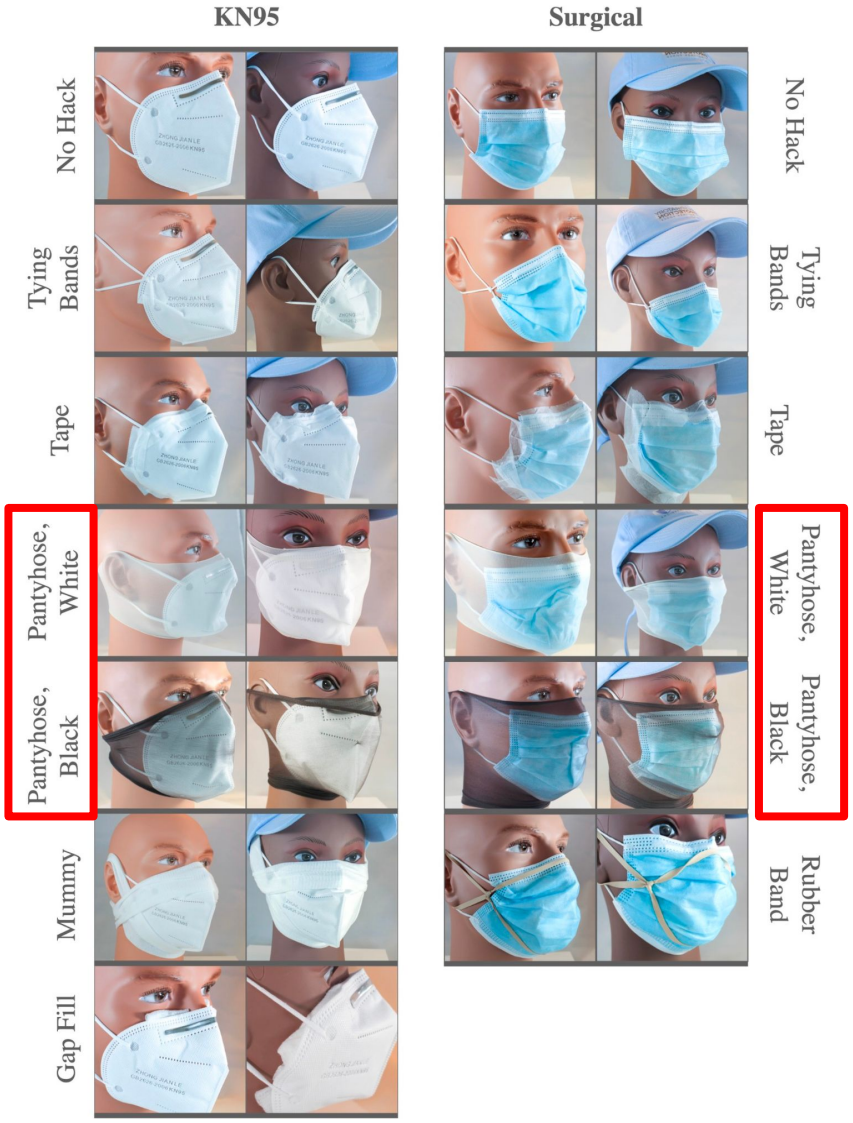
- **The clinical insights were noteworthy, such as the short incubation period, the swift rise in viral levels, and the lengthy period of infectiousness.**

Source: Research Square

Face Mask Fit Hacks

(Plos One, 2/2/2022)

- **It is recognized that improving fit tends to improve mask effectiveness.**
- **The use of pantyhose, tape, and rubber bands were effective for most participants. A pantyhose overlayer was observed to be the most effective hack.**
- **The development of effective fit-improvement solutions remains a critical issue in need of further development.**



Source: Plos One

5. Long COVID
- Post-Acute COVID Syndrome, PACS

(Nepal) Source

Long COVID

- 'Post-Acute COVID Syndrome (PACS)'

(CDC, 1/24/2022)

- **CDC long COVID definition: post-COVID conditions as an umbrella term for the wide range of health consequences that are present four or more weeks after infection.**

- **The time frame of four or more weeks provides a rough approximation of effects that occur beyond the acute period, but the timeframe might change as we learn more.**

Source: CDC

Long COVID: Everything You Need to Know, and Everything We Still Don't

(CNET, 1/26/2022)

