



# Influenza Vaccination Coverage — United States, 2016–17 Influenza Season

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# Data Sources and Methods (Children)

- **National Immunization Survey-Flu (NIS-Flu)**
  - On-going, national list-assisted random-digit-dial landline and cellular telephone survey of households with children.
  - NIS-Child (19–35 months), NIS-Teen (13–17 years), and NIS-Child Influenza Module (6–18 months and 3–12 years).
  - Parental report: Has child received flu vaccination since July 1, 2016? (month, year).
  - Used interviews conducted October 2016–June 2017.

# Data Sources and Methods (Adults)

- **Behavioral Risk Factor Surveillance System (BRFSS)**
  - On-going state-based telephone survey of randomly selected persons  $\geq 18$  years among the non-institutionalized, U.S. population on health conditions and risk behaviors.
  - Self report: Flu vaccination in the past 12 months (month, year).
  - Used interviews conducted September 2016–June 2017.

# Data Sources and Methods (Adults and Children)

## ■ Analysis

- Conducted Kaplan-Meier survival analysis to determine cumulative monthly influenza vaccination coverage of one or more doses received from July 2016–May 2017.
- Coverage estimates calculated for children (6 mos.–17 yrs.) from NIS-Flu and for adults ( $\geq 18$  yrs.) from BRFSS and then combined for all persons  $\geq 6$  months.
- Imputations were performed where month and year of vaccination missing.
- Weighted estimates were calculated in SUDAAN to account for complex survey design.
- T-tests ( $p < 0.05$ ) to determine differences between groups and between the 2015–16 and 2016–17 seasons.

