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## U.S. Influenza Activity and Preliminary 2023-24 Influenza Vaccine Effectiveness Estimates

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**Influenza Division**

**National Center for Immunization and Respiratory Diseases**

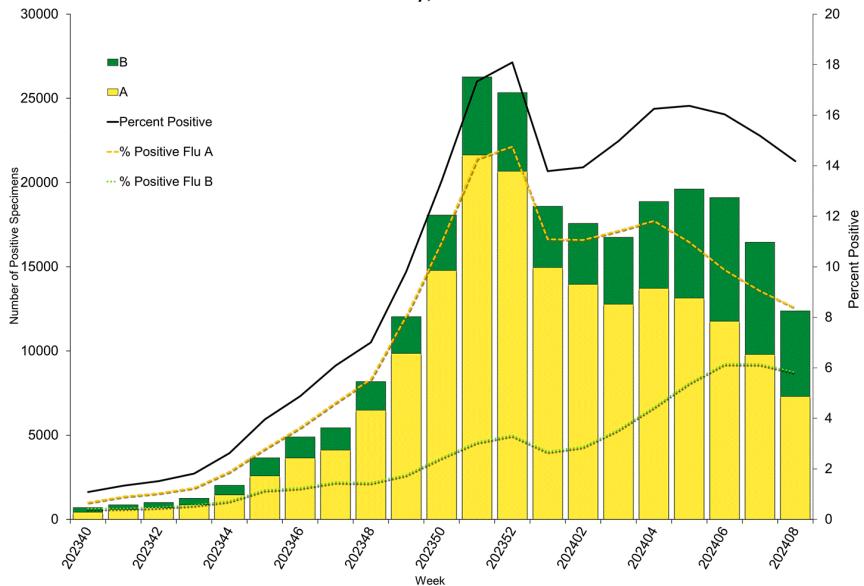
**Centers for Disease Control and Prevention**