- **Q1: What are the symptoms of long COVID?**
  - **Some lingering symptoms of COVID-19, per the CDC, include:**
    - **Difficulty breathing or shortness of breath**
    - **Tiredness or fatigue**
    - **Symptoms that get worse after physical or mental activities**
    - **Difficulty thinking or concentrating ("brain fog")**
    - **Cough**
    - **Chest or stomach pain**
    - **Headache**
    - **Palpitations**
    - **Joint or muscle pain**
    - **Pins-and-needles feeling**
    - **Diarrhea**
    - **Sleep problems**
    - **Fever**
    - **Lightheadedness**
    - **Rash**
    - **Mood changes**
    - **Change in smell or taste**
    - **Changes in menstrual period cycle**

Source: CNET

Long COVID: Everything You Need to Know, and Everything We Still Don't

(CNET; JHU, 1/26/2022)

- **Q2: How common is long COVID? Can Omicron cause it?**
  - **While Omicron may cause less severe symptoms, this may not mean a decreased risk of long-term sickness. Roughly 15 to 20% (other studies: 12-60%) of people who have confirmed cases develop lingering symptoms.**

- **Q3: What causes long COVID? Do the vaccines help?**
  - **Type 2 diabetes, inflammation, and a past infection with Epstein-Barr virus might increase someone's risk if the virus is reactivated, as well as SARS-CoV-2 RNAemia, or virus in the blood. (Slide #68)**

Source: CNET

Studies of COVID Vaccines and Long COVID

(Review as of 1/20/2021)

Q4: Can vaccines prevent long Covid?

- **Study 1 (UK)** (The Lancet, 1/1/2022) **found that people who were fully vaccinated and had gotten breakthrough infections were about half as likely as unvaccinated people to report long COVID symptoms**
- **Study 2 (US)** (medRxiv, 11/18/2021) **found that people who had received even one dose of vaccine were 7-10 times less likely to report two or more symptoms of long COVID 12-20 weeks later**
- **Study 3 (UK)** (medRxiv, 11/8/2021) **found that having a vaccine before being infected did not reduce the risk of most symptoms of long COVID**

Source: NYT; The Lancet; medRxiv (US); medRxiv (UK)

Early Risk Factors May Anticipate Long COVID

- Type 2 DM, SARS-CoV-2 RNAemia, EB viremia, and specific autoantibodies

(Cell, 1/24/2022)

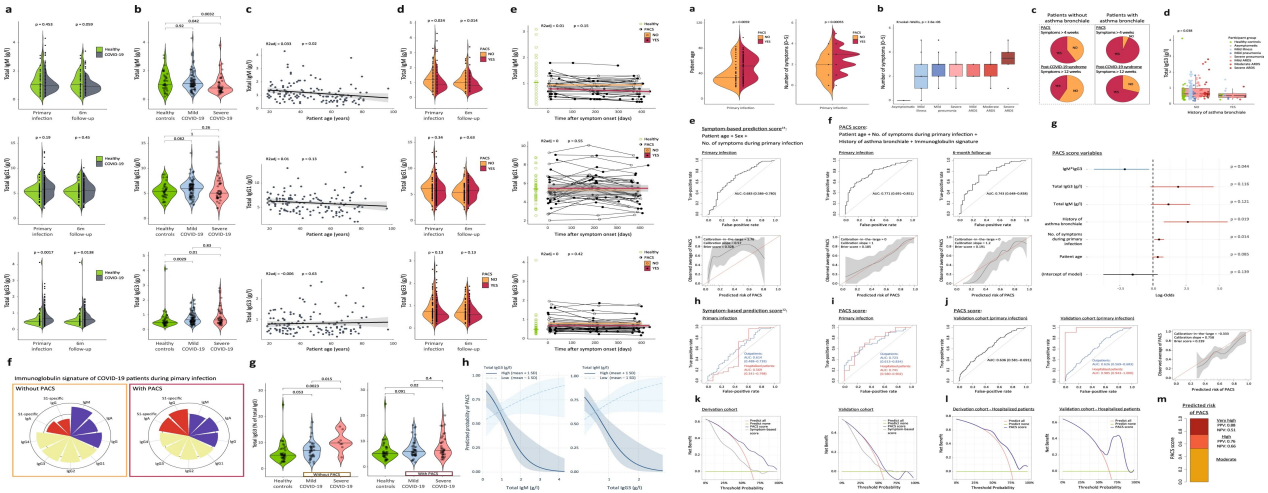
- **A study involving 309 infected patients from initial diagnosis to convalescence to study the effects of post-acute sequelae of COVID (PASC), or long COVID.**
- **Four PASC anticipating risk factors at the time of initial diagnosis: type 2 diabetes, SARS-CoV-2 RNAemia, Epstein-Barr virus viremia, and specific autoantibodies.**
- **PASC may include memory loss, gastrointestinal (GI) distress, fatigue, anosmia, shortness of breath, and other symptoms.**
- **These biological factors could point to ways to prevent or treat long COVID if identified early in an infection.**

