

# ***Annenberg Science and Public Health Knowledge Monitor***

*Summer 2024*

A project of the Annenberg Health & Risk Communication Institute  
of the Annenberg Public Policy Center of the University of Pennsylvania

Kathleen Hall Jamieson, Ph.D.  
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Shawn Patterson Jr., Ph.D.  
Laura A. Gibson, Ph.D.  
Patrick E. Jamieson, Ph.D.

August 15, 2024

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# Table of Contents

<b>The Annenberg Science and Public Health Knowledge Monitor</b> .....	<b>5</b>
Key Findings .....	5
Other Findings .....	6
Contributions .....	7
<b>Confidence in Public Health Institutions and Experts</b> .....	<b>8</b>
Trust in Groups to Act in Your Best Interest .....	10
Confidence in the FDA’s Vaccine Approval Process .....	11
<b>COVID-19 Misinformation &amp; Vaccine Perceptions</b> .....	<b>13</b>
Perceptions of Vaccine Safety and Efficacy .....	13
Decreasing Intentions to Vaccinate .....	15
Likelihood of Taking A Combination Vaccines .....	16
COVID-19 Vaccine Misinformation .....	17
Vaccination During Pregnancy .....	18
<b>Climate Health Knowledge &amp; Misinformation</b> .....	<b>22</b>
Increasing Science-Consistent Climate Beliefs .....	22
Experiencing Extreme Weather .....	24
<b>Measles</b> .....	<b>26</b>
Measles on the Rise .....	26
Confidence in Vaccination .....	27
Attitudes Toward Childhood Vaccination .....	27
Pregnancy and Measles Risks .....	28
False Belief in MMR Vaccine-Autism Link Endures .....	29
<b>Mpox</b> .....	<b>32</b>
Declining Salience .....	32
Decline in Knowledge .....	34
Likelihood of Vaccination .....	34
A Worrisome Reminder .....	35
<b>Sexually Transmitted Infections</b> .....	<b>36</b>
STIs on the Rise .....	36
Treatment and Prevention .....	36
Broader Knowledge about STIs .....	38
Signs of Syphilis .....	39

Stigma .....	40
Racial Disparities .....	41
<b>Methodology</b> .....	<b>43</b>
Weighting .....	44
Weighting Benchmarks .....	47

# The Annenberg Science and Public Health Knowledge Monitor

The Annenberg Science and Public Health (ASAPH) Knowledge Monitor, a project of the Annenberg Public Policy Center (APPC) of the University of Pennsylvania, tracks national levels of health knowledge and misinformation over time.

For the purposes of this report, health knowledge and misinformation are defined as recommendations or information which are consistent across expert scientific sources. Specifically, we define *science-consistent* information as being consistent with the conclusions reached by expert organizations that serve as custodians of the best available knowledge about the scientific matter at issue.<sup>1</sup> In the case of public health, these custodians include the Centers for Disease Control and Prevention (CDC), the National Institutes of Health (NIH), and the World Health Organization (WHO).

<sup>1</sup>Jamieson. 2017. “The need for a science of science communication: Communicating science’s values and norms.” In *The Oxford Handbook of the Science of Science Communication*, Oxford Library of Psychology. June 6, 2017.

Building on the Annenberg Science Knowledge (ASK) surveys, which since 2016 have been focused on health knowledge and misinformation about topics such as the Zika virus, measles, and COVID-19, the ASAPH Knowledge Monitor generates indices of knowledge about such vital health topics as maternal and reproductive health, vaccination, COVID-19, mpox, and indications and treatment of heat-related illness. It also provides an ongoing measure of public confidence in the National Institutes of Health (NIH), U.S. Centers for Disease Control and Prevention (CDC), and U.S. Food and Drug Administration (FDA).

This third ASAPH report is based on 20 waves of a nationally representative panel survey of U.S. adults, first empaneled in April 2021, conducted for APPC by SSRS, an independent market research company. The twentieth wave was conducted July 11-18, 2024, and has a margin of sampling error (MOE) of  $\pm 3.6$  percentage points at the 95% confidence level.

## Key Findings

Data from recent waves of the ASAPH panel show a decline in support for vaccines overall, with the lowest support for COVID-19 vaccines.

- **Trust in Vaccines:** ASAPH has assessed vaccine benefit and risk perceptions in multiple waves since wave 14 (June 2023 – July 2024). In the most recent measurements (August 2023), just 66% believe the benefits of the COVID-19 vaccine outweigh the risks, significantly lower than the 89% who believe the benefits of the MMR vaccine outweigh the risks.

- **Willingness to Take a Trivalent Vaccine:** Given the lower perceptions of benefits for the relatively newer COVID-19 vaccine, it is not surprising that 27% of participants report that they are not at all likely to take a single-shot trivalent mRNA vaccine that would protect against flu, COVID-19, and RSV. Still, in July 2024, nearly half reported they were somewhat or very likely to take such a trivalent vaccine.
- **Decline in Perceptions of MMR Safety & Efficacy:** Respondents viewed the MMR (measles, mumps, and rubella) vaccine as safer and more effective than any of the other five vaccines considered in the survey, with 81% reporting the MMR vaccine is either somewhat or very safe and 83% reporting it as somewhat or very effective. However, these perceptions of MMR vaccine safety and efficacy represent a significant decline from the prior year when 88% of panelists reported that the MMR vaccine was somewhat or very safe and 87% perceived it as somewhat or very effective.
- **Increase in Endorsement of COVID-19 Misinformation:** The majority of respondents still endorse the science-consistent response (55-65%) for the knowledge items. However, across all but one item, endorsement of the science-inconsistent response has increased significantly over time (see Figure 10), suggesting that COVID-19 vaccine misinformation is not going away.
- **School Vaccination Endorsement:** School vaccination requirements are important tools for maintaining vaccination coverage across the population, and in turn, lowering rates of disease. Yet only 63% of respondents believe healthy children should be required to be vaccinated for attendance in public schools.

The CDC recommends all adults are vaccinated for the seasonal flu and COVID-19, as well as getting the Tdap (tetanus, diphtheria, and whooping cough) vaccine every 10 years.<sup>2</sup>

<sup>2</sup>CDC. 2023. “[Adult Immunization Schedules.](#)” *Immunization Schedules.* November 16, 2023.

## Other Findings

- **Decline in Mpox Knowledge:** As mpox (formerly monkeypox) has receded both in terms of the number of cases in the United States and its salience to the public, so, too, has science-consistent knowledge about the disease. Over the course of the 2022 outbreak, our respondents became more likely to know that mpox is less contagious than COVID-19, that getting a COVID-19 vaccine does not increase a recipient’s likelihood of getting mpox, that men who have sex with men are at higher risk of mpox infection, and that a vaccine against mpox exists. These gains in knowledge over 2022, however, largely disappeared by 2024.
- **Lack of STI Knowledge:** Despite the rise in STIs such as syphilis, just over half of our respondents (54%) know that a case of syphilis can be permanently cured and many either mistakenly think there is a vaccine to prevent it (16%) or are unsure (30%). Addi-

tionally, the public is not sure whether some STI infections can be permanently cured, including mpox (61%) and HPV (45%), or whether a vaccine exists to prevent them (just 44% for mpox and 67% for HPV, which both have vaccines).

- **Increased Climate Change Knowledge & Support to Mitigate Effects:** From November 2023 to July 2024, respondents generally endorsed more science-consistent beliefs about climate change. They were significantly more likely to report that climate change was increasing the risk of illness in the U.S. and that heat waves are becoming more frequent and intense. When it comes to means of addressing climate change, more than half of Americans strongly or somewhat favor a series of government steps designed to mitigate the effects of climate change. The initiative that garnered the most support was community grants to protect against impacts of climate change (27%).
- **Trust in Groups:** Americans reported trusting scientists and police officers to act in their best interests more than the other groups assessed. Specifically, medical scientists were trusted significantly more than any other group (77% trusted them “a moderate amount” or more). Climate scientists had less support, but still a majority (65%). However, scientists working on artificial intelligence were perceived very differently, receiving 46%, just slightly more support than business leaders.

## Contributions

Data analysis is conducted by research analysts Shawn Patterson Jr., Ph.D. and Laura Gibson, Ph.D.; the administration and quality control for The Annenberg Science and Public Health Knowledge Monitor is overseen by APPC managing director of survey research Ken Winneg, Ph.D; Patrick E. Jamieson, Ph.D., director of APPC’s Annenberg Health and Risk Communication Institute, developed the questions in the surveys. The survey itself is directed by APPC director Kathleen Hall Jamieson, Ph.D. Scholars leading the teams that helped to develop pilot panels on Zika, vaccination, and COVID-19 include Dolores Albarracín, Ph.D., director of APPC’s Communication Science Division, Dan Romer, Ph.D., APPC’s research director, and Hall Jamieson. The cover was designed by APPC senior designer Zachary Reese. The Annenberg Science and Public Health Knowledge Monitor is a project of APPC’s Annenberg Health and Risk Communication Division, which is funded by an endowment established for it by the Annenberg Foundation.

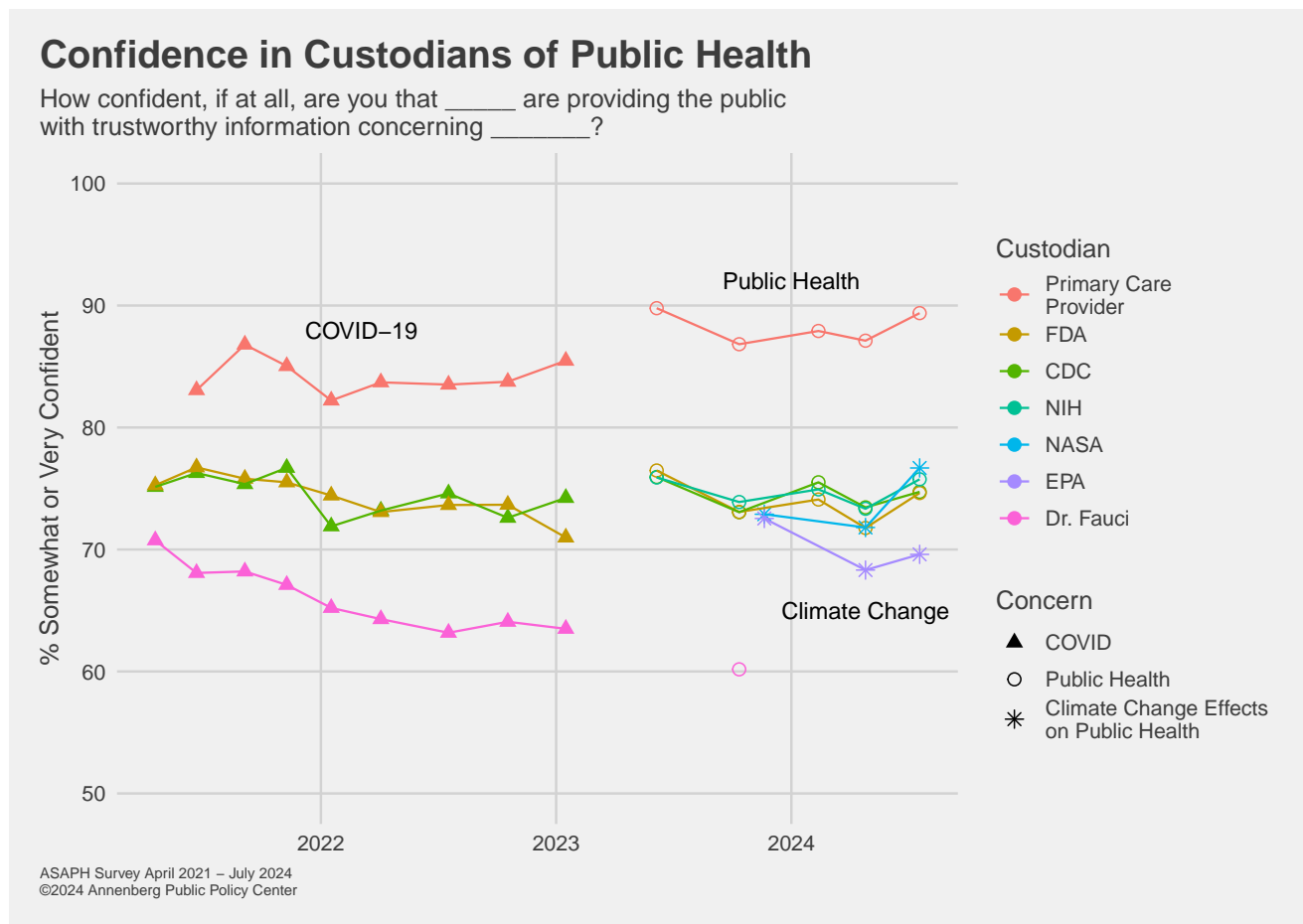
The Annenberg Public Policy Center was established in 1993 to educate the public and policy makers about communication’s role in advancing public understanding of political, science, and health issues at the local, state, and federal levels.



# Confidence in Public Health Institutions and Experts

The Annenberg Science and Public Health (ASAPH) survey has regularly asked respondents to report their level of confidence in those who provide public health information. As reported in the ASAPH Spring 2023 report, we assessed confidence initially about trustworthy information on treatment and prevention of COVID-19. In 2023, we refocused our core question on confidence in the federal public health agencies and Dr. Anthony Fauci and, for the climate-related health waves, on assessing confidence in the EPA and NASA. We also regularly ask about confidence that your primary health provider is providing trustworthy information.

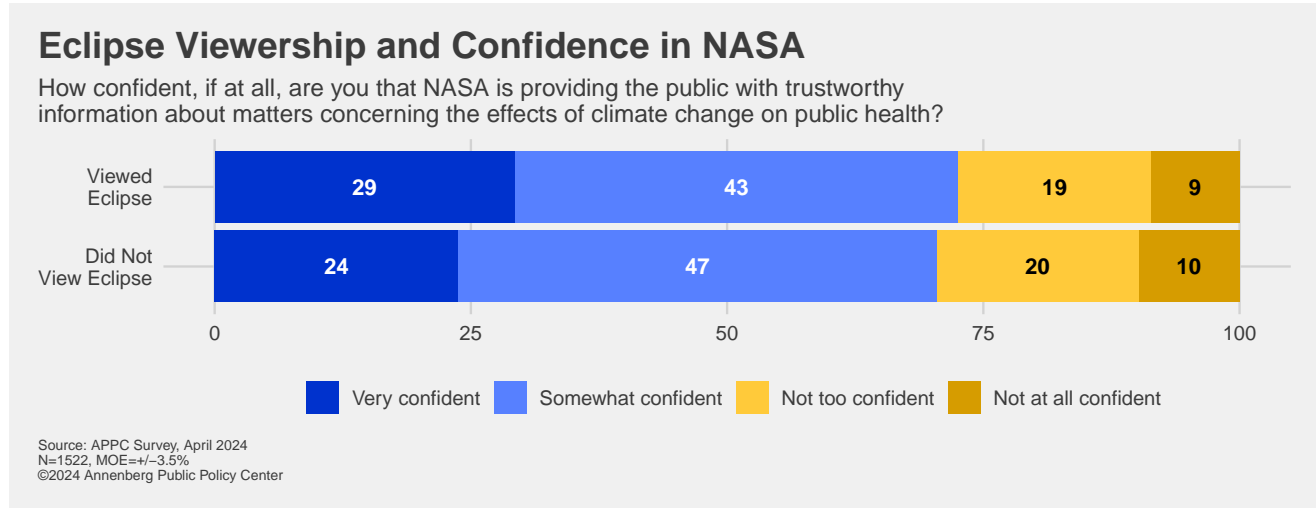
**Figure 1: Confidence in Custodians of Public Health**



As shown in Figure 1, respondents had the most confidence in their primary care providers regarding general “matters of public health” in 2023 and 2024. Similar to trust in providing COVID-19 information, they had less confidence in public health institutions such as the FDA and CDC, although rates were still above 70%. Respondents had the least confidence

in Dr. Fauci, with just 60% at the end of 2023. Dr. Fauci stepped down as director of the National Institute of Allergy and Infectious Diseases at the NIH at the end of 2022.

**Figure 2: Eclipse Viewership and Confidence in NASA**



Respondents reported similar levels of trust in institutions providing the public with information about the effects of climate change on public health as they did for matters of public health in general. Although by July 2024, the gap in confidence between NASA and the EPA (the least trusted organization) had widened (77% versus 70%). Confidence in NASA may have been boosted, in part, by the Great North American Eclipse in April 2024, which captured the attention of much of the public (see Figure 2).

**Table 1: Eclipse Viewership and NASA Confidence**

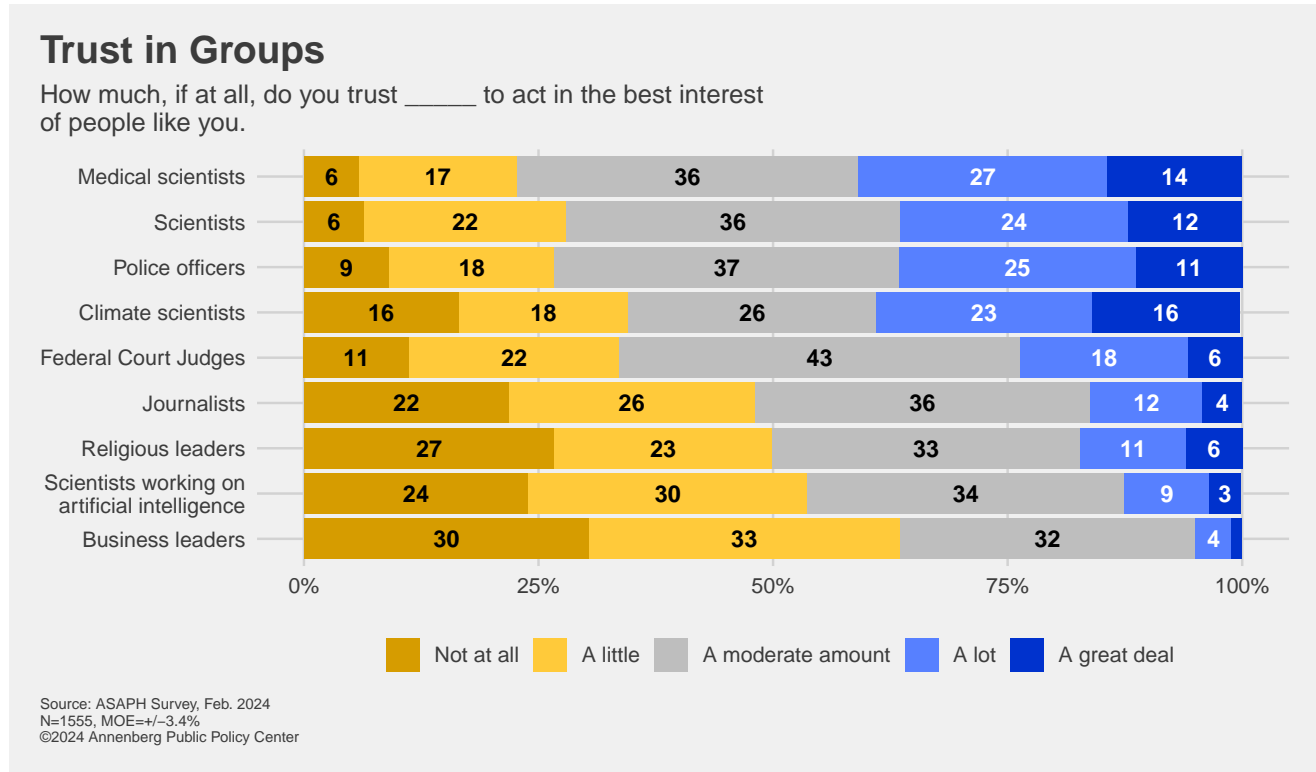
	Eclipse	NASA 2024	NASA 2024		NASA
Viewed 2024 Eclipse		0.018 (0.015)	0.039** (0.014)	April	-0.067*** (0.012)
Nov. 2023 NASA Confidence	-0.047 (0.049)		0.493*** (0.025)	April*Eclipse	0.058*** (0.015)
Demographics	Yes	Yes	Yes	Within-Subject	Yes
Num.Obs.	1356	1469	1355	Num.Obs.	2926
R <sup>2</sup>	0.026	0.186	0.371	R <sup>2</sup>	0.813
R <sup>2</sup> Adj.	0.017	0.179	0.364	R <sup>2</sup> Adj.	0.610
RMSE	0.47	0.26	0.23	RMSE	0.14

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

In a regression analysis (see Table 1), participants who reported viewing the eclipse at all (in person or on a screen) reported increased confidence in NASA from April 2024 to July 2024 relative to those who did not report viewing the eclipse. Column 3 shows that after controlling for previous confidence in NASA, viewing the Eclipse had a positive association

with NASA confidence in 2024. Column 4 presents a within-subject difference-in-differences specification demonstrating similar results.