# Data Sources and Methods (Special Populations)

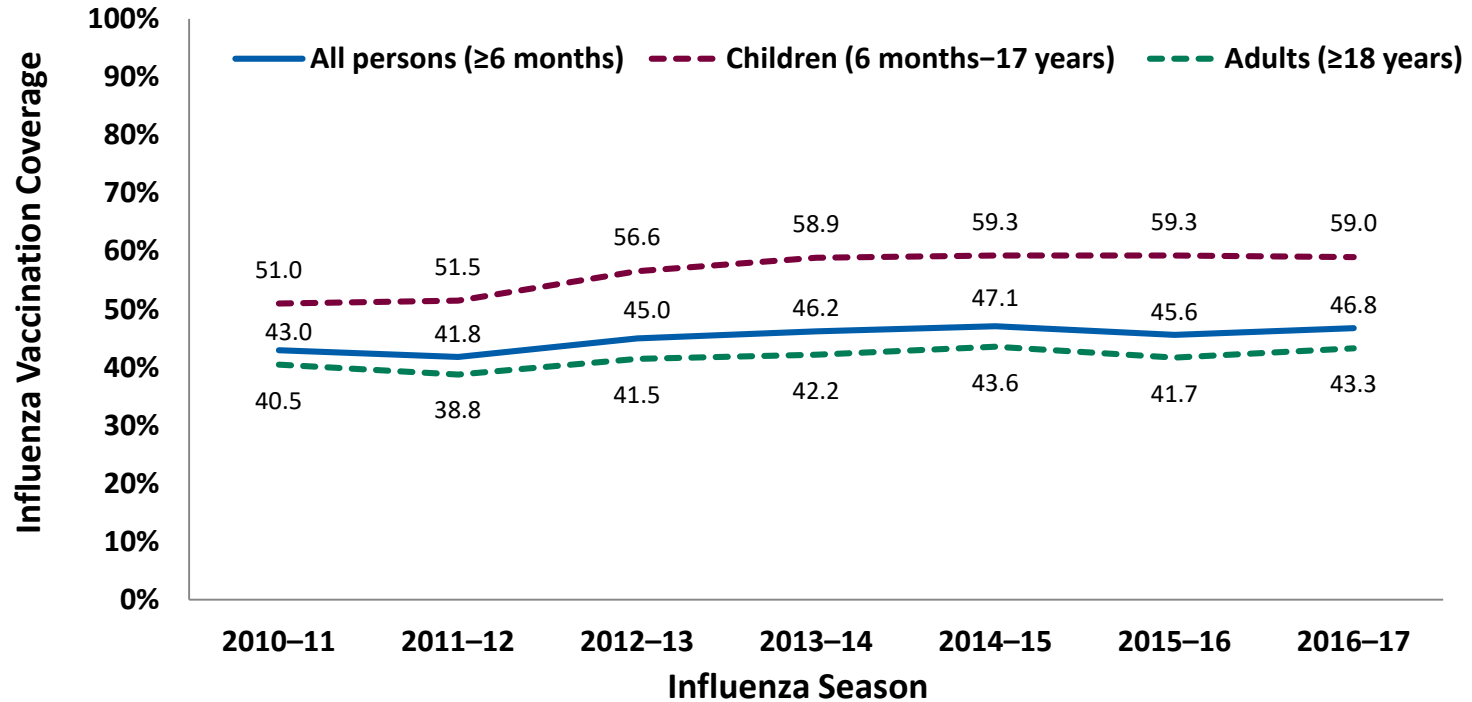
## ▪ **Pregnant women**

- Opt-in web-based Internet panel survey conducted March 28–April 7, 2017.
- Women recruited from general population Internet panel (Survey Sampling International).
- Included 2,319 women who were pregnant during October 2016–January 2017.

## ▪ **Health care personnel (HCP)**

- Opt-in web-based Internet panel survey conducted March 28–April 19, 2017.
- 2,438 HCP recruited from two Internet sources:
  - Professional HCP recruited from the membership of WebMD.
  - Assistants/aides and nonclinical support staff recruited from general population Internet panels operated by Survey Sampling International.

# Seasonal Influenza Vaccination Coverage, by Age Group and Season, NIS-Flu and BRFSS, United States, 2010–11 through 2016–17 Seasons



Starting with the 2011–12 season, adult estimates reflect changes in BRFSS survey methods: the addition of cellular telephone samples and a new weighting method.

# Influenza Vaccination Coverage by Age Group, Children 6 months–17 years, NIS-Flu, United States, 2016–17 Season

Age Group	Unweighted Sample Size	%* ±95% CI†	Difference from the 2015–16 Season ±95% CI
6 months–17 years	143,169	59.0 ± 0.7	-0.3 ± 1.1
6 months–4 years	44,094	70.0 ± 1.3	0.0 ± 1.9
6–23 months	16,374	76.3 ± 2.0	1.0 ± 2.6
2–4 years	27,720	66.2 ± 1.6	-0.6 ± 2.4
5–17 years	99,075	55.6 ± 0.8	-0.3 ± 1.2
5–12 years	63,130	59.9 ± 1.0	<b>-1.9 ± 1.6‡</b>
13–17 years	35,945	48.8 ± 1.3	<b>2.0 ± 1.9‡</b>

\*Percentage vaccinated.

† Confidence interval half-widths.

‡ Statistically significant difference between the 2016–17 season and the 2015–16 season by t-test (P<0.05).

# Influenza Vaccination Coverage by Race/Ethnicity, Children 6 months–17 years, NIS-Flu, United States, 2016–17 Season

Race/Ethnicity*	Unweighted Sample Size	% <sup>†</sup> ±95% CI <sup>‡</sup>	Difference from the 2015–16 Season ±95% CI
White only, non-Hispanic	82,341	54.3 ± 0.8	-1.0 ± 1.2
Black only, non-Hispanic	14,196	59.3 ± 2.2	-1.6 ± 3.0
Hispanic	27,806	67.0 ± 1.8	2.3 ± 2.7
Other, non-Hispanic (Total)	18,826	63.4 ± 1.9	-1.4 ± 3.1
Asian	7,119	69.3 ± 2.9	-4.2 ± 4.5
Am. Indian/Alaska Native	2,057	61.6 ± 6.4	0.9 ± 9.8
Other or multiple races	9,650	58.2 ± 2.6	1.2 ± 4.0

