EMORY UNIVERSITY SCHOOL OF MEDICINE

Grady

The COVID-19 Pandemic: lessons learned

CARLOS DEL RIO, M.D.

DISTINGUISHED PROFESSOR OF MEDICINE, GLOBAL HEALTH AND EPIDEMIOLOGY

EXECUTIVE ASSOCIATE DEAN OF EMORY UNIV. SCHOOL OF MEDICINE FOR GRADY

PRESIDENT IDSA

DECEMBER 2022

Advisor during the pandemic to…

DELTA

Atlanta Symphony Orchestra

INTERNATIONAL MARKET CENTERS

UNITED

The World Residences at Sea

PAIDEIA SCHOOL

THE NEW SCHOOL

MLS MAJOR LEAGUE SOCCER

CLEARY GOTTLIEB

Royal Caribbean INTERNATIONAL

THE ATLANTA OPERA

UNIVERSITY OF MIAMI

NCAA

EMORY

TRUIST

GEORGIA MUNICIPAL ASSOCIATION

Atlanta Committee for Progress

us open

Jonathan Mann, MD, MPH

(July 20, 1947 – September 2, 1998)

- Funding Director of Project SIDA in Zaire – 1984 -1986
- Funding Director of WHO Global Programme on AIDS 1986 – 1990
- Funded the Health and Human Rights organization Health Right International in 1990
- Died in the crash of Swissair flight 111 flying from NYC to Geneva

Our responsibility is historic, for when the history of AIDS and the global response is written, our most precious contribution may well be that at the time of plague we did not flee; we did not hide; and we did not separate.

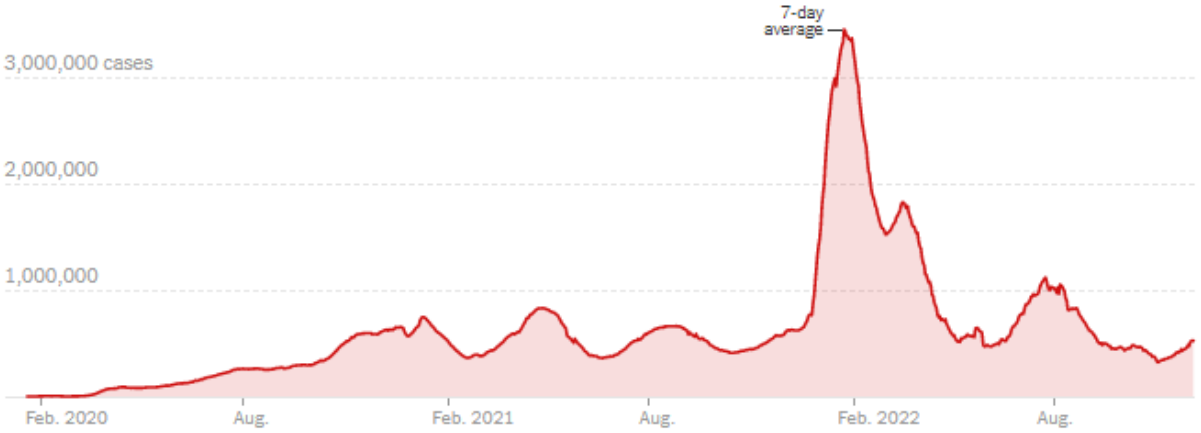
—JONATHAN MANN

Coronavirus World Map: Tracking the Global Outbreak

Updated Dec. 5, 2022

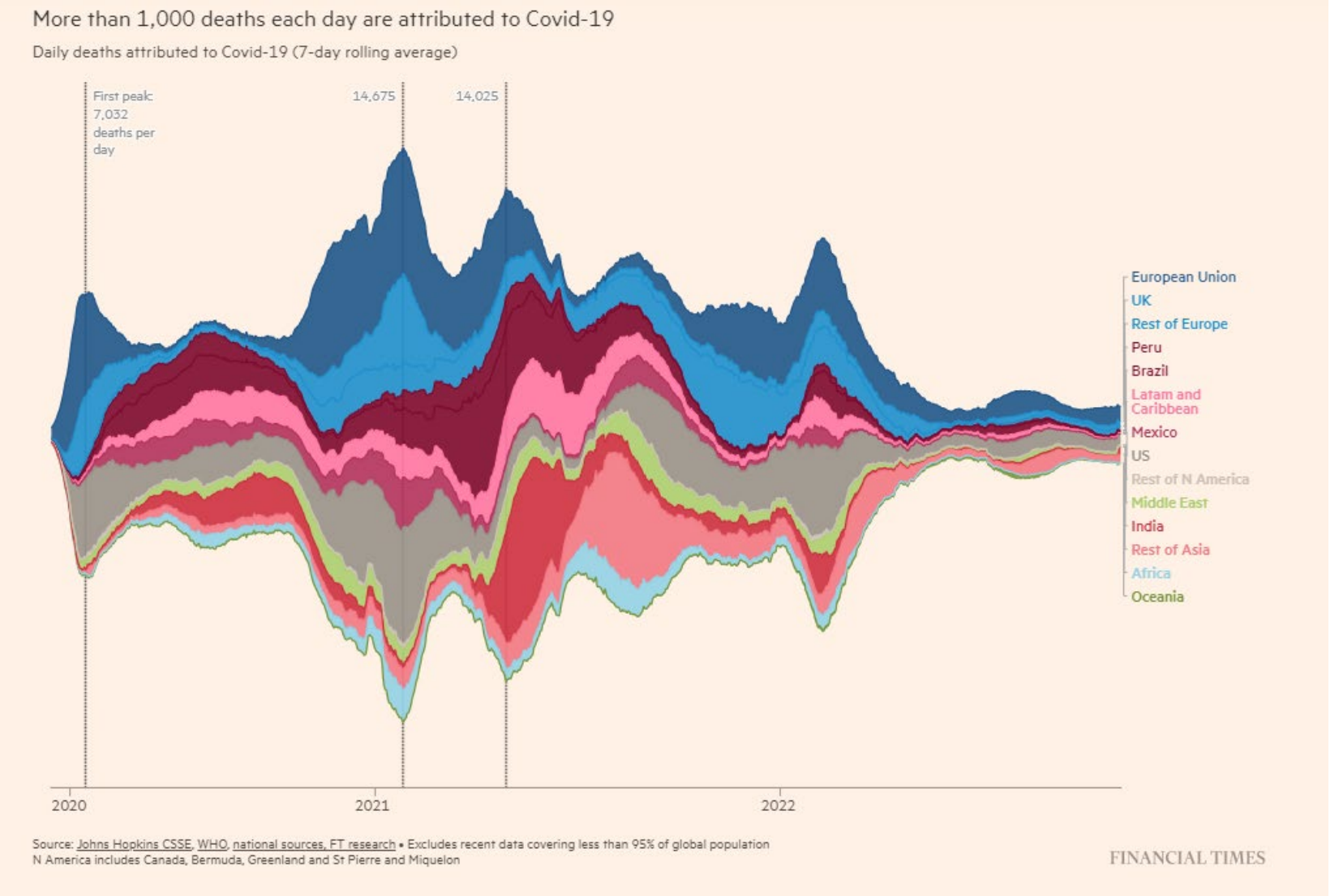
New reported cases

All time | Last 90 days



	DAILY AVG. ON DEC. 4	PER 100,000	14-DAY CHANGE
Cases	521,258	7	+26%
Deaths	1,437	<1	+1%