**Figure 3: Trust in Different Groups and Professions**



### Trust in Groups to Act in Your Best Interest

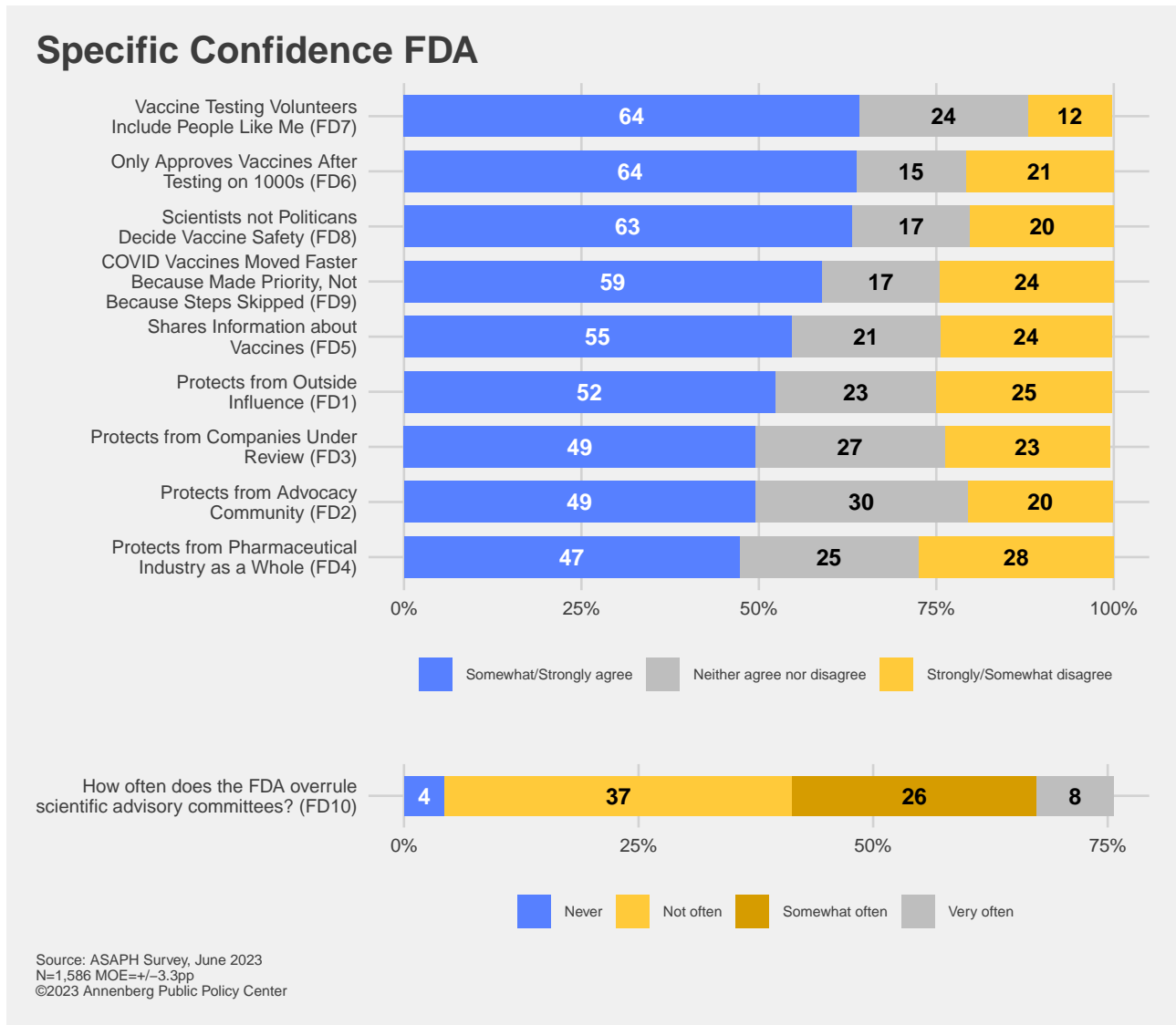
In the February 2024 ASAPH, Americans reported trusting scientists and police officers to act in their best interests more than the other groups assessed (see Figure 3). Medical scientists, in particular, were trusted significantly more than any other group (77% trusted them a moderate amount or more). Police officers and unmodified “scientists” had similarly high levels of trust (73% and 72%, respectively). Climate scientists and federal court judges had similar levels of trust (65% and 66%, respectively), but federal court judges were more likely to only be trusted “a moderate amount” and not more.

On the lower end of the spectrum, business leaders were trusted the least to act in Americans’ best interests.<sup>3</sup> Just 37% trusted them a moderate amount or more. Scientists working on artificial intelligence were perceived very differently from the other types of scientists, receiving just slightly more support than business leaders (46%). Religious leaders and journalists were in the

<sup>3</sup>This ordering of groups is similar to Pew Research Center. 2023. “Majorities of Americans say they have at least a fair amount of confidence in scientists, but ratings have fallen since early in the coronavirus outbreak.” November 10, 2023

middle of the pack with moderate levels of trust (50% and 52%, respectively).

**Figure 4: Specific Confidence in FDA Vaccine Approval Process**



## Confidence in the FDA’s Vaccine Approval Process

In January 2023, in addition to the broad questions about trust described above (Figure 1), we also asked about 10 specific measures of confidence in the FDA’s vaccine approval process (see Figure 4). Overall confidence in the trustworthiness of the FDA exceeded each measure of specific confidence concerning the FDA’s vaccine approval process. Whereas 77% of respondents express general confidence in the FDA, only 47-64% of respondents strongly or

somewhat agree with the first nine items.

All 10 of the specific confidence items correlated positively with each other and with general confidence in the FDA. Not surprisingly, the four items assessing the FDA protecting the vaccine process from outside influence were the most highly correlated ( $r = .73$  to  $.81$  for FD1, FD2, FD3, FD4 in Figure 4). A parallel analysis of the items conducted in a separate exploratory factor analysis suggests that these items are measuring a single construct that when combined led to an extremely consistent scale ( $\alpha = .93$ ).



# COVID-19 Misinformation & Vaccine Perceptions

## Perceptions of Vaccine Safety and Efficacy

Vaccines are one of the great success stories of public health. Vaccination has eliminated or nearly eliminated some diseases (e.g., smallpox and polio). For others, such as COVID-19, it has significantly decreased the number of people experiencing severe illness, hospitalization, and death because of infection.<sup>4</sup>

<sup>4</sup>CDC. 2024. “Benefits of Getting Vaccinated.” *COVID-19*. July 8, 2024.

Unfortunately, recent years have seen declines in Americans’ perceptions that a variety of vaccines are safe and effective (see Figure 5). Although most respondents still report these vaccines as safe (65-81%) and effective (61-83%), respondents surveyed showed significant declines in perceptions of safety for MMR and COVID-19 vaccines, and in perceptions of efficacy for MMR, seasonal flu, and pneumonia vaccines.

**COVID-19 Vaccine Perceived as Less Safe & Effective than Other Vaccines:** Our respondents consider MMR and seasonal flu vaccines, which have existed for decades, safer and more effective (75-83%) than the more recent COVID-19 vaccines (65-66%). Evidence from the CDC suggests that COVID-19 vaccines are actually more effective than flu vaccines.<sup>5</sup> There has also been an increase in perceptions that the COVID-19 vaccines are very or somewhat unsafe (from 18% to 24%). This contradicts the CDC’s message that taking a COVID-19 vaccine is the best defense against the disease. The CDC continually monitors post-licensure safety studies after a vaccine is approved to ensure that its benefits outweigh its risks, even after approval.<sup>6</sup>

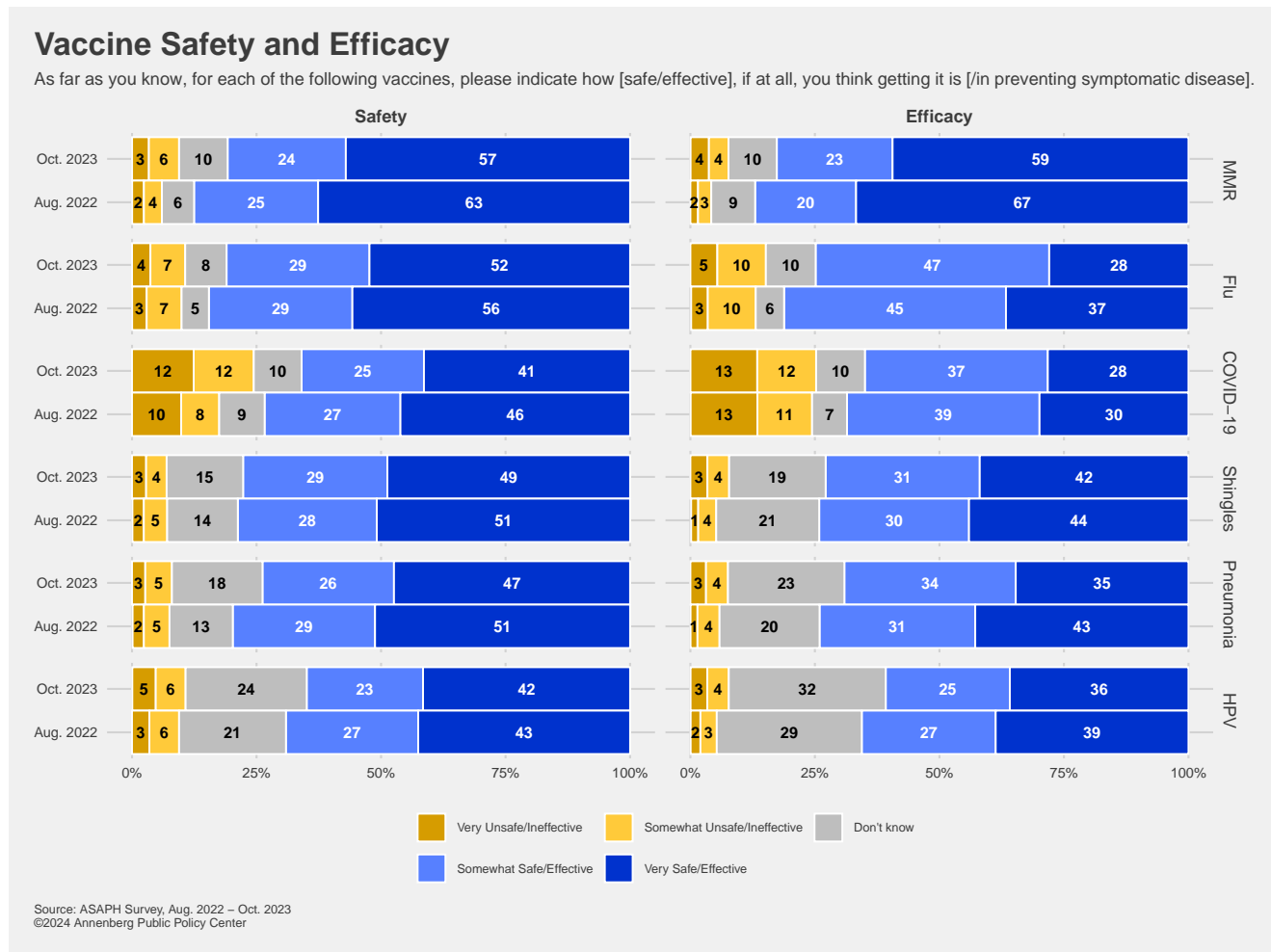
<sup>5</sup>See CDC. 2024. “CDC Seasonal Flu Vaccine Effectiveness Studies.” *Influenza (Flu)*. February 29, 2024; CDC. 2024. “COVID-19 Vaccine Effectiveness.” *COVID-19*. July 12, 2024.

<sup>6</sup>CDC. 2024. “Safety Information by Vaccine.” *Vaccine Safety*. February 12, 2024.

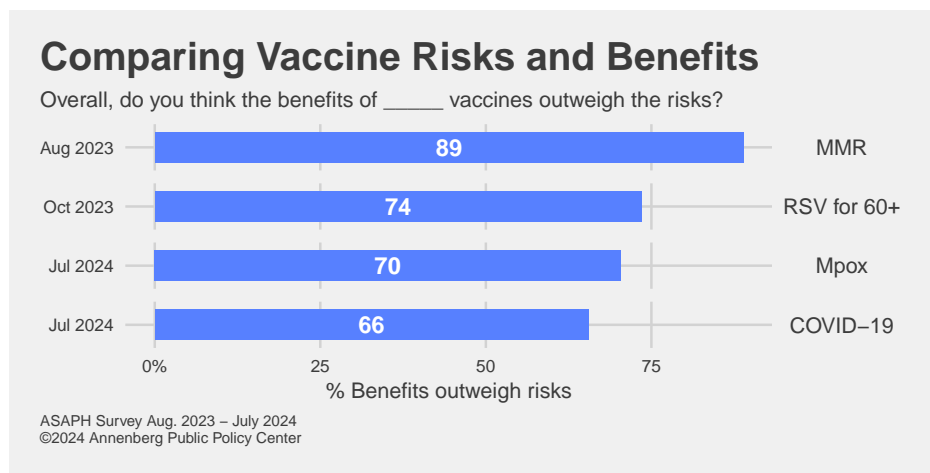
**Unsure about Vaccines for Sub-Groups:** Respondents were significantly more likely to say they were “unsure” about the effectiveness of vaccines aimed at particular populations. For example, 32% were unsure about the effectiveness of the HPV vaccine aimed at young adults, and roughly one in five were unsure about vaccines for diseases primarily affecting older people (pneumonia=23%, shingles=19%). Even more people were unsure about the efficacy of getting vaccinated with recent RSV vaccines during pregnancy (47%) or when one is over 60 years old (37%).

**Comparison Across Vaccines:** Looking holistically at the benefit and risk perceptions our respondents held of different vaccines, we see the same ordering of MMR and COVID-19. In the multiple waves in which we have assessed perceptions of these vaccines, perceptions did not change significantly. In August 2023, the vast majority of participants (89%) reported that the benefits of the MMR vaccine outweigh the risks, while significantly fewer, just two-thirds, feel similarly about COVID-19 vaccines (see Figure 6).

**Figure 5: Beliefs about Vaccine Safety and Efficacy**



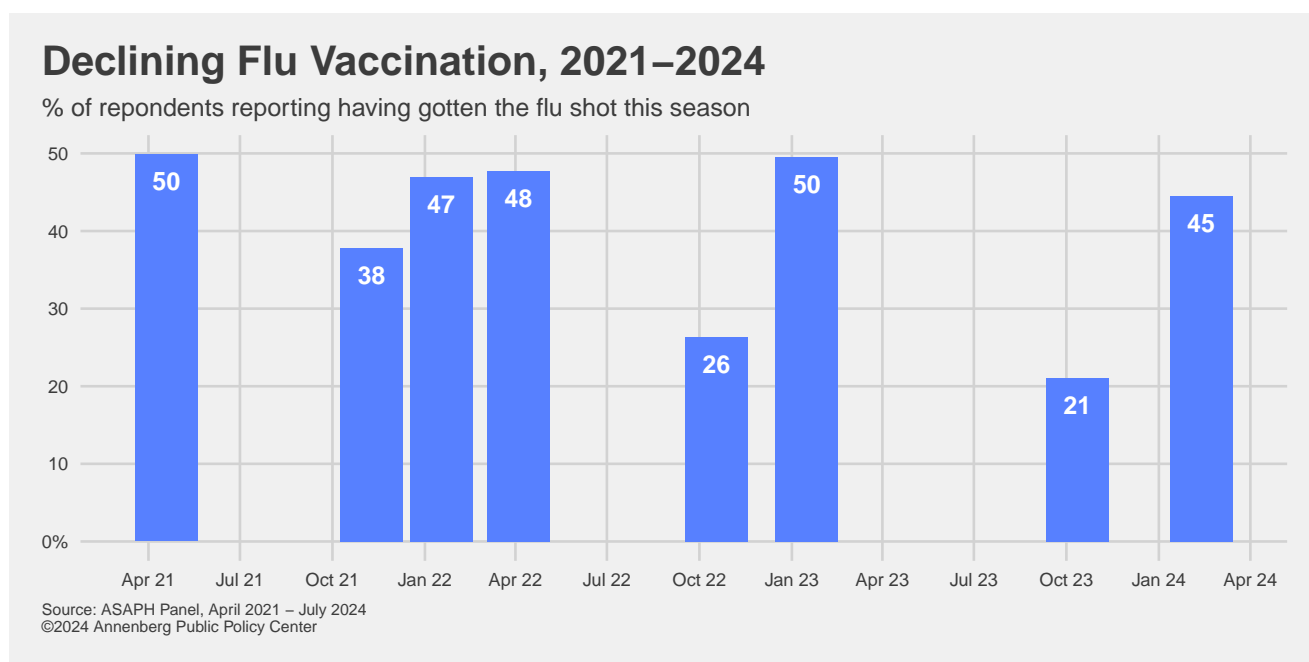
**Figure 6: Comparing Vaccine Risks and Benefits**



## Decreasing Intentions to Vaccinate

**Seasonal Flu:** Across survey waves, fewer say they’ve had their seasonal flu shot. In the U.S., flu season occurs in the fall and winter peaking between December and February. The CDC recommends getting vaccinated in September and October, therefore, flu vaccination rates vary by month. Comparing fall vaccination rates, just 21% in mid-October 2023 said they had received the flu shot this season, compared with 26% in mid-October 2022 and 38% in the second week of November 2021 (Figure 7). Similarly comparing rates at the end of the flu vaccination season, 45% reported they got their flu shot this season in mid-February 2024, compared with 50% in January 2023.

**Figure 7: Declining Flu Vaccination, 2021-2024**



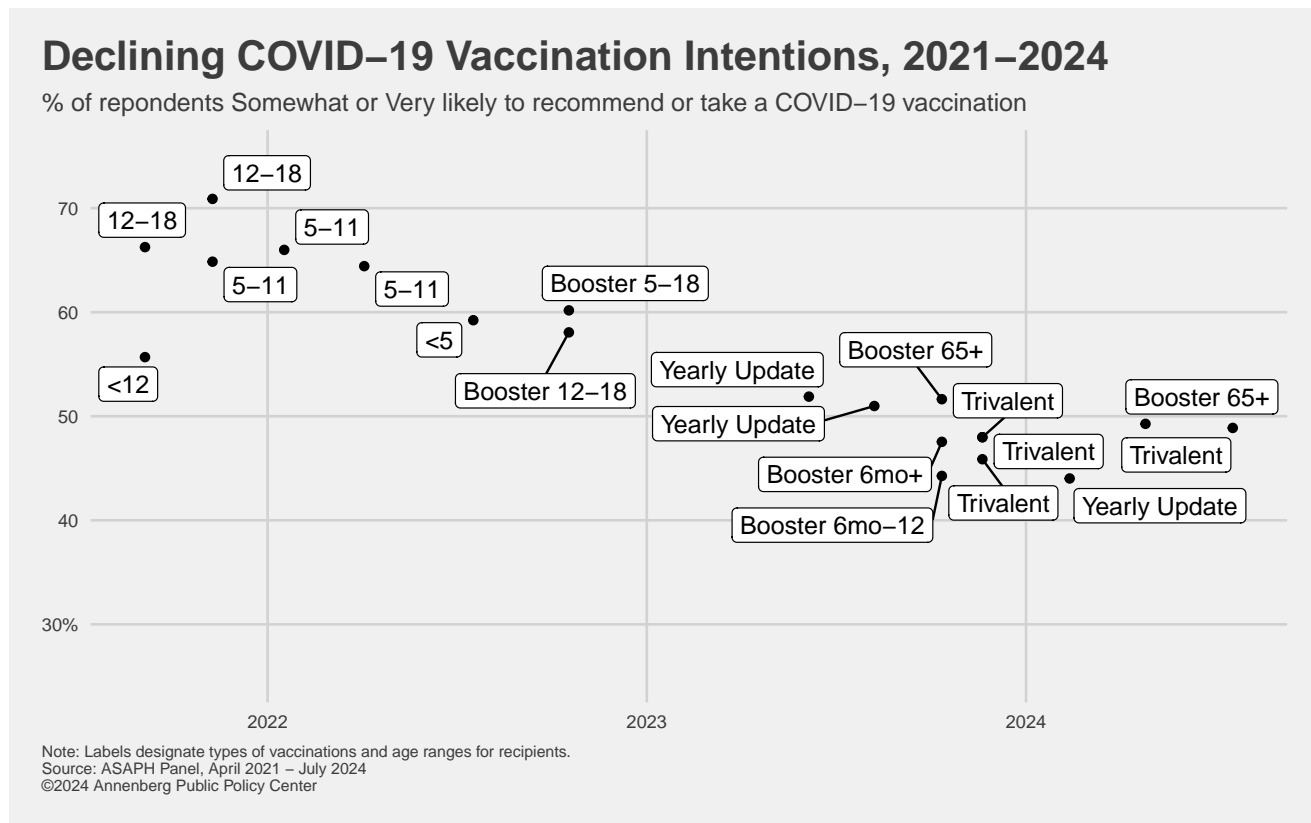
**RSV:** Knowledge about RSV is generally up, though not enthusiasm for the vaccine. Two vaccines against RSV for adults 60 and older were approved in May 2023 by the FDA and in June 2023, the CDC recommended that such older adults “may receive a single dose of RSV vaccine” upon consultation with their health care provider.<sup>7</sup> There was mixed reception for the RSV preventives:

- The vaccine for older adults: Over half of those surveyed (55%) say they would be likely to recommend that a friend or family member age 60 or older talk with their health care provider about whether to get the RSV vaccine, a statistically significant decline from 61% in August 2023. In February 2024, 51% would take the vaccine if they were 60 or older and their health care provider recommended it.