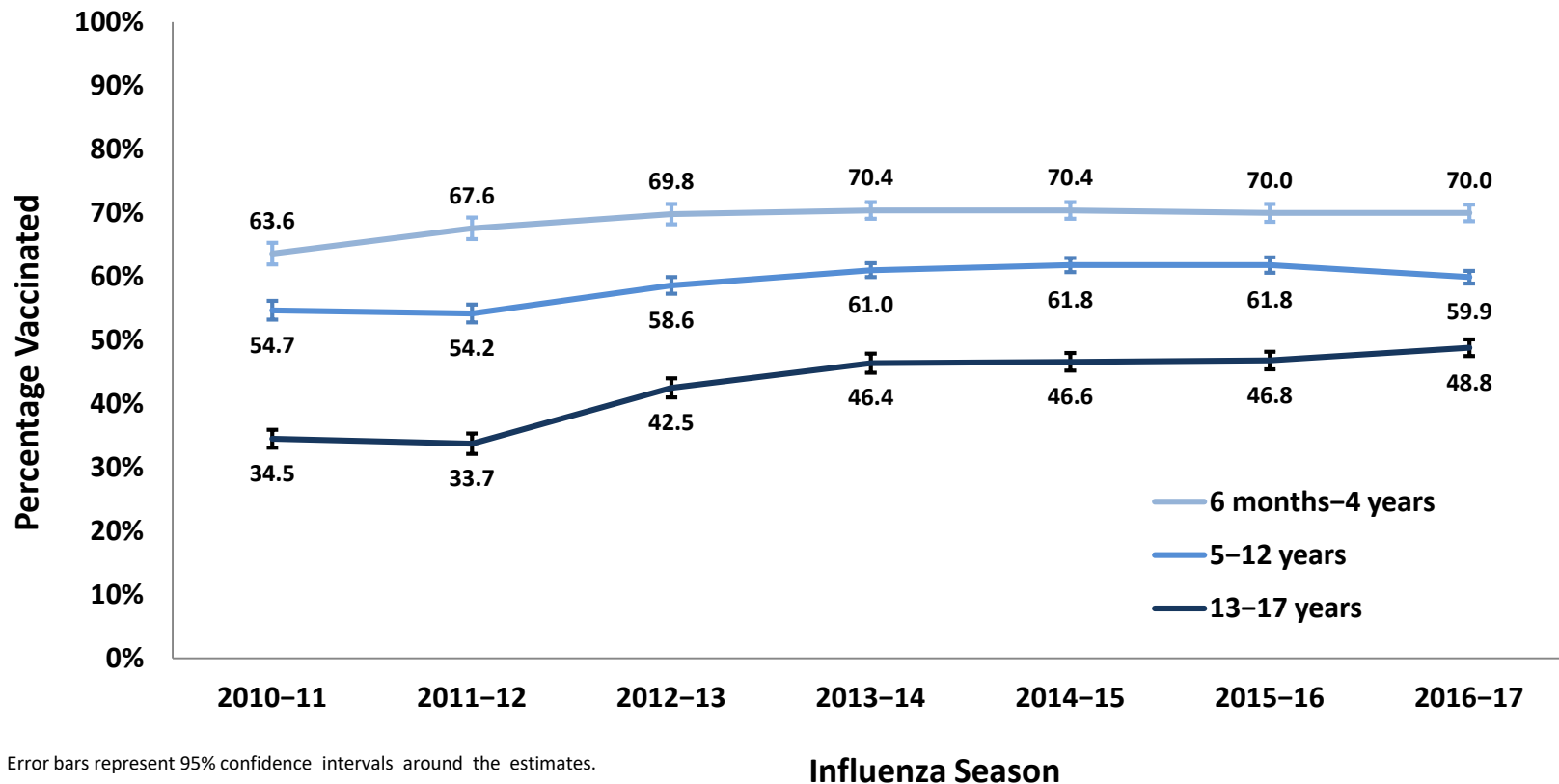
\*Race/ethnicity is based on parental or self report. Persons of Hispanic ethnicity may be of any race. Persons categorized as white, black, or other or multiple races were identified as non-Hispanic. The other or multiple races category included persons reporting Asian, American Indian and Alaska Native, Native Hawaiian or other Pacific Islander, other, or multiple races. Persons identified as multiple races in the other or multiple races category had more than one race category selected.