Source: Cell

Blood Test May Predict Risk of Long COVID

(Nature, 1/25/2022)

- A study of over 500 individuals across two cohorts was conducted during their primary infection and up to one year later.
- The study found that an immunoglobulin (Ig) signature (based on IgM and IgG3 levels alongside age and other health factors) is able to predict the risk of PACS.
- Though preliminary, researchers had a 75% accuracy rate in predicting who would get long COVID.



Source: Nature

Clinical Outcomes Among Patients With 1-Year Survival Following ICU COVID Treatment

(JAMA, 1/24/2022)

- **246 patient study who were alive 1 year following ICU treatment.**
- **Of these patients, 74.3% reported physical symptoms, 26.2% mental symptoms, and 16.2% cognitive symptoms.**
- **Long-term consequences are still widely unknown and there's need for long-term follow-up studies.**

Physical Outcomes

- **6.1% (15/245) had frailness**
- **56.1% (138/246) had fatigue**
- **Two-thirds had new physical problems:**
  - **(38.9%) weakened condition**
  - **(26.3%) joint stiffness**
  - **(25.5%) joint pain**
  - **(24.8%) muscle weakness**
  - **(21.3%) myalgia**
  - **(20.8%) dyspnea**

Mental Outcomes

- **17.9% (44/246) had symptoms of anxiety**
- **18.3% (45/246) had symptoms of depression**
- **9.8% (24/244) had symptoms of post-traumatic stress disorder**

Cognitive Outcome

- **16.2% (39/241) had cognitive symptoms (the median CFQ-14 score was 24.8)**

Source: JAMA

Long-COVID Symptoms Less Likely in Vaccinated People

- At least two doses vaccination may protect against long-COVID

(Nature, 1/25/2022)

- **People who've been both vaccinated and infected are less likely to report fatigue and other health problems than unvaccinated people.**
- **Of 637/951 (67%) infected individuals who were vaccinated, commonly reported symptoms included: fatigue (22%), headache (20%), weakness (13%), and persistent muscle pain (10%).**
- **Those who received two doses vaccination were less likely than unvaccinated individuals to report any of these symptoms: fatigue (by 64%), headache (by 54%), weakness (by 57%), and persistent muscle pain (by 68%).**

Source: Nature

Study: medRxiv

Cerebrospinal Fluid Offers Clues to Post-COVID 'Brain Fog'

- Abnormal CSP found in brain and spinal cord of PACS individuals with impaired cognition

(UCSF, 1/18/2022)

- **A UCSF study that involved 32 adults found that 10 out of 13 people who were infected with COVID and had impaired cognition, abnormal CSF found in the brain and spinal cord.**

- **Four fluid samples from people who had COVID and didn't have cognitive symptoms showed no abnormalities.**

- **The abnormalities included elevated levels of protein that suggested inflammation and unexpected antibodies found in an activated immune system.**

Source: UCSF

6. Policies and Forecasting

(Mexico) Source

Update on COVID Policies

- LA county extended the deadline for health care workers to receive a booster dose from 2/1/22 to 3/1/22
- LA county Addressing Low COVID-19 Vaccination Rates in Children 5-11 Years of Age. Hospitalizations among children aged 5-11 reached their highest numbers since the beginning of the pandemic. Most of these hospitalizations in this age group are in children who are not fully vaccinated
- The CMS are providing reimbursement for COVID-19 vaccine counselling visit for children, even if vaccine is not directly administered

Source:ACDC, CDPH, FDA

COVID-19 Immunizations Requirements for Covered Workers

COVID-19 Vaccine	Primary vaccination series	When to get the vaccine booster dose	Which vaccine booster dose to receive
Moderna	1st and 2nd doses	Booster dose 5 months after 2nd dose	Any of the COVID-19 vaccines authorized in the United States may be used for the booster dose, but either Moderna or Pfizer-BioNTech are preferred.
Pfizer-BioNTech	1st and 2nd doses	Booster dose 5 months after 2nd dose	Any of the COVID-19 vaccines authorized in the United States may be used for the booster dose, but either Moderna or Pfizer-BioNTech are preferred.
Johnson and Johnson [J&J]/Janssen	1st dose	Booster dose 2 months after 1st dose	Any of the COVID-19 vaccines authorized in the United States may be used for the booster dose, but either Moderna or Pfizer-BioNTech are preferred.
World Health Organization (WHO) emergency use listing COVID-19 vaccine	All recommended doses	Booster dose 5 months after getting all recommended doses	Single booster dose of Pfizer-BioNTech COVID-19 vaccine
A mix and match series composed of any combination of FDA-approved, FDA-authorized, or WHO-EUL COVID-19 vaccines	All recommended doses	Booster dose 5 months after getting all recommended doses	Single booster dose of Pfizer-BioNTech COVID-19 vaccine