<sup>7</sup> CDC. 2024. “Clinical Overview of RSV.” *Respiratory Syncytial Virus Infection (RSV)*. July 3, 2024.

**COVID-19:** The ASAPH panel has reported on their likelihood of taking the COVID-19 vaccine or recommending it to others. From early 2022 to July 2024 we see an overall decline in the likelihood of taking or recommending it (see Figure 8).

**Figure 8: Declining COVID-19 Vaccination Intentions, 2021-2024**



### Likelihood of Taking A Combination Vaccines

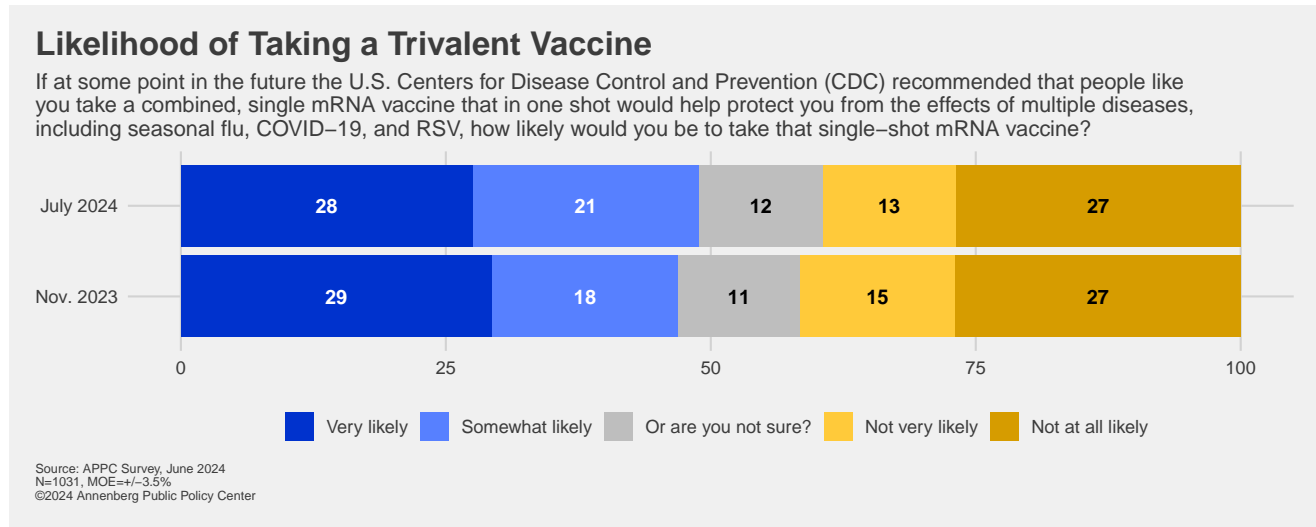
Given the lower perceptions of benefits for the relatively newer COVID-19 vaccine and the declining likelihood of taking or recommending it, it is not surprising that 27% of participants report that they are “not at all likely” to take a single-shot trivalent mRNA vaccine that would protect against flu, COVID-19, and RSV (Figure 9). Still, in July 2024, nearly half reported they were “somewhat” or “very likely” to take such a trivalent vaccine.

CDC tracks adult vaccination trends over time. By the end of June 2024, 48% of adults were vaccinated against the 2023-24 seasonal flu, while just 22% were vaccinated against COVID-19 in 2023-24.<sup>8</sup> Transitioning the people who typically get their seasonal flu vaccine to a trivalent vaccine could increase COVID-19 vaccination rates dramatically. The risk is that this vaccine substitution might backfire and reduce the number of people who get vacci-

<sup>8</sup> CDC. 2024. “Vaccination Trends—Adults.” August 3, 2024.

nated overall if those who have taken the flu vaccine in the past are unwilling to be vaccinated against other diseases in a single vaccine.

**Figure 9: Likelihood of Taking a Trivalent Vaccine**



## COVID-19 Vaccine Misinformation

The ASAPH surveys have tracked the amount of endorsement of five COVID-19 vaccine misinformation beliefs for nearly three years (April 2021 to July 2024). The majority of respondents still endorse the science-consistent response (55%-65%). However, across all but one item, endorsing the science-inconsistent response has increased over time (triangles in Figure 10), suggesting that COVID-19 vaccine misinformation remains a concern.

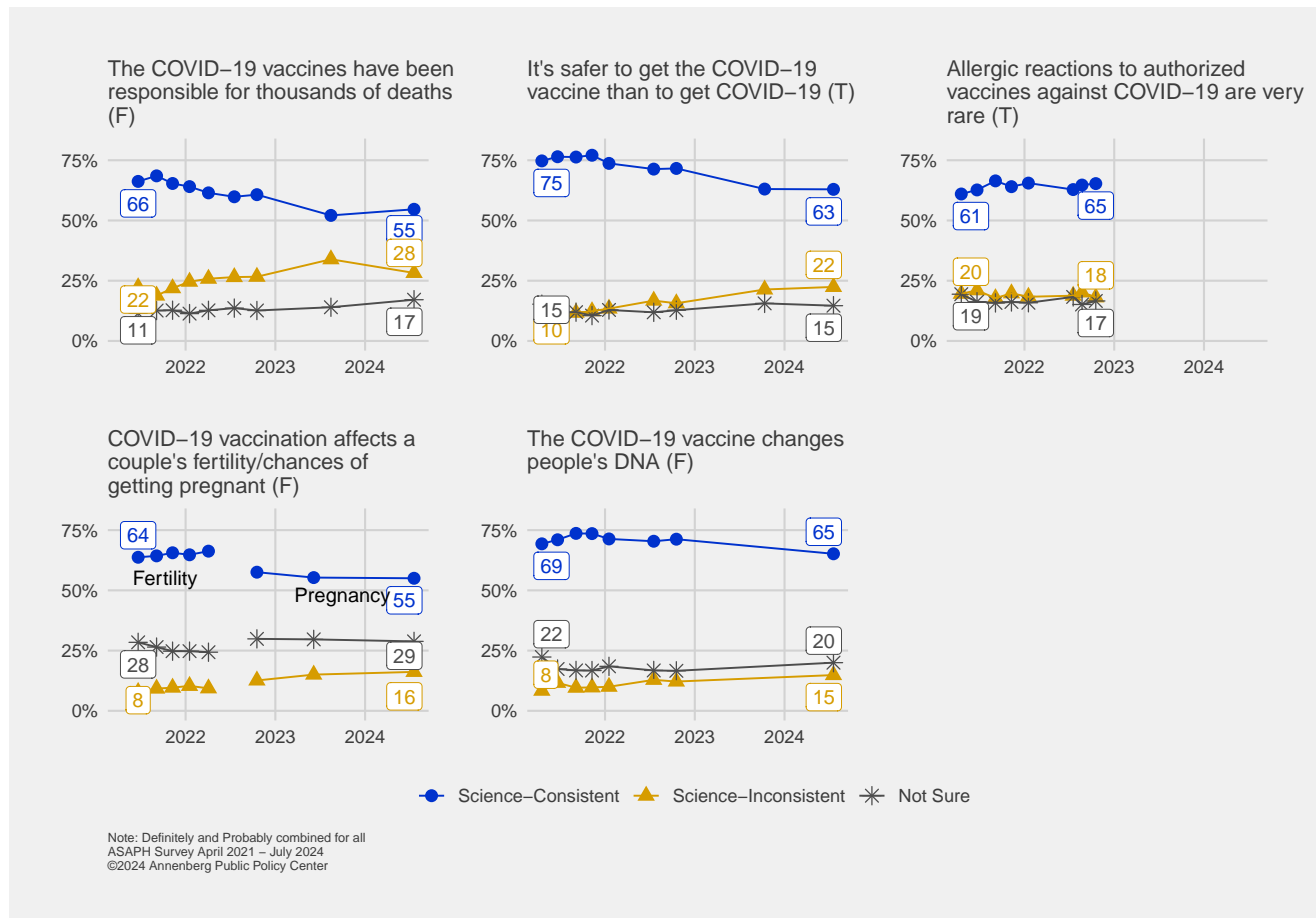
The misinformed belief that COVID-19 *vaccinations* have been responsible for thousands of deaths in the U.S. increased from 22% in June 2021 to 28% in July 2024. Similarly, the false belief that it is safer to get a COVID-19 *infection* than to get the COVID-19 vaccine increased from 10% in April 2021 to 22% in July 2024. Inaccurately believing that COVID-19 vaccination affects a couple’s chances of getting pregnant increased from 13% in October 2022 to 16% in July 2024. Finally, mistakenly believing that getting the COVID-19 vaccine changes people’s DNA increased from 8% in April 2021 to 15% in July 2024.

In contrast, believing that allergic reactions are *not* very rare was stable at 18% as of July 2024, and encouragingly there was a significant increase in endorsing the science-consistent response that they *are* very rare (from 61% to 65%).

The only significant increase in people reporting they were “not sure” about certain misinformation beliefs was for whether COVID-19 vaccinations have been responsible for thousands of deaths (11-17%).



**Figure 10: COVID-19 Misinformation**



## Vaccination During Pregnancy

**Knowledge of CDC recommended vaccines:** From June 2023 to April 2024, respondents increased their understanding of which vaccinations the CDC recommends during pregnancy (Figure 11). In the most recent assessment, many knew the CDC recommended receiving the seasonal flu (50%), COVID-19 (43%), and the combination tetanus, diphtheria, and acellular pertussis/whooping cough (Tdap, 35%) vaccines. Numbers were roughly comparable for which vaccines the CDC does *not* recommend getting while pregnant (chose either none of these or said not that specific vaccine): measles (39%) or chickenpox (43%).<sup>9</sup>

<sup>9</sup> CDC. 2024. "Vaccines During Pregnancy FAQs." *Vaccine Safety*. August 3, 2024.

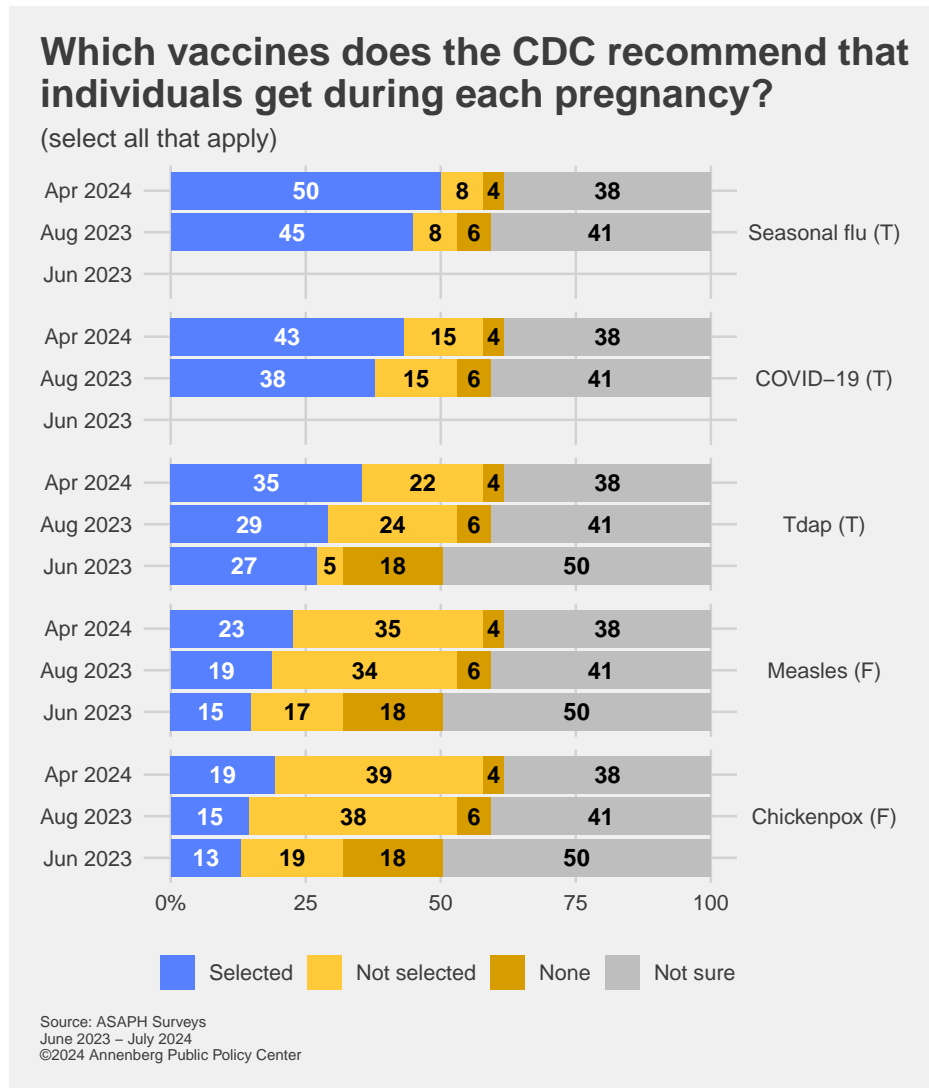
Both the Tdap vaccine and the seasonal flu shot are inactivated vaccines and are recommended by the CDC during each pregnancy. In October 2023:

- Only 1 in 4 people (24%) know that a pregnant person who gets the flu is at higher risk

of delivering the baby early. Nearly half of those surveyed (45%) are not sure.

- Only half of those surveyed (51%) know it is true that a flu shot protects pregnant people and their babies from serious health problems both during and after pregnancy.

**Figure 11: CDC Vaccine Recommendations During Pregnancy**

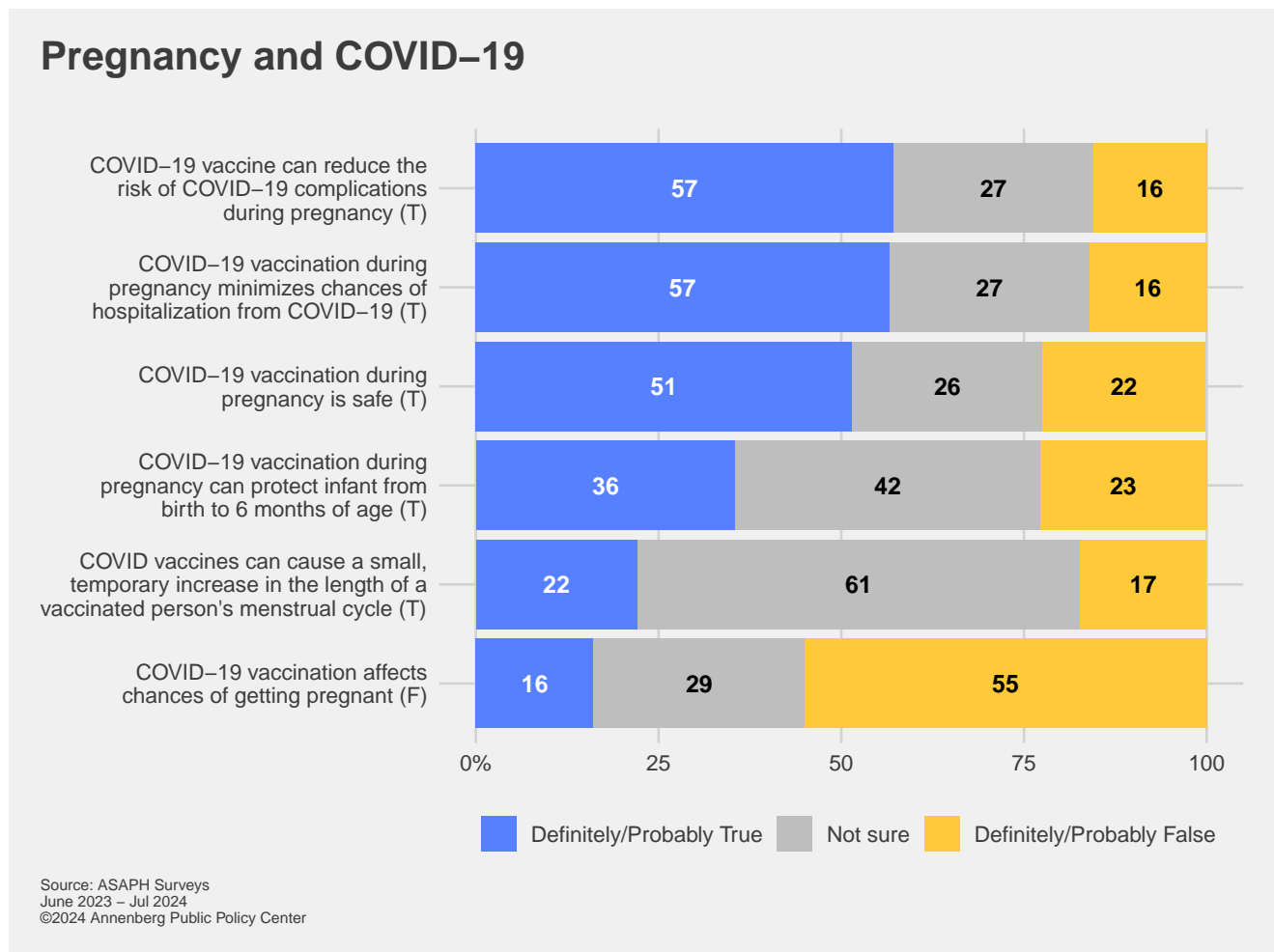


**Pregnancy and COVID-19:** The CDC says that pregnant people “are more likely to get severely ill with COVID-19 compared with non-pregnant people.” The CDC also says pregnant people “can receive a COVID-19 vaccine” and that getting the vaccine during pregnancy can prevent an individual from getting severely ill from COVID-19.<sup>10</sup> The most recent survey waves found that large numbers of people are uncertain or do not know the benefits of COVID vaccination during pregnancy:

<sup>10</sup>CDC. 2024. “COVID-19 Vaccination for People Who Are Pregnant or Breastfeeding.” COVID-19. July 2, 2024.

- In April 2024, just over half (57%) knew that getting a COVID-19 vaccine can reduce the risk of COVID-19 complications that can affect a pregnancy and 57% also knew that COVID-19 vaccination during pregnancy is effective at minimizing the chances of hospitalization with COVID-19 (see Figure 12).
- In June 2023, just over half of those surveyed (51%) knew that COVID-19 vaccination during pregnancy is safe. And just 1 in 3 people knew (36%) that getting a COVID-19 vaccine during pregnancy can protect an infant from birth to six months of age from COVID-related hospital stays. An even smaller percentage (22%) knew that COVID-19 vaccines can cause “a small, temporary increase in the length of a vaccinated person’s menstrual cycle,” while 17% incorrectly say it is false, most people (61%) are unsure.
- In July 2024, most people (55%) knew that COVID-19 vaccination does not affect a couple’s chances of getting pregnant.