<sup>†</sup>Percentage vaccinated.

<sup>‡</sup>Confidence interval half-widths.

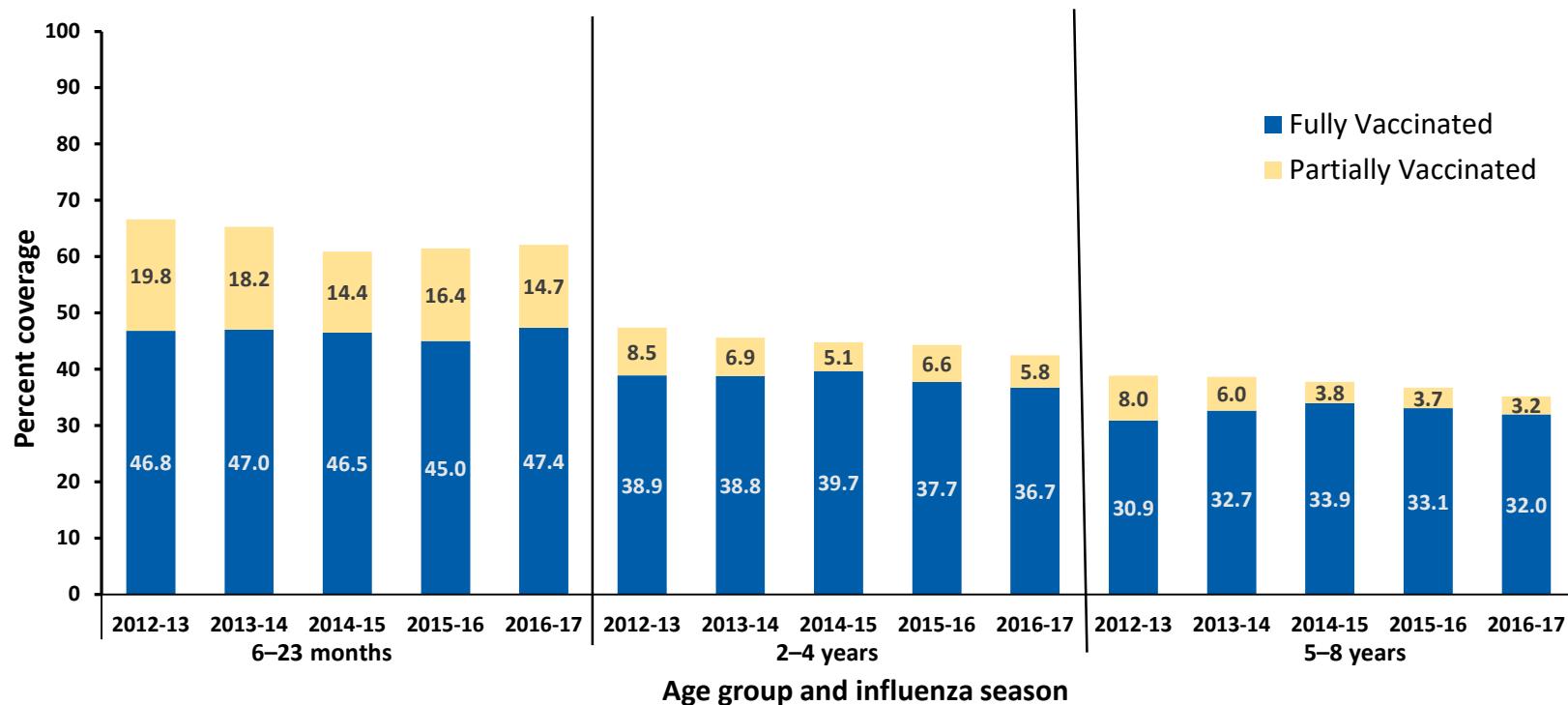


# Seasonal Influenza Vaccination Coverage Among