Source: CDPH

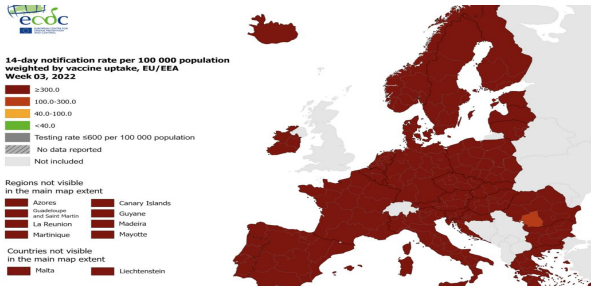
Re-Open EU to Travellers

- Travellers with a valid EU digital COVID certificate should not be subject to additional restrictions to free movement (EU, 01/25/2022)

A valid EU digital COVID certificate includes:

- **Vaccination certificate: A vaccine approved at European level if at least 14 days and no more than 270 days.**
- **Negative PCR test result: No more than 72 hours before travel or a negative rapid antigen test obtained no more than 24 hours before travel.**
- **Certificate of recovery: No more than 180 days have passed since the date of the first positive test result.**

Exception: Member states' regions indicating the potential risk of infection.



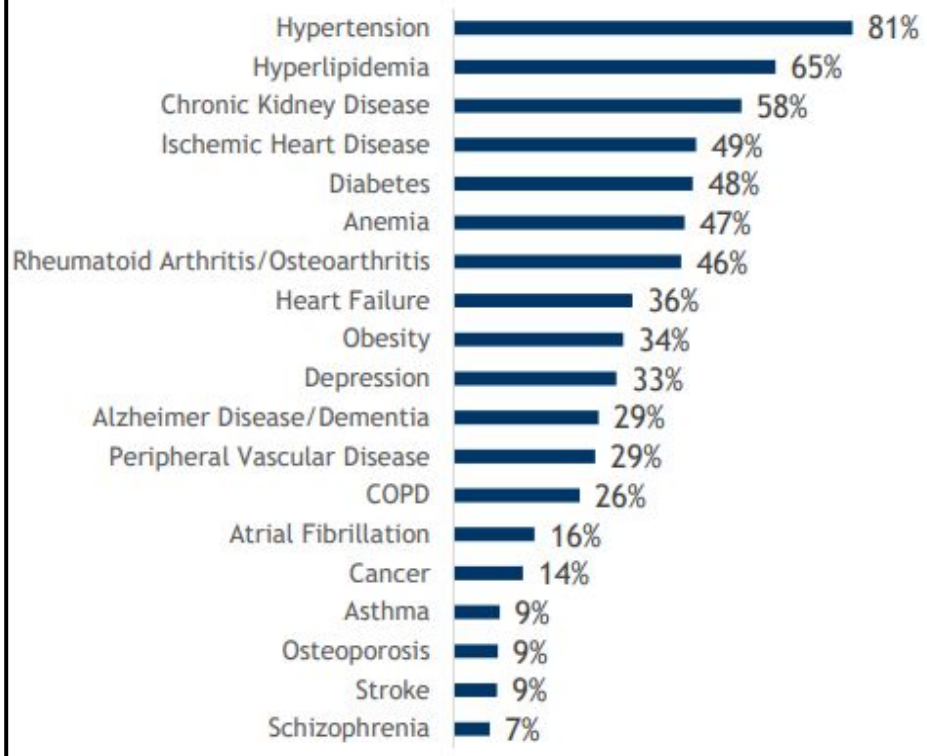
Source: EU

Preliminary Medicare COVID-19 Data Snapshot

- Average fee-for-service hospitalization is $24,304 /person (1/1/2020-11/20/2021)

961,260 Total Fee-for-Service COVID-19 Hospitalizations

Chronic Condition Prevalence Among Fee-for-Service COVID-19 Hospitalized Beneficiaries



Medicare Payments for Fee-for-Service COVID-19 Hospitalizations

$23.4B

Total Medicare payment for fee-for-service COVID-19 hospitalizations

$24,304

$3,414 (5th percentile) - **$67,458** (95th percentile)