Vaccines and Related Biological Products Advisory Committee

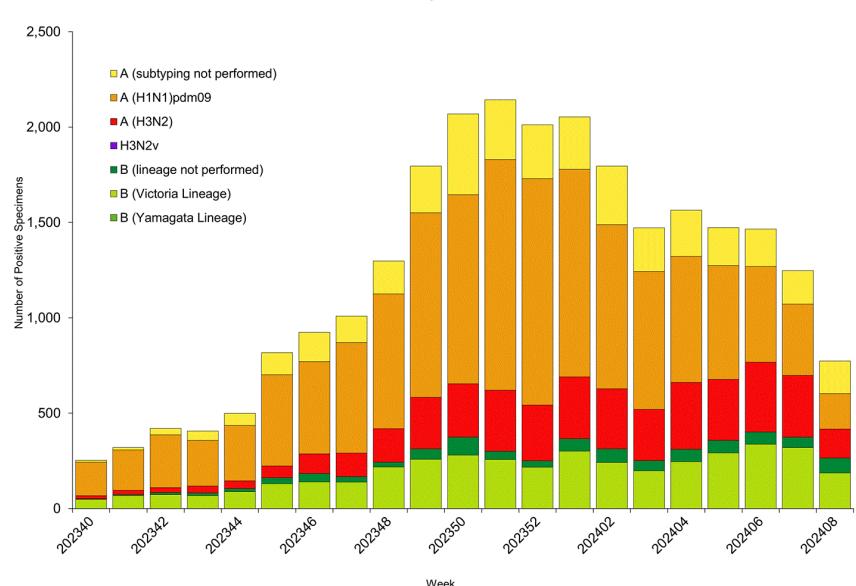
March 5, 2024

# Virologic Surveillance

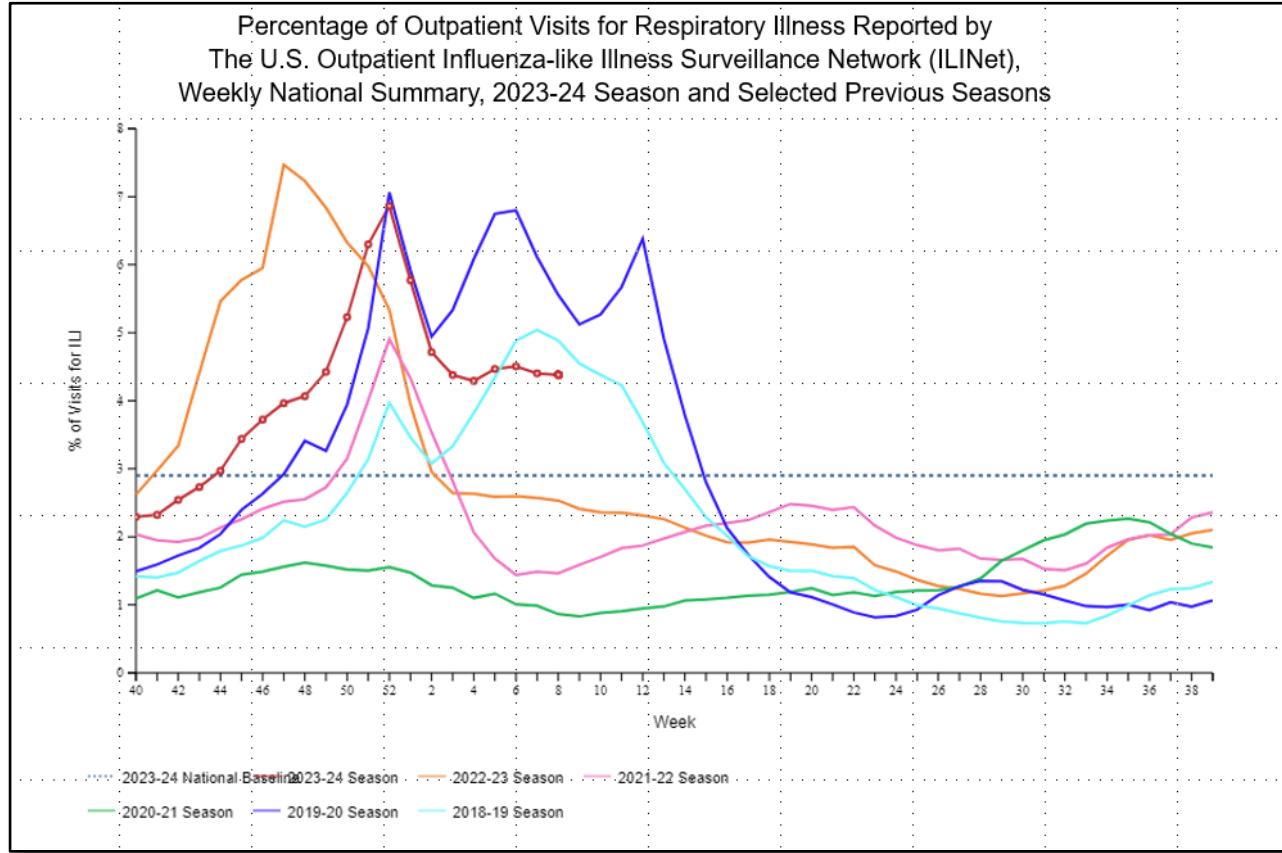
Influenza Positive Tests Reported to CDC by U.S. Clinical Laboratories,  
National Summary, 2023-2024 Season



