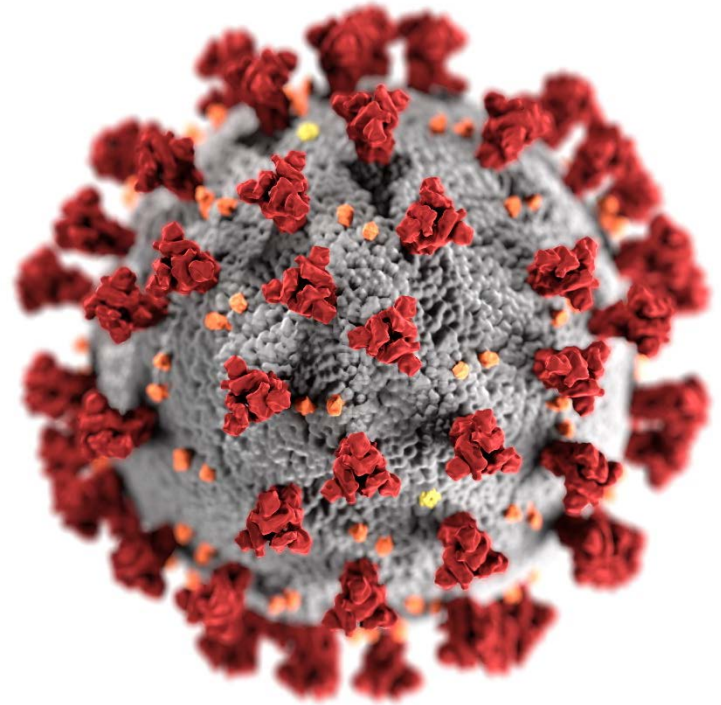


EtR Framework:

Pfizer-BioNTech COVID-19 vaccine in
adolescents aged 12-15 years

Sara Oliver, MD, MSPH
ACIP Meeting
May 12, 2021



cdc.gov/coronavirus

Evidence to Recommendations Framework



Evidence to Recommendations (EtR) Framework

- Structure to describe information considered in moving from evidence to ACIP vaccine **recommendations**
- Provide **transparency** around the impact of additional factors on deliberations when considering a recommendation

Evidence to Recommendations (EtR) Framework

Policy Question

- Should vaccination with Pfizer-BioNTech COVID-19 vaccine (2-doses, IM) be recommended for persons 12-15 years of age under an Emergency Use Authorization?

Evidence to Recommendations (EtR) Framework

PICO Question

Population	Persons aged 12-15 years
Intervention	Pfizer-BioNTech COVID-19 vaccine (BNT162b2)
Comparison	No Vaccine
Outcomes	Symptomatic laboratory-confirmed COVID-19 Hospitalization due to COVID-19 Multisystem inflammatory syndrome in children (MIS-C) SARS-CoV-2 seroconversion to a non-spike protein Asymptomatic SARS-CoV-2 infection Serious Adverse Events Reactogenicity grade ≥ 3

Evidence to Recommendations (EtR) Framework

EtR Domain	Question
Public Health Problem	<ul style="list-style-type: none">• Is the problem of public health importance?
Benefits and Harms	<ul style="list-style-type: none">• How substantial are the desirable anticipated effects?• How substantial are the undesirable anticipated effects?• Do the desirable effects outweigh the undesirable effects?
Values	<ul style="list-style-type: none">• Does the target population feel the desirable effects are large relative to the undesirable effects?• Is there important variability in how patients value the outcome?
Acceptability	<ul style="list-style-type: none">• Is the intervention acceptable to key stakeholders?
Feasibility	<ul style="list-style-type: none">• Is the intervention feasible to implement?
Resource Use	<ul style="list-style-type: none">• Is the intervention a reasonable and efficient allocation of resources?
Equity	<ul style="list-style-type: none">• What would be the impact of the intervention on health equity?

Evidence to Recommendations (EtR) Framework

EtR Domain	Question
Public Health Problem	<ul style="list-style-type: none">• Is the problem of public health importance?
Benefits and Harms	<ul style="list-style-type: none">• How substantial are the desirable anticipated effects?• How substantial are the undesirable anticipated effects?• Do the desirable effects outweigh the undesirable effects?
Values	<ul style="list-style-type: none">• Does the target population feel the desirable effects are large relative to the undesirable effects?• Is there important variability in how patients value the outcome?
Acceptability	<ul style="list-style-type: none">• Is the intervention acceptable to key stakeholders?
Feasibility	<ul style="list-style-type: none">• Is the intervention feasible to implement?
Resource Use	<ul style="list-style-type: none">• Is the intervention a reasonable and efficient allocation of resources?
Equity	<ul style="list-style-type: none">• What would be the impact of the intervention on health equity?

“The intervention” = Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years

“The problem” = COVID-19 among adolescents aged 12–15 years

EtR Domain: Public Health Problem



Public Health Problem

Is COVID-19 disease among adolescents aged 12–15 years of public health importance?

- Are the consequences of COVID-19 serious?
- Is COVID-19 urgent?
- Are a large number of adolescents affected by COVID-19?
- Are there populations disproportionately affected by COVID-19?

No Probably no Probably yes Yes Varies Don't know



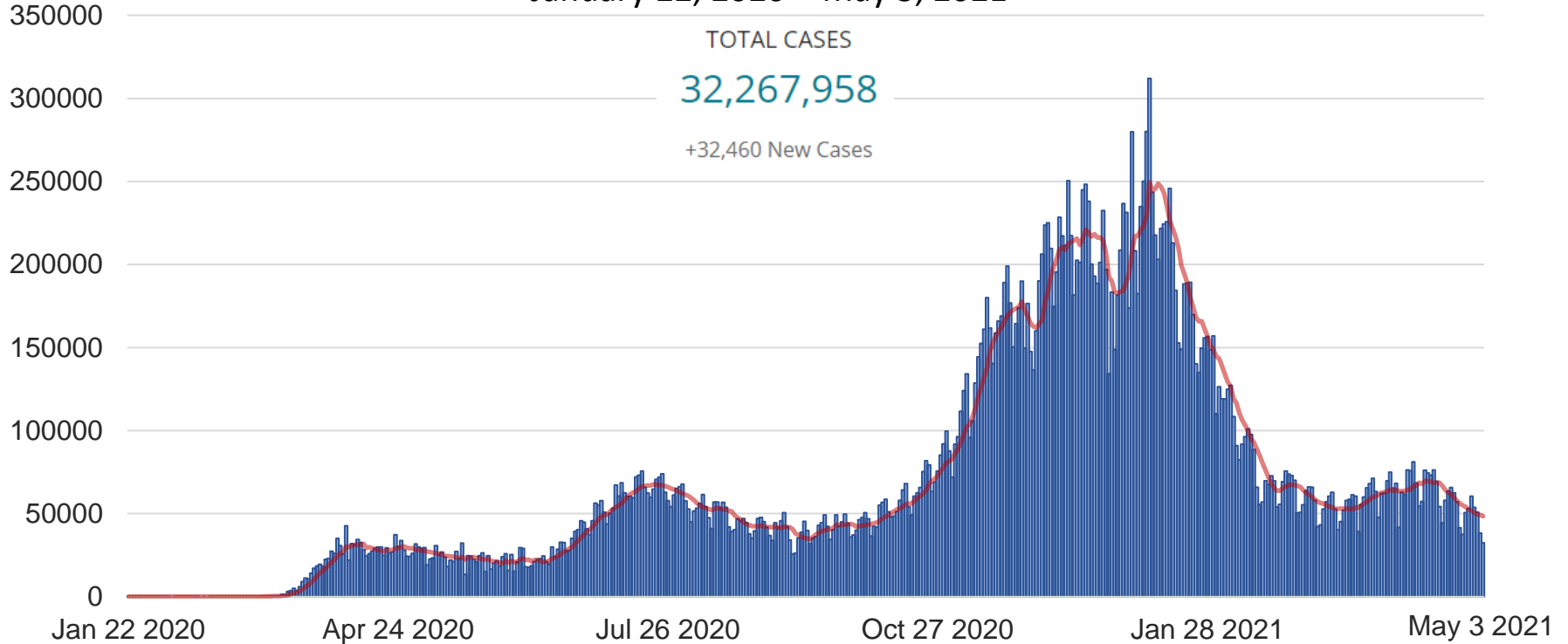
Public Health Problem:

Review of the available evidence

- COVID-19 incidence and burden estimates
- COVID-19 associated hospitalization rates
- COVID-19 associated mortality
- Multisystem Inflammatory Syndrome in Children (MIS-C)
- Transmission

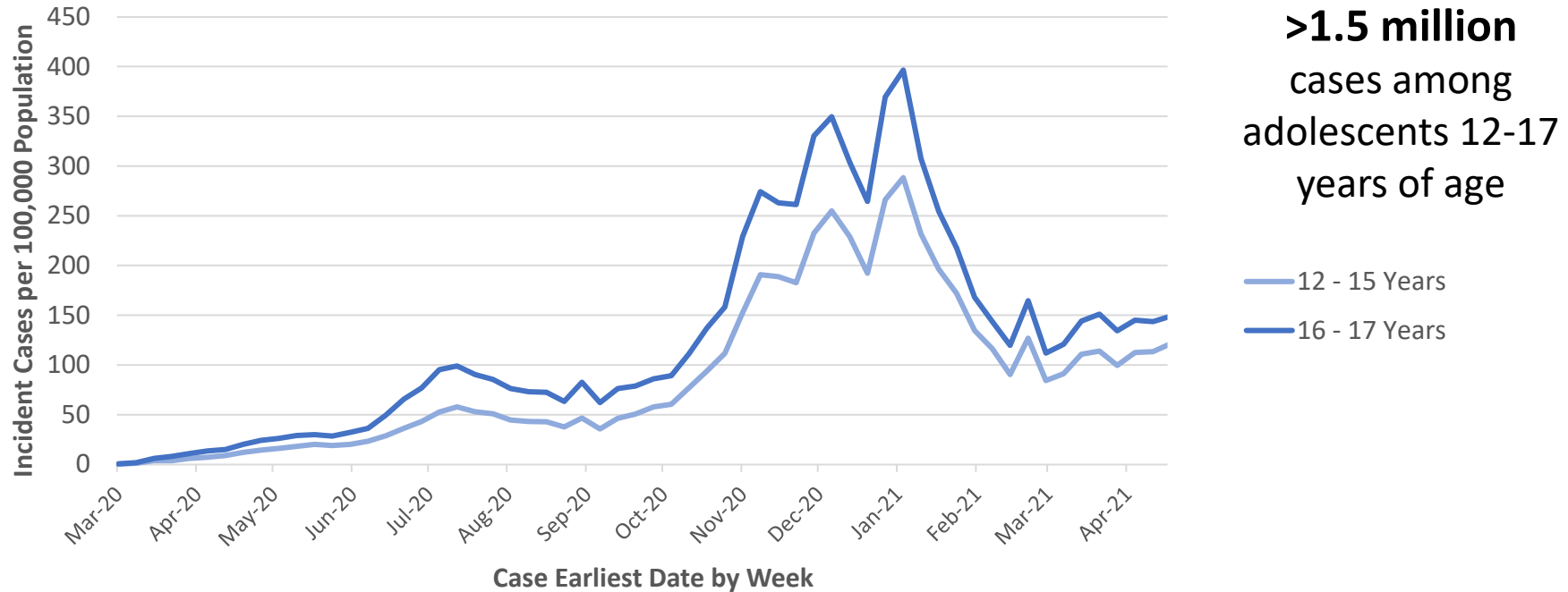
Trends in Number of COVID-19 Cases in the US

January 22, 2020 – May 3, 2021



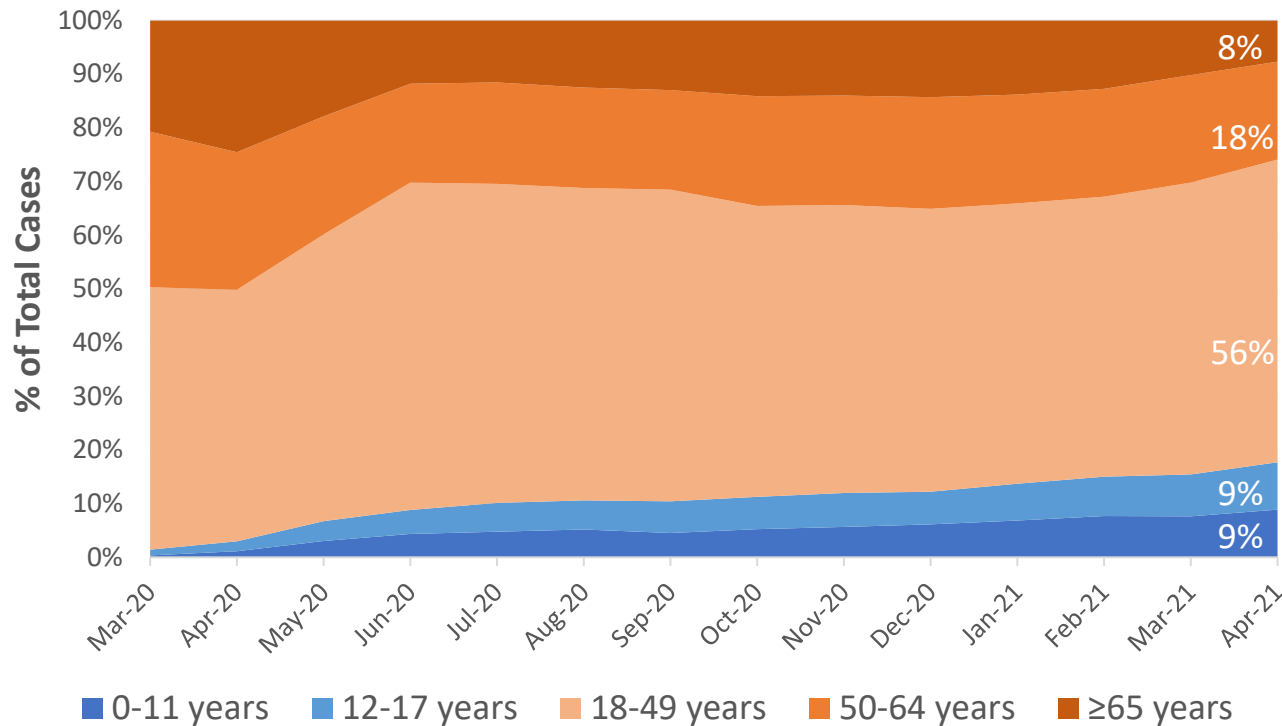
Trends in Number of COVID-19 Cases among Adolescents 12-17 Years of Age