Average Medicare payment per fee-for-service COVID-19 hospitalized beneficiary

Source: CMS

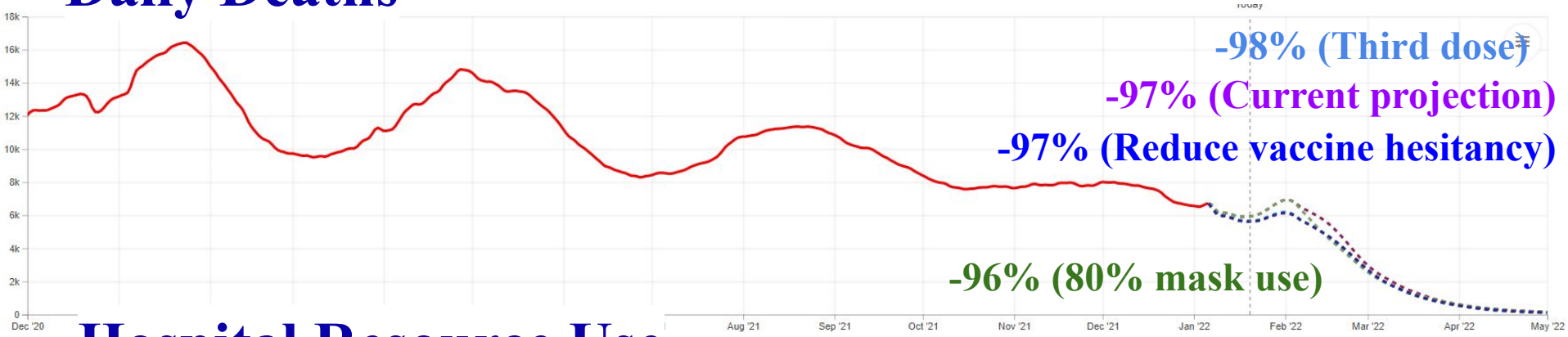
Forecast

3-Month Global Forecast by IHME (UW)

- Deaths projected to decrease 97% under current scenario

(IHME/University of Washington, 2/3/2022)

Daily Deaths



Hospital Resource Use

Institute for Health Metrics and Evaluation (IHME): a research institute specializing in global health statistics and impact evaluation at the University of Washington in Seattle

Source: IHME

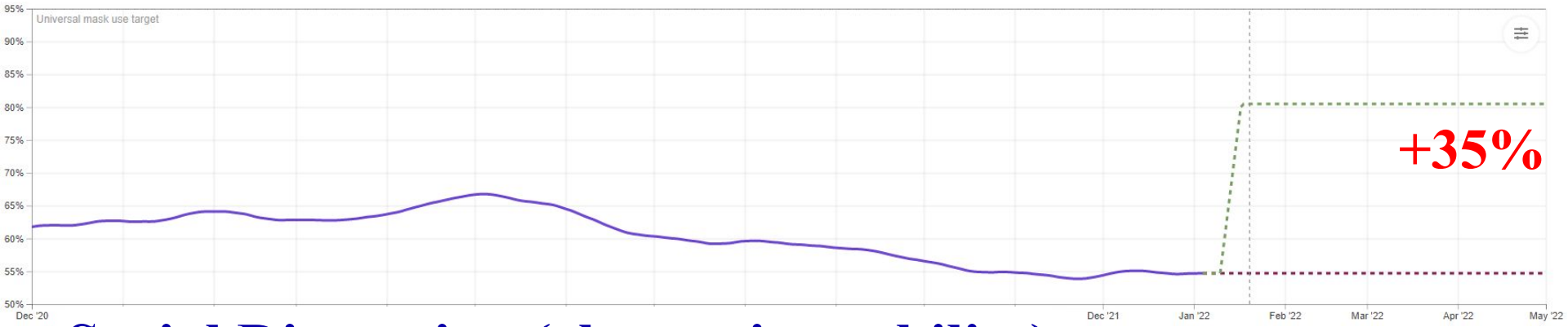
Forecast

3-Month Global Forecast by IHME (UW)