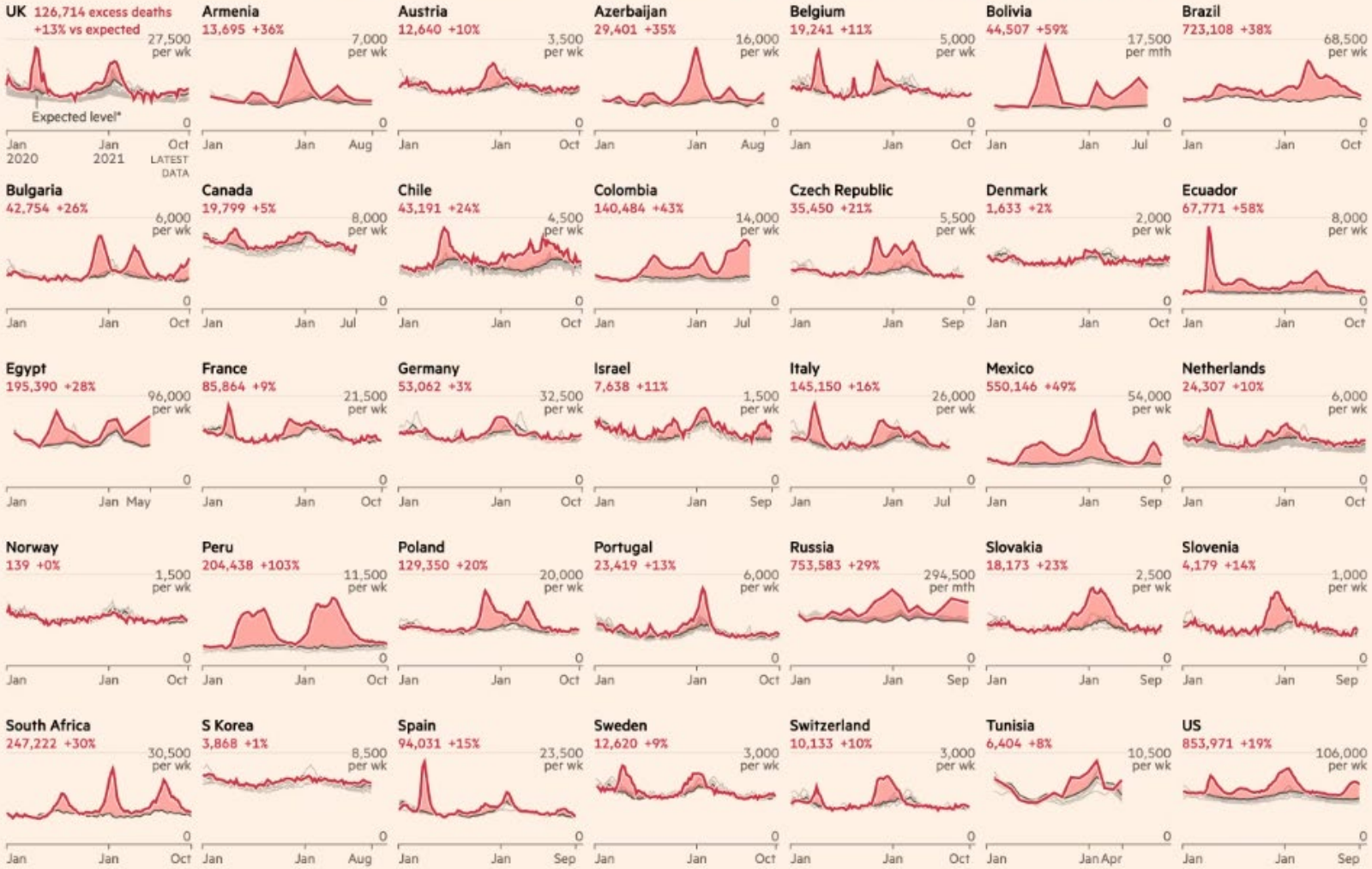
About this data



https://www.ft.com/content/a2901ce8-5eb7-4633-b89c-cbdf5b386938

Death rates have climbed far above historical averages in many countries that have faced Covid-19 outbreaks

Number of deaths per week from all causes, 2020 vs recent years: Shading indicates total excess deaths since 100 confirmed cases in the country



*Adjusted for trend over recent years

Sources: FT analysis of national mortality data and Karlinsky & Kobak's World Mortality Dataset. Data updated November 2

FT graphic: John Burn-Murdoch / @jburnmurdoch

Coronavirus Timeline

Jan 09, 2020
WHO reports a novel coronavirus.

Jan 21, 2020
First confirmed case in the United States.

Jan 30, 2020
WHO declares the coronavirus outbreak a public health emergency of international concern.

Feb 03, 2020
WHO releases the Strategic Preparedness and Response Plan.

Feb 26, 2020
Brazil reports its first case, the first one in Latin America.

Mar 11, 2020
WHO characterizes COVID-19 as a pandemic.

Mar 16, 2020
Several countries across Latin America impose restrictions on their citizens to slow the spread of the virus.

Apr 02, 2020
WHO reports that transmission from a pre-symptomatic case can occur before symptom onset.

Apr 06, 2020
WHO issues updated guidance on masks, advising the use of a mask by healthy people.

Apr 24, 2020
Launch of the Access to COVID-19 Tools Accelerator.

May 10, 2020
WHO issues interim guidance on contact tracing and considerations in adjusting public health and social measures.

Coronavirus Timeline

Jun 04, 2020
Number of daily reported cases surpasses 100,000 globally

Jun 10, 2020
The WHO warns that Mexico is facing its “most dangerous moment."

Jun 30, 2020
The European Union prepares to open to visitors from 15 countries. The list excludes the United States, Brazil or Russia.

Sep 1, 2020
The WHO independent panel to started to work

Sep 11, 2020
WHO highlights the value of antigen based rapid diagnostic tests.

Sep 28, 2020
Global deaths reach 1 million.

Nov 30, 2020
The WHO’s director general encourages the country’s leaders to use face masks in order to model the behavior for the population.