March 1, 2020 – April 30, 2021



Proportion of Total COVID-19 Cases by Age Group

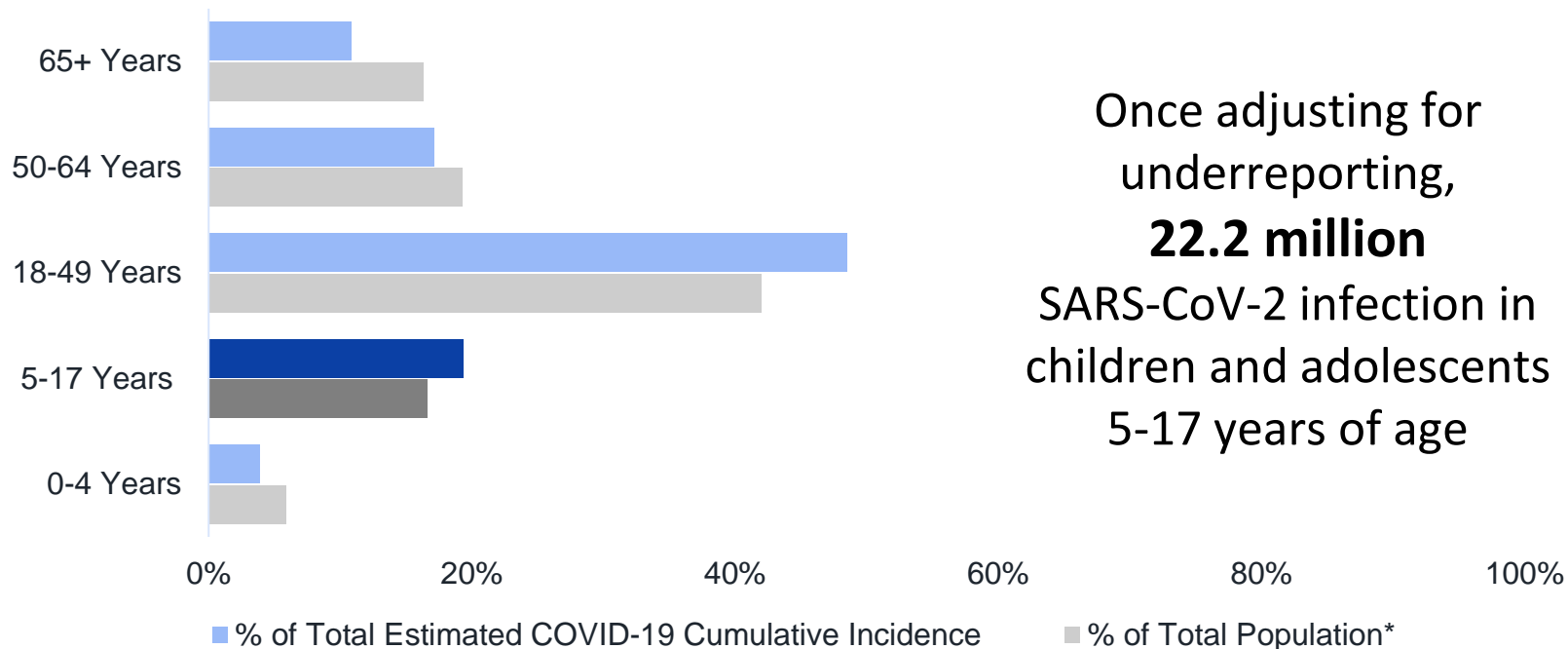
— United States, March 1, 2020–April 30, 2021



As more adults vaccinated, adolescents aged 12-17 years of age make up a greater proportion of total cases: **9%** of cases reported in April 2021

Percent of Total Estimated COVID-19 Cumulative Incidence and Total Population by Age Group

— United States, February 2020–March 2021

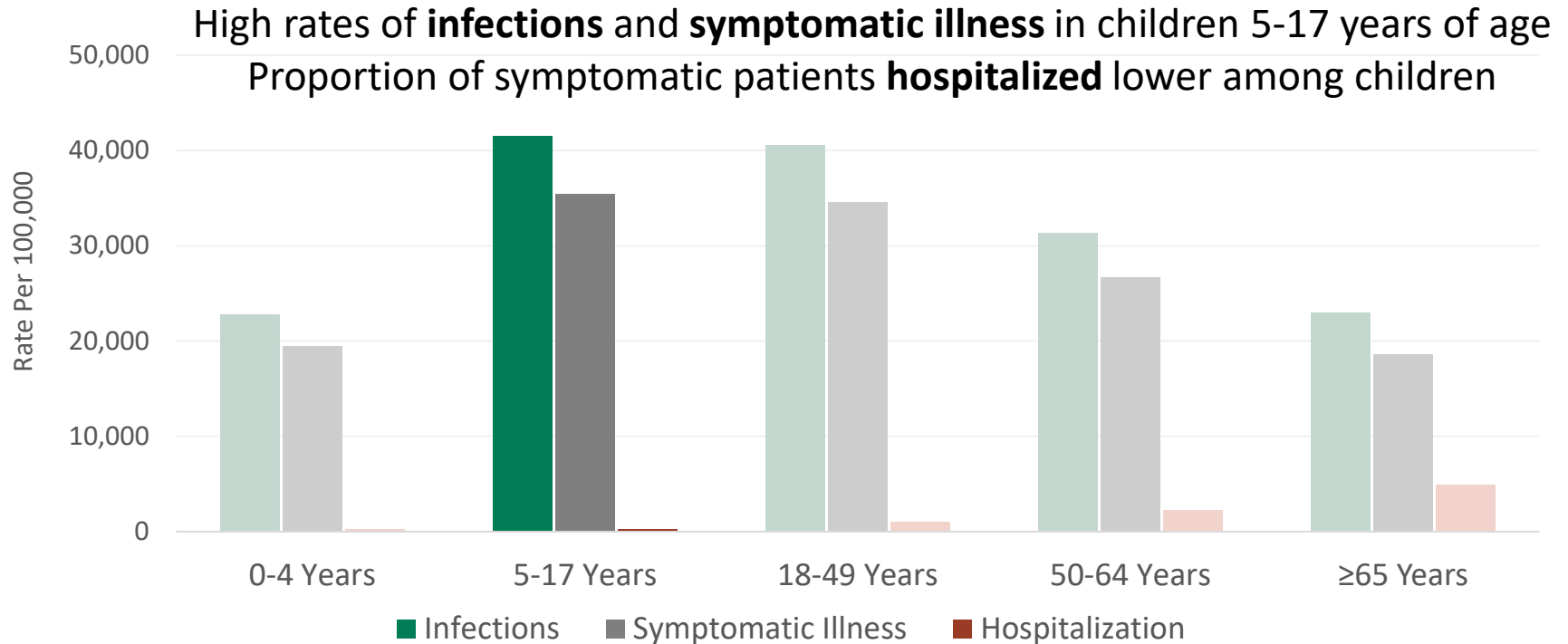


Once adjusting for underreporting,
22.2 million
SARS-CoV-2 infection in
children and adolescents
5-17 years of age

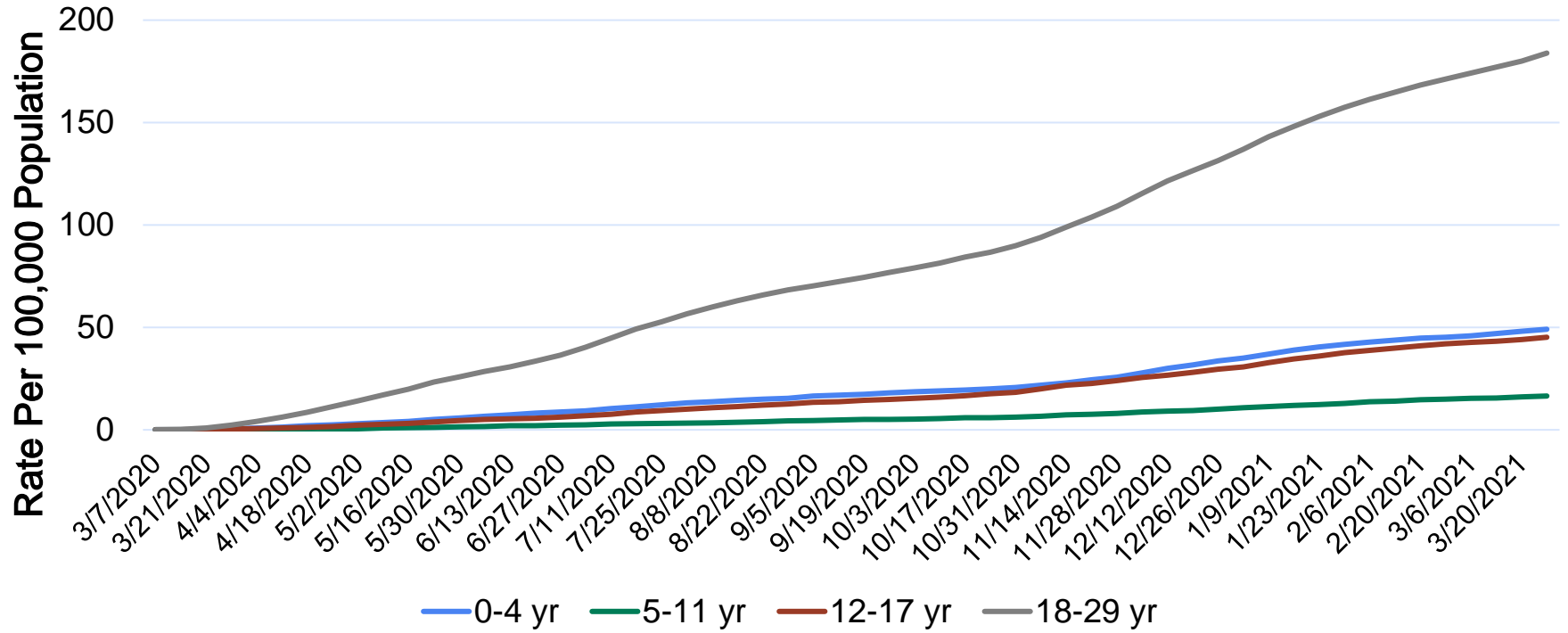
* Sources <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/burden.html>
U.S. Census Bureau, Population Division, 2020 Demographic Analysis (December 2020 release)

Estimated Rates of COVID-19 Disease Outcomes per 100,000 population, by Age Group

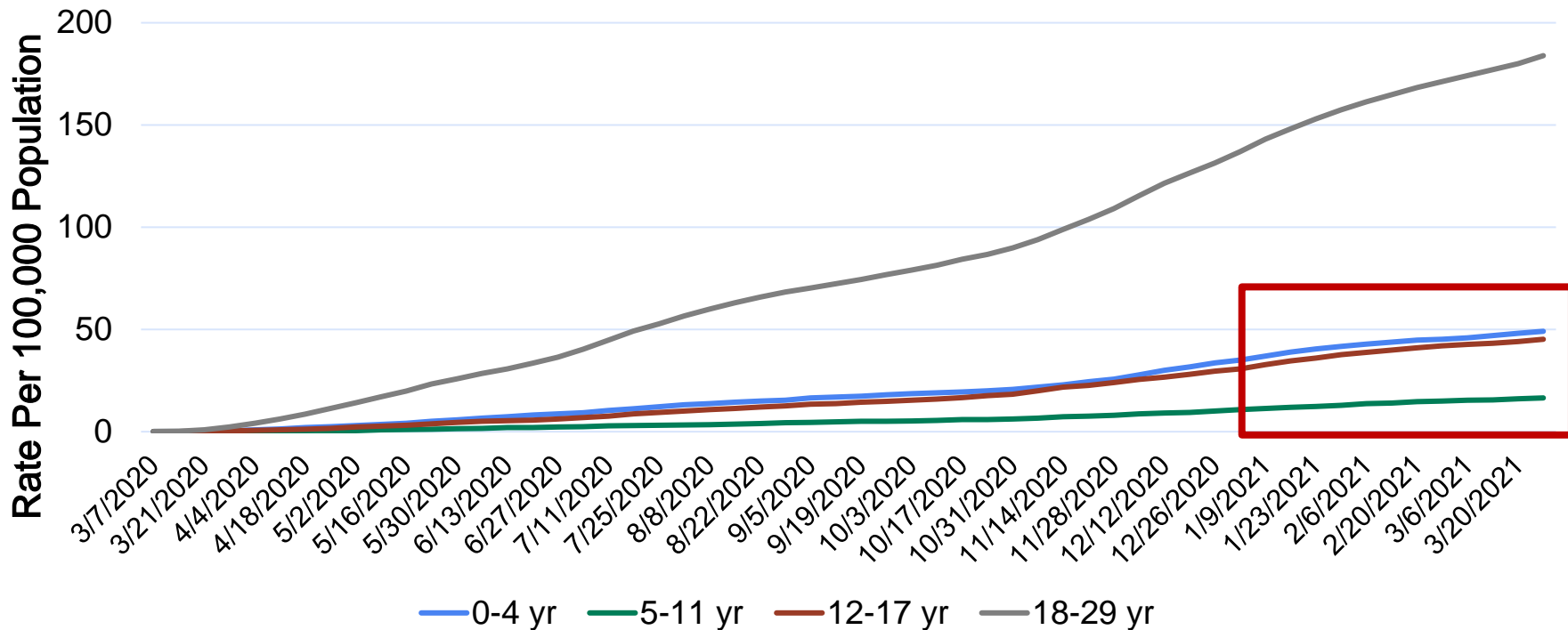
— United States, February 2020–March 2021