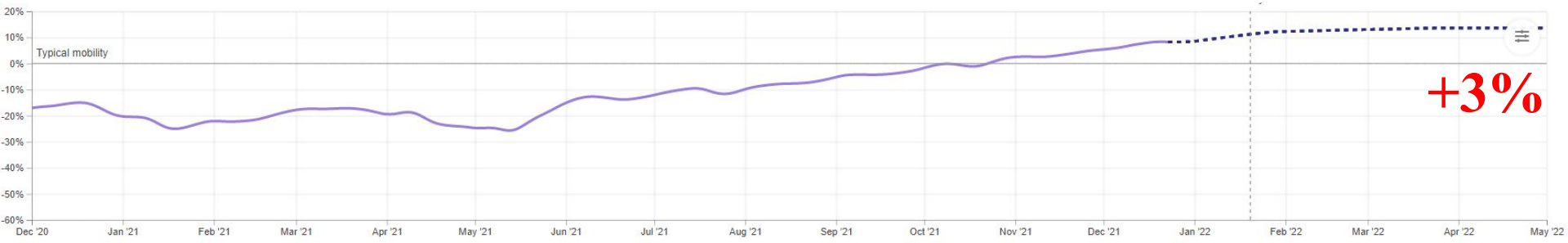
- Projected to increase 35% mask use and 3% change in mobility

(IHME/University of Washington, 2/3/2022)

Mask Use



Social Distancing (change in mobility)



Institute for Health Metrics and Evaluation (IHME): a research institute specializing in global health statistics and impact evaluation at the University of Washington in Seattle