Figure 12: Pregnancy and COVID-19



**Pregnancy and RSV:** In August 2023, the FDA approved, and the CDC later recommended, an RSV vaccine for pregnant individuals to be given during weeks 32 to 36 of pregnancy to protect babies born during RSV season. During the summer of 2023, the FDA and CDC also signed off on a monoclonal antibody injection – which is not a vaccine – to be administered to newborns to protect against RSV. <sup>11</sup>

<sup>11</sup> CDC. 2024. “[Respiratory Syncytial Virus \(RSV\) Immunizations.](#)” *Vaccines and Preventable Diseases*. July 3, 2024.

- The vaccine during pregnancy: People are split on whether to recommend the RSV vaccine to a pregnant friend or family member. Told in February 2024 that the CDC recommended this new vaccine against RSV for pregnant individuals to protect their infants, 39% would not recommend it (a significant decline from 45% in October 2023) and 43% would.
- The monoclonal antibody injection for infants: In October 2023, 42% say they would be likely to recommend the monoclonal antibody injection for an infant and 35% would not, no significant change since August 2023. A greater proportion (31%) would recommend a pregnant friend or family member get the RSV vaccine while pregnant than the 14% who would instead recommend an injection for an infant.

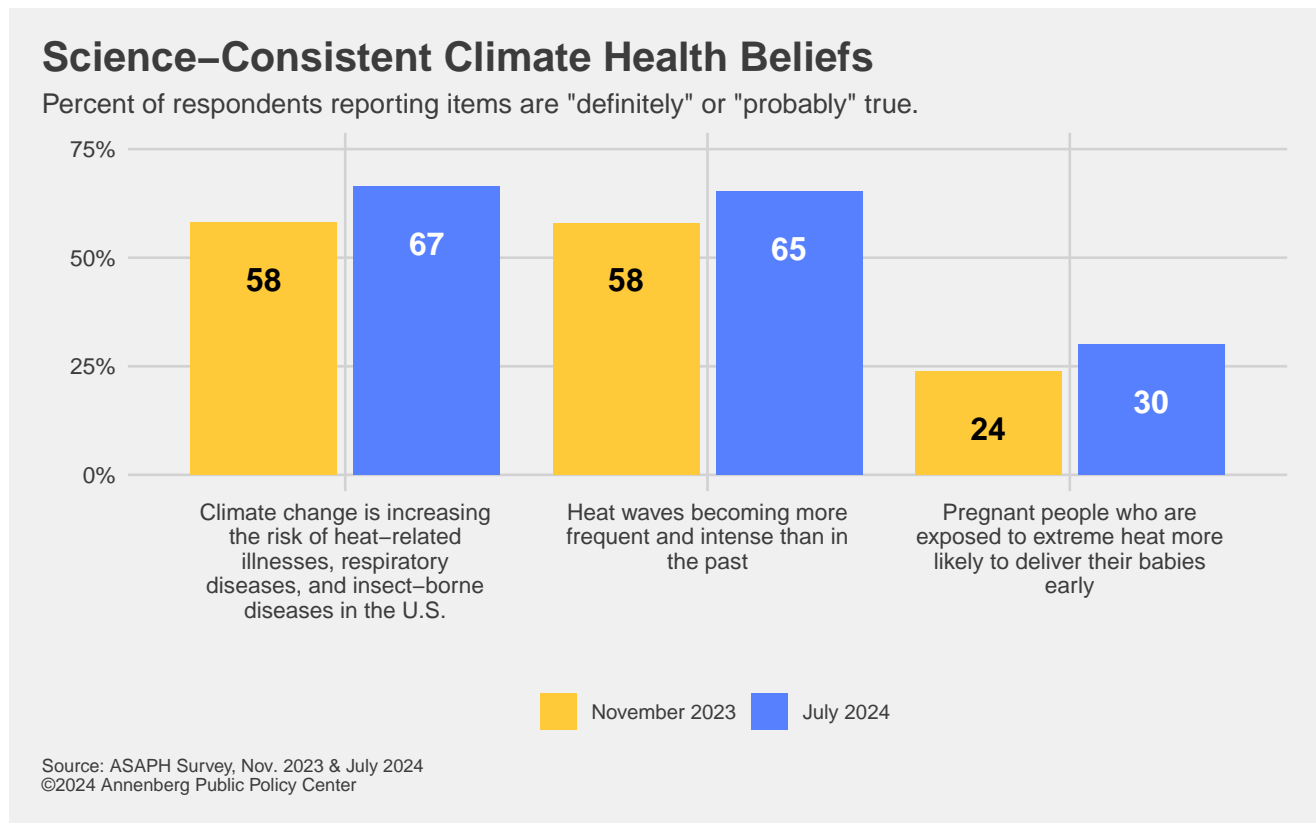
# Climate Health Knowledge & Misinformation

Climate change poses an unprecedented risk to public health. In September 2021, the editors of *The Lancet*, *The New England Journal of Medicine*, *The British Medical Journal*, and many other health journals declared that “[t]he greatest threat to global public health is the continued failure of world leaders to keep the global temperature rise below 1.5°C and to restore nature. Urgent, society-wide changes must be made and will lead to a fairer and healthier world.”<sup>12</sup> This urgency underlies the importance in understanding the factors that might affect public understanding of the symptoms of heat-related illness and appropriate responses to it and support for responsive policies and behaviors needed to mitigate and address climate change.

<sup>12</sup> Atwoli, Lukoye, Abdullah H. Baqui, Thomas Benfield, Raffaella Bosurgi, Fiona Godlee, Stephen Hancocks, Richard Horton, et al. 2021. “Call for emergency action to limit global temperature increases, restore biodiversity, and protect health.” *NEJM* 385: 1134-1137.

## Increasing Science-Consistent Climate Beliefs

Figure 13: Science-Consistent Climate Health Beliefs



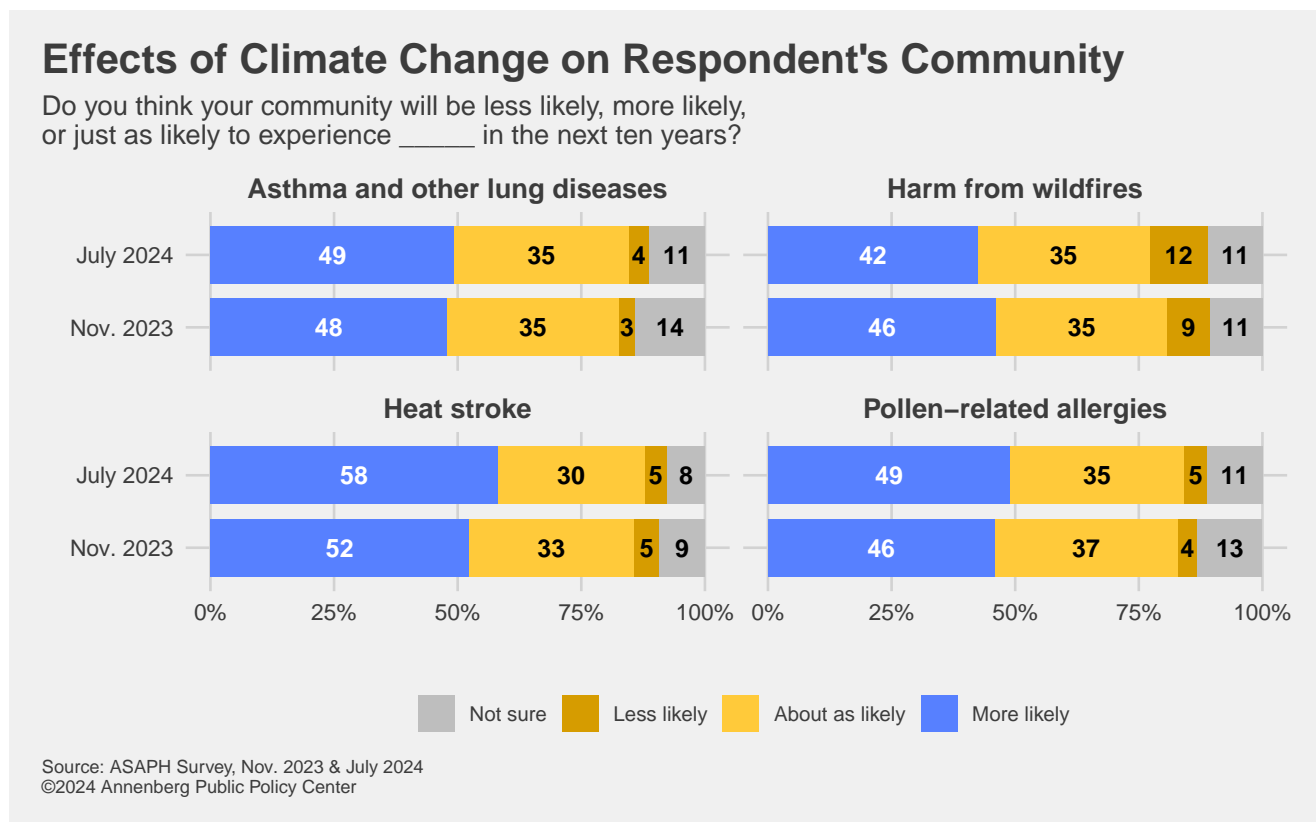


Between November 2023 and July 2024, respondents generally provided more science-consistent responses to items addressing beliefs about climate change. As shown in Figure 13, respondents were significantly more likely to report that climate change was increasing the risk of illness in the U.S., that heat waves are becoming more frequent and intense, and that pregnant people exposed to extreme heat are more likely to deliver their baby prematurely.

When it came to how climate change would affect their own community, changes were more muted. Respondents were more likely to think that the incidence of heat stroke would become more common in their community but were somewhat more likely to think that harm from wildfires, including from smoke inhalation, would be less likely in ten years. There was no change in perceptions of asthma or pollen-related allergies. All four health conditions in Figure 14 are expected to become more common as a result of climate change.<sup>13</sup>

<sup>13</sup>The U.S. Centers for Disease Control and Prevention (CDC). 2024. "Effects of Climate Change on Health." *Climate and Health*: Feb. 29, 2024.

**Figure 14: Effects of Climate Change on Respondent’s Community**



## Experiencing Extreme Weather

Our results suggest that extreme weather has affected the daily lives of millions of Americans over the past year. In November 2023:

- **Temperature:** Over 4 in 10 (45%) say temperatures in their local area were warmer than usual last summer.

Figure 15 shows that as of July 2024:

- **Heat:** Two-thirds (77%) say extreme outdoor heat either sometimes (34%), often (22%), or frequently (21%) affected their typical daily activities. This is significantly more than reported similarly in November 2023. This should come as no surprise as over 30 cities across the country experience record heat.<sup>14</sup>
- **Smoke:** Only 30% say poor air quality resulting from wildfire smoke either sometimes (24%), often (5%), or frequently (2%) affected their typical daily activities. This is down from a total of 50% in November 2023 following the Canadian forest fires in June that affected most of the eastern U.S.<sup>15</sup>
- **Flooding:** 23% say flooding produced by unusual levels of rain either sometimes (18%), often (4%), or frequently (1%) affected their typical daily activities.
- **Tornadoes/Hurricanes:** 18% said a tornado or hurricane either sometimes (13%), often (3%), or frequently (1%) affected their typical daily activities.
  - While experience with both flooding and tornadoes or hurricanes is down slightly from November 2023, hurricane season peaks between August and October,<sup>16</sup> and the National Oceanic and Atmospheric Administration (NOAA) predicts an “above-normal” 2024 season.<sup>17</sup>

<sup>14</sup>Erdman, Jonathan. 2024. “Summer is Half Over, And on A Record-Hot Pace in Over 30 Cities in East, West.” *The Weather Channel*: July 18, 2024.

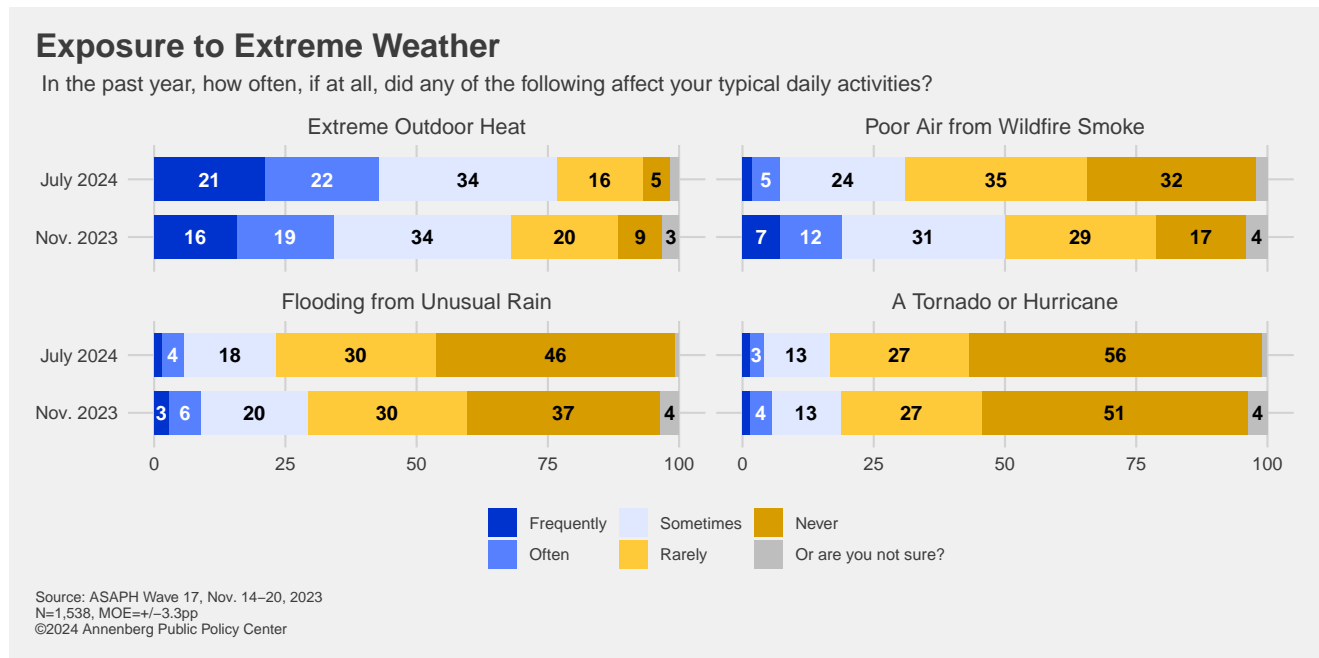
<sup>15</sup>Chow, Denise, Evan Bush, and Elizabeth Chuck. 2023. “Air quality levels in parts of the U.S. plunge as Canada wildfire raves.” *NBC News*: June 5, 2023.

<sup>16</sup>Dolce, Chris, and Jonathan Erdman. 2024. “Hurricane Season Peak Time Begins in August.” *The Weather Channel*: August 2, 2024.

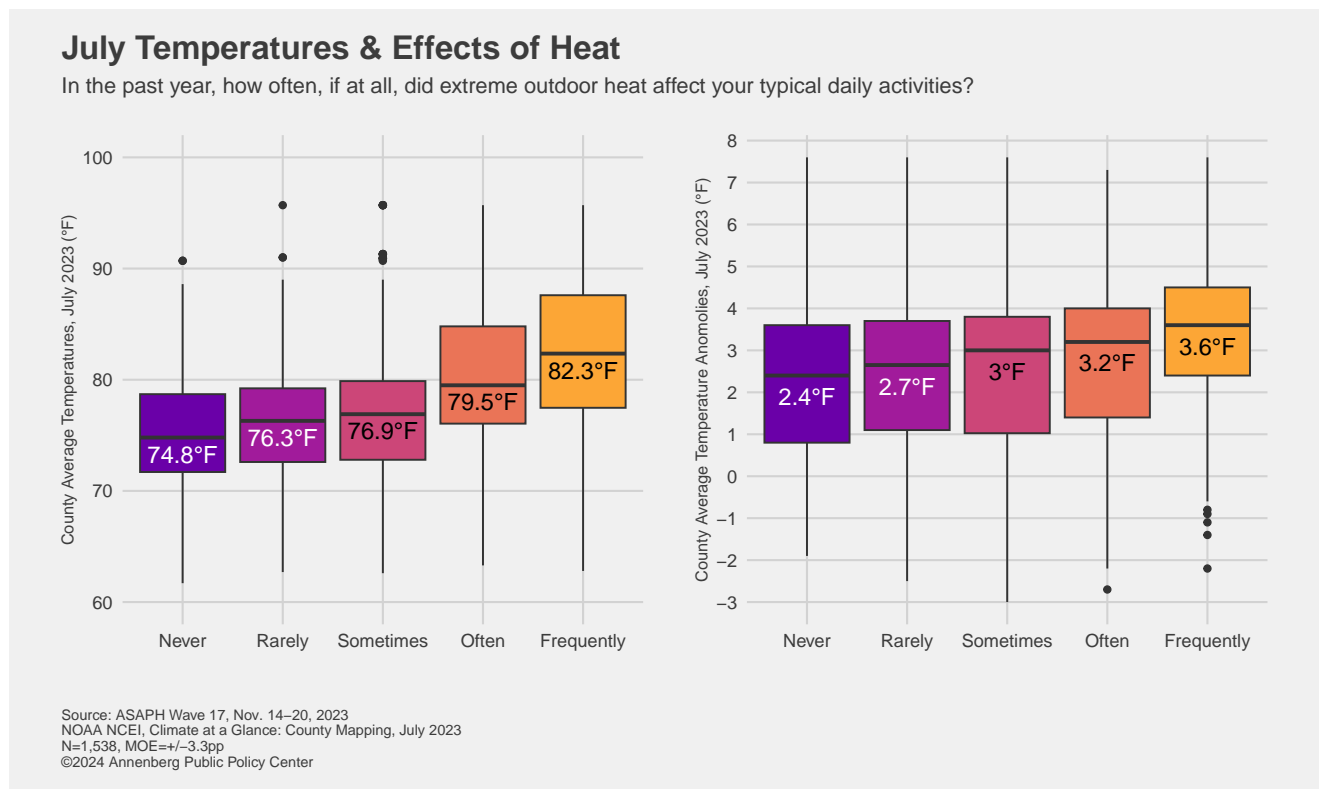
<sup>17</sup>NOAA. 2024. “NOAA predicts above-normal 2024 Atlantic hurricane season.” May 23, 2024.

Not only are those in hotter areas more likely to report that extreme outdoor heat had affected their typical daily activities but so, too, are those who are living in areas who are experiencing more anomalous weather. Both panels of Figure 16 show a positive association between the absolute average high July temperature in a respondent’s home county and reporting being affected by extreme heat (panel 1) and how anomalously hot their July temperatures were that year compared to the 1901-2000 July average.

**Figure 15: Exposure to Extreme Weather**



**Figure 16: July Temperatures and the Effects of Heat**



# Measles

Measles is highly contagious and can cause serious health complications,<sup>18</sup> especially in children under 5 years old. The measles, mumps, and rubella (MMR) vaccine used in the U.S. provides long-lasting protection against all strains of measles for those who have received both recommended doses. Until 2020, nationwide vaccination rates had been near 95% for a decade. But the CDC reports that among U.S. kindergarten students in the 2022-23 school year, only 93% had received both MMR doses.<sup>19</sup>

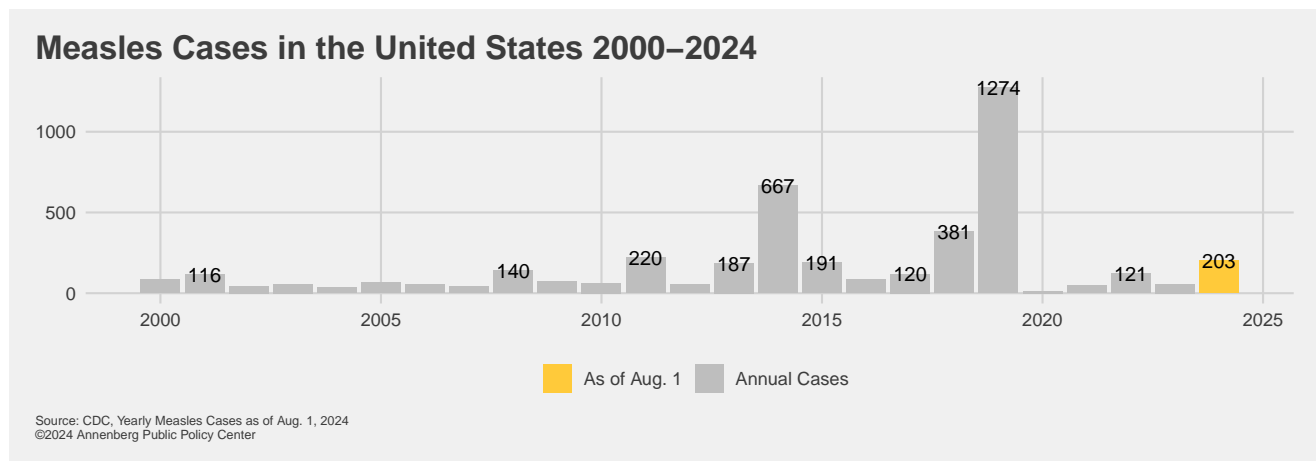
<sup>18</sup> CDC. 2024. “About Measles.” *Measles (Rubeola)*: May 29, 2024.