Mar 03, 2021
The Alpha variant detected in UK is named and considered a variant of concern

May 05, 2021
The Delta variant detected in India is named and considered as variant of concern

Nov 26, 2021
The Omicron variant detected in South Africa is named and considered a variant of concern

Coronavirus Timeline

Dec 27, 2021
CDC updates and shortens isolation and quarantine recommendations

Jan 12, 2022
SCOTUS blocks Biden's vaccine-or-test mandate for large private companies

Apr 18, 2022
Federal judge voids national mask mandate for airpolnes and other travel

May 17, 2022
US reaches 1 million COVID deaths

June 15, 2022
Fauci tests positive for COVID

July 5, 2022
BA.5 omicron subvariant becomes the dominant variant in the US

July 21, 2022
President Biden tests positive for COVID

Aug 11, 2022
CDC streams its COVID-19 guidance

Sept 1, 2022
ACIP recommends bivalent Pfizer-BioNtech COVID-19 vaccine

Dec 1, 2022
BQ.1 & B.Q.1.1 responsible for > 50% of COVID cases in the US. FDA removed bebtelovimab EUA

Center for American Progress

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TRENDING: CORONAVIRUS HEALTH CARE DACA CLIMATE CHANGE TA

RACE AND ETHNICITY

STATEMENT: The Violence of This Week and Past 400 Years Demonstrate That Systemic Racism Is America's Underlying Disease

Date: May 28, 2020
Contact: Julia Cusick
Email: jcusick@americanprogress.org

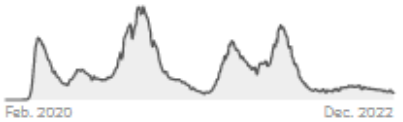
New reported cases

All time | Last 90 days

Test positivity rate

Hospitalized

Deaths



	DAILY AVG. ON DEC. 4	PER 100,000	14-DAY CHANGE
Cases	51,995	16	+28%
Test positivity	12%	—	+41%
Hospitalized	35,614	11	+28%
In I.C.U.s	4,107	1	+22%
Deaths	250	<1	−12%

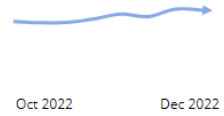
About this data

https://www.nytimes.com/interactive/2021/us/covid-cases.html

Daily Update for the United States

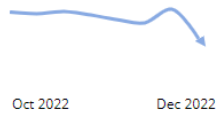
Cases
New Cases (Weekly Total)
303,101

Case Trends



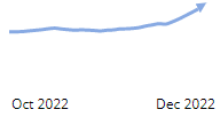
Deaths
New Deaths (Weekly Total)
1,780

Death Trends



Hospitalizations
New Admissions (Daily Avg)
4,378

Admission Trends



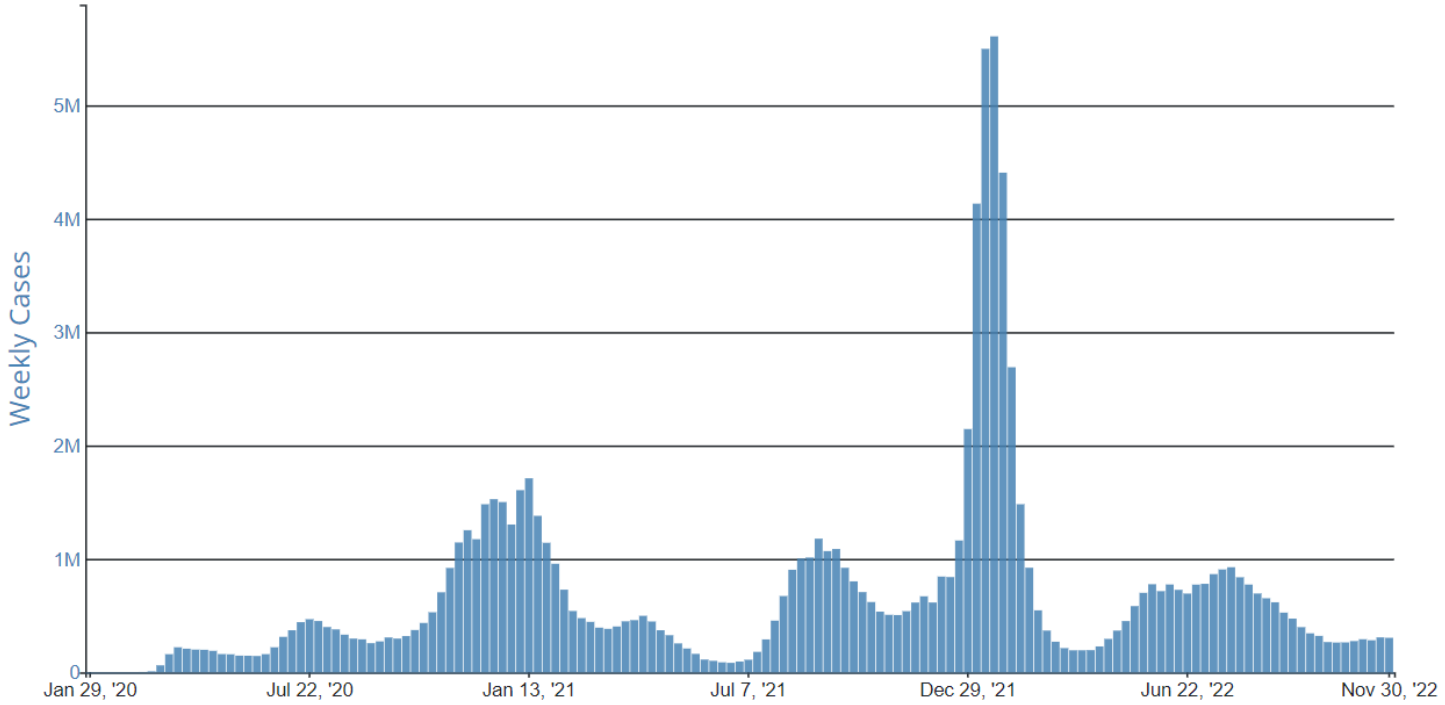
Vaccinations
% 5+ with Updated Booster Dose
12.7%