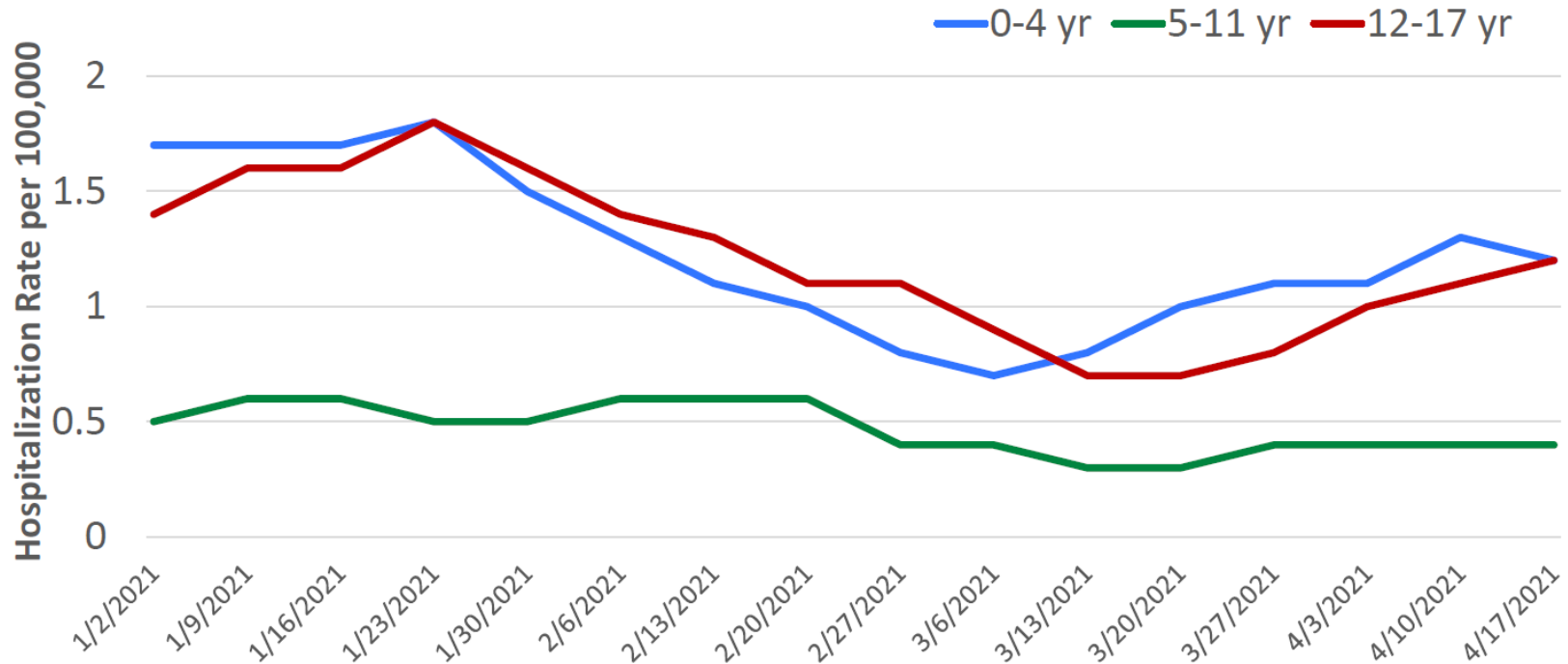
Cumulative Rates of COVID-19-Associated Hospitalizations by Select Age Groups — COVID-NET, Mar 1, 2020–Mar 27, 2021



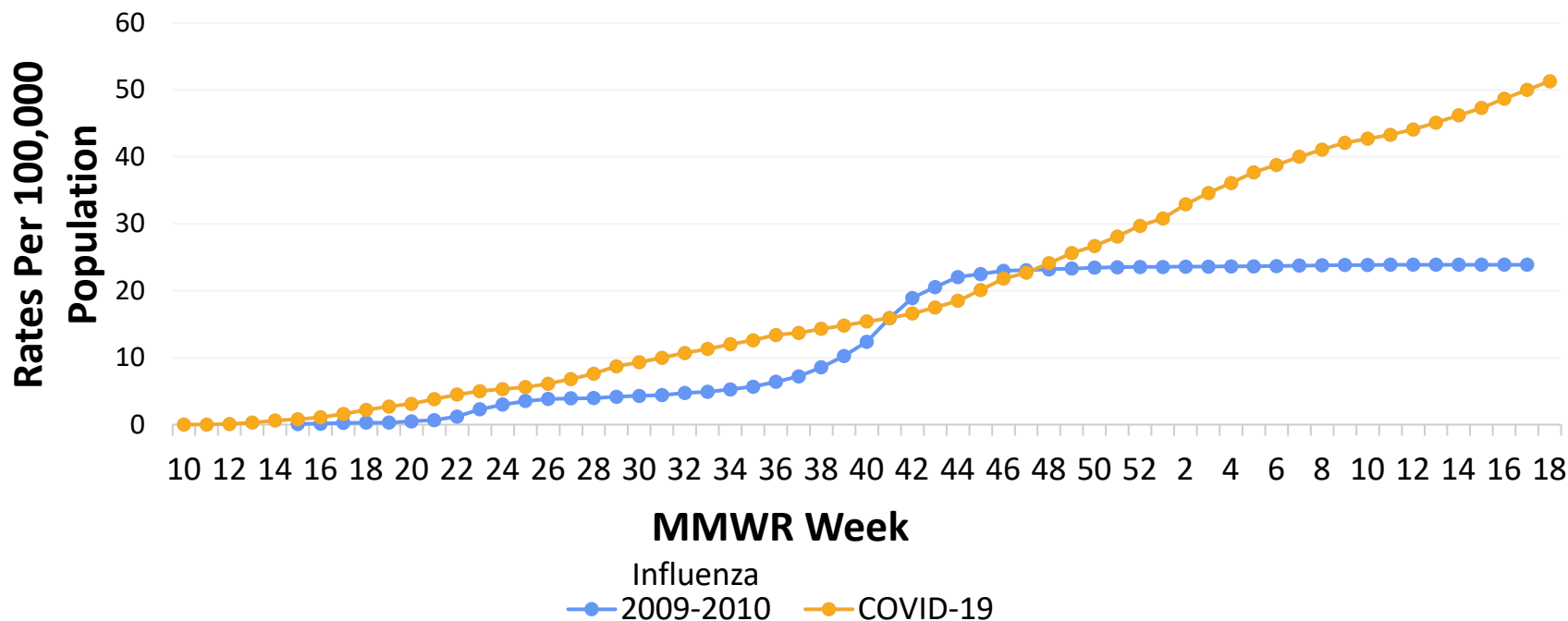
Cumulative Rates of COVID-19-Associated Hospitalizations by Select Age Groups — COVID-NET, Mar 1, 2020–Mar 27, 2021



Three-week Moving Average Rate of Hospitalization by Select Age Groups — COVID-NET, Dec 27, 2020–April 17, 2021



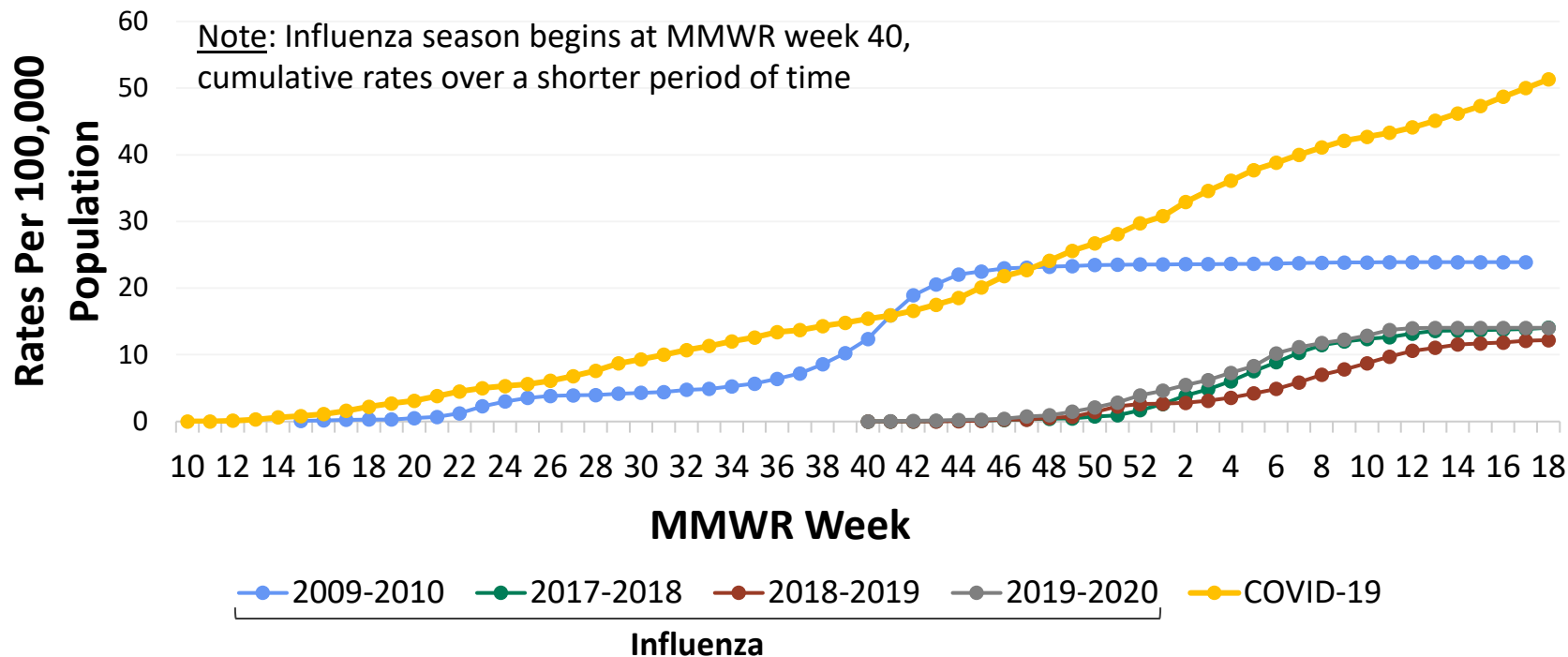
Cumulative 2009 H1N1 Influenza- and COVID-19-Associated Hospitalization among Adolescents 12-17 years by MMWR week — FluSurv-NET and COVID-NET



*The 2009-2010, H1N1 pandemic season, includes data from MMWR week 15-39 of the 2008-2009 season

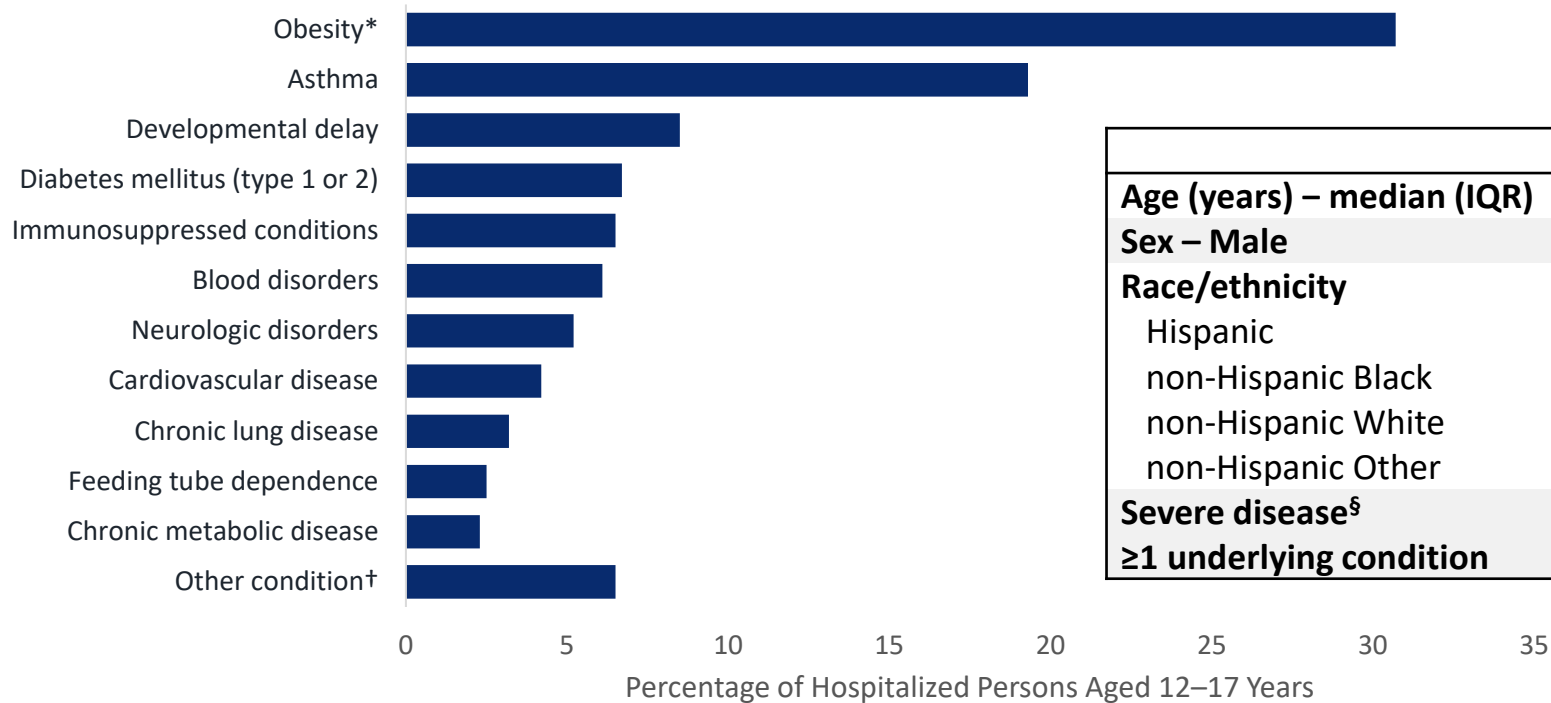
Cumulative Influenza- and COVID-19-Associated Hospitalizations Rates among Adolescents 12-17 years by MMWR week

— FluSurv-NET and COVID-NET



*The 2009-2010, H1N1 pandemic season, includes data from MMWR week 15-39 of the 2008-2009 season

Hospitalized Children 12–17 Years (n=772) —COVID-NET, Mar 2020–Jan 2021



	N	(%)
Age (years) – median (IQR)	15	(14-17)
Sex – Male	369	(48)
Race/ethnicity		
Hispanic	249	(32)
non-Hispanic Black	238	(31)
non-Hispanic White	202	(26)
non-Hispanic Other	83	(11)
Severe disease[§]	239	(31)
≥1 underlying condition	471	(61)