Children, by Age Group and Season, United States, 2010–2017



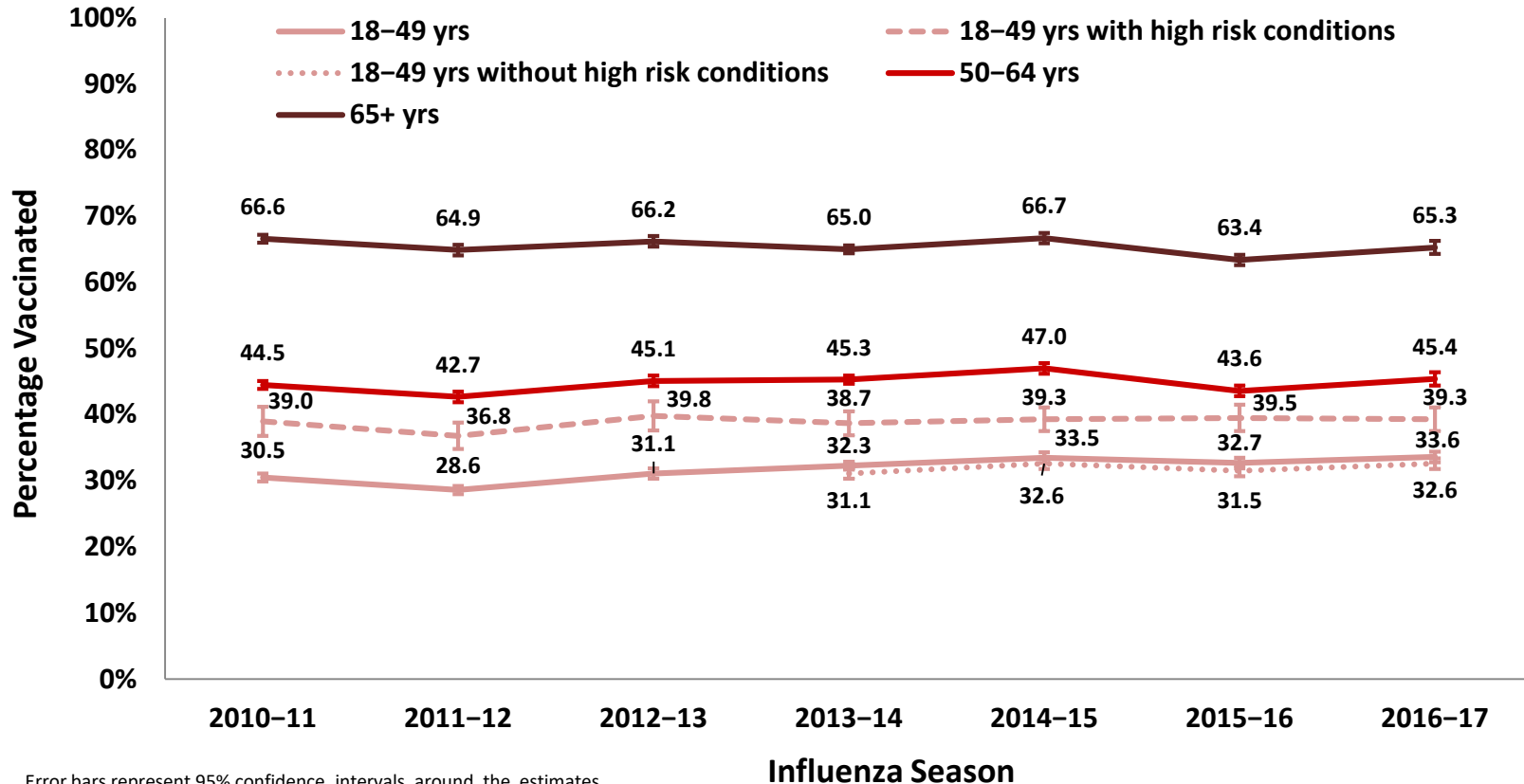
Error bars represent 95% confidence intervals around the estimates.