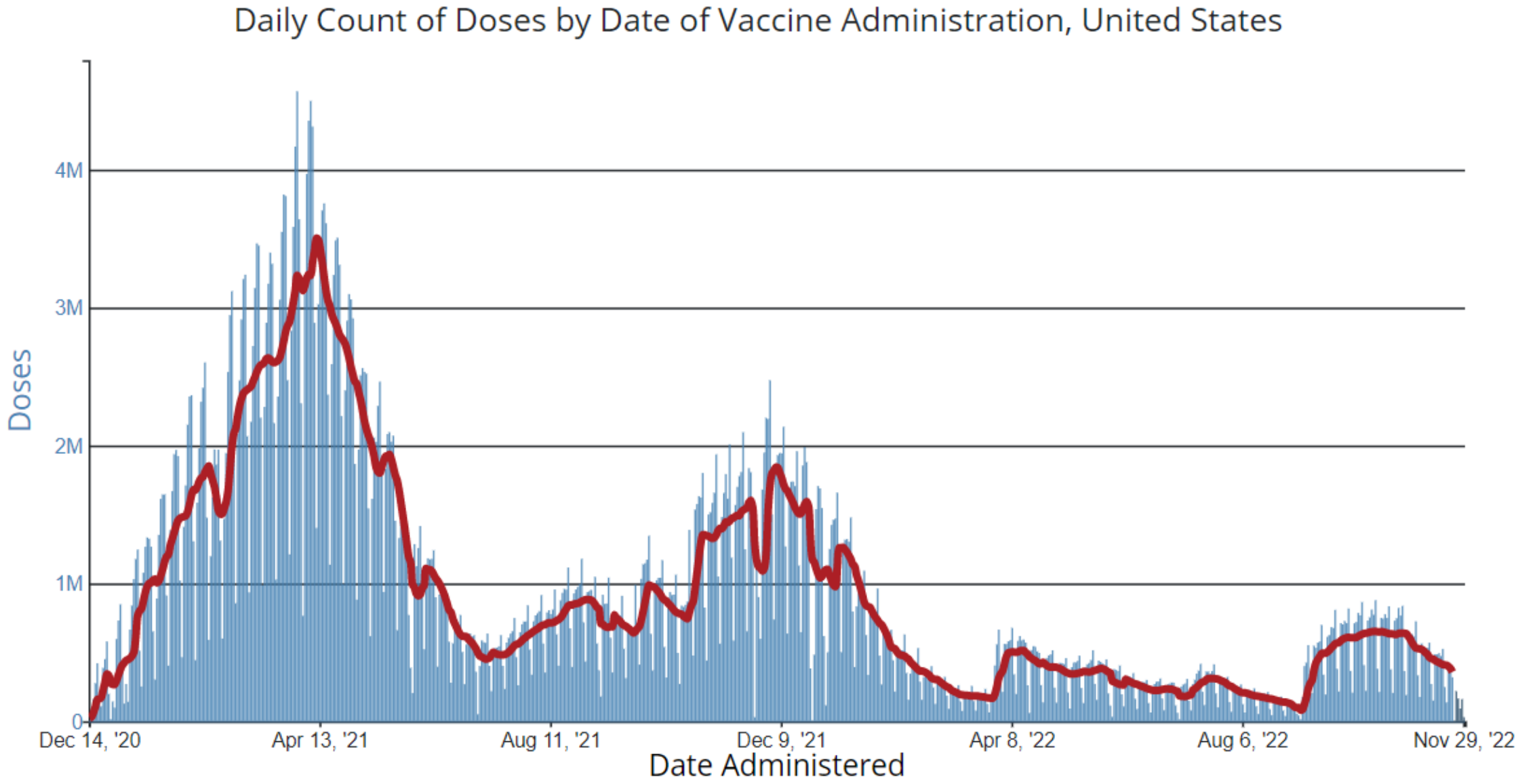
People Age 5+

Total Cases	Total Deaths	Current Hospitalizations	Total Updated Booster Doses (People 5+)
98,777,220	1,077,303	28,609	39,719,443

CDC | Data as of: December 2, 2022 2:43 PM ET. Posted: December 2, 2022 3:43 PM ET

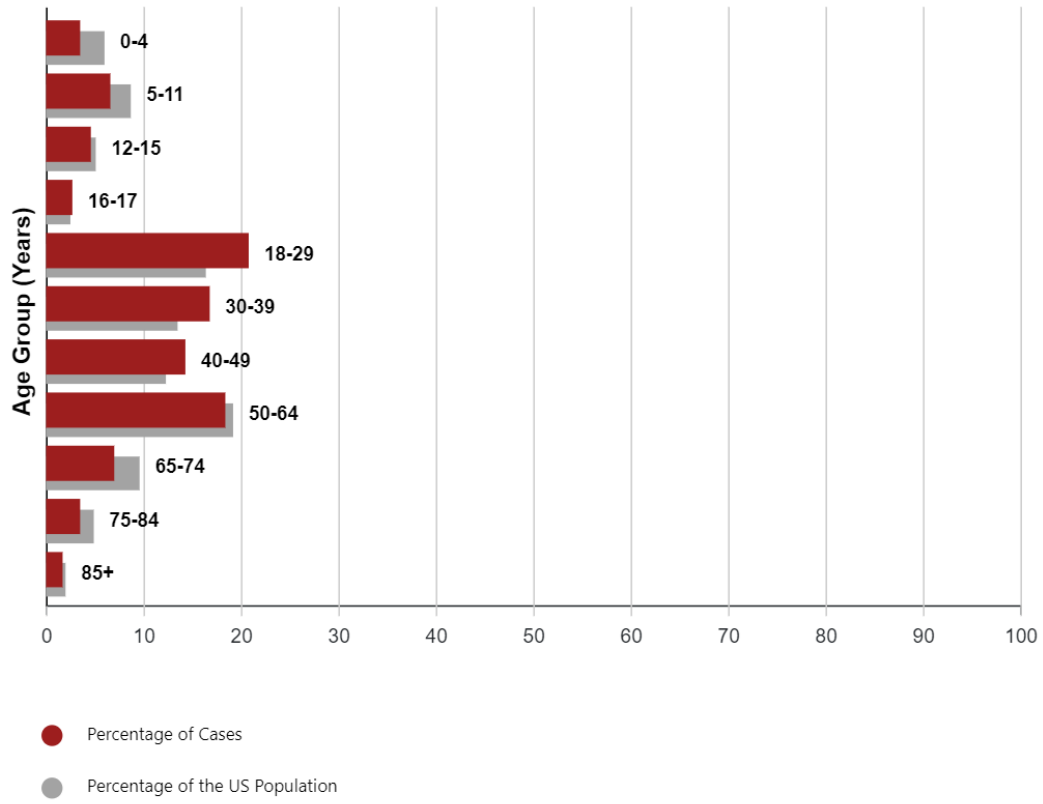
Weekly Trends in Number of COVID-19 Cases in The United States Reported to CDC




Daily Count of Doses by Date of Vaccine Administration, United States
Doses
4M
3M
2M
1M
0
Dec 14, '20
Apr 13, '21
Aug 11, '21
Dec 9, '21
Apr 8, '22
Aug 6, '22
Nov 29, '22
Date Administered

Cases by Age Group:

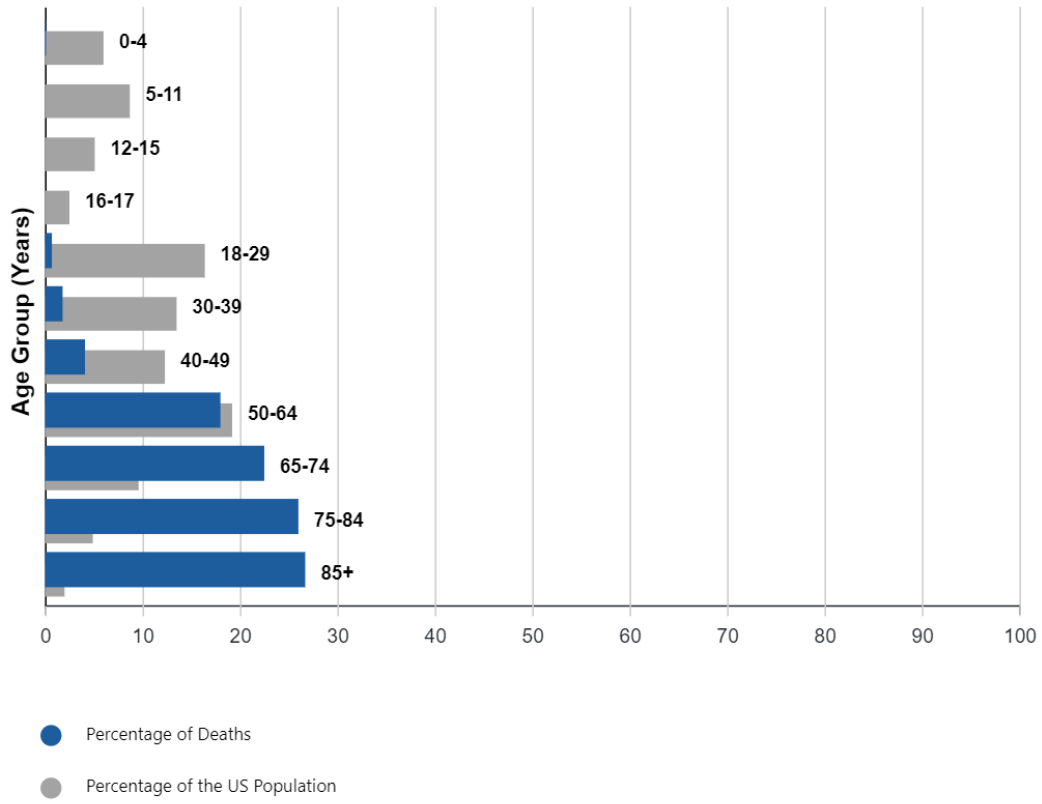
Data from 86,558,563 cases. Age group was available for 85,777,844 (99%) cases.



☑ Show Percentage of the US Population that is in this demographic category

Deaths by Age Group:

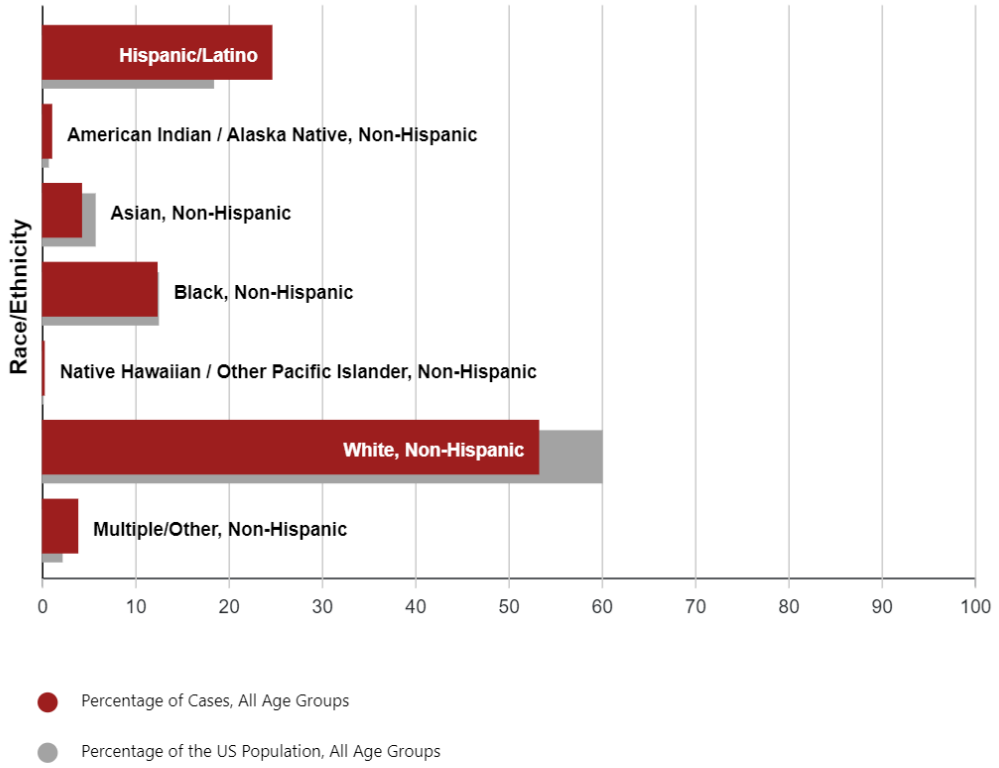
Data from 896,801 deaths. Age group was available for 895,964 (99%) deaths.



☑ Show Percentage of the US Population that is in this demographic category

Cases by Race/Ethnicity:

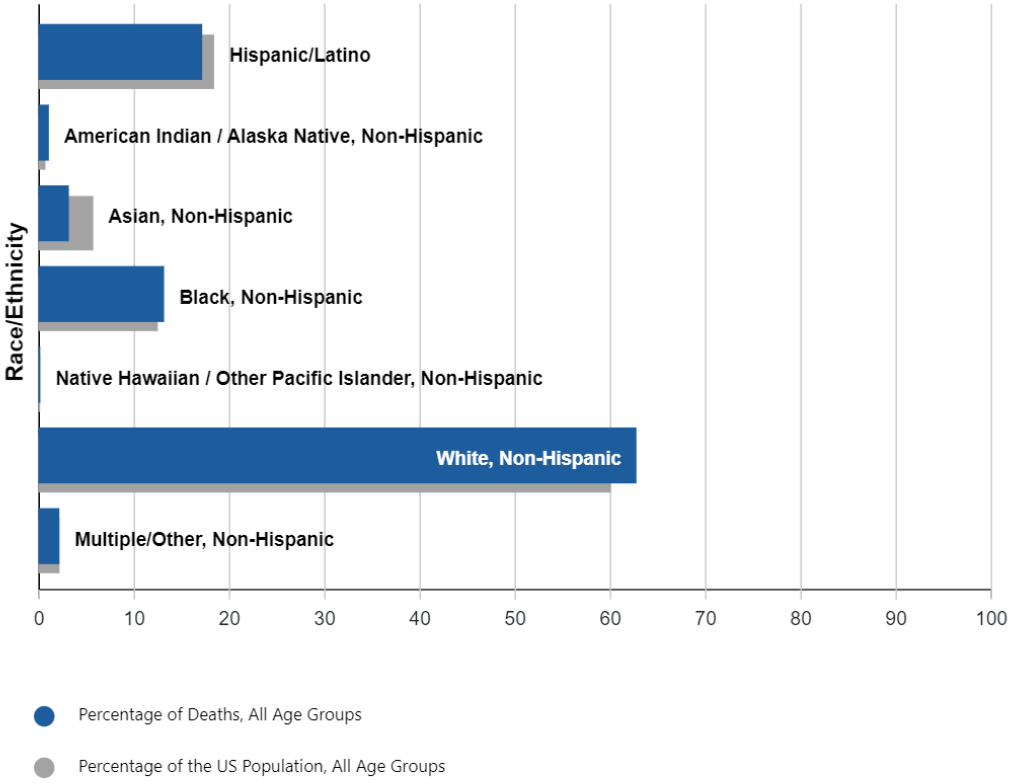
Data from 86,558,563 cases. Race/Ethnicity was available for 56,772,502 (65%) cases.