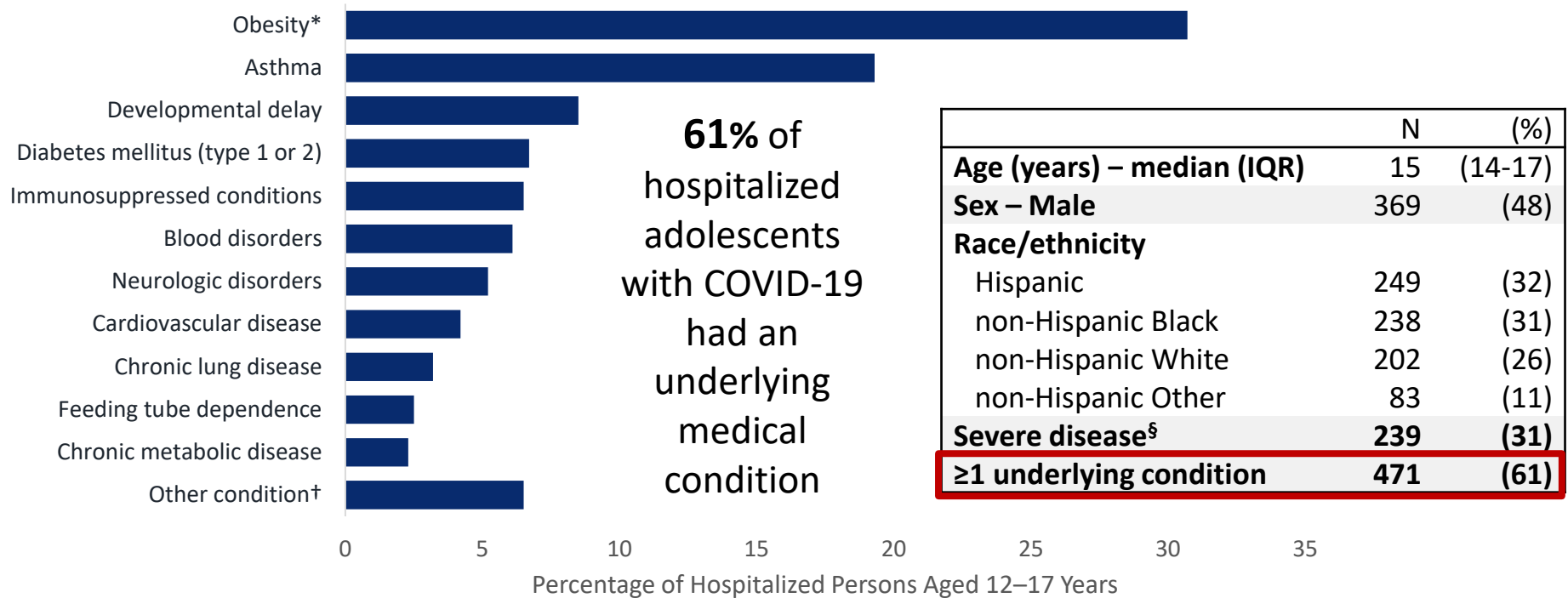
[§]Requiring intensive care unit admission or mechanical ventilation

*BMI (kg/m²) ≥95th percentile for age and sex based on CDC growth charts, ICD-10 codes for obesity, or obesity selected on case report form

†Includes gastrointestinal or liver disease; renal disease; rheumatologic, autoimmune, inflammatory conditions; abnormality of the airway.

COVID-19-associated hospitalizations reported to COVID-NET surveillance system March 1, 2020–January 31, 2021. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.

Hospitalized Children 12–17 Years (n=772) —COVID-NET, Mar 2020–Jan 2021



[§]Requiring intensive care unit admission or mechanical ventilation

*BMI (kg/m²) ≥95th percentile for age and sex based on CDC growth charts, ICD-10 codes for obesity, or obesity selected on case report form

†Includes gastrointestinal or liver disease; renal disease; rheumatologic, autoimmune, inflammatory conditions; abnormality of the airway.

COVID-19-associated hospitalizations reported to COVID-NET surveillance system March 1, 2020–January 31, 2021. COVID-NET is a population-based surveillance system that collects data on laboratory-confirmed COVID-19-associated hospitalizations among children and adults through a network of over 250 acute-care hospitals in 14 states.

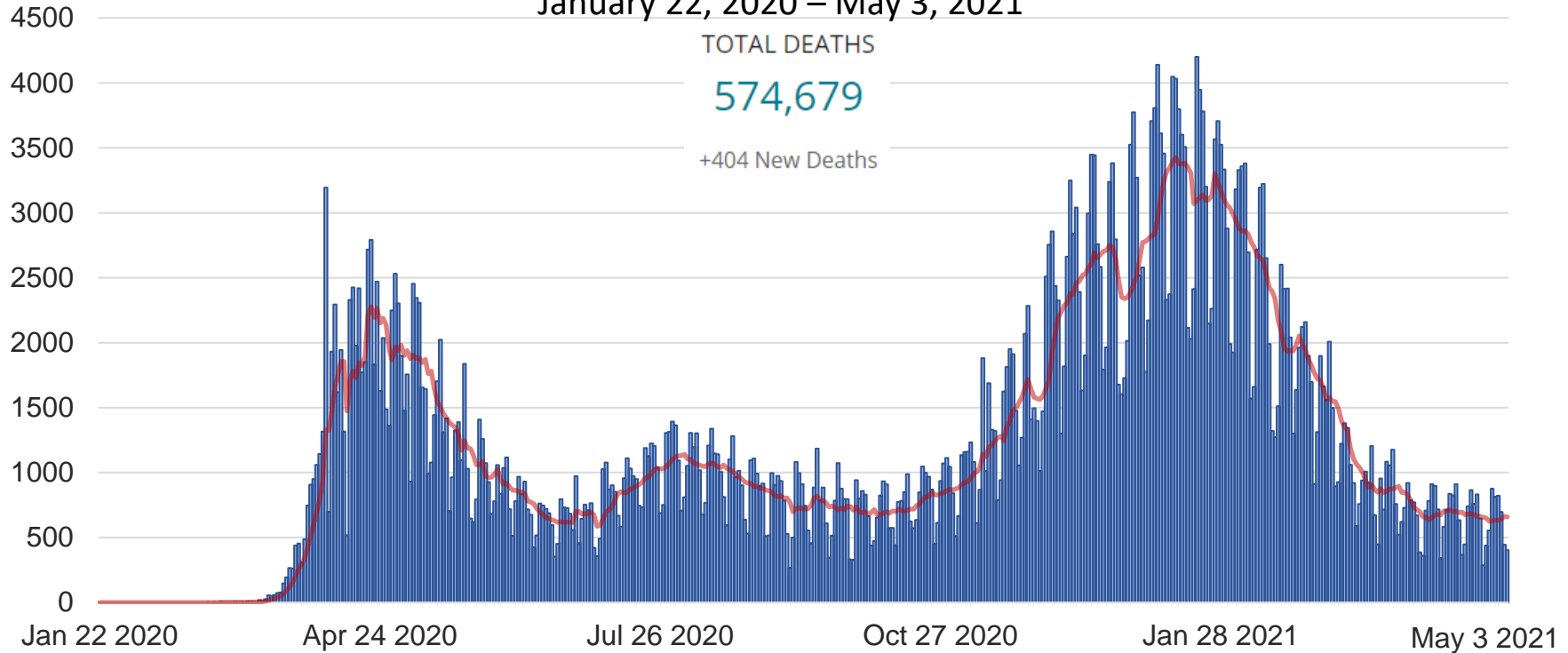
Trends in Number of COVID-19 Deaths in the US

January 22, 2020 – May 3, 2021

TOTAL DEATHS

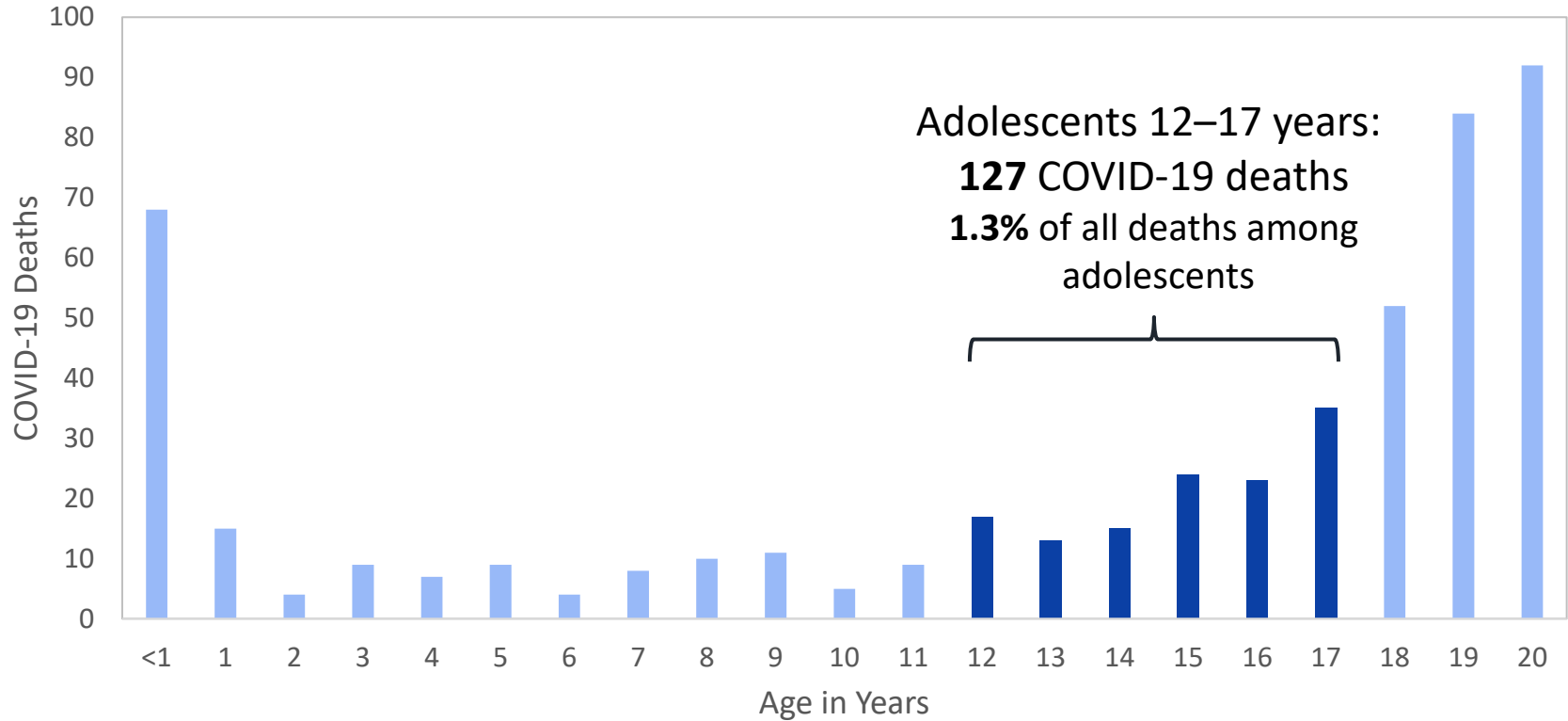
574,679

+404 New Deaths



COVID-19 Deaths by Age Group, NCHS

—January 1, 2020–April 30, 2021

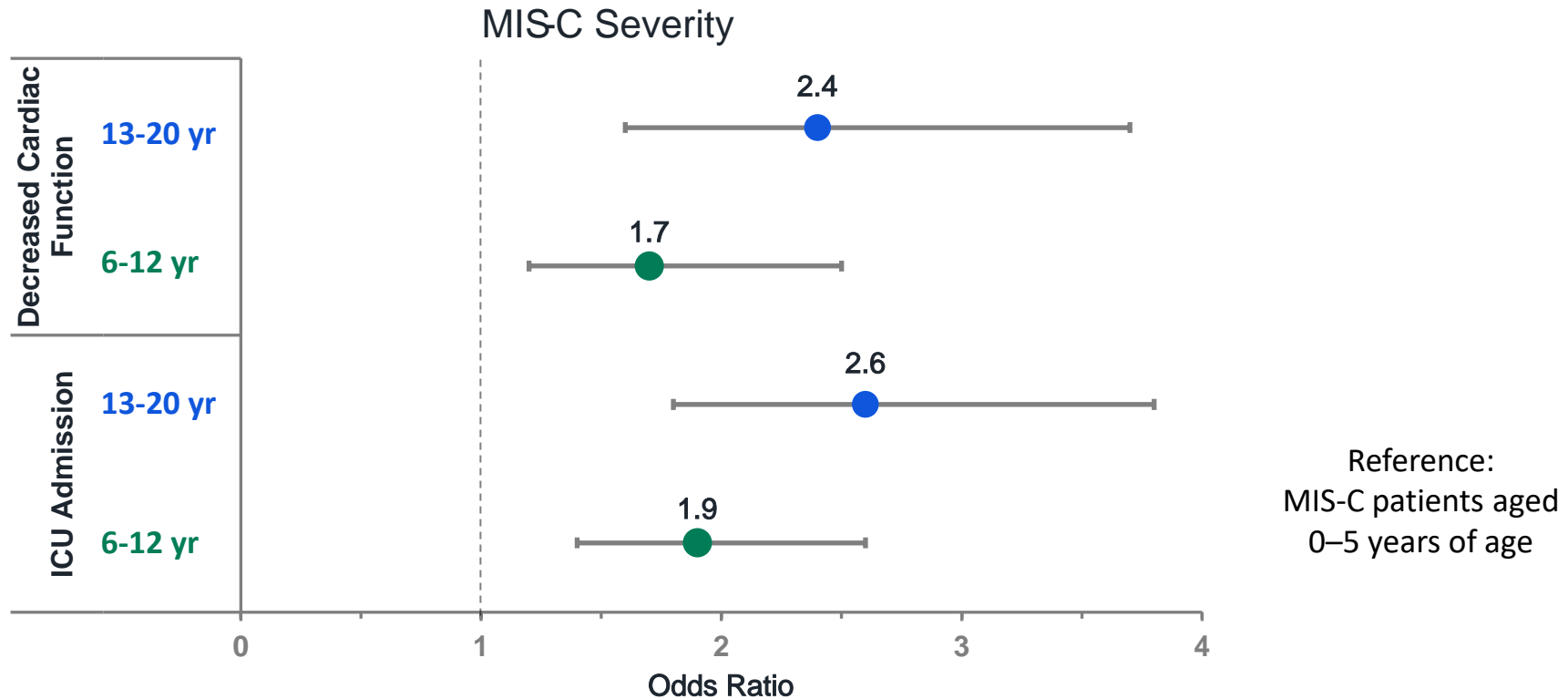


Multisystem Inflammatory Syndrome in Children (MIS-C)