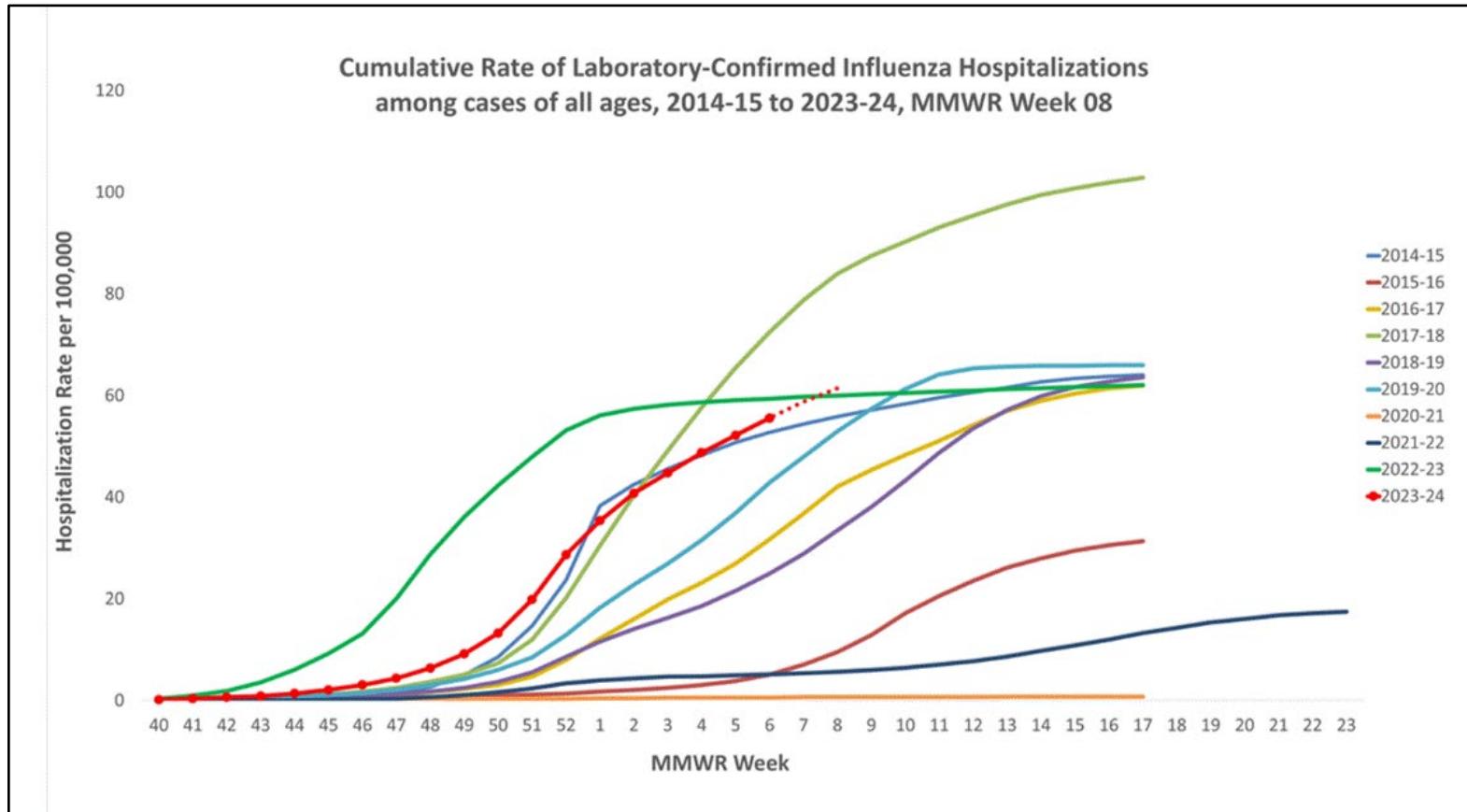
Influenza Positive Tests Reported to CDC by U.S. Public Health Laboratories,  
National Summary, 2023-2024 Season