# Full and Partial Seasonal Influenza Vaccination Coverage Among Children 6 Months–8 Years, by Age Group and Season, Six IIS Sentinel Sites, United States, 2012–2017



Census data were used as denominators and IIS data from the six IIS Sentinel Sites were used as numerators. Full vaccination coverage was classified as having received at least the recommended number of flu vaccine doses (one or two), based on ACIP recommendations for that season. Partial vaccination coverage was classified as having received only one flu vaccine dose when recommended to receive two doses.

# Seasonal Influenza Vaccination Coverage Among Adults, by Age Group and Season, United States, 2010–2017



Error bars represent 95% confidence intervals around the estimates.

Starting with the 2011-12 season, adult estimates reflect changes in BRFSS survey methods: the addition of cellular telephone samples and a new weighting method.

## Influenza Vaccination Coverage by Age Group, Adults 18 years and older, BRFSS, United States, 2016–17 Season

Age Group	Unweighted Sample Size	%* ±95% CI†	Difference from the 2015–16 Season ±95% CI
≥18 years	325,801	43.3 ± 0.6	1.6 ± 0.7‡
18–64 years	206,532	37.5 ± 0.6	1.2 ± 0.8‡
18–64 years at high risk§	54,748	46.4 ± 1.2	0.4 ± 1.7
18–64 years not at high risk	149,533	34.9 ± 0.8	1.4 ± 1.0‡
18–49 years	107,527	33.6 ± 0.8	0.9 ± 1.1
18–49 years at high risk	19,092	39.3 ± 1.8	-0.2 ± 2.7
18–49 years not at high risk	87,094	32.6 ± 0.8	1.1 ± 1.1
50–64 years	99,005	45.4 ± 1.0	1.8 ± 1.3‡
≥65 years	119,269	65.3 ± 1.0	1.9 ± 1.3‡

\* Percentage vaccinated.

† Confidence interval half-widths.

‡ Statistically significant difference between the 2016–17 season and the 2015–16 season by t-test (P<0.05).

§ Selected high risk conditions; includes people with asthma, diabetes, heart disease, chronic obstructive pulmonary disease, or cancers other than skin cancer.

## Influenza Vaccination Coverage by Race/Ethnicity, Adults 18 years and older, BRFSS, United States, 2016–17 Season

Race/Ethnicity*	Unweighted Sample Size	% <sup>†</sup> ±95% CI <sup>‡</sup>	Difference from the 2015–16 Season ±95% CI
White only, non-Hispanic	253,191	45.9 ± 0.6	1.4 ± 0.8 <sup>§</sup>
Black only, non-Hispanic	25,067	37.4 ± 1.6	0.8 ± 2.3
Hispanic	21,680	36.9 ± 2.0	2.5 ± 2.7
Other, non-Hispanic (Total)	20,266	43.6 ± 2.5	2.6 ± 3.5
Asian	6,440	47.1 ± 4.3	3.1 ± 5.4
Am. Indian/Alaska Native	5,024	37.5 ± 3.7	-5.4 ± 5.5
Other or multiple races	8,802	41.7 ± 3.7	5.3 ± 5.4