- Severe hyperinflammatory syndrome occurring 2-6 weeks after acute SARS-CoV-2 infection, resulting in a wide range of manifestations and complications
 - 60-70% of patients are admitted to intensive care, 1-2% die^{1,2}
- **3,742 MIS-C cases** have been reported to national surveillance as of May 3, 2021³
 - Median age of 9, with 21% (804) of cases occurred in adolescents 12-17 years
 - 63% of reported cases have occurred in children who are Hispanic/Latino or Black, Non-Hispanic
 - Estimated incidence of 1 to 8.5 MIS-C cases per million person-months

1. Feldstein LR, Tenforde MW, Friedman KG, et al. Characteristics and Outcomes of US Children and Adolescents With Multisystem Inflammatory Syndrome in Children (MIS-C) Compared With Severe Acute COVID-19. *JAMA*. 2021;325(11):1074-1087. doi:10.1001/jama.2021.2091
2. Belay ED, Abrams J, Oster ME, et al. Trends in Geographic and Temporal Distribution of US Children With Multisystem Inflammatory Syndrome During the COVID-19 Pandemic [published online ahead of print, 2021 Apr 6]. *JAMA Pediatr*. 2021;e210630. doi:10.1001/jamapediatrics.2021.0630
3. Health Department-Reported Cases of Multisystem Inflammatory Syndrome in Children (MIS-C) in the United States. <https://www.cdc.gov/mis-c/cases/index.html>

Severity of Multisystem Inflammatory Syndrome in Children (MIS-C) by Age



Adolescents and Transmission of SARS-CoV-2

- Some studies observed similar infection rates between children and adults, while others found lower infection rates among children compared with adults^{1,2}
- Adolescents may be more likely to be infected than younger children (<10 years)
 - Supported by contact tracing, test positivity, and population-based seroprevalance data²
- Secondary transmission from adolescents can and does occur
 - While SARS-CoV-2 transmission among students relatively rare, several studies suggest transmission more likely within high school than elementary school settings^{3,4}

1. Bi Q et al. Lancet Infect Dis. 2020;20(8):911-919

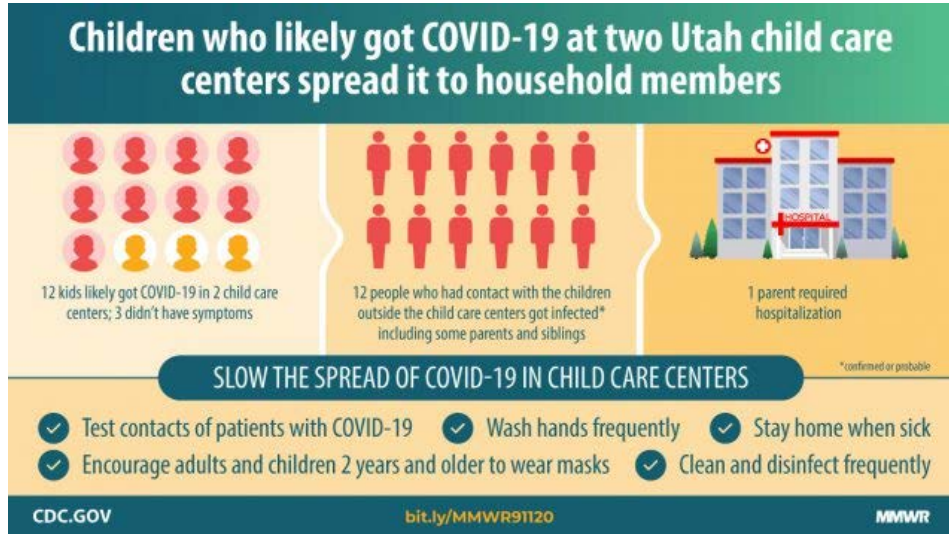
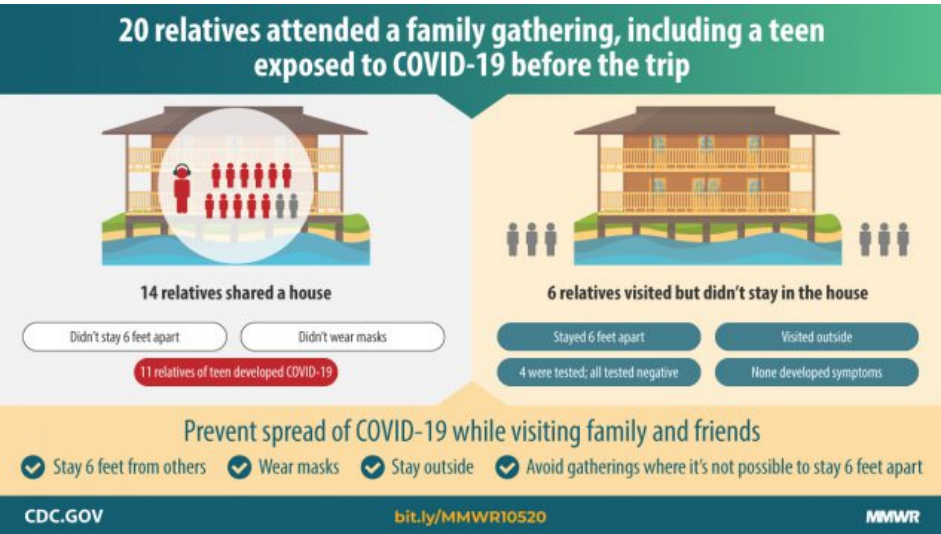
2. CDC Science Brief: Transmission of SARS-CoV-2 in K-12 schools. https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/transmission_k_12_schools.html

3. Goldstein E et al. On the Effect of Age on the Transmission of SARS-CoV-2 in Households, Schools, and the Community. J Infect Dis. 2021 Feb 13;223(3):362-369.

4. Larosa E et al. Secondary transmission of COVID-19 in preschool and school settings in northern Italy after their reopening in September 2020. Euro Surveill. 2020;25(49):2001911.

Adolescents and Transmission of SARS-CoV-2

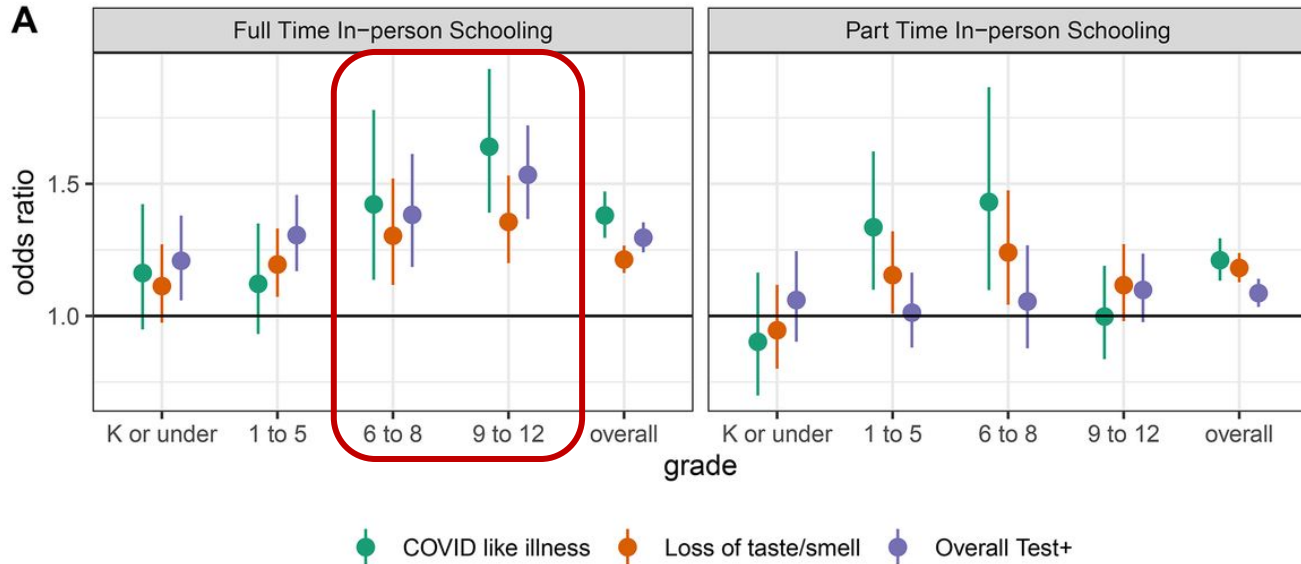
- Outbreak investigations have demonstrated efficient transmission among children, adolescents, and young adults, including transmission to older household members



- Lopez A et al. MMWR Morb Mortal Wkly Rep 2020;69:1319–1323
- Schwartz N et al. MMWR Morb Mortal Wkly Rep 2020;69:1457–1459

Adolescents and Transmission of SARS-CoV-2

Adults living in a household with a child engaged in **full-time in-person school** had an **increase** in odds of reporting COVID-19 like illness, loss of taste/smell, or positive SARS-CoV-2 test within previous 14 days



COVID-19-related outcomes compared to households with children not attending in-person school (reference), prior to adjustment for mitigation efforts

Public Health Problem:

Summary of the available evidence

Adolescents 12–17 years of age are at risk of severe illness from COVID-19

- Over 1.5 million reported cases and >13,000 hospitalizations to date
 - Hospitalization rate higher than 2009-10 H1N1 pandemic
- Clinical presentation of MIS-C more severe in adolescents than in younger children

COVID-19 in adolescents may also indirectly impact others' health

- Adolescents contribute to transmission in households and communities
 - Including older vulnerable populations
- Adolescents represent an increasing proportion of recent COVID-19 cases

Public Health Problem

Work Group Interpretation

Is COVID-19 disease among adolescents aged 12–15 years of public health importance?

- No Probably no Probably yes Yes Varies Don't know



EtR Domain: Benefits and Harms



Benefits and Harms

How substantial are the desirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is a desirable effect?

Minimal Small Moderate Large Varies Don't know



Benefits and Harms

How substantial are the undesirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is a undesirable effect?

Minimal Small Moderate Large Varies Don't know



Benefits and Harms

Do the desirable effects outweigh the undesirable effects?

- What is the balance between the desirable effects relative to the undesirable effects?

- Favors intervention (Pfizer-BioNTech COVID-19 vaccine)
- Favors comparison (no vaccine)
- Favors both
- Favors neither
- Unclear



Benefits and Harms:

Summary of the Available Evidence: Benefits

- The clinical trial for the Pfizer-BioNTech COVID-19 vaccine demonstrated efficacy against symptomatic, laboratory-confirmed COVID-19. The efficacy was **100%**

High certainty of evidence

Benefits and Harms:

Summary of the Available Evidence: Benefits

- The geometric mean ratio (GMR) for antibodies in 12–15-year-olds compared with 16–25-year-olds was **1.76** (95% CI:1.47, 2.10), and **met the noninferiority criteria**
- No hospitalizations due to COVID-19 or cases of MIC-C were reported by any trial participants

Benefits and Harms:

Summary of the Available Evidence: Harms

- Serious adverse events (SAE) were reported in a higher proportion of recipients of vaccine versus placebo (0.4% vs 0.2%) based on 5 SAEs in the vaccine group and 2 in the placebo group

Very low certainty of evidence

- Severe reactions were more common in vaccine recipients; a grade ≥ 3 reaction was reported by 10.7% of vaccinated versus 1.9% of placebo group

High certainty of evidence

Benefits and Harms:

Summary of the Available Evidence: Harms

- **No deaths** were reported among any trial participants
- Local reactions within 7 days occurred in **91%** vaccine recipients
 - Pain at the injection site most common
- Systemic reactions within 7 days occurred in **91%** vaccine recipients
 - Fatigue and headache most common
- Most symptoms resolved in 1-2 days

Benefits and Harms:

Summary of the Available Evidence: Harms

- No cases of anaphylaxis reported in the adolescent (12-15 years of age) study participants
- No cases of Bell's Palsy or facial paralysis reported in adolescents
- Among adolescents 12-15 years of age, 7 (0.6%) in the vaccine group had lymphadenopathy, compared to 1 (0.1%) participant in the placebo group
 - Most lymphadenopathy was local (arm or neck region), occurred on the same side as vaccination, and was reported within 2-10 days

Summary of GRADE

Outcome	Importance	Design (# of studies)	Findings	Evidence type
Benefits				
Symptomatic lab-confirmed COVID-19	Critical	RCT (1)	Pfizer-BioNTech COVID-19 vaccine is effective in preventing symptomatic COVID-19	1
Hospitalization due to COVID-19	Important	No studies	Data not available from any studies	ND
Multisystem inflammatory syndrome in children (MIS-C)	Important	No studies	Data not available from any studies	ND
SARS-CoV-2 seroconversion	Important	No studies	Data not available from any studies	ND
Asymptomatic SARS-CoV-2 infection	Important	No studies	Data not available from any studies	ND
Harms				
Serious adverse events	Critical	RCT (1)	5 SAEs among vaccinated and 2 among unvaccinated; certainty in the estimate was very low. No SAEs were judged to be related to vaccination.	4
Reactogenicity	Important	RCT (1)	Severe reactions were more common in vaccinated; any grade ≥ 3 reaction was reported by 10.7% of vaccinated vs. 1.9% of placebo group	1

Evidence type: 1=high; 2=moderate; 3=low; 4=very low; ND, no data.

Benefits and Harms

How substantial are the desirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is a desirable effect?

Minimal Small Moderate Large Varies Don't know



Benefits and Harms

How substantial are the undesirable anticipated effects?

- How substantial are the anticipated effect for each main outcome for which there is an undesirable effect?

Minimal Small Moderate Large Varies Don't know



Benefits and Harms

Do the desirable effects outweigh the undesirable effects?

- What is the balance between the desirable effects relative to the undesirable effects?

- Favors intervention (Pfizer-BioNTech COVID-19 vaccine)
- Favors comparison (no vaccine)
- Favors both
- Favors neither
- Unclear



EtR Domain: Values



Values

Criteria 1:

Does the target population feel that the desirable effects are large relative to undesirable effects?

- How does the target population view the balance of desirable versus undesirable effects?
- Would patients/caregivers feel that the benefits outweigh the harms and burden?
- Does the population appreciate and value the Pfizer-BioNTech COVID-19 vaccine?

Minimal Small Moderate Large Varies Don't know



Values

Criteria 2:

Is there important uncertainty about, or variability in, how much people value the main outcomes?

- How much do individuals value each outcome in relation to the other outcomes?
- Is there evidence to support those value judgements?
- Is there evidence that the variability is large enough to lead to different decisions?