Source: IHME

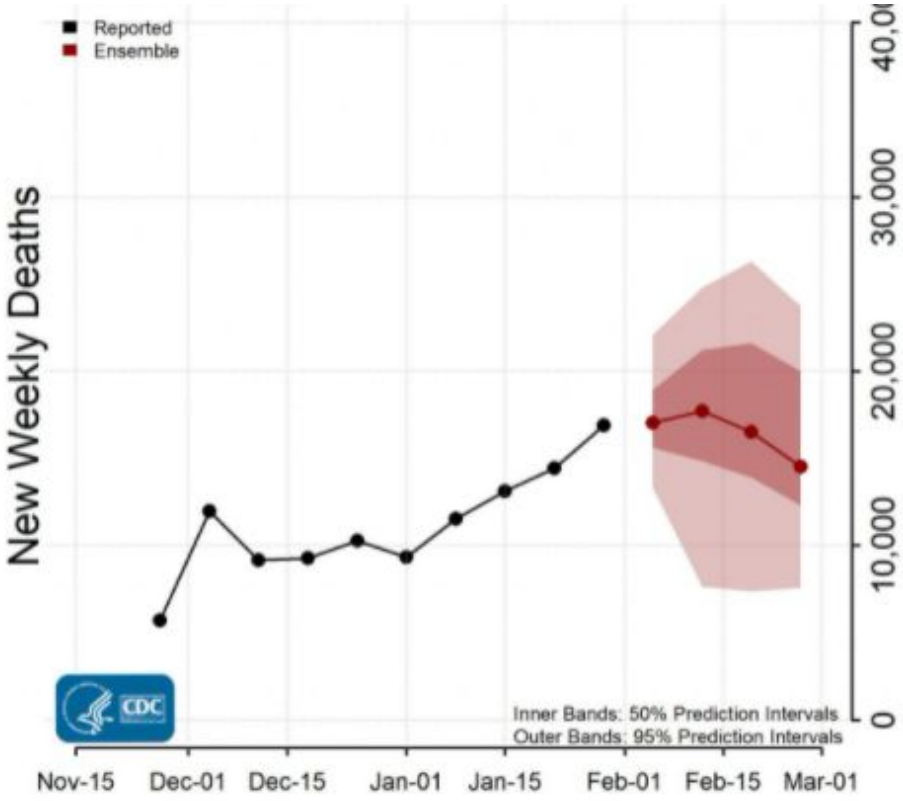
Forecast

US National Forecasts of New Deaths and Hospitalizations

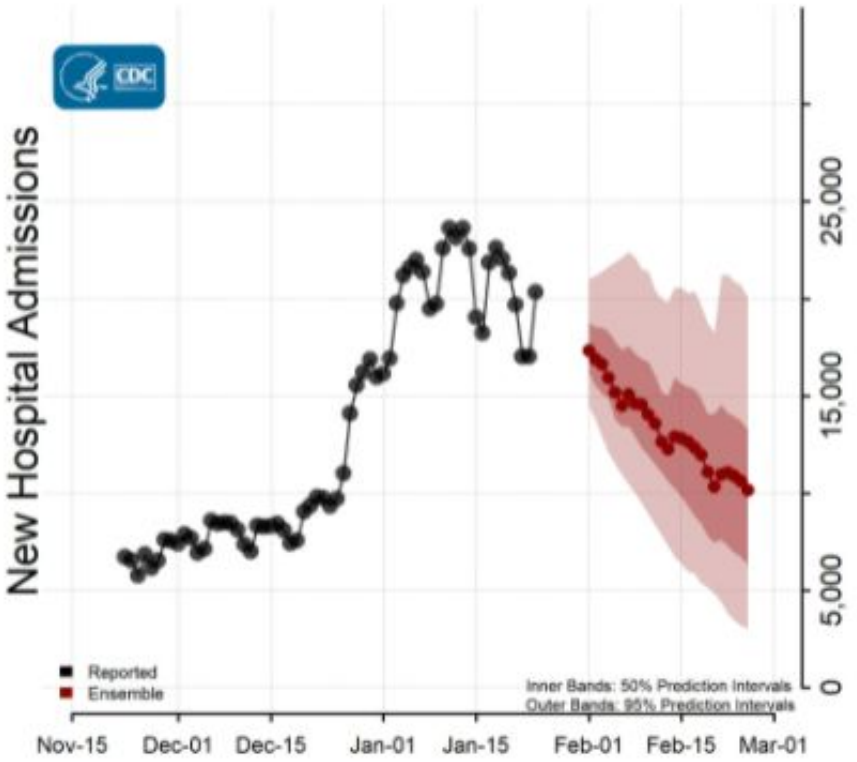
- Projected downward trend for new deaths and hospitalizations

(CDC, 2/3/2022)

New Deaths



Hospitalizations



Predictions from 27 institutes across the nation

Source: CDC

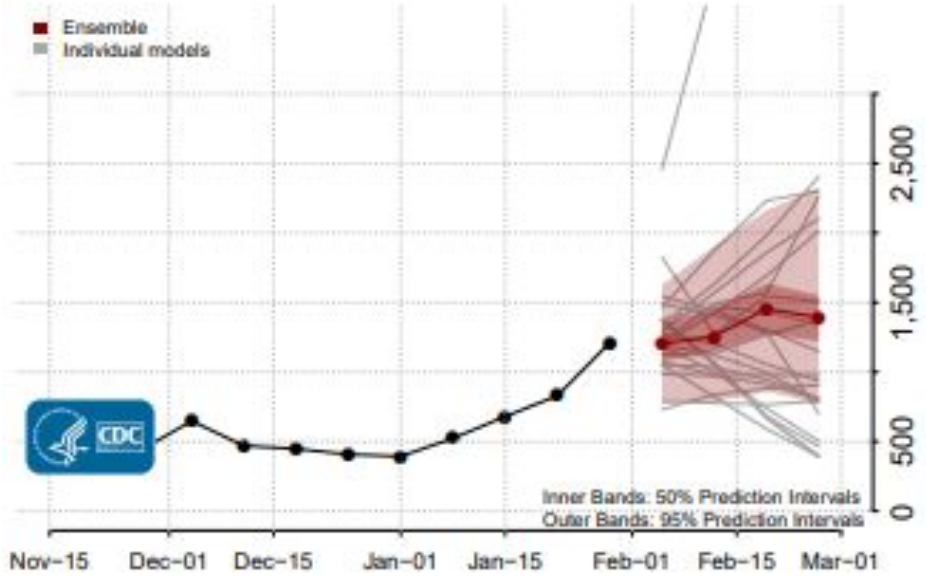
Forecast

California Forecasts of New Deaths and Hospitalizations

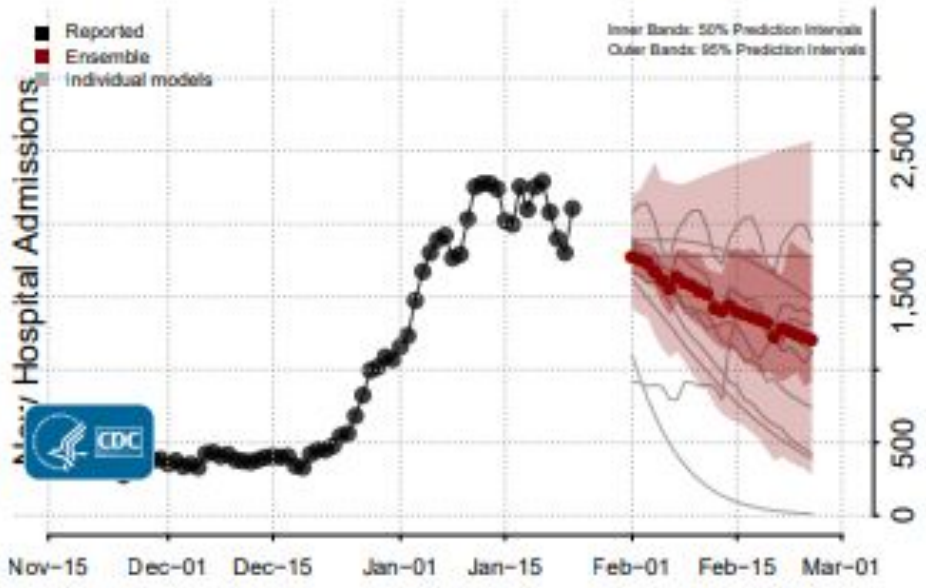
- Projected upward trend for new deaths and downtrend for hospitalizations