☑ Show Percentage of the US Population that is in this demographic category

Deaths by Race/Ethnicity:

Data from 896,801 deaths. Race/Ethnicity was available for 763,974 (85%) deaths.



☑ Show Percentage of the US Population that is in this demographic category

Date	Milestone
Dec 1	Covid-19 illness documented (unpublicized Nov 17th)
Jan 10	SARS-CoV-2 virus sequenced
Jan 15	NIH designs mRNA vaccine in collaboration with Moderna
Mar 16	Moderna Phase 1l2 trial begins
May 2	Pfizer/BioNTech Phase 1l2 trial begins
July 14	Moderna Phase 1l2 trial published in NEJM
July 27, 28	Moderna and Pfizer/BioNTech Phase 3 trial begins
Aug 12	Pfizer/BioNTech Phase 1l2 published in Nature
October 22,27	Enrollment in both Phase 3 trials complete; >74,000 participants
Nov 9	Pfizer/BioNTech announces interim analysis efficacy > 90%
Nov 16	Moderna announces interim analysis efficacy 94.5%
Nov 18	Pfizer/BioNTech announces 95% efficacy as final result
Nov 20	1st EUA submitted by Pfizer/BioNTech
Nov 27	Distribution of vaccine by UAL charter flights throughout US
Dec 10	FDA External review of Pfizer/BioNTech EUA
Dec 11	Phase 1a Vaccination begins for health care professionals*

*Provisional on positive external review

The first doses were administered at the Hope Clinic of Emory Vaccine Center on March 31

nature

COVID and 2020: An extraordinary year for science

The coronavirus pandemic shaped the year in research — from vaccines and treatments to campus shutdowns and virtual meetings.

Clinical Infectious Diseases

INVITED ARTICLE

HEALTHCARE EPIDEMIOLOGY: Robert A. Weinstein, Section Editor

COVID-19—Lessons Learned and Questions Remaining

Ferric C. Fang,[1] Constance A. Benson,[2] Carlos del Rio,[3] Kathryn M. Edwards,[4] Vance G. Fowler Jr,[5] David N. Fredricks,[6] Ajit P. Limaye,[1] Barbara E. Murray,[7] Susanna Naggie,[5] Peter G. Pappas,[8] Robin Patel,[9] David L. Paterson,[10] David A. Pegues,[11] William A. Petri Jr,[12] and Robert T. Schooley[2]

Clinical Infectious Diseases® 2021;72(12):2225–40

LESSONS LEARNED

Epidemiology

- Presymptomatic transmission plays an important role in community spread.
- 10–20% of individuals may be responsible for 80% of transmission.
- Short range aerosol transmission is an important route of spread, and longer-range transmission can occur in closed, poorly-ventilated spaces.
- Racial and socioeconomic disparities in illness are similar those seen in the HIV pandemic.

Virology

- Type I interferon responses play a critical role during early infection.

Clinical

- Age, sex and comorbidities have a major impact on disease severity and mortality.
- Children have generally mild illness but rarely can develop an immune-mediated Multisystem Inflammatory Syndrome (MIS-C).
- Severe illness with respiratory failure is associated with a proinflammatory immune dysregulation that includes a robust type 2 response.
- Inflammatory vascular and thromboembolic complications are frequently encountered in severe infections.

Diagnosis

- Nucleic acid amplification tests to detect viral RNA are recommended for diagnosis.
- Sensitivity of diagnostic tests can depend on specimen and assay type and is time-dependent.
- Antibody responses may be short-lived, particularly in mild or asymptomatic infections.
- IgM and IgG appear at approximately the same time.
- Biomarkers can predict disease progression and complications.

Treatment

- Large coordinated multicenter randomized clinical trials are superior to observational studies or small fragmented trials to assess novel therapies.
- Hydroxychloroquine appears to be ineffective.
- Remdesivir can shorten illness duration if given early.
- Corticosteroids are beneficial in critically ill patients requiring mechanical ventilation.
- Early superinfections are uncommon but late infections, including invasive pulmonary aspergillosis, are a risk in critically ill patients.

Prevention

- Vaccines are being rapidly developed and tested.
- Universal face mask use can reduce the efficiency of transmission.
- Health care workers are at risk but can be protected by appropriate PPE.

QUESTIONS REMAINING

Epidemiology

- How can superspreader events be avoided?
- Why do infection rates and severity vary so widely among individuals and countries?
- Why are global COVID-19 mortality rates falling?

Virology

- Does viral diversity influence illness severity?
- Can early administration of agents such as vitamin D, famotidine or interferon prevent infection or arrest disease progression?
- What is the impact of prior exposure to endemic seasonal coronaviruses?

Clinical

- What are late complications and how can they be managed and/or prevented?

Treatment

- What is the treatment for mild disease?
- When should antifungal prophylaxis be considered?
- Is there a role for immunomodulatory agents in addition to corticosteroids?
- How should the timing of immunomodulatory interventions be optimized?
- Is convalescent plasma beneficial?
- What is the role and optimal dosing of anticoagulant therapy?

Diagnosis

- What is the accuracy of antigen compared to viral RNA testing?
- What are the correlates and durability of protective immunity?

Prevention

- Can effective vaccines and other targeted immunotherapeutics be found?
- Does low-level viral exposure lead to protective immunity?
- How can communities reopen and resume essential activities without incurring new waves of epidemic spread?
- Can upgrading ventilation systems in businesses and schools facilitate reopening?

The United States' Response to COVID-19: A Case Study

https://globalhealthsciences.ucsf.edu/sites/globalhealthsciences.ucsf.edu/files/covid-us-case-study.pdf

Conclusion #1

The United States lacked effective political leadership in its COVID-19 response at the federal level. Leadership at State and local levels was highly variable.