# Influenza-Like Illness (ILI) Activity—ILINet



# Influenza-Associated Hospitalizations—FluSurv-NET

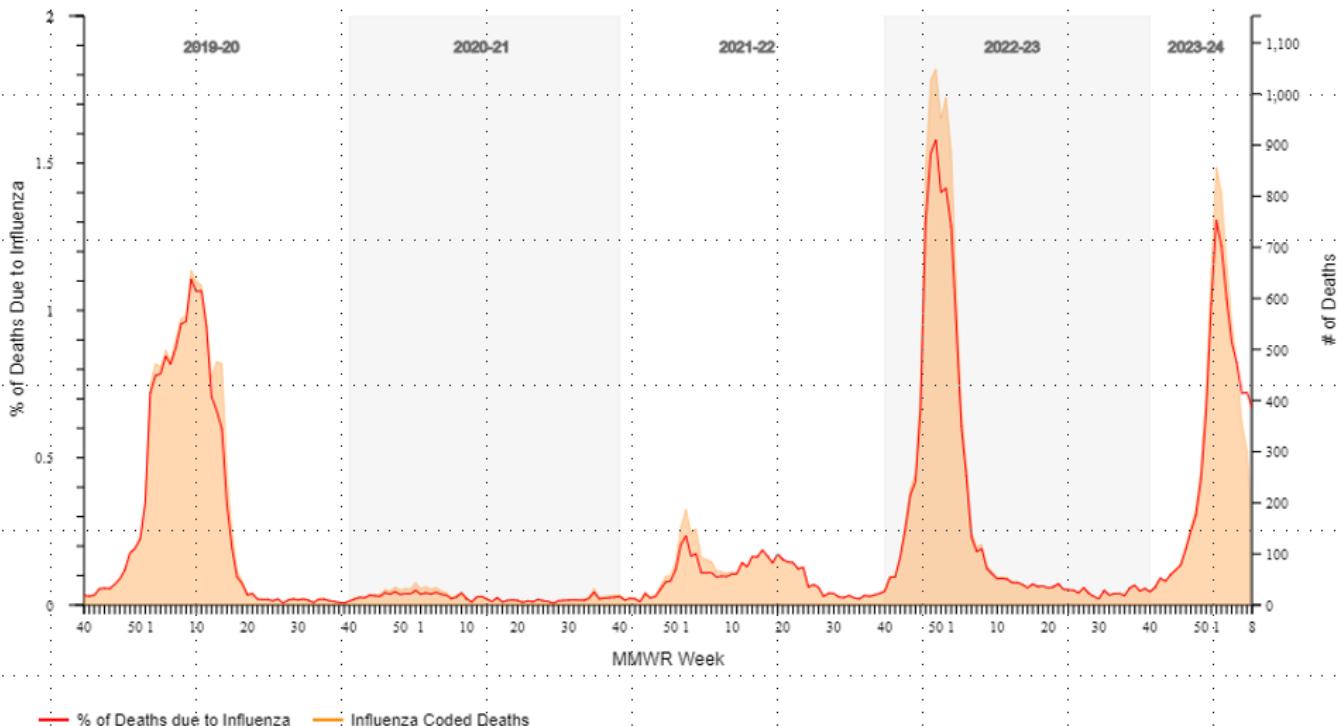


# Pneumonia, and Influenza (P&I) Mortality—

National  
Center for  
Health  
Statistics  
Mortality  
Surveillance  
System

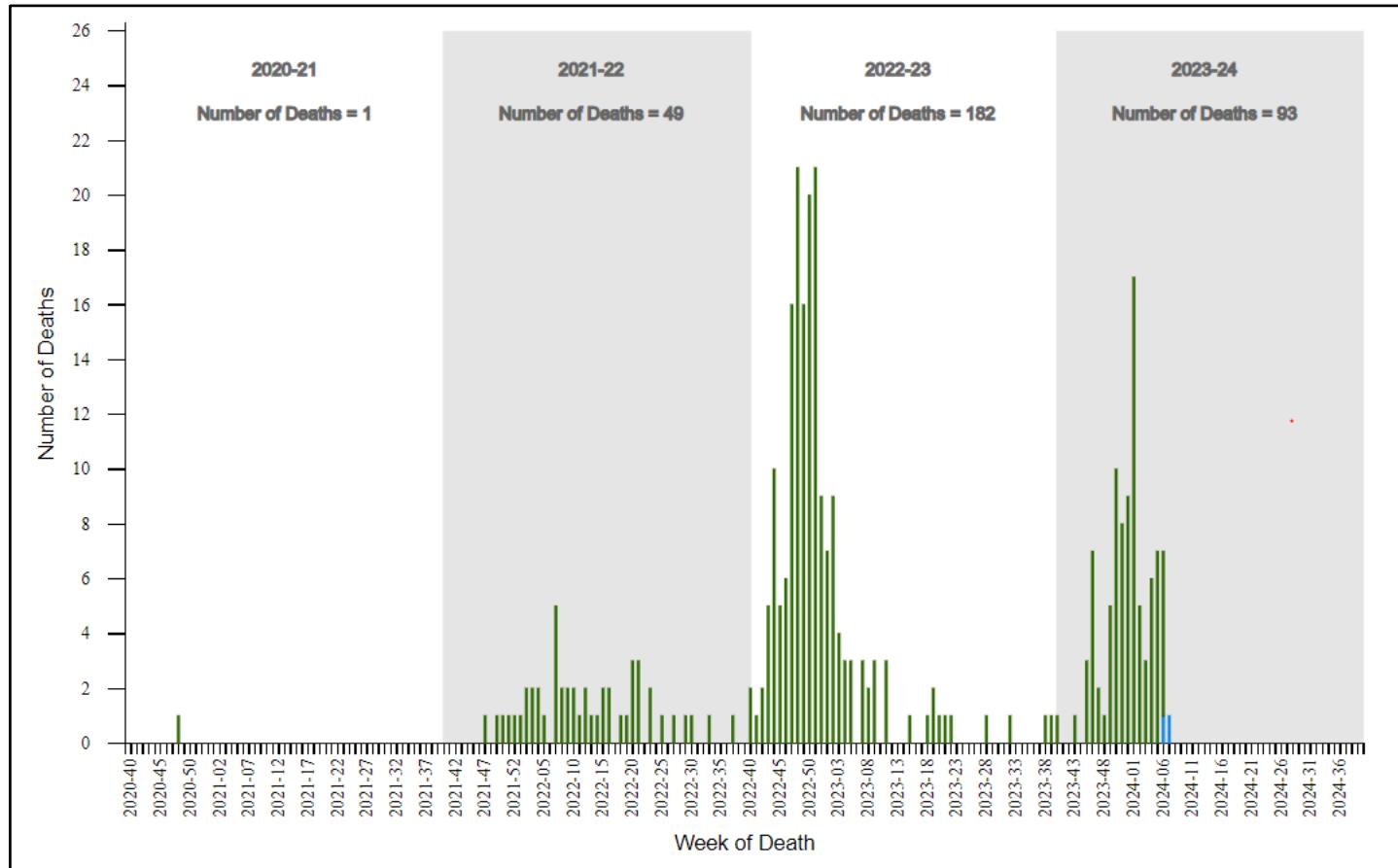
CDC FluView—  
week ending  
February 24, 2023

Pneumonia and Influenza Mortality from  
the National Center for Health Statistics Mortality Surveillance System  
National Summary data through the week ending February 24, 2024



# Pediatric Mortality

CDC FluView—  
week ending  
February 24, 2023



# Summary as of the Week Ending February 24, 2024

- U.S. influenza activity has lessened slightly in recent weeks but is ongoing.
  - Percent of tests positive peaked at ~18% in late December; currently ~14%.
- Influenza A(H1N1)pdm09 viruses have predominated, with co-circulation of influenza A(H3N2) and B viruses.
- The cumulative influenza-associated hospitalization rate is 61.5/100,000.
- 93 influenza-associated pediatric deaths reported thus far this season.