(CDC, 2/3/2022)

New Deaths



Hospitalizations



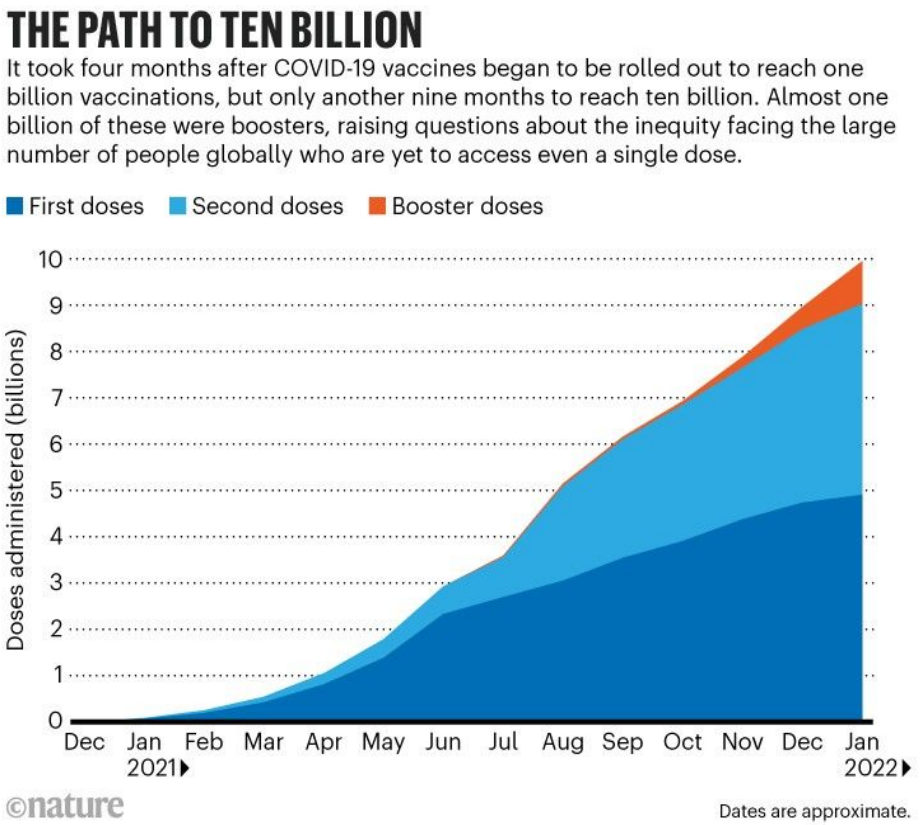
Predictions from 27 institutes across the nation

Source: CDC

New World Milestone: 10 Billion Vaccinations, but Inequity Remains

(Nature, 1/31/2022)

- **Since the vaccine rollout began, more than 60% of the world's population (4.8 billion people) have received at least one dose.**
- **But there are still huge inequities in access, with just 5.5% of people in low-income nations having received two doses.**
- **Currently, just 16% across the entire African have received a single dose.**
- **Some scientists caution that this continued inequality increases the risk of new SARS-CoV-2 variants emerging from poorly vaccinated populations.**



Source: Nature

Equitable Access to Vaccines Makes a Life-Saving Difference to All Countries

(Nature, 1/31/2022)

- **The pandemic has had devastating impacts on economies, education, health care and social activities in an increasingly globalized world.**
- **Over 70% of people in high-income countries (HICs) are fully vaccinated; in low-income countries, that number is 4%.**
- **HICs have access to vaccinate their populations several times over, leaving many low- and middle-income countries struggling to vaccinate their population even once.**
- **Vaccine inequity provides only short-term benefits to HICs. Equitable vaccine allocation strategies will substantially curb the spread of new strains.**

Source: Nature

Thank You!

(Brazil) Source