Conclusion #2

The U.S. failed to act early and decisively in combating the virus. Critical delays and poorly executed basic public health interventions, compounded by chronic under-investment in public health, were key contributors to the staggering number of cases and deaths.

Conclusion #3

Immigrant, Black, Latinx, American Indian/Alaska Native populations, and those living in poverty, have suffered disproportionately from the COVID-19 pandemic.

Conclusion #4

The Structure of the U.S. health system is fundamentally ill-suited to mount an effective, coordinated response to a pandemic.

Conclusion #5

Hospitals in the U.S. were unprepared to cope with a high influx of COVID-19 patients.

Conclusion #6

U.S. commitment to vaccine development has been a defining success. Slow initial rollout and the absence of a coordinated national vaccination strategy threatened to overshadow this singular achievement.

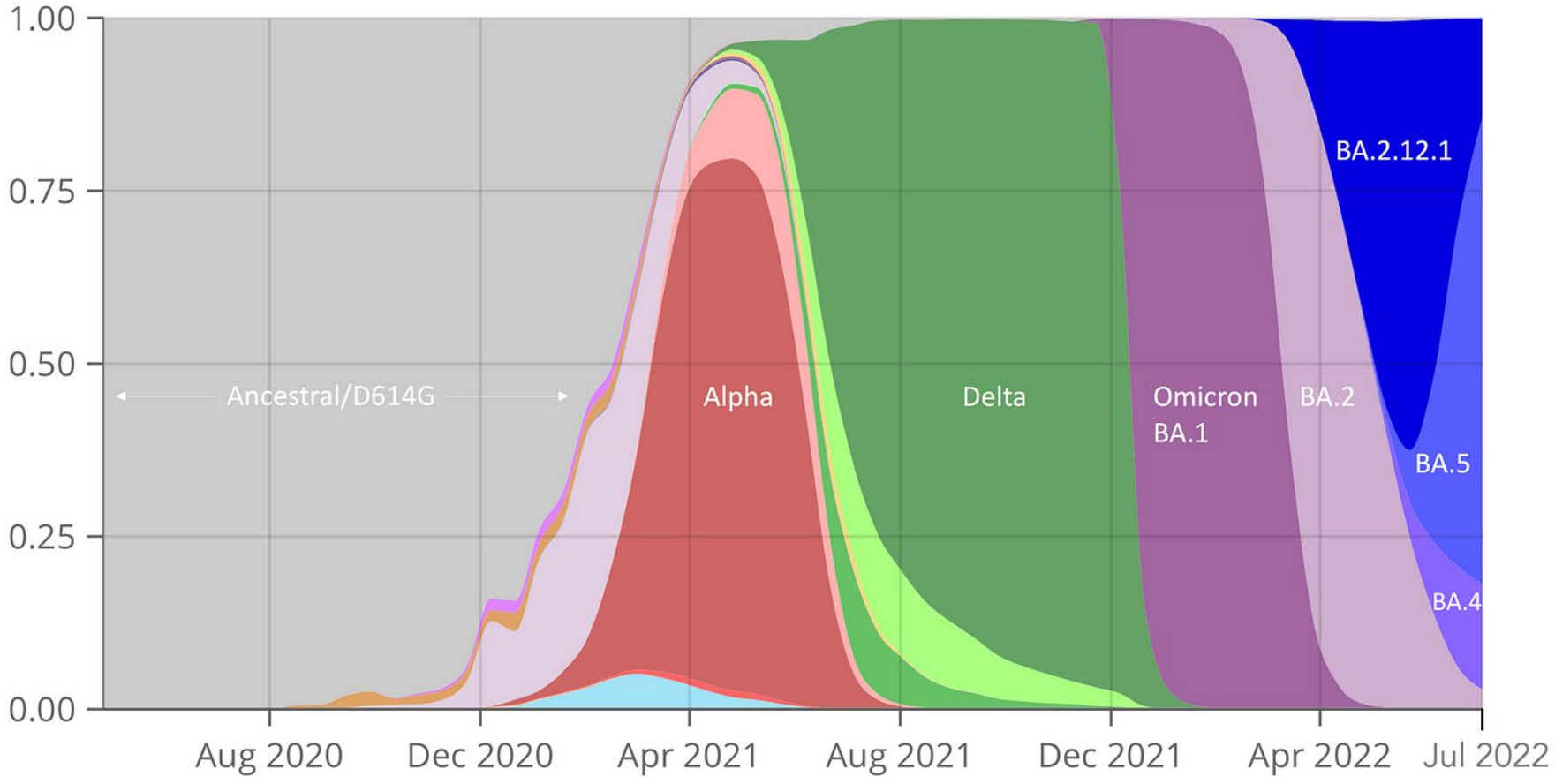
Conclusion #7

Record levels of federal spending to support families and businesses were effective in protecting many Americans from serious economic shocks.

Conclusion #8

The U.S. will not be safe until all countries are safe. Pandemics represent a global security threat that requires commitment to global immunologic equity.