## Interim Estimates of 2023–24 Seasonal Influenza Vaccine Effectiveness

Originally presented by Aaron M. Frutos, PhD, MPH

On behalf of CDC Influenza Vaccine Effectiveness Collaborators

Advisory Committee on Immunization Practices

February 28, 2024

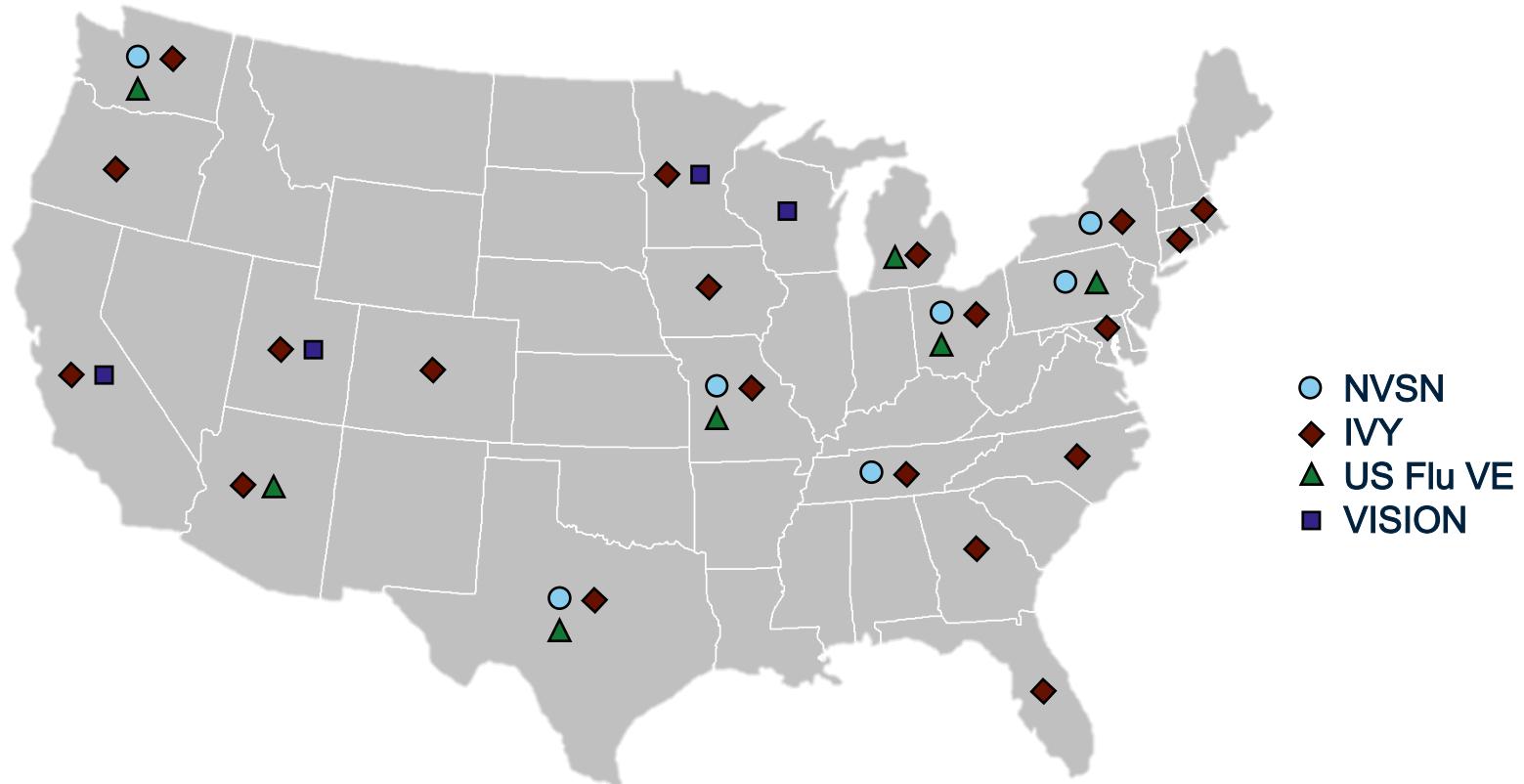
# CDC Influenza Vaccine Effectiveness Networks

Four networks to evaluate vaccine effectiveness (VE) against laboratory-confirmed influenza for children, adolescents, and adults in the outpatient and inpatient settings

# CDC Influenza Vaccine Effectiveness Networks

- **Investigating Respiratory Viruses in the Acutely Ill (IVY)**
  - Adults  $\geq 18$  years
  - Hospitalization
- **New Vaccine Surveillance Network (NVSN)**
  - Children/adolescents 6 months through 17 years
  - Outpatient visits, emergency department/urgent care, hospitalization
- **U.S. Flu Vaccine Effectiveness Network (US Flu VE)**
  - Children/adolescents 6 months through 17 years; adults  $\geq 18$  years
  - Outpatient visits, emergency department/urgent care
- **Virtual SARS-CoV-2, Influenza, and Other respiratory viruses Network (VISION)**
  - Children/adolescents 6 months through 17 years; adults  $\geq 18$  years
  - Emergency department/urgent care, hospitalization

# CDC influenza VE networks include patients from 22 states



# 2023-2024 Influenza VE Methods

**Enrollees:** Have acute respiratory illness

**Dates of enrollment:** Fall 2023- Early 2024

**Design:** Test-negative design

- Comparing vaccination odds among case patients with influenza confirmed by molecular assay versus control patients testing negative for influenza and SARS-CoV-2
- Vaccination status: receipt of any 2023–24 seasonal flu vaccine according to medical records, immunization registries, claims data, and/or self-report