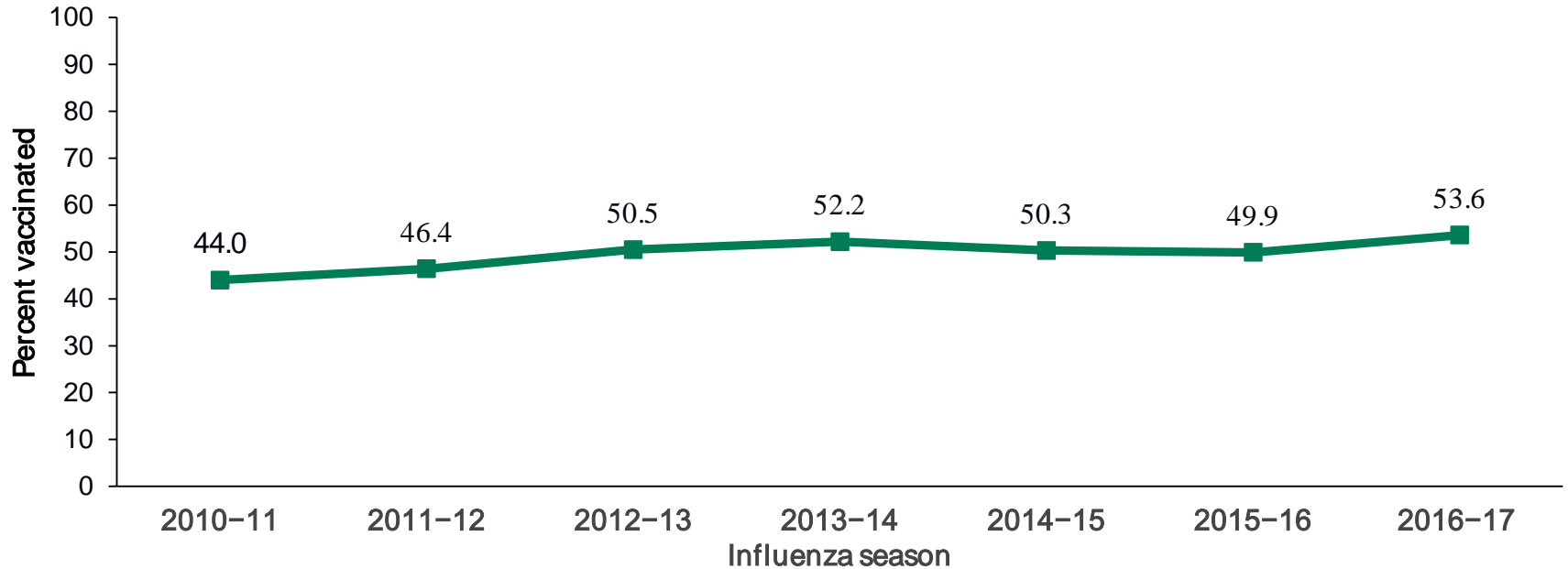
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<sup>†</sup> Percentage vaccinated.