- Important uncertainty or variability
- Probably important uncertainty or variability
- Probably not important uncertainty or variability
- No important uncertainty or variability
- No known undesirable outcomes

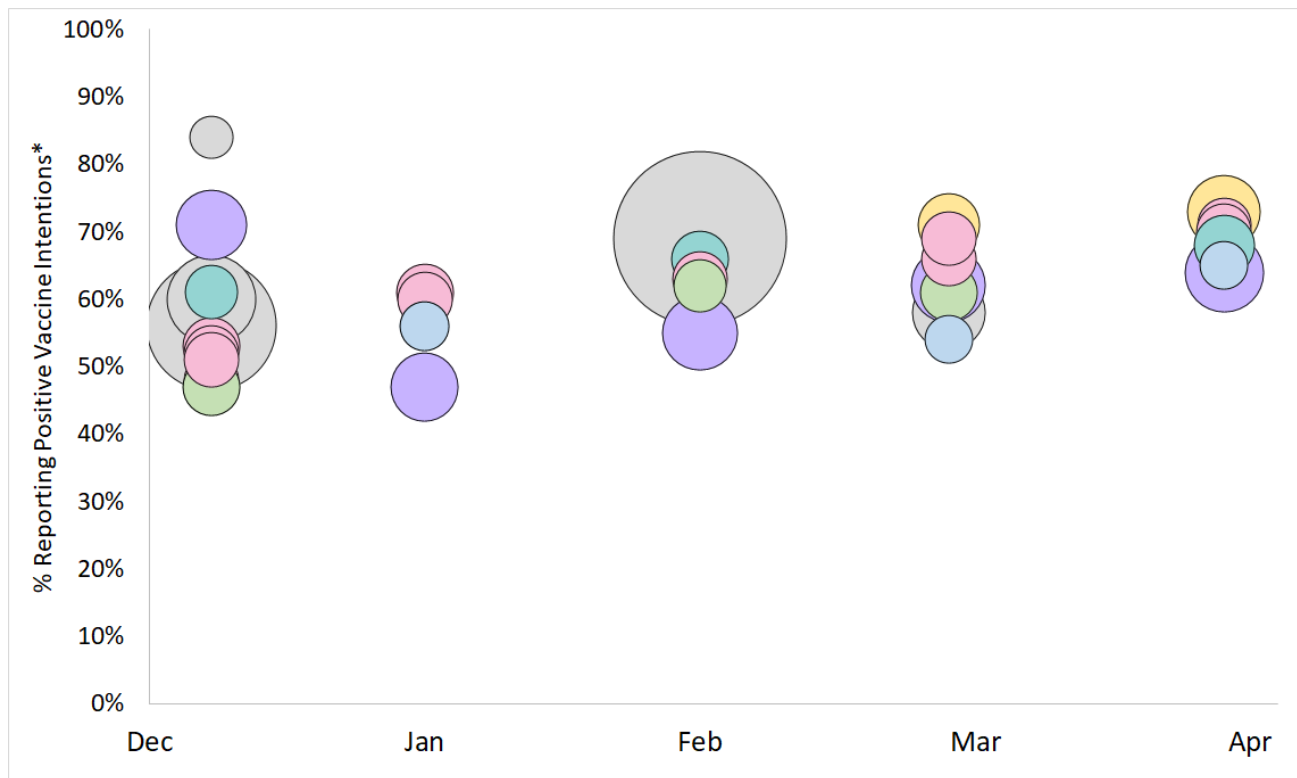


Values:

Review of the Available Evidence

- Review of scientific literature, news media, and reports
 - Pubmed: (COVID-19 OR coronavirus OR SARS-CoV-2) AND (vaccin* OR immunization) AND (survey OR questionnaire OR poll) AND (adolescent OR child* OR parent*)
 - Google: “COVID-19,” “coronavirus,” “vaccine,” “survey,” “poll,” “hesitancy,” “intent,” “willingness”
 - Societal Experts Action Network COVID-19 Survey Archive
- Limited to surveys conducted since authorization of COVID-19 vaccines (December 2020)

Positive COVID-19 Vaccination Intention among Adults[†]



Reference	Date	N	% Intent
Szilagy	Dec	5,660	56%
Savoia	Dec	2,650	60%
KFF	Dec	1,676	71%
APNORC	Dec	1,117	47%
Axios-Ipsos	Dec	1,101	53%
Axios-Ipsos	Dec	1,009	48%
Axios-Ipsos	Dec	1,003	52%
Axios-Ipsos	Dec	1,002	51%
Quinnipiac	Dec	978	61%
ABC/IPSO	Dec	621	84%
Axios-Ipsos	Jan	1,112	61%
KFF	Jan	1,563	51%
Axios-Ipsos	Jan	1,038	60%
Monmouth	Jan	809	50%
Pew	Feb	10,121	69%
KFF	Feb	1,874	55%
Quinnipiac	Feb	1,075	66%
Axios-Ipsos	Feb	1,038	63%
APNORC	Feb	914	62%
COVID Collab	Mar	1,845	58%
NPR/Marist Poll	Mar	1,309	71%
KFF	Mar	1,862	62%
APNORC	Mar	1,103	61%
Axios-Ipsos	Mar	1,001	66%
Axios-Ipsos	Mar	995	69%
Monmouth	Mar	802	54%
NPR/Marist Poll	Apr	1,809	73%
Axios-Ipsos	Apr	979	71%
Axios-Ipsos	Apr	1,033	70%
Quinnipiac	Apr	1,237	68%
Monmouth	Apr	800	65%
KFF	Apr	2,097	64%

[†]Surveys with multiple time points are shown with the same color bubble for each time point. Surveys with only one time point are shown in gray.

*Positive vaccine intentions includes persons reporting definitely, probably, or somewhat likely to get vaccinated themselves. Some surveys also included persons who already received vaccine.

Values:

Surveys of Parents (intent to have children vaccinated)

- Among parents surveyed, **46-60%** plan to get their children vaccinated¹⁻⁴
- Reasons for not vaccinating²:
 - not sure it will be safe (59%)
 - Vaccine developed too quickly (59%)
 - don't trust info being published about the vaccine (48%)
 - won't trust right away (44%)
 - don't have enough info (43%)
- Parents reported similar or slightly lower intent to vaccinate their children compared to intent to vaccinate themselves^{3,4}

1. Axios/Ipsos April 2-5; Axios/Ipsos April 16-19; Calarco and Anderson preprint; WebMD March 2021.

2. National Parents Union Survey January 2021

3. Simonson M, Baum M, Lazer D, et al. The COVID States Project #45: Vaccine hesitancy and resistance among parents.OSF Preprints, 19 Mar. 2021. <https://doi.org/10.31219/osf.io/e95bc>

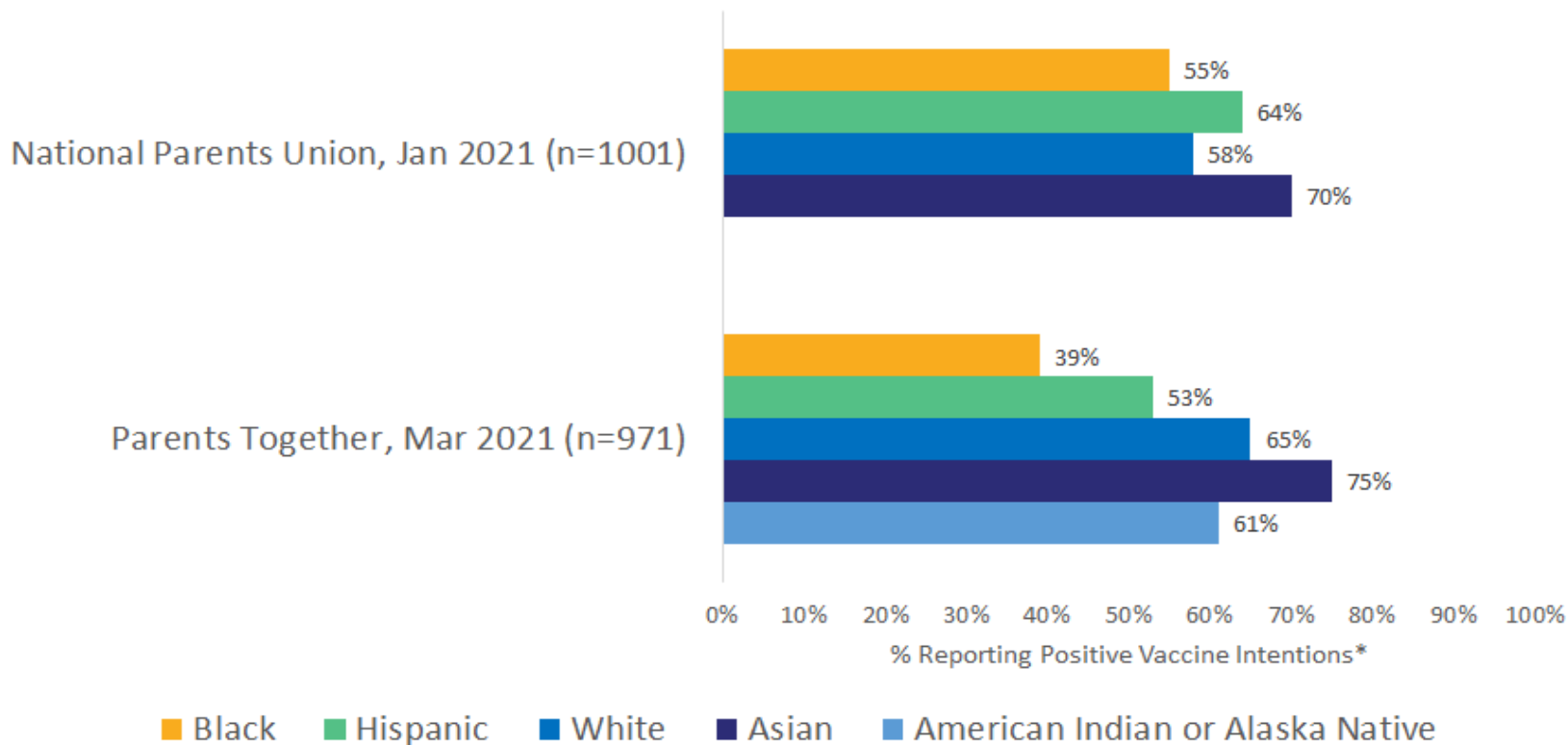
4. Parents Together March 2021 Survey

Values:

Surveys of Parents (intent to have children vaccinated)

- Intent to vaccinate children differed by parent's **gender, age & income** status
- Fathers were more willing to vaccinate their children than mothers
- Older mothers were more willing to vaccinate their children than younger mothers
- Higher income households were more likely to report intent to vaccinate
- Lower income households twice as likely to say “not sure” about vaccinating their children compared to higher income households

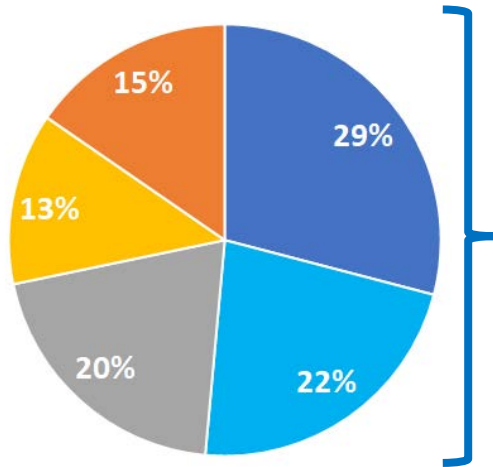
Values: Parents' Intent for Children to Receive COVID-19 Vaccine Varies by Race/Ethnicity



*Positive vaccine intentions includes persons reporting definitely or probably likely to get their child vaccinated.

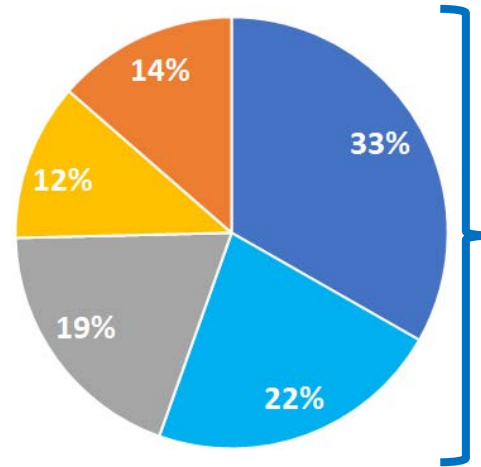
Values: Surveys of Adolescents and Parents Intent to get vaccine/have children vaccinated

Adolescents 13-17 years
(n=839)



51%
definitely/probably
will get vaccinated

Parents of Adolescents 12-17 years
(n=766)



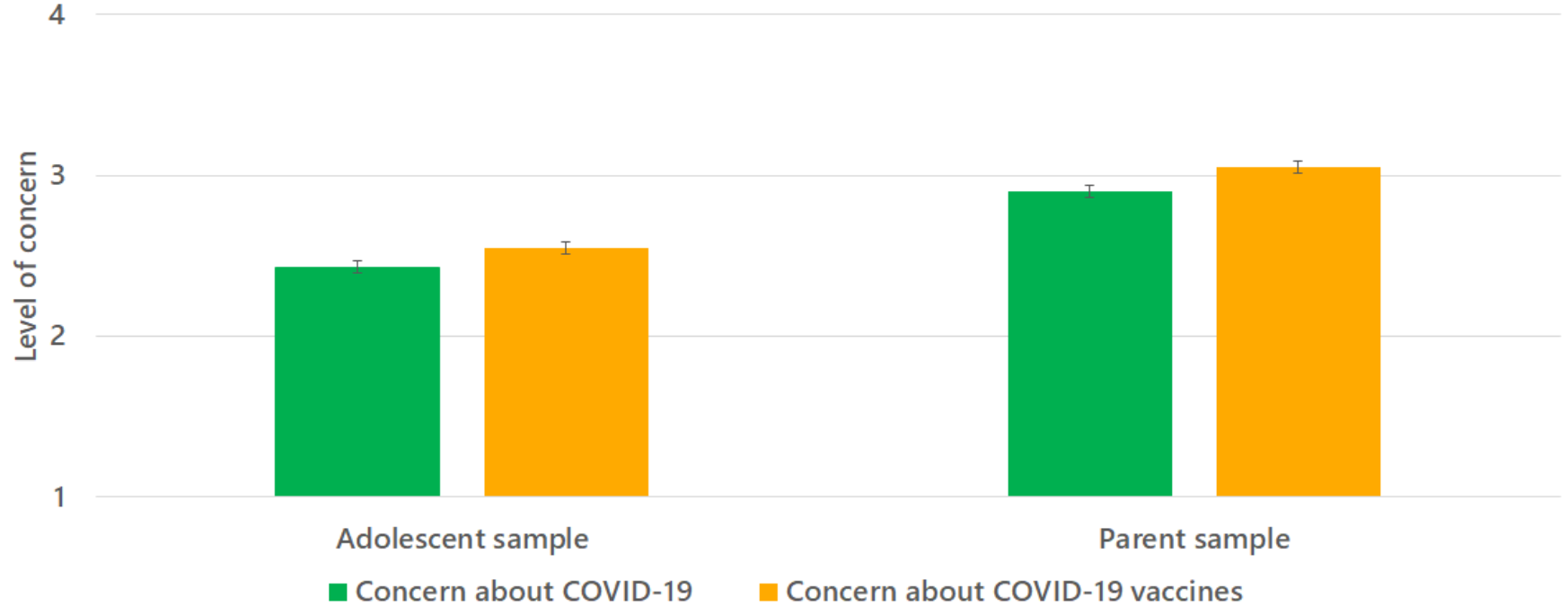
55%
definitely/
probably
will get adolescent
vaccinated