# 2023-2024 Influenza VE Methods

**Analysis:**  $VE = (1 - \text{adjusted OR}) \times 100\%$

- Adjusted for geographic region, age, calendar time of illness
  - IVY, US Flu VE, and VISION also adjusted for sex and race and ethnicity
  - US Flu VE also adjusted for days between illness onset and enrollment and self-reported general health status.
- VE estimates were calculated for influenza A subtypes A(H1N1)pdm09 and A(H3N2) when possible
  - Subtype not available for VISION
- VE was not estimated for some age groups and settings when sample size was small or when models did not converge

# Pediatric VE

(aged 6 months–17 years)



# Pediatric VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	123/622 (20)	793/2,577 (31)	59 (48, 67)
US Flu VE (Outpatient)	29/283 (10)	182/736 (25)	67 (48, 80)
VISION (Outpatient)	961/6,068 (16)	4,579/15,274 (30)	60 (57, 64)
NVSN (Inpatient)	29/128 (23)	543/1,321 (41)	61 (40, 75)
VISION (Inpatient)	21/113 (19)	299/921 (32)	52 (16, 72)

# Pediatric VE against Influenza A

**Influenza test result by influenza vaccination status, no. vaccinated/Total (%)**

	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	84/411 (20)	793/2,577 (31)	55 (41, 66)
US Flu VE (Outpatient)	27/212 (13)	182/736 (25)	46 (15, 67)
VISION (Outpatient)	920/5,524 (17)	4,579/15,274 (30)	59 (55, 62)
NVSN (Inpatient)	25/102 (25)	543/1,321 (41)	56 (30, 73)
VISION (Inpatient)	21/105 (20)	299/921 (32)	46 (7, 69)

# Pediatric VE against Influenza A(H1N1)pdm09

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	61/298 (20)	793/2,577 (31)	54 (37, 66)
US Flu VE (Outpatient)	11/120 (9)	182/736 (25)	61 (26, 81)
NVSN (Inpatient)	18/79 (23)	543/1,321 (41)	60 (32, 77)

# Pediatric VE against Influenza A(H3N2)

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	19/87 (22)	793/2,577 (31)	55 (20, 74)
US Flu VE (Outpatient)	2/17 (12)	182/736 (25)	Not estimated
NVSN (Inpatient)	4/10 (40)	543/1,321 (41)	Not estimated

# Pediatric VE against Influenza B

**Influenza test result by influenza vaccination status, no. vaccinated/Total (%)**

	Influenza-positive	Influenza-negative	VE (95% CI)
NVSN (Outpatient)	39/216 (18)	793/2,577 (31)	64 (47, 75)
US Flu VE (Outpatient)	3/76 (4)	182/736 (25)	89 (70, 97)
VISION (Outpatient)	45/571 (8)	4,579/15,274 (30)	79 (71, 85)
NVSN (Inpatient)	4/27 (15)	543/1,321 (41)	Not estimated
VISION (Inpatient)	0/10 (0)	299/921 (32)	Not estimated

# Adult VE

(aged  $\geq 18$  years)



# Adult VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	177/568 (31)	803/1,807 (44)	33 (16, 47)
VISION (Outpatient)	4,501/18,385 (24)	21,356/52,657 (41)	49 (47, 51)
IVY (Inpatient)	200/632 (32)	1,517/3,872 (39)	44 (32, 54)
VISION (Inpatient)	728/1,839 (40)	7,425/14,168 (52)	41 (34, 47)

# Adult VE against Influenza A

**Influenza test result by influenza vaccination status, no. vaccinated/Total (%)**

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	168/495 (34)	803/1,807 (44)	27 (9, 43)
VISION (Outpatient)	4,343/15,896 (27)	21,356/52,657 (41)	46 (44, 48)
IVY (Inpatient)	80/264 (30)	1,517/3,872 (39)	42 (23, 57)
VISION (Inpatient)	713/1,742 (41)	7,425/14,168 (52)	40 (33, 47)