It’s the virus, stupid

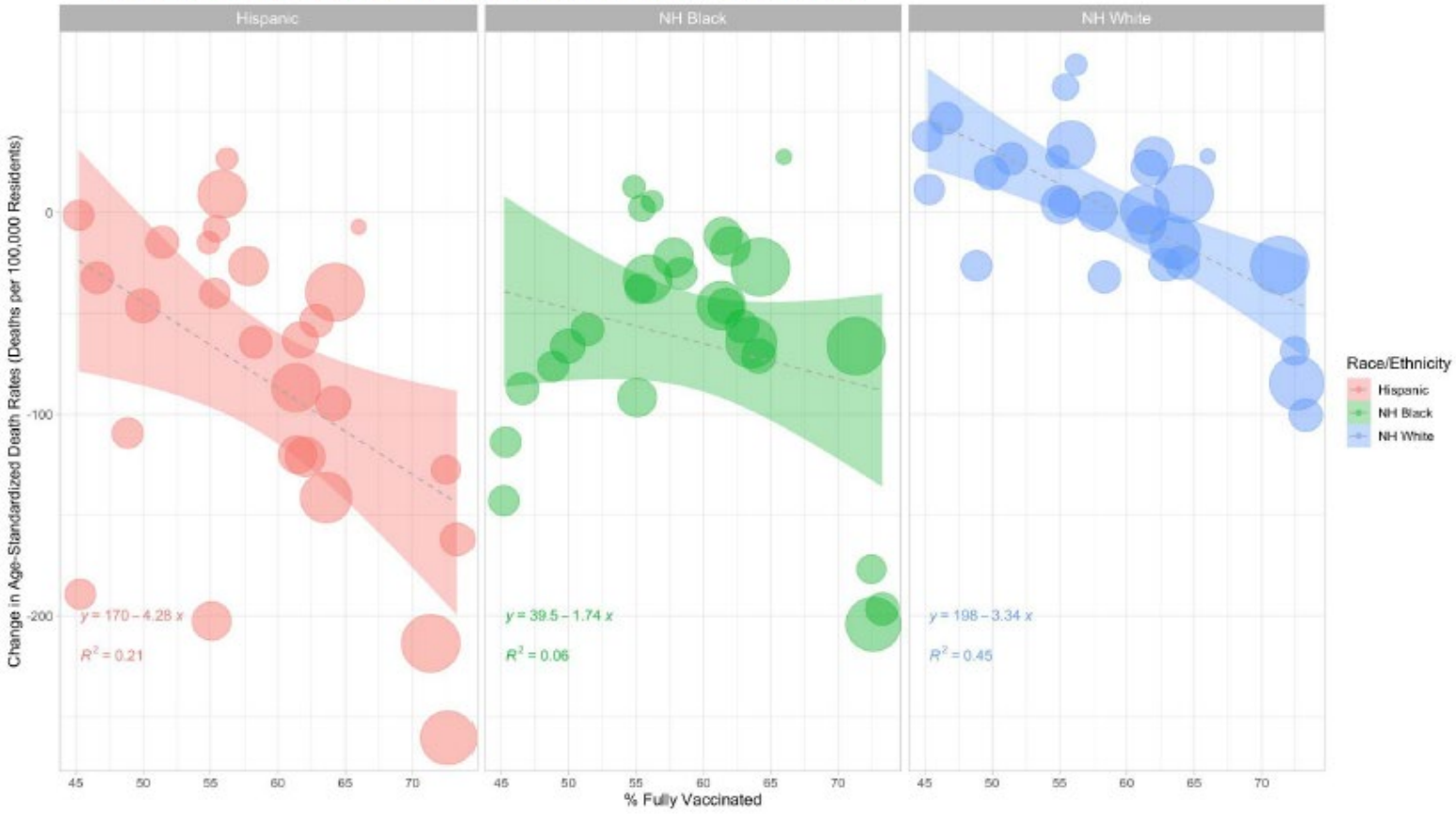


https://erictopol.substack.com/p/its-the-virus-stupid?utm_medium=email

In Rural America, Covid Hits Black and Hispanic People Hardest

At the peak of the Omicron wave, Covid killed Black Americans in rural areas at a rate roughly 34% higher than it did white people.

Figure 5. Vaccination and Changes in Age-Standardized Death Rates in Combinations of Metro-Nonmetro Categories and Census Divisions by Race/Ethnicity, March 2020-February 2021 to March 2021-February 2022



https://www.medrxiv.org/content/10.1101/2022.07.20.22277872v1

We're not just fighting an epidemic; we're fighting an infodemic. Fake news spreads faster and more easily than this virus, and is just as dangerous.

Tedros Adhanom Ghebreyesus
Director-General, World Health Organization

DISCUSSION PAPER

Identifying Credible Sources of Health Information in Social Media: Principles and Attributes

Raynard S. Kington, MD, PhD, MBA, Phillips Academy in Andover; **Stacey Arnesen, MS,** National Library of Medicine; **Wen-Ying Sylvia Chou, PhD, MPH,** National Cancer Institute; **Susan J. Curry, PhD,** The University of Iowa; **David Lazer, PhD,** Northeastern University; and **Antonia M. Villarruel, PhD, RN, FAAN,** University of Pennsylvania

July 16, 2021

https://s3.amazonaws.com/nam.edu-uploads/Identifying+Credible+Sources+of+Health+Information+in+Social+Media.pdf

Five tenants of crisis communication in the digital age

Prompt – or rumor and innuendo fill the gap

Compassionate – if you don't deal with people's feelings first, they won't listen to the facts

Honest – no lying by commission, omission, or understatement and/or exaggeration for the purpose of obfuscating the truth ("spinning")

Informative – answering the basic journalistic interrogatives of who, what, why, when, where and how

Interactive – in our Digital Age, providing stakeholders multiple media for asking questions and engaging in constructive commentary

Conclusions

Communication is a critical part of crisis response.

Think about positive framing.

Trust is at the center of crisis communication. Be a “ROCK” that for people can rely on:

- **R**eliability – do what you say you are going to do
- **O**pen – be truthful and transparent
- **C**ompetence – set clear expectations
- **K**ind – be empathic and listen to people needs and concerns

What are the lessons from the HIV pandemic that are applicable to COVID-19?

Lessons learned in the HIV Response

1. Think harm reduction, not risk elimination
2. Eliminate any type of stigma and discrimination
   - Focus on human rights and gender perspective
3. Trust is as important as tests
   - Trust is important and must be earned
4. Involve all affected parties in the response
   - Community building works better than edicts from above
   - Involve affected communities in planning and implementation of research
5. The importance of information and language
   - Accurate and timely local information are required to enable and guide interventions
6. Attention to the most vulnerable people
   - The price of new treatments will determine how we perceive those who need them
7. Don’t blame individuals for systemic failures
   - A quality public health system is essential
8. Resilience as a capacity to overcome
9. Think globally and act locally
10. Scientific and public health efforts require multidisciplinary teams

COVID-19 Public Health Lessons

- Risk is not equality distributed
- The rapid spread of a respiratory virus can place enormous pressure on even well-resourced health systems
- Take public health seriously – invest in public health
- While pandemics are unpredictable by nature, proper preparation and prior planning can help manage better
- Do more to tackle non-communicable diseases
- Health equity matters – its time to end structural racism!

Conclusions

Anticipate health inequalities

- Track the socioeconomic status and gender of those affected and extend this effort to track the economic impacts
- Social conditions make it difficult for the vulnerable to change behaviors
- New advances often most rapidly benefit the better off, increasing inequalities
- Our efforts should acknowledge inequalities and not increase them

Create the enabling environment to support behavior change

- Meaningful involvement of communities can shape social norms
- Building social capital, trust and community cohesion catalyzes the impact of health messages
- Unintended consequences must be avoided

A multidisciplinary approach is essential

Conclusions

Protection of healthcare personnel is important:

- Universal precautions in healthcare became the norm as a result of HIV.
- Routine use of masks in healthcare may become the norm as a result of COVID-19

Humility is essential:

- Balance the fear of uncertainty with the need to act. However, in taking actions, we must not resort to desperation. Rather, each action should be based on ethically sound data as it becomes available.
- We need to respect the constraints of our knowledge and recognize that we may need to change our guidelines as new information emerges.

Love can be fatal:

- COVID-19 has turned every man, woman and child into a potential serial killer.
- If there is a fear worse than contracting a deadly illness from someone you love, it is giving a deadly illness to someone you love.

Conclusions

- Those of us who were HIV researchers became COVID researchers.
- The advance in research that has been taken into guidelines has been incredibly fast.
- COVID-19 has uncovered long standing heath inequalities, it is time to address them.
- Confronting a pandemic requires a global approach.