<sup>19</sup> Seither, Rane, et al. 2023. “Coverage with Selected Vaccines and Exemption from School Vaccine Requirements Among Children in Kindergarten – United States, 2022–23 School Year.” *MMWR*: 72:1217–1224.

In the 2022-23 school year, rates of parents requesting a vaccine exemption were still low but increased to 3.0% compared to 2.6% in the previous year. Nonmedical exemptions account for 100% of this national increase. Exemption rates over 5% limit the potential for community immunity, thus increasing the risk of measles outbreaks. Ten states in the 2022-23 school year reported >5% exemption rates from at least one vaccine for kindergarteners. These increases in exemptions could be attributable to actual increases in vaccine hesitancy or persistent barriers to vaccination for families whose access to routine childhood vaccination series was reduced by the COVID-19 pandemic. The Annenberg Science and Public Health (ASAPH) panel assessed public knowledge and attitudes toward MMR vaccination.

## Measles on the Rise

Figure 17: Measles Cases in the United States 2000-2024



Measles was officially eliminated from the U.S. in 2000 after over 20 years of successful population-wide vaccination efforts.<sup>20</sup> Elimination meant that measles was not endemic – continuously spread in a specified region – within the U.S. in the prior 12 months.

<sup>20</sup> CDC. 2024. “History of Measles.” *Measles (Rubeola)*: May 29, 2024.

New infections were only introduced when people got measles in another country and brought it to the U.S. However, lacking consistent, ongoing, population-wide vaccination, the U.S. had 1,274 cases of measles in 2019, the greatest number in one year since 1992.

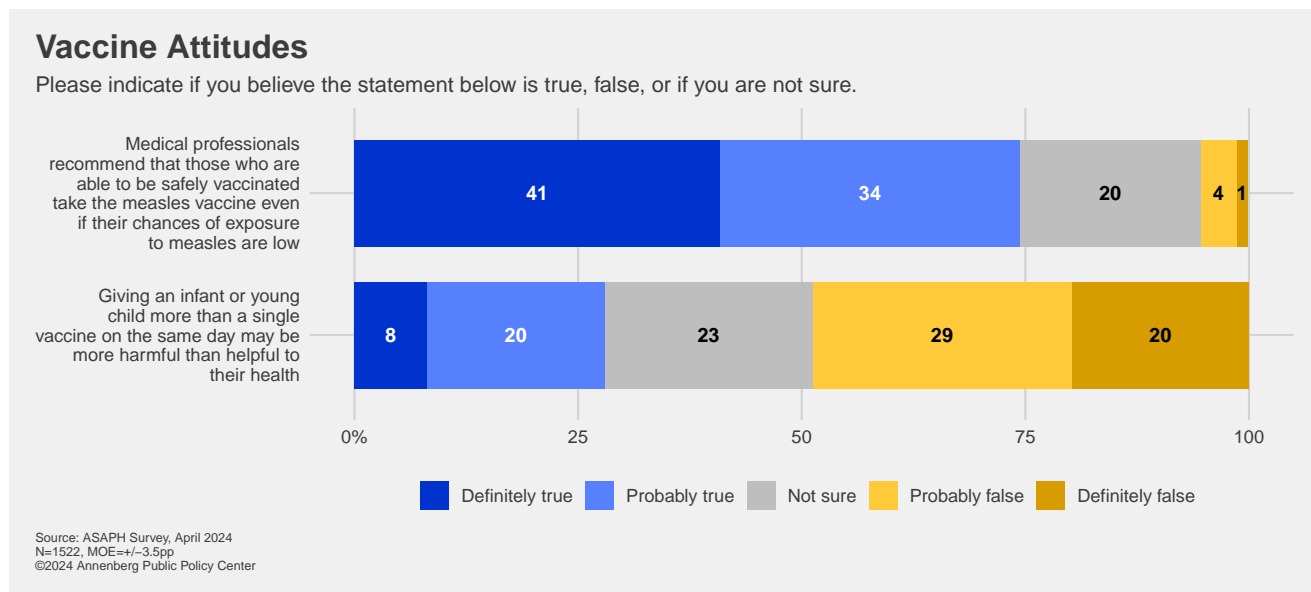
As seen in Figure 17, by July 2024, there have already been at least three times the number of cases there were in all of 2023, suggesting we are on track for another record year that could have been avoided through more complete childhood vaccination coverage.

### Confidence in Vaccination

Vaccination is the best defense we have against infectious diseases like measles, mumps, and rubella. Fortunately, the American public remains relatively confident in the vaccine for these diseases. In October 2023, respondents viewed the MMR vaccine as safer and more effective than any other surveyed vaccine (see Figure 5), with 81% reporting the MMR vaccine is either somewhat or very safe and 83% reporting it as somewhat or very effective. However, these perceptions of MMR vaccine safety and efficacy represent a significant decline from August 2022 when 88% of panelists reported that the MMR vaccine was somewhat or very safe and 87% perceived it as somewhat or very effective.

### Attitudes Toward Childhood Vaccination

Figure 18: Vaccine Attitudes



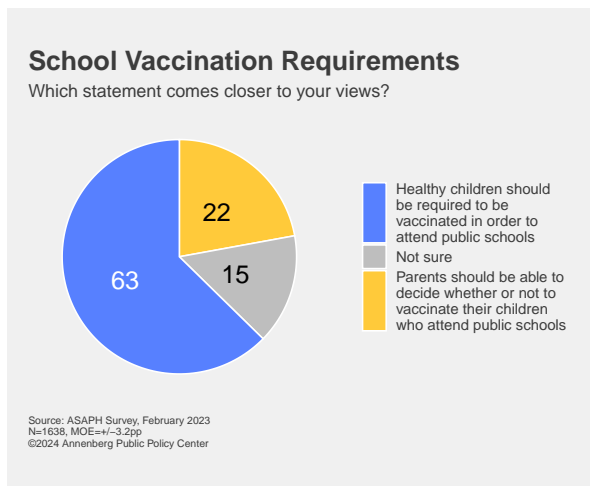
In April 2024, we again saw that a large proportion of the public knows that medical professionals recommend taking the MMR vaccine, even if your chances of exposure to measles are low (74% report it is probably or definitely true that medical professionals recommended the

MMR vaccine, see Figure 18). Still 20% were not sure, suggesting an opportunity for public health professionals to increase public knowledge.

Less than half of respondents (49%) knew that it is not more harmful than helpful to give children more than a single vaccine on the same day, and many were not sure (23%). The Advisory Committee on Immunization Practices and the American Academy of Pediatrics both recommend getting all routine childhood vaccines on time. Combining vaccines reduces the overall number of visits to the doctor and therefore, barriers to full, on-time vaccination.<sup>21</sup>

<sup>21</sup> CDC. 2024. “Multiple Vaccinations at Once.” *Vaccine Safety*: Aug. 14, 2020.

**Figure 19: Attitudes Toward School Vaccination Requirements**



School vaccination requirements are important tools for maintaining vaccination coverage across the population, and in turn, lowering rates of disease. Vaccination against measles, rubella, diphtheria, tetanus, pertussis, polio, and chickenpox is required for kindergarteners in every state (and medical exemptions are also provided in every state). Yet, as seen in Figure 19, only 63% of respondents believe healthy children should have this requirement for attendance in public schools.

## Pregnancy and Measles Risks

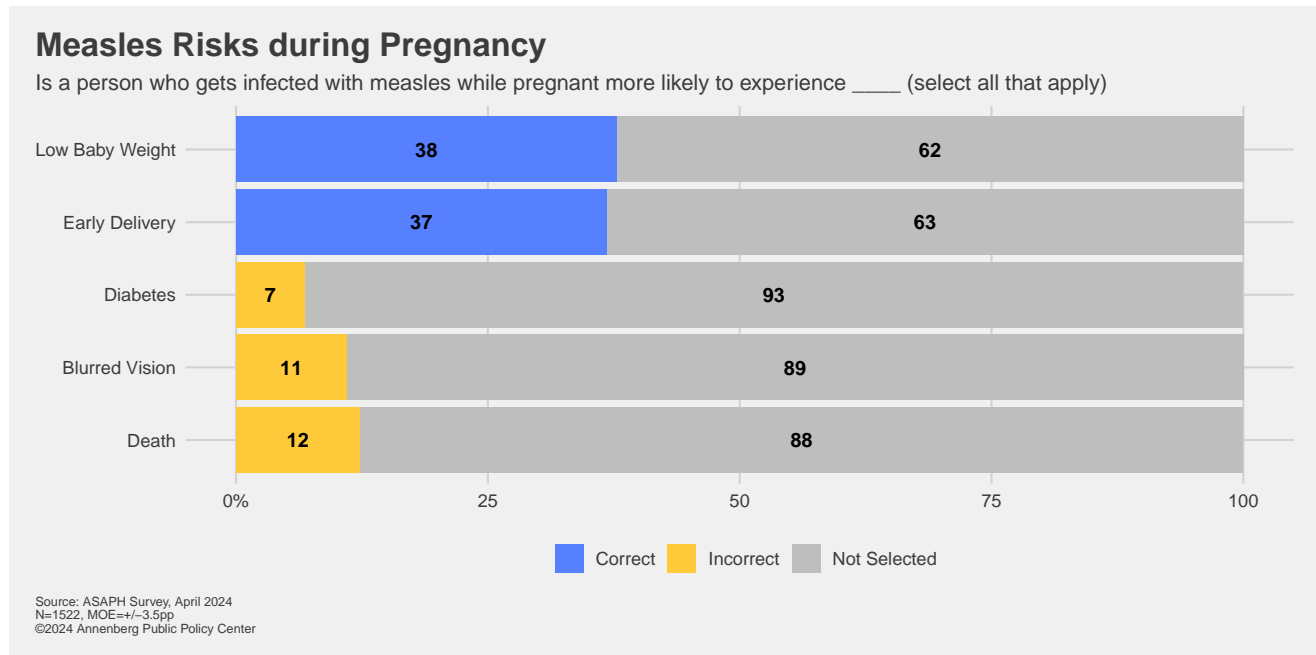
The survey asked respondents to select whether a series of possible complications were associated with having measles while pregnant. The majority of respondents (56%) were not sure about the impact of measles on any of the potential pregnancy complications. About 4 in 10 people correctly (in blue below, see Figure 20) identified two complications associated with contracting measles while pregnant—delivering a low birth weight baby (38%) and early delivery (37%). A fairly small number of people incorrectly indicated that diabetes (7%), blurred vision (11%), and death (12%) are more likely to occur if you have measles while pregnant. They are not.

Unlike some other vaccines (such as seasonal flu, RSV, and Tdap), medical professionals do not recommend the MMR vaccine for pregnant people. This is because the vaccine uses a live, weakened (i.e., attenuated) form of the virus. The CDC notes: “Even

though MMR is a safe and effective vaccine, there is a theoretical risk to the baby. This is because it is a live vaccine, meaning it contains a weakened version of the living viruses.”<sup>22</sup> Instead, the CDC recommends the MMR vaccine be given a month or more before someone becomes pregnant, if they were not already vaccinated against measles, mumps, and rubella.

<sup>22</sup>CDC. 2024. “Measles, Mumps, and Rubella (MMR) Vaccination: What Everyone Should Know.” *Vaccines and Preventable Diseases*: Jan. 26, 2021.

**Figure 20: Measles Risks during Pregnancy**



This specific vaccination knowledge is not widely known, as shown in Figure 21. Most people (57%) are not sure whether pregnant individuals should get vaccinated against measles if they have not already been vaccinated against it. Almost one-third (32%) incorrectly think that medical professionals recommend that pregnant people take the vaccine. Only 12% know that medical professionals do not recommend this vaccine for pregnant individuals. With population-level vaccination rates around 93%-95%, this is understandable. This scenario would only apply for a small fraction of the U.S. population.

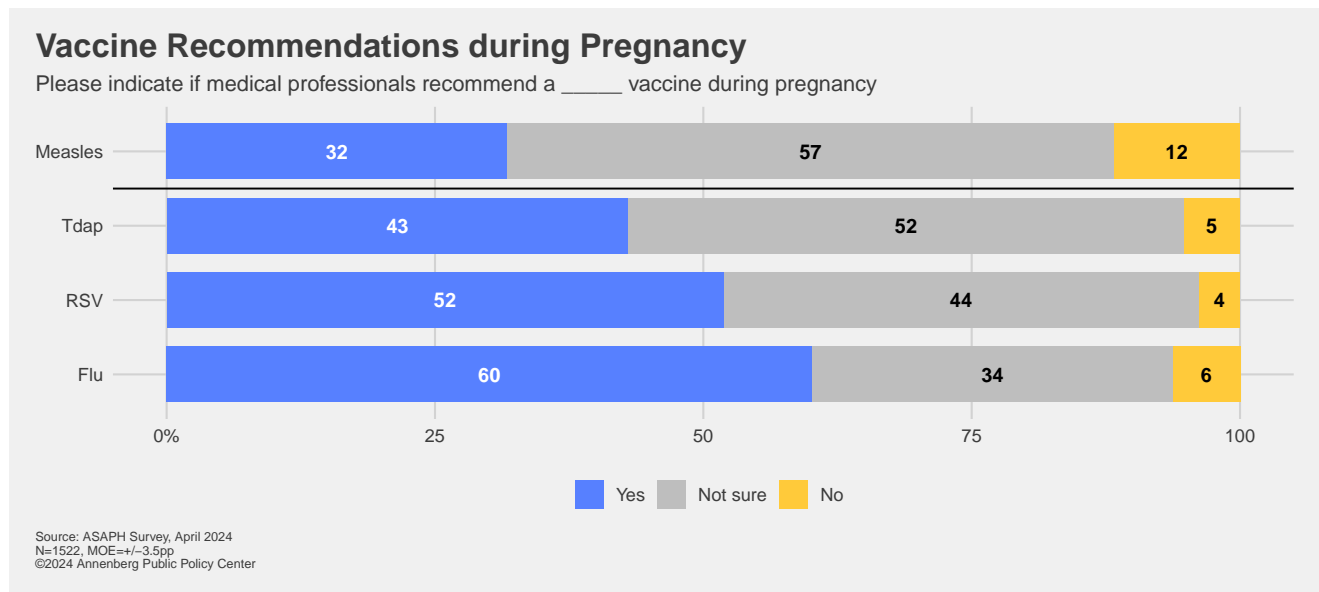
### False Belief in MMR Vaccine-Autism Link Endures

As measles cases rise across the United States and perceptions of MMR vaccine safety and efficacy fall, a quarter of U.S. adults still did not know that there is no causal evidence linking the measles vaccine to autism.<sup>23</sup> Twenty-four percent said the statement that “The CDC has said there is no evidence of a link between measles vaccine and getting autism” is somewhat or very inaccurate – and

<sup>23</sup>CDC. 2024. “Autism and Vaccines.” *Vaccine Safety*: May 14, 2024.



**Figure 21: Vaccine Recommendations during Pregnancy**



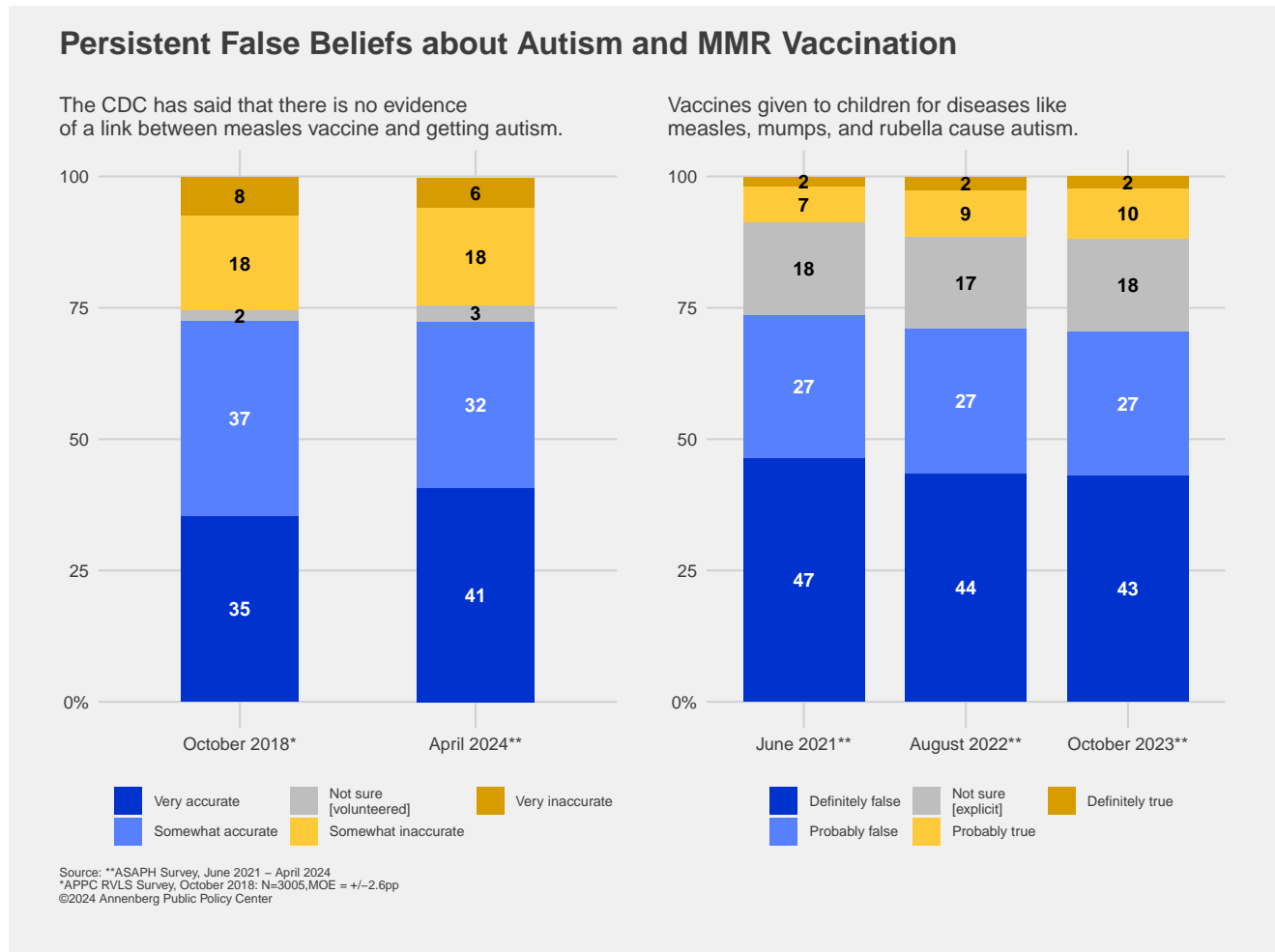
another 3% volunteered that they were not sure (see Figure 22).

The findings are consistent with those in an APPC survey fielded by NORC in October 2018, prior to the COVID-19 pandemic. Both surveys indicate that a sizable and consistent number of Americans either believed the false connection or did not know what is correct. The false link was asserted by Andrew Wakefield in a 1998 *Lancet* paper that was subsequently retracted.<sup>24</sup>

<sup>24</sup>Motta, Matthew, and Dominik Stecula. 2021. "Quantifying the effect of Wakefield et al.(1998) on skepticism about MMR vaccine safety in the US." *PLoS one* 16.8: e0256395.

The findings are also consistent with ASAPH survey waves in 2021-2023 which did not mention the CDC’s guidance. In these surveys, 9% to 12% thought it was probably or definitely true that vaccines given to children for diseases like measles, mumps, and rubella cause autism, while 17% to 18% were not sure whether that is true or false (when explicitly offered a “not sure” option). With such a large proportion unsure, health care and public health workers have an opportunity to help educate the public about the safety of the MMR and other vaccines, which could improve vaccination rates and decrease the risk of future outbreaks.