# Adult VE against Influenza A(H1N1)pdm09

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	111/308 (36)	803/1,807 (44)	25 (1, 43)
IVY (Inpatient)	58/209 (28)	1,517/3,872 (39)	50 (30, 64)

# Adult VE against Influenza A(H3N2)

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	14/67 (21)	803/1,807 (44)	54 (11, 77)
IVY (Inpatient)	18/45 (40)	1,517/3,872 (39)	Not estimated

# Adult VE against Influenza B

**Influenza test result by influenza vaccination status, no. vaccinated/Total (%)**

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	9/76 (12)	803/1,807 (44)	78 (57, 90)
VISION (Outpatient)	164/2,530 (6)	21,356/52,657 (41)	78 (74, 81)
IVY (Inpatient)	5/21 (24)	1,517/3,872 (39)	Not estimated
VISION (Inpatient)	18/103 (17)	7,425/14,168 (52)	60 (30, 77)

# Adult (aged 18–64) VE



# Adult (aged 18–64) VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	136/489 (28)	503/1,368 (37)	25 (3, 42)
VISION (Outpatient)	2,557/14,698 (17)	9,194/33,086 (28)	52 (50, 55)
IVY (Inpatient)	87/383 (23)	579/1,927 (30)	49 (33, 61)
VISION (Inpatient)	197/773 (25)	1,367/4,050 (34)	40 (28, 50)

# Adult (aged 18–64) VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	128/417 (31)	503/1,368 (37)	13 (-13, 34)
VISION (Outpatient)	2,425/12,294 (20)	9,194/33,086 (28)	49 (46, 51)
IVY (Inpatient)	37/156 (24)	579/1,927 (30)	42 (13, 61)
VISION (Inpatient)	187/694 (27)	1,367/4,050 (34)	38 (24, 48)

# Adult (aged 18–64) VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	8/75 (11)	503/1,368 (37)	75 (50, 89)
VISION (Outpatient)	135/2,433 (6)	9,194/33,086 (28)	79 (75, 82)
IVY (Inpatient)	2/16 (12)	579/1,927 (30)	Not estimated
VISION (Inpatient)	13/83 (16)	1,367/4,050 (34)	50 (5, 74)

Adult (aged  $\geq 65$ ) VE

# Adult (aged $\geq 65$ ) VE against any influenza

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	41/79 (52)	300/439 (68)	51 (14, 72)
VISION (Outpatient)	1,944/3,687 (53)	12,162/19,571 (62)	41 (36, 45)
IVY (Inpatient)	113/249 (45)	938/1,945 (48)	42 (23, 56)
VISION (Inpatient)	531/1,066 (50)	6,058/10,118 (60)	42 (34, 50)

# Adult (aged $\geq 65$ ) VE against Influenza A

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	40/78 (51)	300/439 (68)	52 (16, 73)
VISION (Outpatient)	1,918/3,602 (53)	12,162/19,571 (62)	40 (36, 45)
IVY (Inpatient)	43/108 (40)	938/1,945 (48)	47 (19, 65)
VISION (Inpatient)	526/1,048 (50)	6,058/10,118 (60)	42 (34, 49)

# Adult (aged $\geq 65$ ) VE against Influenza B

Influenza test result by influenza vaccination status, no. vaccinated/Total (%)

	Influenza-positive	Influenza-negative	VE (95% CI)
US Flu VE (Outpatient)	1/1 (100)	300/439 (68)	Not estimated
VISION (Outpatient)	29/97 (30)	12,162/19,571 (62)	69 (51, 80)
IVY (Inpatient)	3/5 (60)	938/1,945 (48)	Not estimated
VISION (Inpatient)	5/20 (25)	6,058/10,118 (60)	Not estimated

# Summary



# Summary of four CDC influenza VE networks

Vaccination with a 2023-24 influenza vaccine **reduced the risk for** medically attended influenza **outpatient visits and hospitalizations** among **children, adolescents, and adults** across 22 US States

Vaccination was effective against **both influenza A (mostly subtype A(H1N1)pdm09) and B (lineage Victoria) viruses** that have circulated this season

Results were **consistent across networks**

# Thank you

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For more information, contact CDC

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TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

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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.