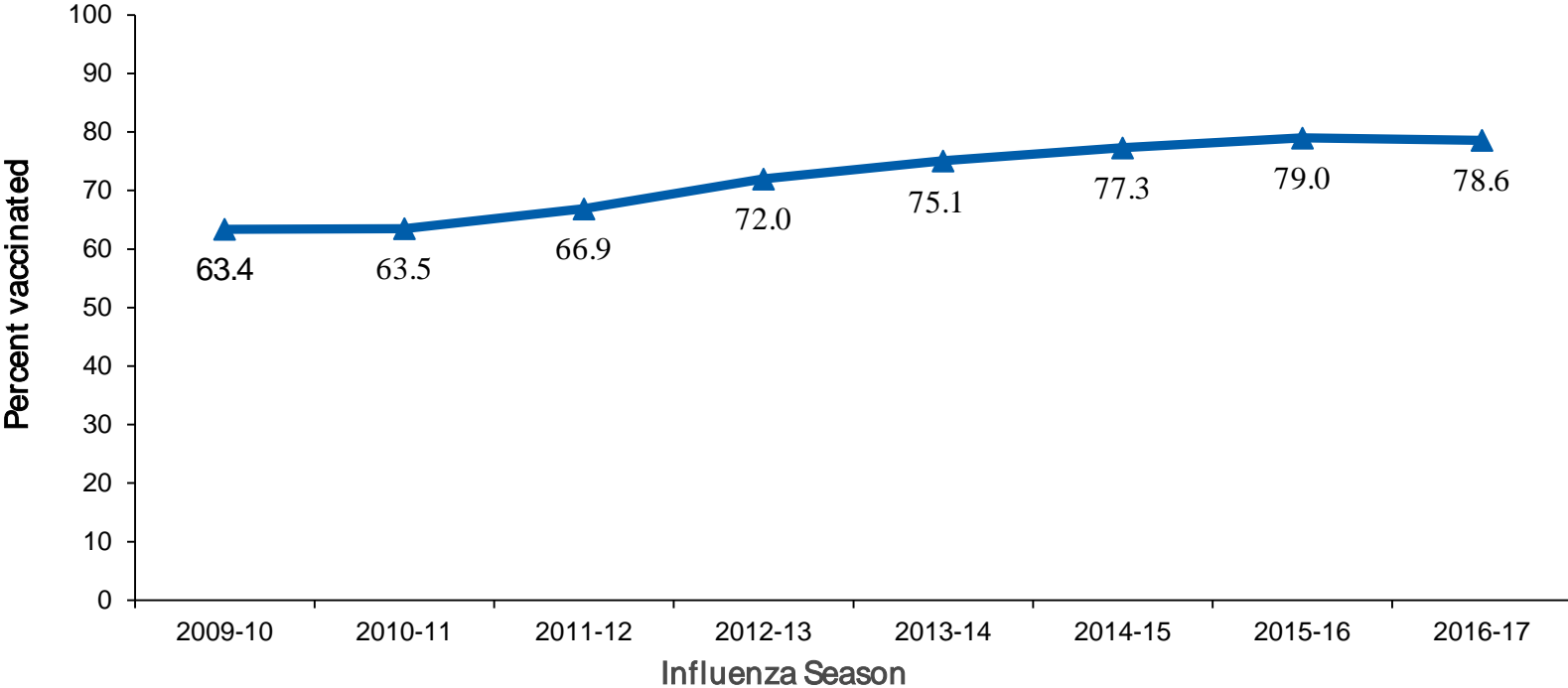
<sup>‡</sup> Confidence interval half-widths.

<sup>§</sup> Statistically significant difference between the 2016–17 season and the 2015–16 season by t-test (P<0.05).

# Influenza Vaccination Coverage Before and During Pregnancy among Women Pregnant Any Time October through January, Internet Panel Survey, United States, 2010–11 through 2016–17 Influenza Seasons



# Influenza Vaccination Coverage Among HCP, Internet Panel Survey, United States, 2009–10 through 2016–17 Influenza Seasons



# Conclusions

- For children overall, influenza vaccination coverage for the 2016–17 season was similar to 2015–16.
  - In 2016–17, a two percentage point increase for children 13–17 years offset a similar decrease among children 5–12 years.
- Adult coverage increased 1.6 percentage points overall.
- For all age groups, except children 6–23 months, coverage remains well below HP2020 targets (70%).
- Coverage among pregnant women (53.6%) and health care personnel (78.6%) in the 2016–17 season was similar to previous seasons.



# Limitations

- **Influenza vaccination status based on parental or self report – recall bias.**
  - Coverage was overestimated.
    - Estimated 149.2 million people vaccinated versus 145.9 million doses distributed.
- **Response rates low – potential nonresponse bias.**
  - NIS-Flu: 50.8–53.1% for landline, 26.2–28.7% for cell phone.
  - BRFSS: 47.4% for Sep–Dec, 45.5% for Jan–Jun.
- **NIS-Flu and BRFSS estimates were combined despite differences in survey methodology.**

## Limitations (2)

- **Full vaccination coverage (2 doses) among children <9 years was not assessed in the NIS-Flu.**
  - IIS sentinel sites might not be representative of the U.S. population.
- **HCP and pregnant women coverage based on non-probability samples.**
  - No statistical tests performed.
  - Might not be representative of the U.S. populations of these groups.

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Additional information available at: <https://www.cdc.gov/flu/fluview/index.htm>

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

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