**Figure 22: Persistent False Beliefs about Autism and MMR Vaccination**



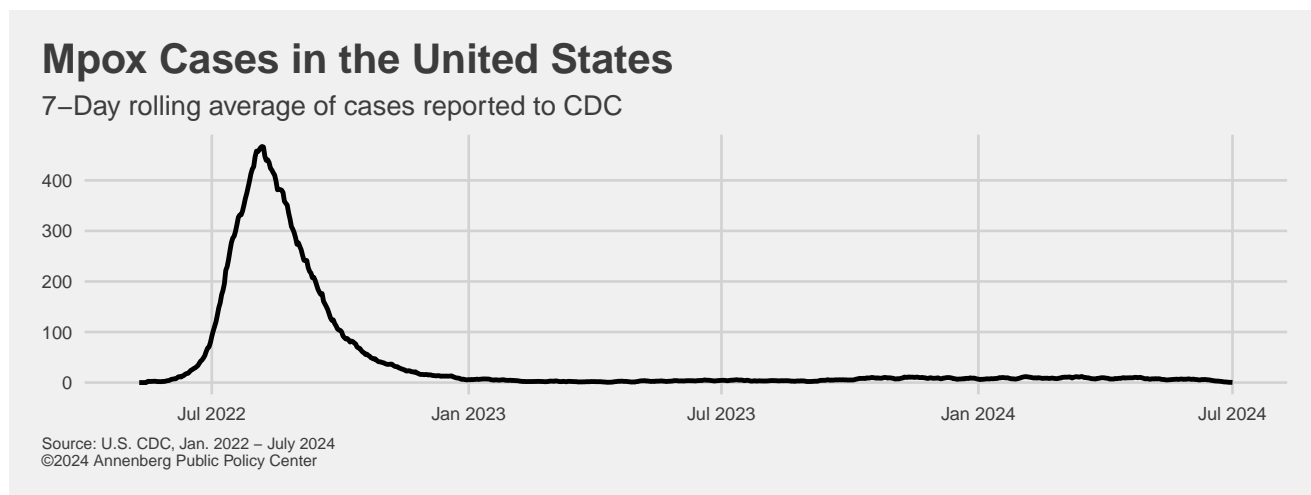
# Mpox

As the salience of mpox (formerly monkeypox) has receded following the 2022 global outbreak, so, too, has the public’s knowledge concerning this public health issue. These results highlight the importance of continued public health interventions from public health institutions and media who provide the public this critical information.

## Declining Salience

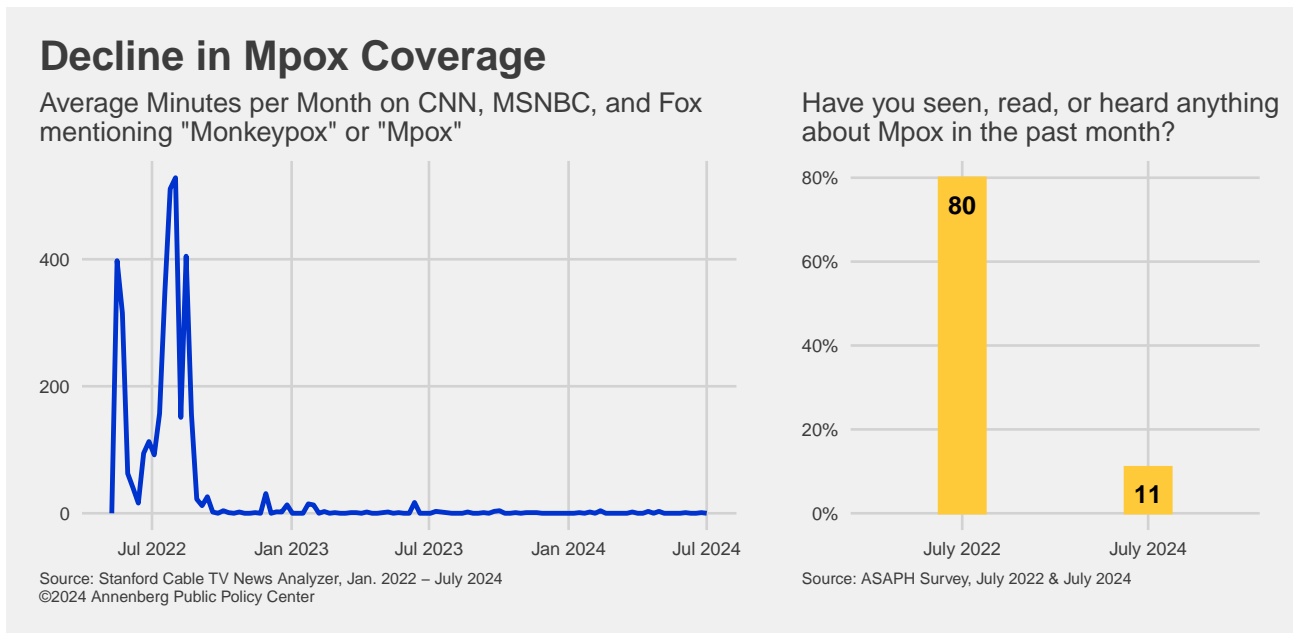
Following a peak in cases occurring in early August 2022, cases of mpox in the United States have dropped dramatically. Figure 23 shows the trends over the past three years. News coverage, as shown in Figure 24, followed a similar pattern. In the summer of 2022, CNN, Fox News, and MSNBC dedicated hundreds of minutes per month to discussing mpox but devoted little if any airtime to the topic in the following summers. It should come as little surprise that while 80% of our respondents reported seeing, reading, or hearing something about mpox in the past month in July 2022, only 11% reported as much in July 2024 (See Figure 24). In sum, mpox has receded from public view.

**Figure 23: Mpox Cases in the United States**

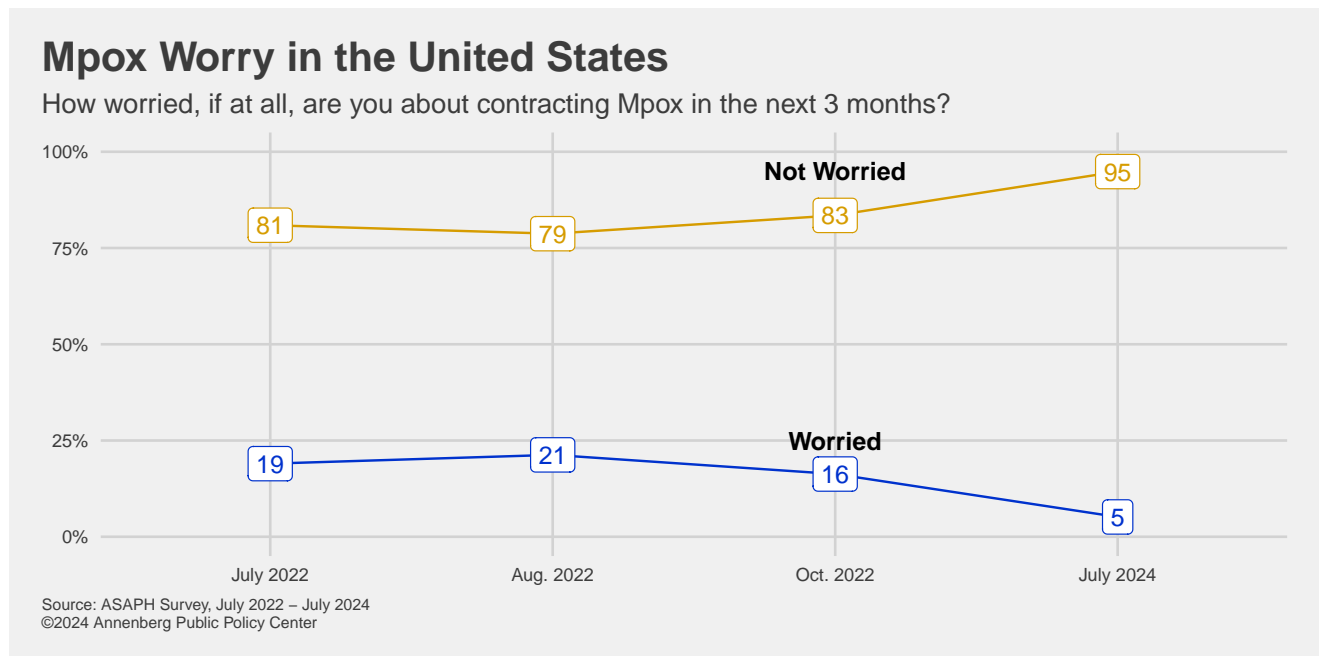


The public is also significantly less worried about contracting mpox. With the disease out of the public’s mind, only one in twenty respondents (5%) reported being somewhat or very worried about contracting mpox in the next 3 months. And in July 2024, only 9% were worried about either them or someone in their family contracting it (see Figure 25). Very few people report first-hand experience with mpox, with only 2% reporting knowing someone personally who contracted mpox.

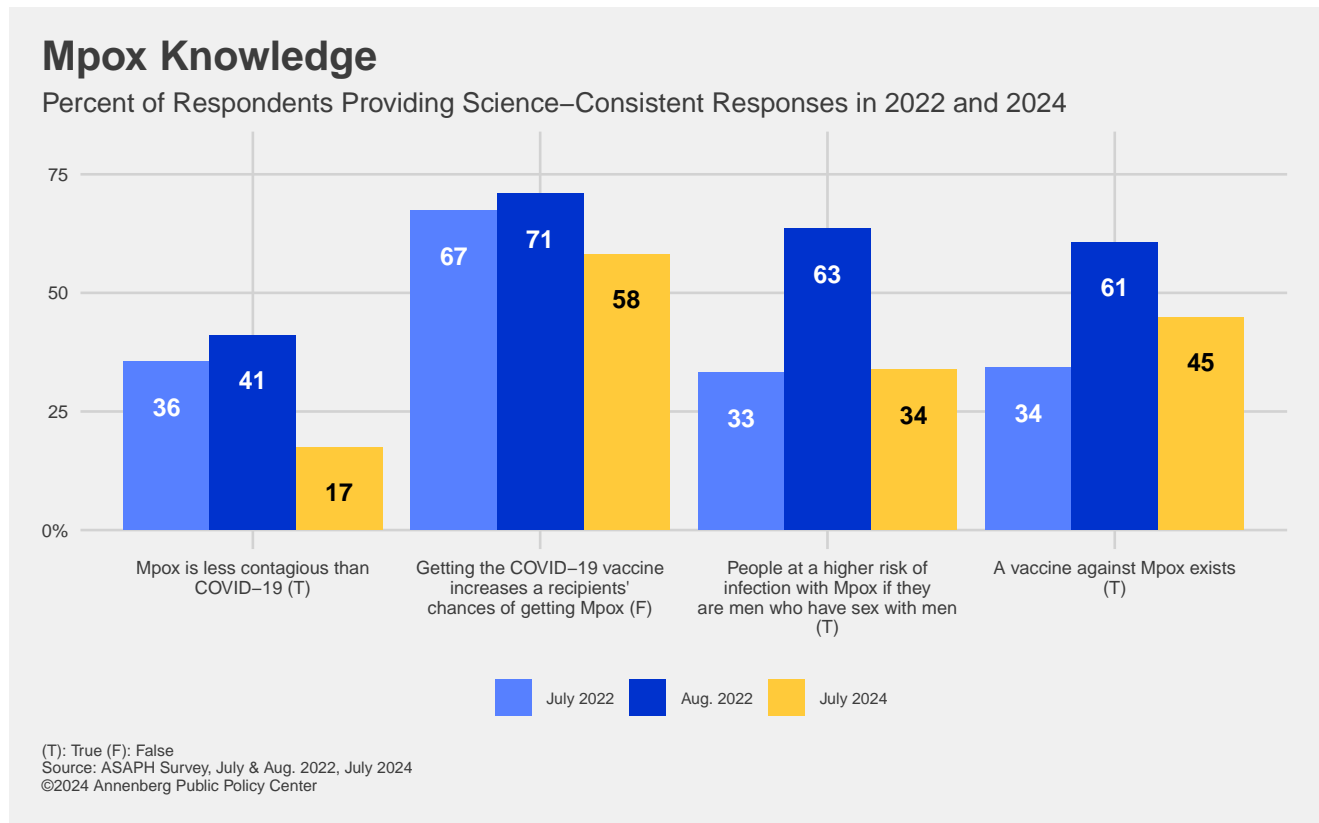
**Figure 24: Decline in Mpox Coverage**



**Figure 25: Decline in Worry about Mpox**



**Figure 26: Decline in Mpox Knowledge**



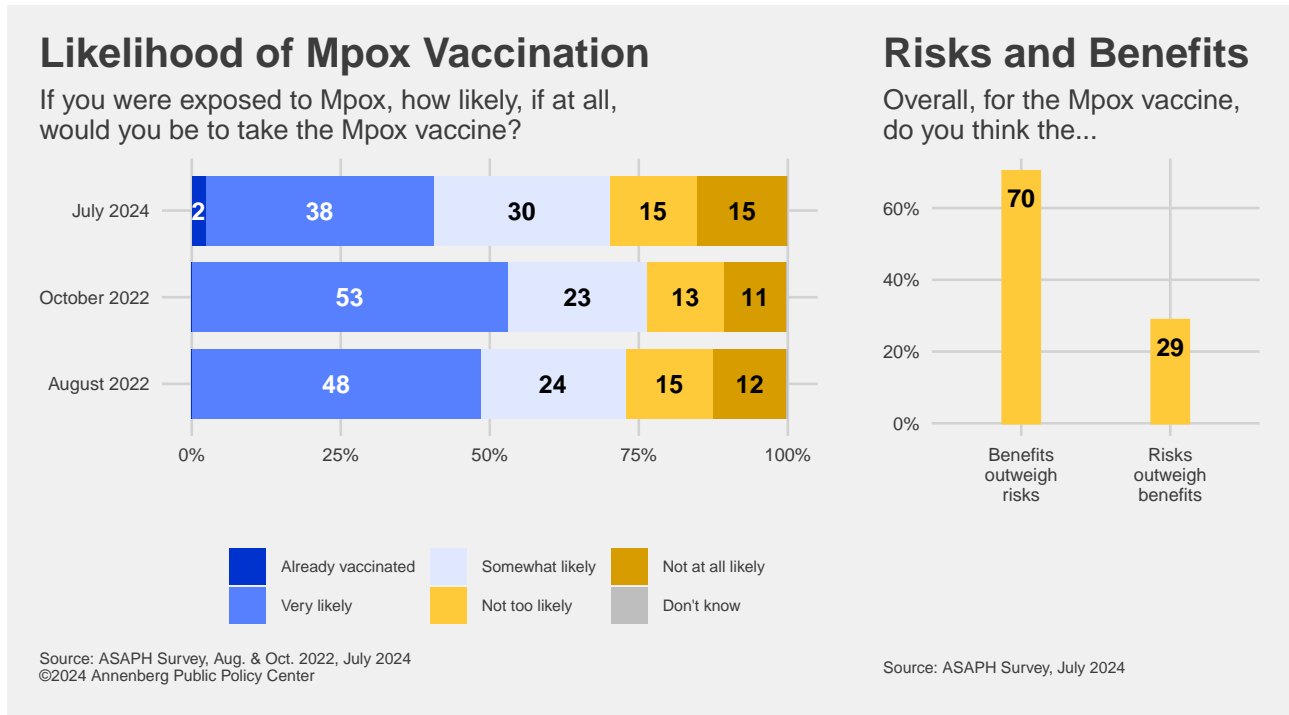
## Decline in Knowledge

As mpox has receded both in terms of the number of cases in the United States and its salience to the public, so, too, has science-consistent knowledge about the disease. Over the course of the 2022 outbreak between July and August 2022, our respondents became more likely to know that mpox is less contagious than COVID-19, that getting a COVID-19 vaccine does not increase a recipient’s likelihood of getting mpox, that men who have sex with men are at higher risk of mpox infection, and that a vaccine against mpox exists. These gains in knowledge over 2022, however, largely disappeared over the ensuing two years (see Figure 26). In fact, on the two items concerning COVID-19 respondents hold less science-consistent beliefs than at the beginning of the 2022 outbreak.

## Likelihood of Vaccination

While knowledge concerning mpox has declined significantly, the decline in science-consistent health intentions is less pronounced. Where 76% reported in October 2022 that they were very likely or somewhat likely to receive an mpox vaccine if they were exposed, 70% either feel similarly or have already been vaccinated against mpox. A comparable 70% also report

**Figure 27: Mpox Vaccination Attitudes**



that the benefits of mpox vaccination outweigh the risks of vaccination. The largest shift is between those who were very likely and now only report being somewhat likely to vaccinate.

### A Worrisome Reminder

In the immediate aftermath of the 2022 global mpox outbreak, many in the public learned important public health knowledge to help prevent and treat the disease. With new outbreaks recently declared in Kenya and the Central African Republic,<sup>25</sup> now is the time for public health officials to remind the public of the risks, symptoms, and means of treatment.<sup>26</sup>

<sup>25</sup> Asadu, Chinedu. 2024. "Mpox outbreaks declared in Kenya and Central African Republic. The race is on to contain the spread." *AP News*: July 31, 2024.

<sup>26</sup> Edwards, Erika. 2024. "CDC, WHO mull stronger Mpox warnings." *NBC News*: Aug. 5, 2024.

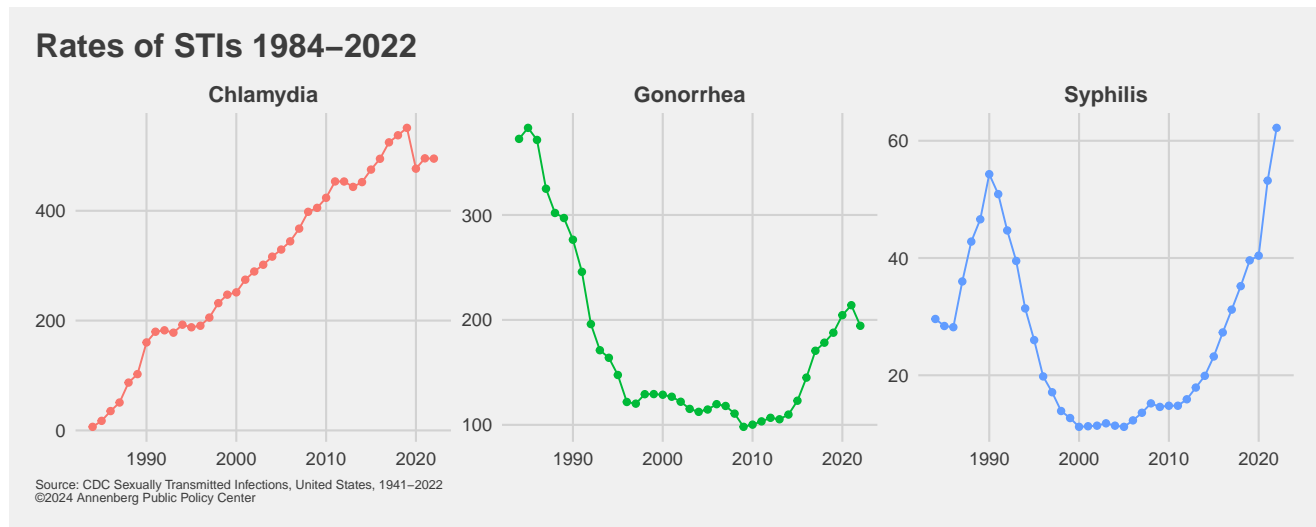
# Sexually Transmitted Infections

## STIs on the Rise

Sexually transmitted infections (STIs) are on the rise across the United States. In January, the CDC reported that syphilis cases had risen 80% over the five years from 2018 to 2022, totaling more than 200,000 in 2022, the last year for which data are available. As shown in Figure 28, cases of chlamydia, gonorrhea, and syphilis are all on the rise, as well.

Given this rise, it is not surprising that 47% of respondents reported either having personally been diagnosed or knowing someone who had been diagnosed with an STI. In fact, nearly one in three (32%) knew multiple people who had been diagnosed with an STI compared to only 42% who knew no one (with 11% not sure, see Figure 29).

**Figure 28: Rates of Select Sexually Transmitted Infections, 1984-2022**



## Treatment and Prevention

Despite the rise in STIs and personal experience with STI diagnoses, just over half of our respondents (54%) know that a case of syphilis can be permanently cured and most either mistakenly think there is a vaccine to prevent it (16%) or are unsure (45%, see Figure 30). While these results find that many are familiar with some ways they can protect themselves from syphilis, many lack familiarity with its symptoms and signs.