■ Definitely will ■ Probably will ■ Not sure ■ Probably not ■ Definitely not

Values: Surveys of Adolescents and Parents Intent to get vaccine/have children vaccinated

- Intent to vaccinate adolescents among the combined sample varied:
 - Higher for male than female adolescents (57% vs. 50%)
 - Higher for adolescents whose parents had at least a four-year degree (66%) vs. parents with less education (48%-50%)
 - Higher in Northeast (64%) and West (60%) vs. Midwest (47%) and South (49%)
- No differences in intent for adolescent COVID-19 vaccination by respondent race/ethnicity

Values: Surveys of Adolescents and Parents Concern for COVID-19 or vaccines



Level: 1 = not concerned; 2 = slightly concerned; 3 = somewhat concerned; 4 = very concerned

Values:

Summary of the Available Evidence

- About **half** of parents say they are likely to get their adolescent vaccinated
- Intent to vaccinate adolescents differed by parents' gender, race, and income
- Intent to vaccinate adolescents similar or slightly lower than parental intent to get vaccinated
- Limited information available on adolescent intent to be vaccinated

Values

Criteria 1:

Does the target population feel that the desirable effects are large relative to undesirable effects?

- How does the target population view the balance of desirable versus undesirable effects?
- Would patients/caregivers feel that the benefits outweigh the harms and burden?
- Does the population appreciate and value the Pfizer-BioNTech COVID-19 vaccine?

Minimal Small Moderate Large **Varies** Don't know



Values

Criteria 2:

Is there important uncertainty about, or variability in, how much people value the main outcomes?

- How much do individuals value each outcome in relation to the other outcomes?
- Is there evidence to support those value judgements?
- Is there evidence that the variability is large enough to lead to different decisions?

- Important uncertainty or variability
- Probably important uncertainty or variability
- Probably not important uncertainty or variability
- No important uncertainty or variability
- No known undesirable outcomes



EtR Domain: Acceptability



Acceptability

Is the Pfizer/BioNTech COVID-19 vaccine acceptable to key stakeholders?

- Are there key stakeholders that would not accept the distribution of benefits and harms?
- Are there key stakeholders that would not accept the undesirable effects in the short term for the desirable effects (benefits) in the future?

No Probably no Probably yes Yes Varies Don't know



Acceptability:

Jurisdictional approach to administer COVID-19 vaccine

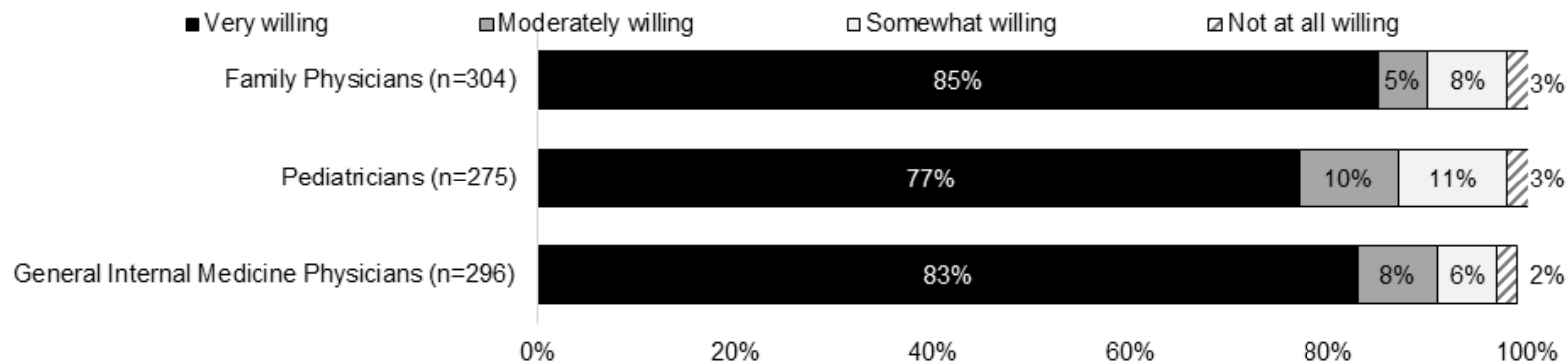
- April 10th pulse of jurisdictional immunization programs on implementation planning for adolescents

Strategy	Description	Example	%Share of jurisdictions
Multi-pronged approach	<ul style="list-style-type: none">• Using a combination of the three below approaches, often staged over time.	Region 8 jurisdiction: "Believe a hybrid model will be needed by utilizing enrolled providers and other pending outreach activities."	46%
Existing provider network	<ul style="list-style-type: none">• Reaching adolescents through existing enrolled provider network, including mass vax and public health sites.	Region 1 jurisdiction: "Plan to encourage in all existing channels including mass vaccination clinics, retail pharmacy partners, and some local health dept clinics."	28%
Pediatric providers and PCPs	<ul style="list-style-type: none">• Emphasis on reaching population through activation of new pediatric providers and family doctors.	Region 4 jurisdiction: "Actively recruiting for additional pediatricians to join the COVID enrollment. Sent out notification to bring on additional providers."	15%
School-based clinics	<ul style="list-style-type: none">• Preparing school-based clinics and events to reach population through temporary PODs.	Region 4 jurisdiction: "Received interest from schools with successful teacher vaccination clinics ...will use grant funds to support these."	11%

Acceptability:

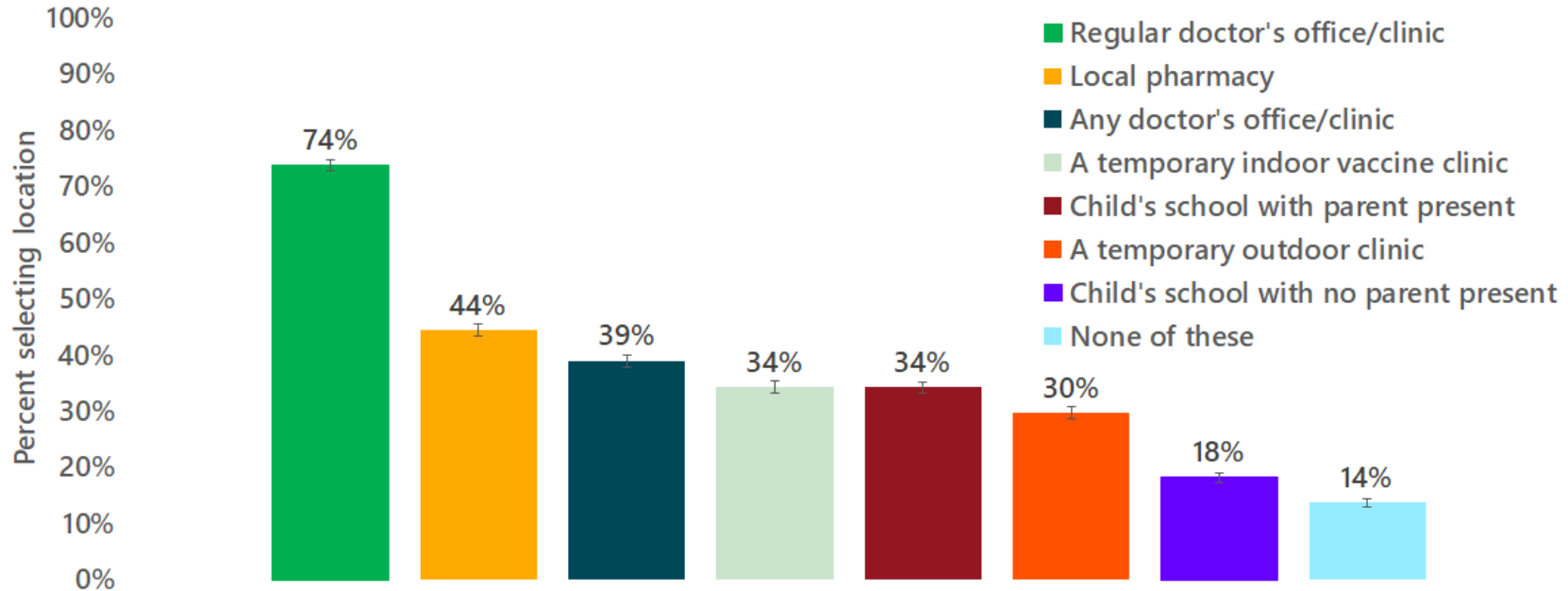
Provider willingness to administer COVID-19 vaccine

- October-December 2020 Survey: family physicians, pediatricians, and internal medicine physicians very willing to administer COVID-19 vaccine in their practices
 - **97%** of providers were willing to administer COVID-19 vaccine
 - Largest perceived barrier to vaccination was parent/patient concern about safety of COVID-19 vaccine



Acceptability: Comfort with adolescent receiving COVID-19 vaccine at each site

CDC/U Iowa Survey of Parents and Adolescents, April 2021



Acceptability:

Summary of the available evidence

- Most jurisdictions utilizing a variety of implementation strategies to vaccinate adolescents
- Nearly all primary care providers surveyed are willing to provide COVID-19 vaccines to their patients
- Adolescents and their parents report greatest comfort with receiving COVID-19 vaccine at their primary care providers' offices

Acceptability

Is Pfizer/BioNTech COVID-19 vaccine acceptable to key stakeholders?

- Are there key stakeholders that would not accept the distribution of benefits and harms?
- Are there key stakeholders that would not accept the undesirable effects in the short term for the desirable effects (benefits) in the future?

No Probably no Probably yes Yes Varies Don't know



EtR Domain: Feasibility



Feasibility

Is the Pfizer/BioNTech COVID-19 vaccine feasible to implement among adolescents aged 12–15 years?

- Is the Pfizer-BioNTech COVID-19 vaccine program sustainable?
- Are there barriers that are likely to limit the feasibility of implementing the Pfizer-BioNTech COVID-19 vaccine or require considerations when implementing it?
- Is access to Pfizer-BioNTech COVID-19 vaccine an important concern?

No Probably no Probably yes Yes Varies Don't know

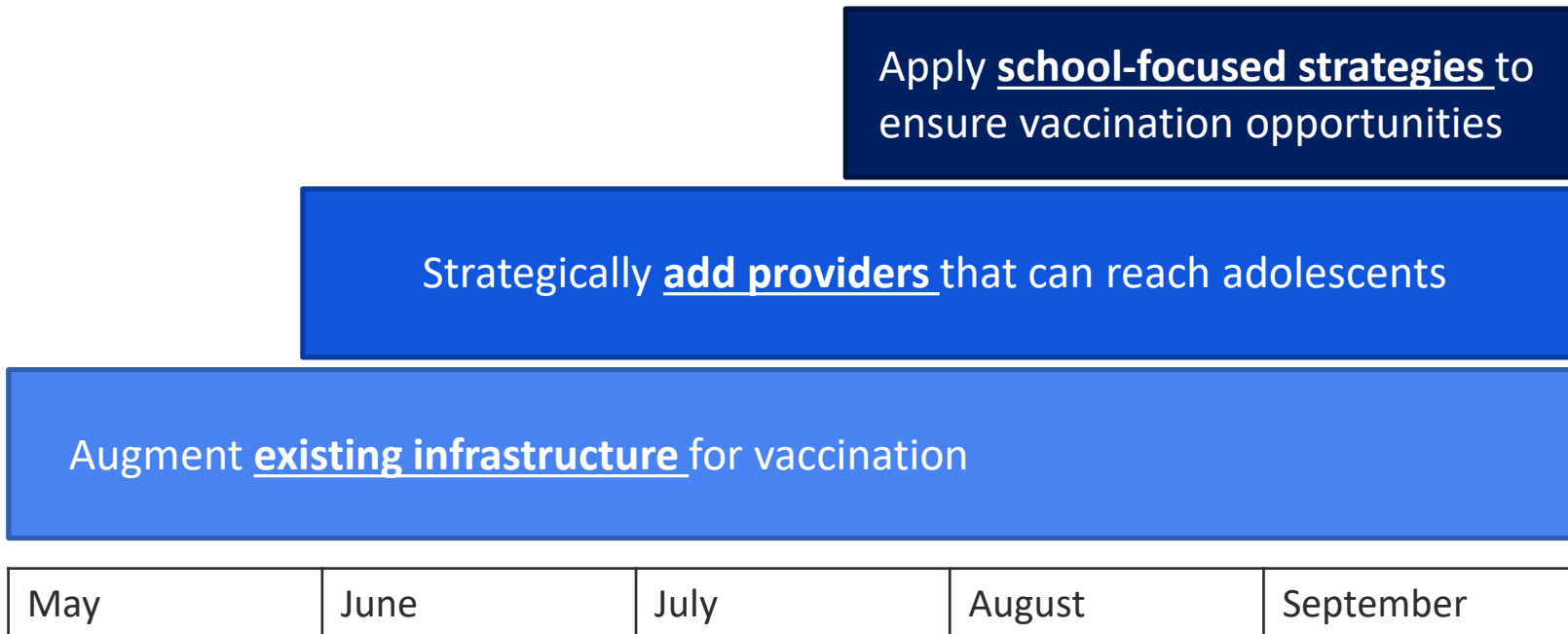


Implementation objectives




- Promote adolescent vaccination as quickly and equitably as possible through a multi-pronged approach
- Jurisdictions and providers currently vaccinating adolescents 16-17 years
- Leverage current COVID-19 vaccination infrastructure to adapt over time:
 - Early summer sprint (May-June)
 - Increase access (June-July)
 - Back-to-school campaign (July-September)

Stepwise approach to increasing vaccine access for adolescents

Adolescent
vaccination



Augment existing public health infrastructure and add new channels to vaccinate adolescents

Category	Approach
 Primary care providers serving adolescents	Utilize primary care as trusted providers to notify, schedule, and vaccinate their patients, including managing routine immunizations, particularly as students return to school
 Pharmacies and HRSA sites¹	Leverage broad pharmacy footprint and HRSA sites to administer COVID-19 vaccine to adolescents rapidly, as with adults
 School-based vaccination	Partner with Federally Qualified Health Centers, pharmacies, public health, and adolescent provider networks to hold targeted programs at schools to ensure equity and coverage, particularly as students return

1. Health Resources and Services Administration (HRSA) sites including: Federally Qualified Health Centers (FQHCs), Rural Health Clinics, Community Health Centers

Feasibility:

Additional considerations

- Current cold-chain storage requirements and package sizes could limit the availability of the Pfizer-BioNTech COVID-19 vaccine.
- Allocation/prioritization of Pfizer-BioNTech for adolescents 12-17 years
- Consent/assent
 - No federal, legal requirement for caregiver consent for COVID-19 vaccination or any other vaccination. However, COVID-19 vaccine must be administered according to applicable state and territorial vaccination laws, including those related to consent.