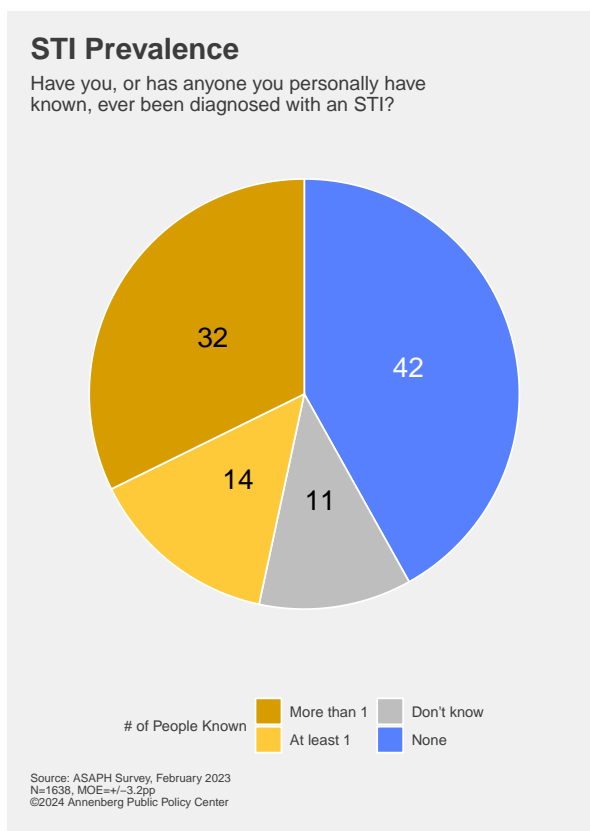
The public is not sure whether some of the STI infections can be permanently cured or whether a vaccine exists to prevent them. Over half know that gonorrhea (65%), chlamydia (63%), and syphilis (54%) can be cured, but only 29% know that the same is true of mpox. But:



- 91% are not sure whether Zika can be cured or think it can be (it can't be cured)
- 65% are not sure whether HPV can be cured or think it can be (it can't be cured)
- 42% are not sure whether genital herpes can be cured or think it can be (it can't be cured)
- And only 26% are not sure whether HIV can be cured or think it can be (it can't be cured)<sup>27</sup>

<sup>27</sup> While many adults can achieve an undetectable viral load of HIV, there have only been seven documented cases of curing HIV through stem cell transplantation. While a cure is medically possible, it is not available to most with HIV. Mallapaty, Smriti. 2024. "Seventh patient 'cured' of HIV: why scientists are excited." *Nature*: July 26, 2024.

**Figure 29: STI Prevalence**



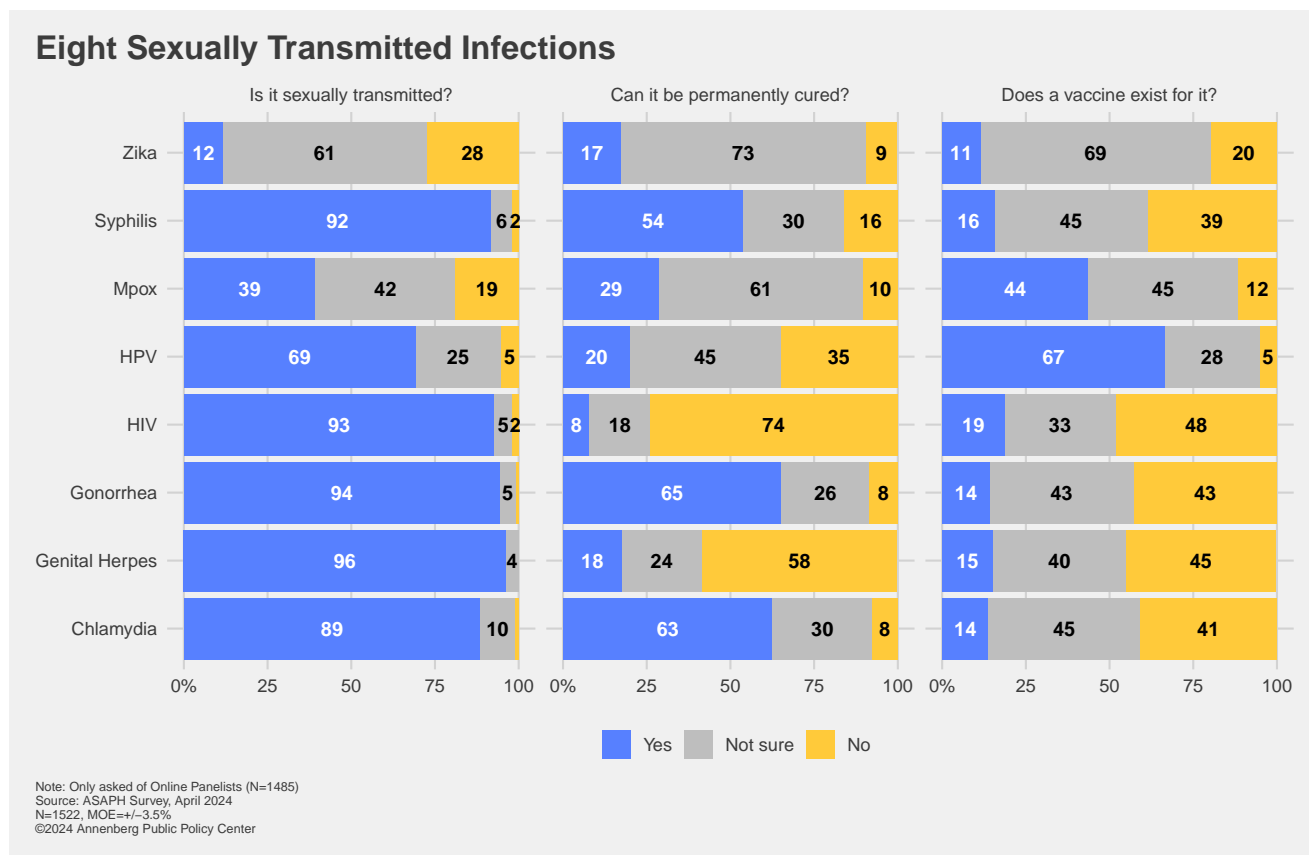
Large majorities of the public recognize six out of eight infections considered in the survey as sexually transmitted infections, including syphilis, HPV, HIV, gonorrhea, genital herpes, and chlamydia. Only 39% recognized mpox as sexually transmitted. Although mpox cases have declined since the 2022 outbreak, low-level transmission continues. Health officials urged continuing vigilance, especially among men who have sex with men (see § Mpox). Similarly, only 12% see Zika as an STI. While Zika is primarily transmitted by mosquitos, it can be transmitted to partners during sexual activity.

When asked whether a vaccine exists to prevent these infections, only for HPV is a majority of the public (67%) aware that there is one, while 44% know there is a vaccine for mpox. For these other infections, there is no vaccine and most of the public is either not sure or incorrect about whether that is the case:

- Zika: 80% do not know there's no vaccine
- Syphilis: 61% do not know there's no vaccine
- HIV: 52% do not know there's no vaccine
- Gonorrhea: 57% do not know there's no vaccine
- Genital herpes: 55% do not know there's no vaccine
- Chlamydia: 59% do not know there's no vaccine <sup>28</sup>

<sup>28</sup> However, clinical trials are ongoing for vaccines for a number of sexually transmitted infections. E.g. Syal, Akshay. 2024. "Chlamydia vaccine shows promise in early trial." *NBC News*: April 11, 2024. And See "The Way Forward: The World Needs Vaccines to Protect Against STIs." *STIWatch.org*. Aug. 12, 2024.

**Figure 30: Knowledge about Eight Sexually Transmitted Infections**

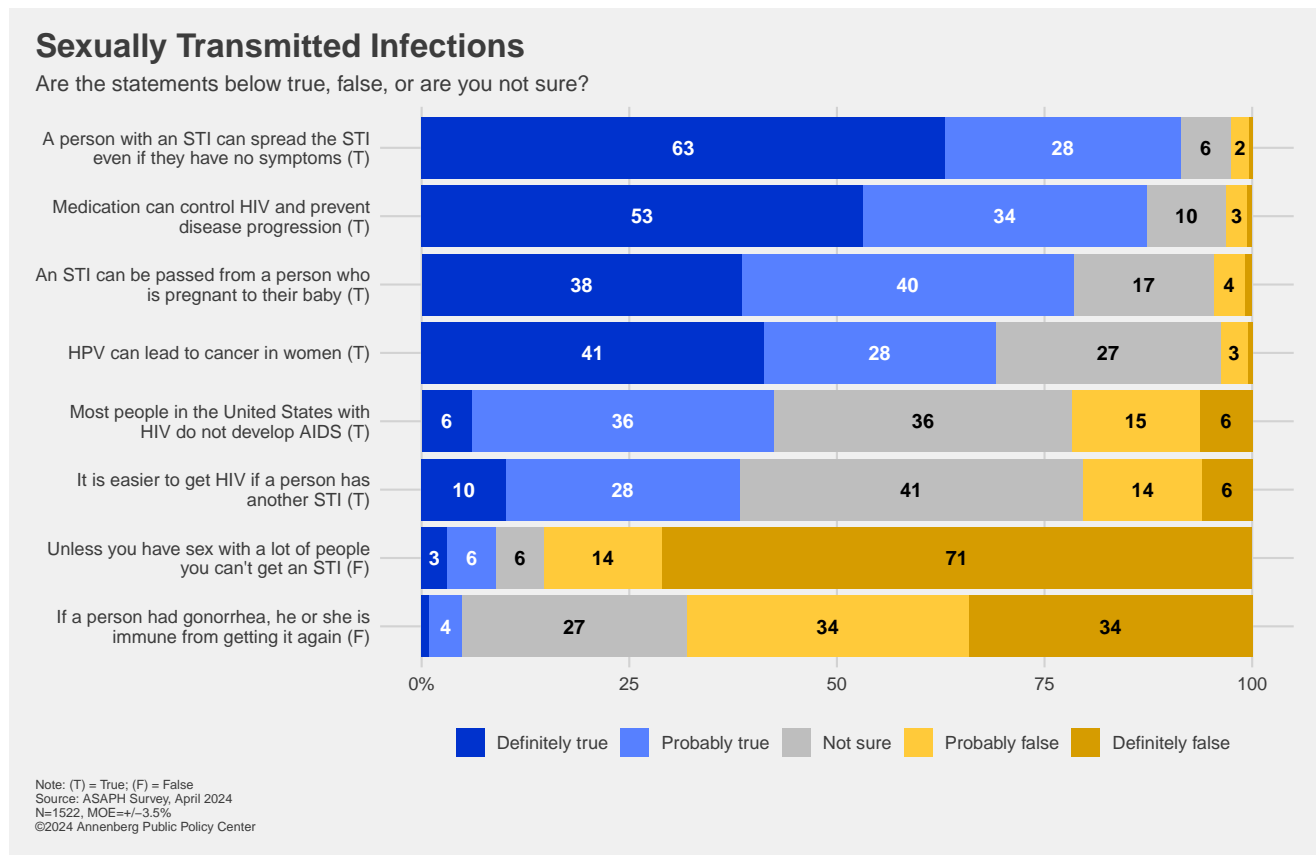


## Broader Knowledge about STIs

Much of the public does have a reasonable level of background knowledge about STIs. Large majorities know: that someone with an STI can spread it to others even if there are no symptoms (91%); that medication can control HIV and prevent disease progression (87%); that an STI can be passed from a person who is pregnant to their baby (78%); and that HPV can lead to cancer in women (69%). And they know it is false to say that unless you have sex with a lot of people you can't get an STI (85%) and that it is false to say that if a person had gonorrhea he or she is immune from getting it again (68%, see Figure 31).

The questions with the greatest uncertainty involve HIV. Just 42% know that most people in the United States with HIV do not develop AIDS and 36% are not sure. Only 38% know it is easier to get HIV if a person has another STI, where 41% are not sure.

**Figure 31: Knowledge about Sexually Transmitted Infections**



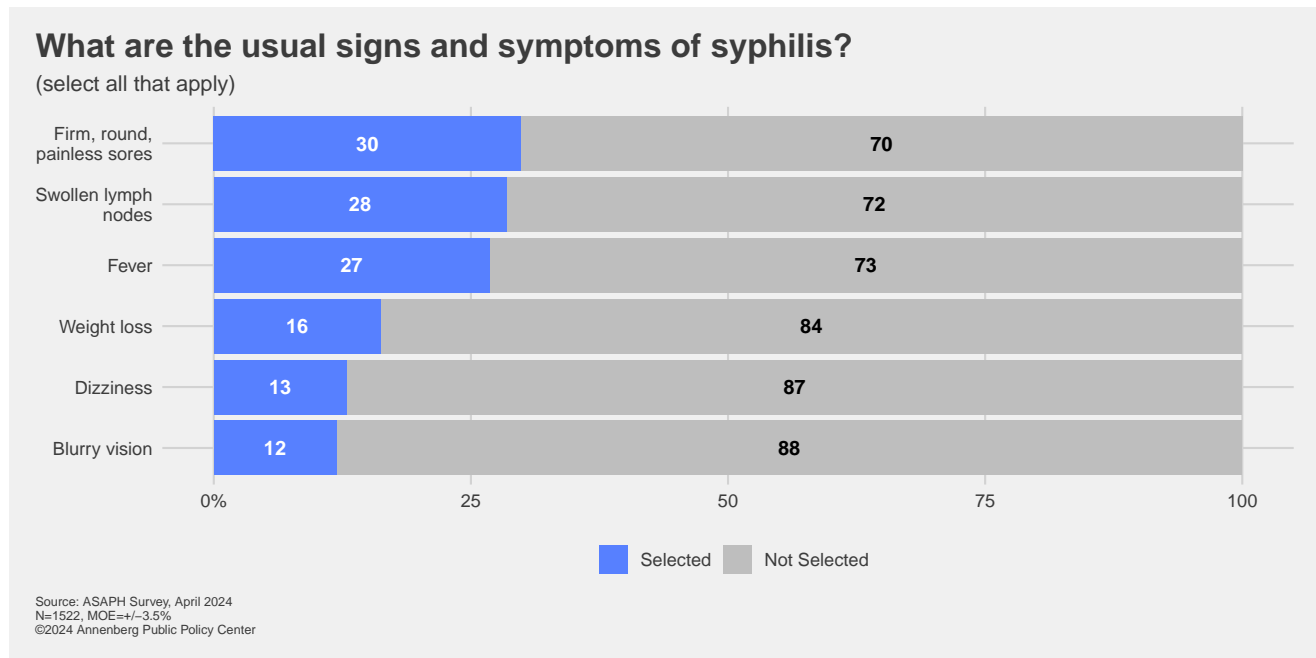
## Signs of Syphilis

When asked to select usual syphilis signs and symptoms from a list, less than a third of survey respondents selected any of the provided symptoms, despite each being recognized by the CDC as potential symptoms of syphilis. Figure 32 shows what share of respondents selected each of the following symptoms.

- 30% selected “firm, round, painless sores”
- 28% selected “swollen lymph nodes”
- 27% selected “fever”
- 16% selected “weight loss”
- 13% selected “dizziness or lightheadedness” [the CDC says it’s a sign of otosyphilis]
- 12% selected “blurry vision” [the CDC says it’s a sign of ocular syphilis]

Fifty-nine percent of respondents explicitly reported that they did not know any of the symptoms of syphilis. Given the importance of early detection for both treatment and limiting the spread, these numbers underscore the importance of increased efforts to educate the public.

**Figure 32: The Symptoms of Syphilis**



## Stigma

Overall, large majorities of respondents report being very or somewhat comfortable talking to their doctor (87%) or sexual partners (88%) about sexually transmitted infections.<sup>29</sup> Fewer felt similarly comfortable talking to their close friends (70%) and immediate family (59%, see Figure 33). Stigma concerning STIs affects individuals’ willingness to seek testing and treatment for STIs.<sup>30</sup>

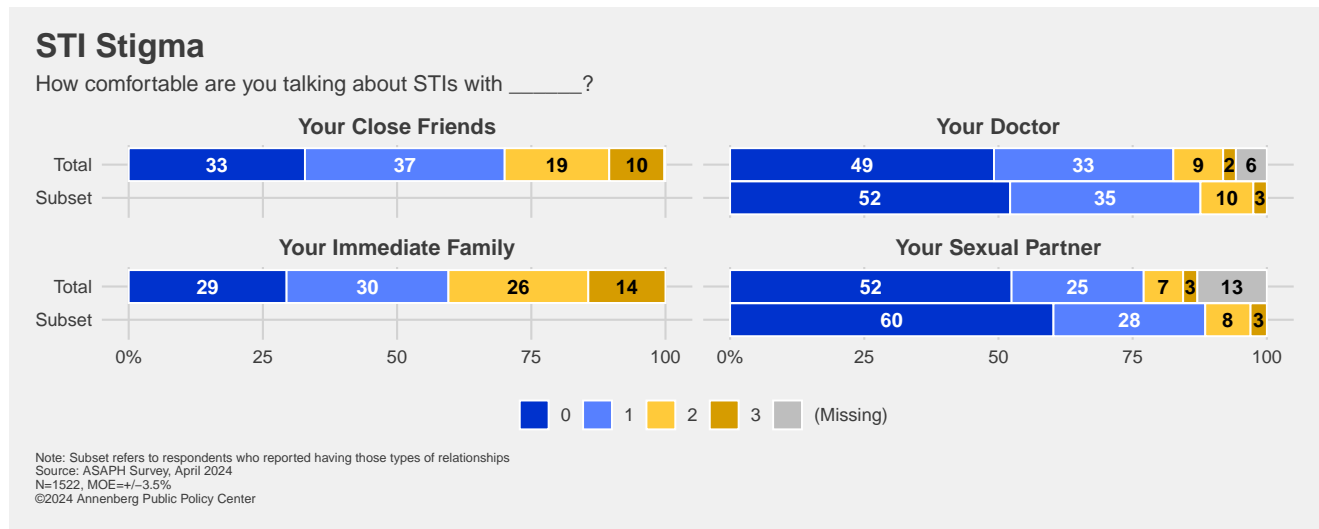
Part of this may be the negative association between stigma and science-consistent knowledge about sexually transmitted diseases. To test this relationship, we created a stigma scale, averaging the comfort individuals experienced talking to doctors, sexual partners, close friends, and their immediate family about STIs. We then created a science-consistent STI knowledge scale, averaging the responses to the eight items presented in Figure 31. We find that those with greater STI stigma have significantly fewer science-consistent beliefs about sexually transmitted infections after controlling for experience with STIs<sup>31</sup> and respondent demographic. As these results come from a cross-sectional study, we do not claim that stigma and knowledge have a causal relationship, however, these results do suggest that addressing both could have a positive impact on public health.

<sup>29</sup> These numbers exclude respondents who reported not having a primary care provider or a sexual partner.

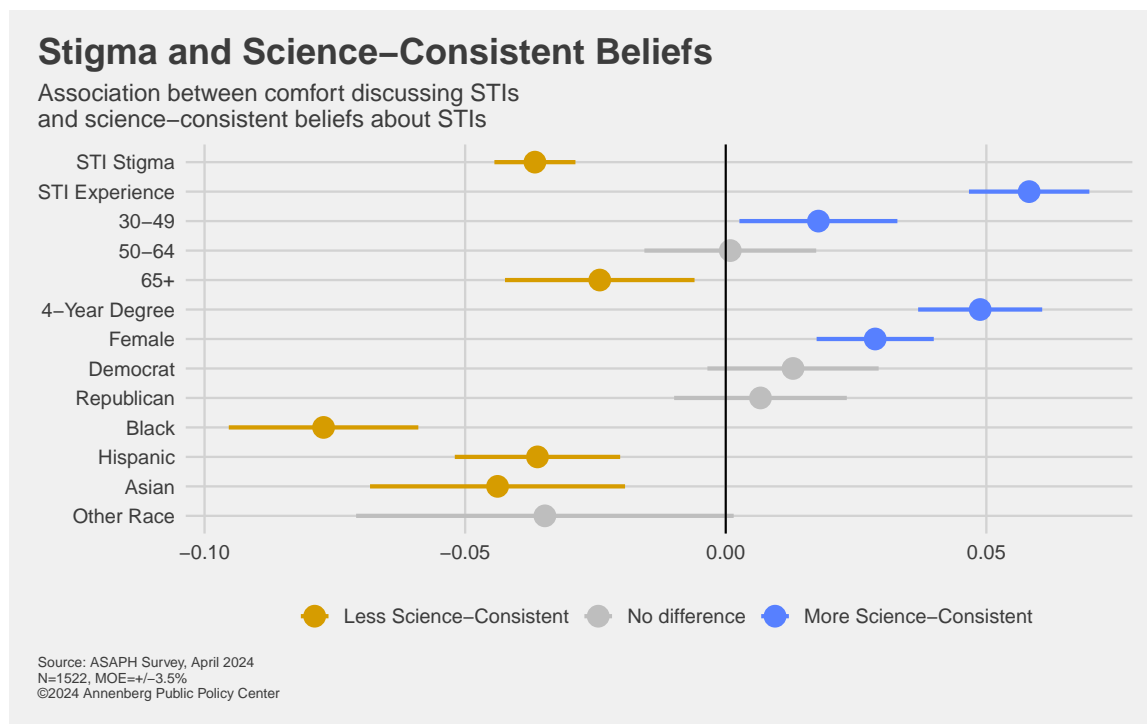
<sup>30</sup> Fortenberry, J. Dennis, Mary McFarlane, Amy Bleakley, Sheana Bull, Martin Fishbein, Diane M. Grimley, C. Kevin Malotte, and Bradley P. Stoner. 2002. “Relationships of stigma and shame to gonorrhea and HIV screening.” *American journal of public health* 92: 378-381. Lichtenstein, Bronwen. 2003. “Stigma as a barrier to treatment of sexually transmitted infection in the American deep south: issues of race, gender and poverty.” *Social Science & Medicine* 57: 2435-2445.

<sup>31</sup> A binary variable where 1 = knows at least one person who has had an STI and 0 otherwise.

**Figure 33: STI Stigma**



**Figure 34: Stigma and Science-Consistent Beliefs**



## Racial Disparities

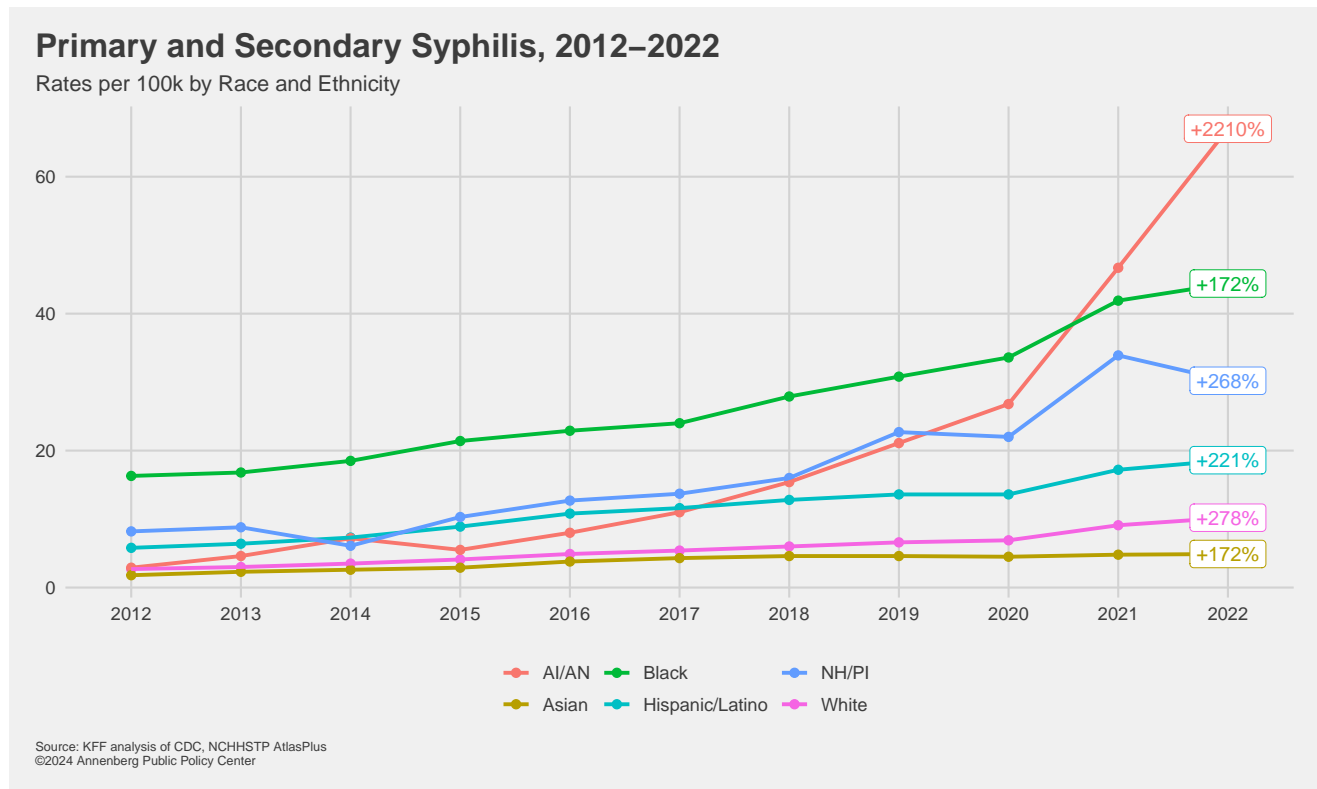
The demographic differences in science-consistent knowledge concerning STIs presented in Figure 34 remind us of the stark racial disparities concerning STIs. For example, whereas White

mothers represent 52.2% of live births, they represent only 27.5% of congenital syphilis (CS) cases. And whereas Black or African American mothers represent only 14.3% of live births, they represent 29.9% of CS cases. This is worrisome given that while the population only increased 6% between 2012 and 2022, over ten times as many babies were born with syphilis during that period.<sup>32</sup>

<sup>32</sup> CDC. 2024. “National Overview of STIs, 2022 : Disparities in STIs.” *Sexually Transmitted Infections Surveillance*, 2022. Jan. 30, 2024

Figure 35 shows the change in primary and secondary syphilis rates by racial and ethnic identity between 2012 and 2022. While rates increased for all races and ethnicities, American Indians and Alaska Natives saw an over 2,000% (2.9 to 67.0 per 100k) increase in cases of primary and secondary syphilis. Black (44.4), Hispanic and Latino Americans (18.6), and Native Hawaiian and Pacific Islander (30.2) Americans all experienced far greater rates than White Americans (10.2) in 2022.

**Figure 35: Racial Disparities in Primary and Secondary Syphilis Rates, 2012 - 2022**



As the CDC notes in their National Overview of STIs, “Acknowledging inequities in STI rates as well as their root causes is a critical first step toward empowering affected groups and the public health community to collaborate in addressing systemic inequities in the burden of disease — with the goal of minimizing the health impact of STIs on individuals and populations.”<sup>33</sup>

<sup>33</sup> CDC. 2024. “National Overview of STIs, 2022 : Disparities in STIs.” *Sexually Transmitted Infections Surveillance*, 2022. Jan. 30, 2024

## Methodology

The data for the Annenberg Science and Public Health (ASAPH) survey were collected from a nationally representative probability panel survey drawn randomly from the SSRS Opinion Panel of U.S. adults, 18 and older. SSRS Opinion Panel members are recruited randomly based on nationally representative address-based sample design (including Hawaii and Alaska). Additionally, hard-to-reach demographic groups were recruited via the SSRS Omnibus survey platform, a nationally representative (including Hawaii and Alaska) bilingual telephone survey designed to meet standards associated with custom research studies.

Both the phone and online surveys were available in Spanish with about 1.7% of the panel using this language. Panel members in our study were not selected for any other studies conducted by SSRS and are considered proprietary. Panelists were invited by email or telephone to participate in the panel and were compensated the equivalent of \$15 for their time at each survey wave. The median length of the surveys was 20 minutes. The survey was deemed exempt from review by the Institutional Review Board of the University of Pennsylvania.

Of the 3,476 U.S. adult panelists invited to participate in wave 1 of the survey, 1,941 completed that wave's survey in April 2021 (56% completion rate). The majority completed the survey online rather than by telephone (97% online and 3% by telephone). These 1,941 panelists were re-contacted at each subsequent wave unless they dropped from the panel. After wave 1, with two rounds with two rounds of replenishment described below, panelist completion rates were high, averaging 82 percent between waves 2 and 20. The response rate for each wave is shown in Figure 36.

The most recent data in this report are drawn from wave 20 of the study, conducted July 11-18, 2024, among a sample of 1,496 respondents, 1,465 from the web and 31 by telephone. A total of 1,469 surveys were conducted in English and 27 in Spanish. 1,961 panelists were invited to complete wave 20 of the survey. The completion rate was 76%. The margin of sampling error (MOE) for total respondents is +/-3.6 percentage points (pp) at the 95% confidence level. The design effect (DEFF) is 1.96. See Table 2 for waves 1-20.<sup>1</sup>

Between waves 8 and 9, The Annenberg Public Policy Center of the University of Pennsylvania (APPC) engaged SSRS in recruiting additional panelists to the ASAPH panel to increase the sample size, account for attrition, and improve the representativeness of the panel. Additional panelists were recruited again via address-based sampling in similar fashion to the initial recruitment as described above. From these recruits, ASAPH randomly selected 74 additional panelists with an educational attainment of a high school degree or less to participate to improve representativeness.

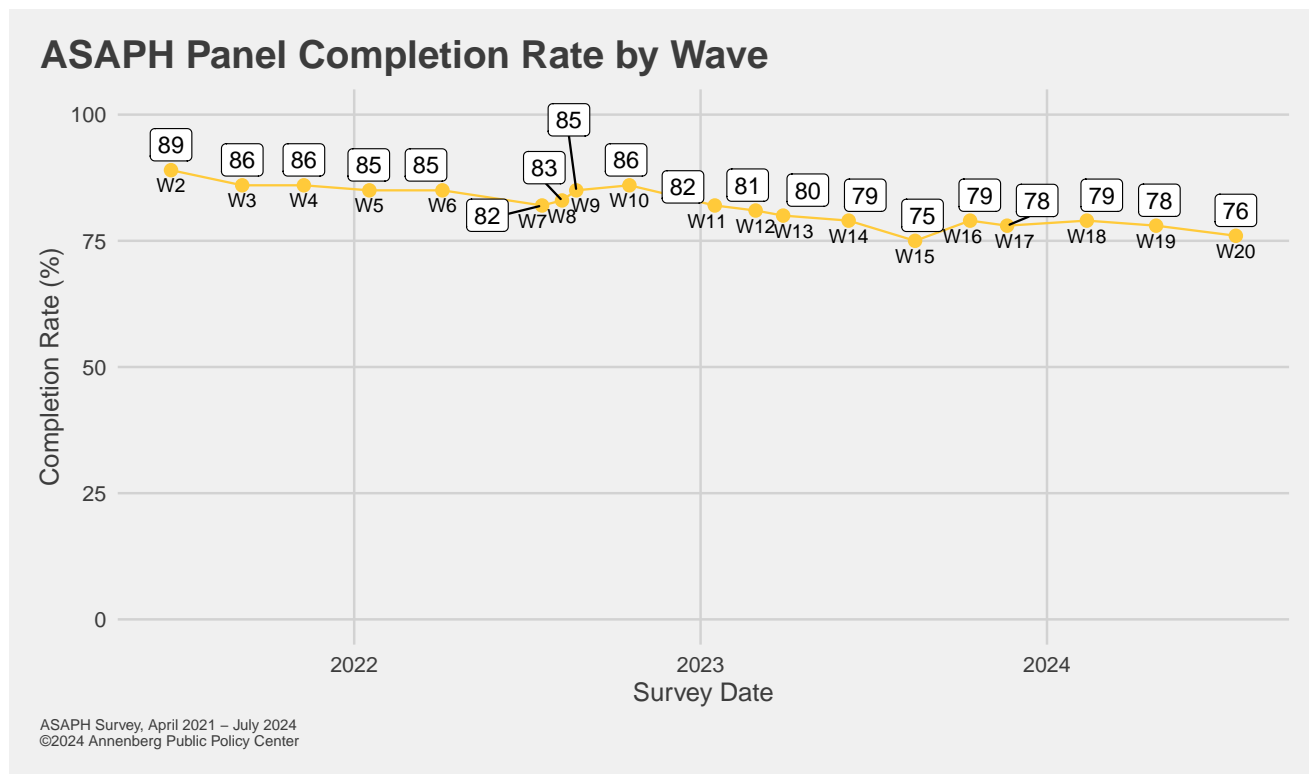
Between waves 9 and 10, APPC engaged SSRS to conduct an engagement survey with the purpose of recruiting additional panelists. The survey was conducted via the SSRS Opinion

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<sup>1</sup> Note some field dates have been updated since the Fall 2022 report.



**Figure 36: ASAPH Panel Completion Rate by Wave**



Panel and invited only newly recruited panelists with an educational attainment of a high school degree or less to participate to improve representativeness. Data collection was conducted from December 6 – December 12, 2022 by web in English only. The survey obtained 60 completes, among which 33 were recruited to the ASAPH Panel. In total, 107 new respondents were added. The reduction in design effect between waves 8 and 10 reflects the improved representativeness of the sample post-replenishment. These new respondents have been retroactively added to their respective waves.

See the Topline Document on the website for the full question results.

### Weighting

Data were weighted by SSRS to represent the adult (18+) population. The data were weighted by first applying a base weight then balancing the demographic profile of the sample to target population parameters.

The base weight for the SSRS Opinion Panel was the final weight from the first wave of the survey (April 2021). The base weights were then standardized and trimmed at the 2nd and 98th percentiles to prevent individual interviews from having too much influence. With the base weight applied, the probability panel was weighted to balance the demographic profile

**Table 2 - Summary of ASAPH Survey Waves**

Wave	n	MOE	Design Effect	Fielded	Closed	Completion Rate
A-1	1941	2.9	1.76	3/30/21	4/19/21	56%
B-2	1719	3.2	1.83	6/9/21	6/22/21	89%
C-3	1669	3.2	1.83	8/16/21	9/5/21	86%
D-4	1672	3.3	1.86	11/3/21	11/9/21	86%
E-5	1656	3.3	1.86	1/11/22	1/17/22	85%
F-6	1638	3.3	1.87	3/29/22	4/4/22	85%
G-7	1580	3.2	1.82	7/12/22	7/18/22	82%
H-8	1584	3.4	1.86	8/2/22	8/8/22	83%
I-9	1621	3.3	1.87	8/16/22	8/23/22	85%
J-10	1646	3.2	1.8	10/11/22	10/18/22	86%
K-11	1657	3.2	1.77	1/10/23	1/16/23	82%
L-12	1638	3.2	1.75	2/22/23	2/28/23	81%
M-13	1622	3.2	1.76	3/23/23	3/29/23	80%
N-14	1586	3.3	1.83	5/31/23	6/6/23	79%
O-15	1482	3.5	1.88	8/9/23	8/15/23	75%
P-16	1559	3.4	1.91	10/5/23	10/12/23	79%
Q-17	1538	3.3	1.73	11/14/23	11/20/23	78%
R-18	1555	3.4	1.89	2/6/24	2/12/24	79%
S-19	1522	3.5	1.89	4/18/24	4/25/24	78%
T-20	1496	3.6	1.96	7/11/24	7/18/24	76%

of the sample to the target population parameters.

SSRS employs a technique called hot decking for missing demographic data. Hot deck imputation replaces the missing values of a respondent randomly with another similar respondent without missing data. These are further determined by variables predictive of non-response that are present in the entire file.<sup>34</sup>

Weighting was accomplished using SPSSINC RAKE, an SPSS extension module that simultaneously balances the distributions of all variables using the GENLOG procedure.

Data were weighted to distributions of: sex by age, sex by education, age by education, race/eth-

<sup>34</sup>This is conducted using an SPSS macro detailed in Myers, Teresa. 2011. "Goodbye, Listwise Deletion: Presenting Hot Deck Imputation as an Easy and Effective Tool for Handling Missing Data." *Communication Methods and Measures* 5 (4): 297–310.

nicity, census region, civic engagement, population density, party ID, voter registration, religious affiliation, and internet use frequency. The main demographic benchmarks were obtained from the 2023 Annual Social and Economic Supplement (ASEC) of Current Population Survey (CPS). The civic engagement benchmark was derived from September 2021 CPS Volunteering and Civic Life Supplement data. Population density was derived from the Claritas Pop-Facts Premier 2023. The registered voter benchmark is from the 2023 Annual Social and Economic Supplement (ASEC) of Current Population Survey (CPS)'s Voting and Registration Supplement. The party ID, internet frequency, and religious affiliation benchmarks came from the 2023 NPORS annual dataset released by Pew Research Center.

Weights were trimmed at the 4th and 96th percentiles to prevent individual interviews from having too much influence on survey-derived estimates.

These weights reflect current recommendations and best practices from SSRS. In waves 1 through 7, weights did not adjust for religion, voter registration, or party identification. Prior benchmarks for race and internet usage were less granular. Both SSRS and APPC independently analyzed the revised practices and found the differences to be small and statistically insignificant for all our questions in Waves 7 and 8.

## Weighting Benchmarks

Category	Values	Parameter	Unweighted	Weighted
Census region	Northeast	17.30%	18.70%	18.60%
	Midwest	20.50%	17.90%	19.20%
	South	38.60%	38.10%	37.30%
	West	23.60%	25.40%	24.90%
Civic engagement	Not engaged	73.00%	55.20%	71.10%
	Civically engaged	27.00%	44.80%	28.90%
Population density	1 Lowest 20%	20.00%	17.20%	20.90%
	2	20.00%	20.30%	18.30%
	3	20.00%	22.30%	20.90%
	4	20.00%	21.40%	19.60%
	5 Highest 20%	20.00%	18.90%	20.40%
Race/ethnicity	White non-Hisp	61.30%	66.70%	63.40%
	Black non-Hisp	12.10%	9.50%	11.40%
	Hispanic, US Born	8.40%	8.50%	8.70%
	Hispanic, Foreign Born	9.10%	4.30%	7.90%
	Asian, non-Hisp	6.50%	9.20%	6.00%
	Other non-Hisp	2.60%	1.90%	2.60%
Religion	Affiliated	71.00%	71.10%	69.50%
	Not Affiliated	29.00%	28.90%	30.50%
Internet Frequency	Almost constantly	41.90%	48.50%	42.20%
	Several times a day	44.10%	42.40%	45.60%
	About once a day	5.30%	4.80%	5.40%
	Several times a week	2.80%	2.50%	3.10%
	Less often	2.20%	1.50%	2.40%
	Not an internet user	3.60%	0.30%	1.30%

Category	Values	Parameter	Unweighted	Weighted
Sex by age	Male 18-24	6.00%	1.10%	3.50%
	Male 25-34	8.80%	7.70%	9.10%
	Male 35-44	8.50%	8.20%	8.90%
	Male 45-54	7.70%	8.40%	8.20%
	Male 55-64	7.80%	8.40%	8.00%
	Male 65+	10.20%	14.80%	9.70%
	Female 18-24	5.80%	1.70%	4.50%
	Female 25-34	8.60%	9.40%	9.40%
	Female 35-44	8.40%	10.40%	9.30%
	Female 45-54	7.80%	8.20%	8.10%
	Female 55-64	8.20%	10.00%	9.10%
	Female 65+	12.20%	11.60%	12.20%
Sex by education	Male HS grad or less	20.00%	8.50%	17.30%
	Male Some college	12.40%	12.20%	12.20%
	Male College grad +	16.50%	27.90%	17.90%
	Female HS grad or less	18.20%	12.30%	17.50%
	Female Some college	14.00%	15.60%	15.00%
	Female College grad +	18.90%	23.40%	20.10%
Age by education	18-34 HS grad or less	11.50%	4.70%	9.20%
	18-34 Some college	8.80%	4.20%	8.10%
	18-34 College grad +	8.90%	11.00%	9.20%
	35-54 HS grad or less	10.90%	7.30%	11.40%
	35-54 Some college	7.80%	9.30%	8.50%
	35-54 College grad +	13.70%	18.70%	14.70%
	55+ HS grad or less	15.70%	8.80%	14.20%
	55+ Some college	9.90%	14.40%	10.70%
	55+ College grad +	12.80%	21.70%	14.10%
Party ID (panel)	Rep	29.00%	22.30%	27.70%
	Dem	30.40%	33.70%	31.70%
	Ind/Other	40.70%	44.00%	40.70%
Voter Registration	Registered to vote	74.80%	89.20%	79.10%
	Not registered	25.20%	10.80%	20.90%