Feasibility

Is the Pfizer/BioNTech COVID-19 vaccine feasible to implement among adolescents aged 12–15 years?

- Is the Pfizer-BioNTech COVID-19 vaccine program sustainable?
- Are there barriers that are likely to limit the feasibility of implementing the Pfizer-BioNTech COVID-19 vaccine or require considerations when implementing it?
- Is access to Pfizer-BioNTech COVID-19 vaccine an important concern?

No Probably no Probably yes Yes Varies Don't know



EtR Domain: Resource Use



Resource Use

Is the Pfizer/BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years, a reasonable and efficient allocation of resources?

- What is the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine?
- How does the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine change in response to changes in context, assumptions, etc?

No Probably no Probably yes Yes Varies Don't know



Resource Use:

Review of the available evidence

- U.S. Government has purchased 600 million doses of mRNA vaccines¹
 - 300 million doses of Pfizer COVID-19 vaccine, delivered in regular increments through the end of July 2021
- Vaccine will be available at no cost
- No studies evaluated cost-effectiveness around the use of COVID-19 vaccines among adolescents
- Vaccinating adolescents may allow greater confidence in safe return to school
 - Reduced work/school absenteeism related to COVID-19 quarantine and isolation
 - Estimated that over time, school closures could have total economic loss as high as \$15 trillion in the US²

¹ <https://www.hhs.gov/about/news/2021/02/11/biden-administration-purchases-additional-doses-covid-19-vaccines-from-pfizer-and-moderna.html>

² <https://www.oecd.org/education/the-impact-of-covid-19-on-education-insights-education-at-a-glance-2020.pdf> ;
<https://www.cnbc.com/2020/09/08/school-disruption-could-cost-the-us-economy-15point3-trillion-oecd.html>

Resource Use:

Work Group Interpretation

- Work Group concluded that cost-effectiveness may not be a primary driver for decision-making during a pandemic and for vaccine used under EUA
 - Will need to be reassessed for future recommendations
- Use of COVID-19 vaccines in as many populations as possible will be important to returning to pre-pandemic activities
 - Return to pre-pandemic activities likely have positive economic impact

Resource Use

Is the Pfizer/BioNTech COVID-19 vaccine among adolescents aged 12–15 years a reasonable and efficient allocation of resources?

- What is the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine?
- How does the cost-effectiveness of the Pfizer-BioNTech COVID-19 vaccine change in response to changes in context, assumptions, etc?

No Probably no Probably yes Yes Varies Don't know



EtR Domain: Equity



Equity

What would be the impact of the Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years, on health equity?

- Are there groups or settings that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine?
- Are there considerations that should be made when implementing the Pfizer-BioNTech COVID-19 vaccine program to ensure that inequities are reduced whenever possible, and that they are not increased?

- Reduced
- Probably reduced
- Probably no impact
- Probably increased
- Increased
- Varies
- Don't know



Equity:

Review of the available evidence

- Identification of groups that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine
 - PROGRESS-Plus Framework:¹ Place of residence, race or ethnicity, gender or sex, socioeconomic status, disability, other
- Review of the scientific and gray literature
- Review of CDC COVID-19 response data and resources
 - CDC COVID Data Tracker & COVID-19-Associated Hospitalization Surveillance Network (COVID-NET)
 - National Center for Health Statistics
 - CDC Science Brief: Evidence used to update the list of underlying medical conditions that increase a person's risk of severe illness from COVID-19

¹ PROGRESS-Plus is an acronym to identify factors associated with unfair differences in disease burden and the potential for interventions to reduce these differential effects. See O'Neill J, Tabish H, Welch V, et al. Applying an equity lens to interventions: using PROGRESS ensures consideration of socially stratifying factors to illuminate inequities in health. *J Clin Epi.* 2014;67: 56-64; Welch VA, Akl EA, Guyatt G, et al. GRADE equity guidelines 1: considering health equity in GRADE guideline development: introduction and rationale. *J Clin Epidemiol.* 2017;90:59-67.

COVID-19: Which Adolescent Groups Could Be Disadvantaged?

- **Place of residence**
 - Living in rural/frontier areas
 - Justice-involved (incarcerated persons)
 - Living in congregate settings (long-term care facilities)
 - Experiencing homelessness
- **Racial and ethnic minority populations**
 - Black, Hispanic or Latino, and Alaskan Native/American Indian
 - Immigration status
- **Occupation**
 - Frontline workers or children of frontline workers
- **Gender/sex**
 - LGBTQ+
- **Socioeconomic status**
 - Poverty
 - High social vulnerability
- **Personal characteristics associated with discrimination**
 - With disabilities
- **Features of relationships**
 - Emancipated minors
 - Not enrolled in school
- **Substance use**

Equity: Review of the available evidence

	Disproportionate COVID-19 morbidity and mortality		Barriers to healthcare
	Adolescents	Adults	
Rural or frontier areas		✓	✓
Justice-involved		✓	✓
Congregate settings		✓	
Homelessness		✓	✓
Race/ethnicity	✓	✓	✓
Immigration status			✓
Occupation		✓	
Sexual and gender minorities			✓
Socioeconomic status		✓	✓
Disabilities	✓	✓	✓
Substance use	✓	✓	✓

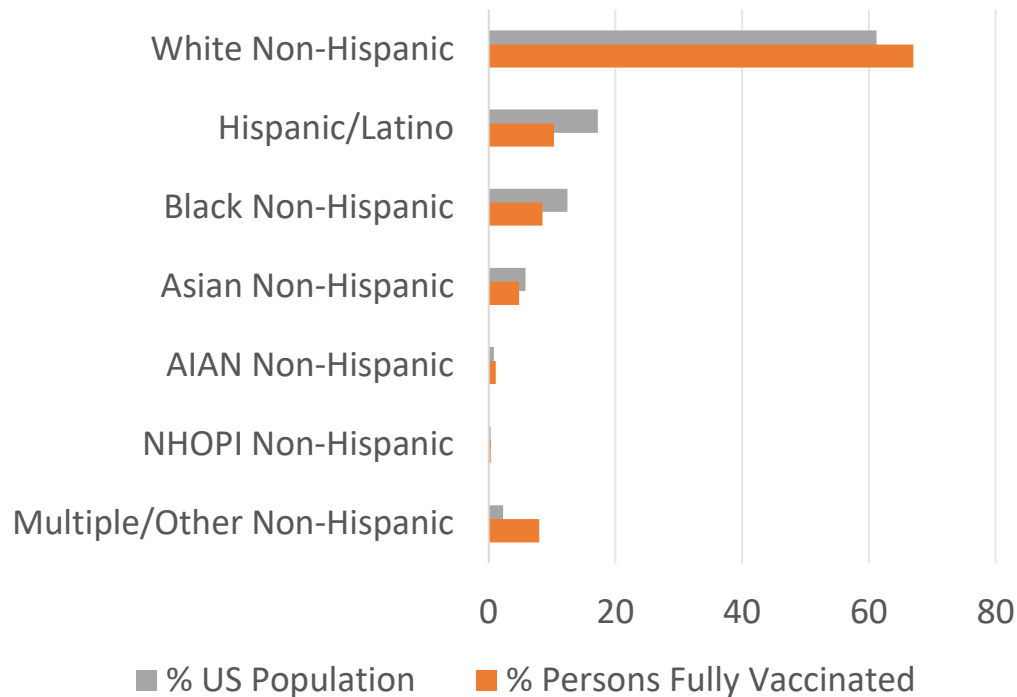
✓ = Published peer-reviewed literature available

Equity:

Data on equitable provision of COVID-19 vaccine in adults

As of May 4, 2021, a lower percentage of Black and Hispanic/Latino adults were fully vaccinated compared with the percentage of these groups in overall population

May see similar patterns in adolescents



Equity:

Opportunities to increase equitable access to the Pfizer-BioNTech COVID-19 vaccine

- Pfizer-BioNTech COVID-19 vaccine characteristics
 - Submitted new data to FDA supporting stability of vaccine when stored for up to one month (31 days) at 2-8°C¹
 - Encourage strategies to efficiently utilize doses and support local redistribution, smaller tray sizes would improve access (e.g., smaller providers, rural areas)
- Need for 2-dose series
 - In adults, only 3% missed the second dose of a 2-dose series, but differences were seen by jurisdiction, race/ethnicity, and age²
- Multipronged approach to improve access
 - Primary care providers serving adolescents, FQHCs, rural health clinics, community health centers, children's hospitals, pharmacies, school-located vaccination clinics

1. <https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-allows-more-flexible-storage-transportation-conditions-pfizer>

2. Kriss JL, Reynolds LE, Wang A, et al. COVID-19 Vaccine Second-Dose Completion and Interval Between First and Second Doses Among Vaccinated Persons — United States, December 14, 2020–February 14, 2021. MMWR Morb Mortal Wkly Rep 2021;70:389–395.

Equity

What would be the impact of the Pfizer-BioNTech COVID-19 vaccine among adolescents aged 12–15 years on health equity?

- Are there groups or settings that might be disadvantaged in relation to COVID-19 disease burden or receipt of the Pfizer-BioNTech COVID-19 vaccine?
- Are there considerations that should be made when implementing the Pfizer-BioNTech COVID-19 vaccine program to ensure that inequities are reduced whenever possible, and that they are not increased?

Reduced

Probably reduced

Probably no impact

Probably increased

Increased

Varies

Don't know



Summary



EtR Domain	Question	Work Group Judgments
Public Health Problem	Is COVID-19 disease among adolescents aged 12–15 years of public health importance?	Yes
Benefits and Harms	How substantial are the desirable anticipated effects?	Large
	How substantial are the undesirable anticipated effects?	Small
	Do the desirable effects outweigh the undesirable effects?	Favors Pfizer-BioNTech COVID-19 vaccine
	What is the overall certainty of the evidence for the critical outcomes?	1 (high) for prevention of symptomatic COVID-19 4 (very low) for serious adverse events
Values	Does the target population feel the desirable effects are large relative to the undesirable effects?	Varies
	Is there important variability in how patients value the outcomes?	Probably important variability
Acceptability	Is the Pfizer-BioNTech COVID-19 vaccine acceptable to key stakeholders?	Yes
Feasibility	Is the Pfizer-BioNTech COVID-19 vaccine feasible to implement among adolescents aged 12–15 years?	Yes
Resource Use	Is the Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years a reasonable and efficient allocation of resources?	Yes
Equity	What would be the impact of the Pfizer-BioNTech COVID-19 vaccine, given to adolescents aged 12–15 years on health equity?	Probably increased

Evidence to Recommendations Framework

Summary: Work Group Interpretations

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings	The balance between desirable and undesirable consequences is <i>closely balanced</i> or <i>uncertain</i>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings	There is insufficient evidence to determine the balance of consequences
--------------------------------	--	---	---	---	--	---

Evidence to Recommendations Framework

Summary: Work Group Interpretations

Balance of consequences	Undesirable consequences <i>clearly outweigh</i> desirable consequences in most settings	Undesirable consequences <i>probably outweigh</i> desirable consequences in most settings	The balance between desirable and undesirable consequences is <i>closely balanced</i> or <i>uncertain</i>	Desirable consequences <i>probably outweigh</i> undesirable consequences in most settings	Desirable consequences <i>clearly outweigh</i> undesirable consequences in most settings	There is insufficient evidence to determine the balance of consequences
--------------------------------	--	---	---	---	---	---

Evidence to Recommendations Framework

Summary: Work Group Interpretations

Type of recommendation	We do not recommend the intervention	We recommend the intervention for individuals based on shared clinical decision-making	We recommend the intervention
-------------------------------	--------------------------------------	--	-------------------------------

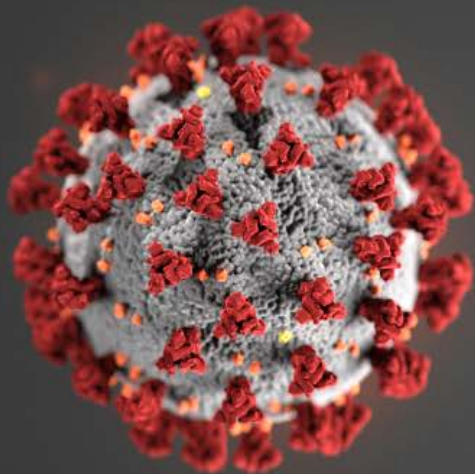
Evidence to Recommendations Framework

Summary: Work Group Interpretations

Type of recommendation	We do not recommend the intervention	We recommend the intervention for individuals based on shared clinical decision-making	We recommend the intervention
-------------------------------	--------------------------------------	--	--------------------------------------

Acknowledgements

- Kate Woodworth
- Megan Wallace
- Julia Gargano
- Jessica MacNeil
- Heather Scobie
- Amy Blain
- Danielle Moulia
- Mary Chamberland
- Steve Hadler
- Nicole Reisman
- Megan Lindley
- Jack Gersten
- Eddie Shanley
- Epi Task Force:
 - COVID-NET
 - DVD Enhanced Surveillance
 - Community Surveillance
 - Seroprevalance
- MIS-C unit
- Data, Analytics and Visualization Task Force
- Respiratory Viruses Branch



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

