

Impact of Survey Device on Response to an Early Season Influenza Vaccination Survey

Michael Bostwick,^{1*} Chris Stringer,¹ Jill Dever,¹ Marshica Stanley,¹ Tammy Santibanez,² Anup Srivastav,² Peng-jun Lu,² Walter Williams,² Ying Wang³

¹RTI International, Research Triangle Park, NC; ²Centers for Disease Control and Prevention, Atlanta, GA; ³GfK Custom Research LLC

1. Overview of National Internet Flu Survey (NIFS)

The Centers for Disease Control and Prevention (CDC) in collaboration with RTI International and GfK Custom Research LLC (GfK) implemented the **National Internet Flu Survey¹** (NIFS) in 2014 and 2015 to rapidly measure policy-relevant national early season influenza vaccination coverage estimates among U.S. adults aged ≥18 years.

- Designed to estimate early-season influenza vaccination coverage rates and knowledge, attitudes, behaviors, and barriers (KABB) related to influenza and influenza vaccination in the U.S. adult population.

- NIFS 2014 and NIFS 2015 data collected over a 2-week period, from the end of October to the second week in November, using a 5- to 10-minute web questionnaire.

- Sample drawn from GfK's KnowledgePanel®, a large-scale online panel based on a representative random sample of the U.S. population.²

- Target population is non-institutionalized civilian U.S. adults aged ≥18 years in the U.S. who speak English.

2. Web Surveys and Mobile Devices

- An estimated 7.0% of Americans now rely predominantly on smartphones for Internet access, with reliance higher than the general population among younger adults, non-white adults, and those with lower household incomes and educational levels.³

- Previous studies have found smartphone respondents are more likely to break off from surveys once started⁴ and have longer completion times⁵ when compared with computer respondents.

- NIFS uses mobile optimization to mitigate potential bias from varying respondent device screen sizes and display types.⁶ The software behind NIFS recognizes the respondent's device and renders the layout according to screen size.

- An NIFS survey invitation is sent via email to sampled panel members; respondents can self-select the type of device on which to complete the questionnaire.

- Through collection of paradata, the distribution of devices used for NIFS 2014 and 2015 is shown below, with an increase* in the rate of smartphone response and a decrease in the rate of computer response:

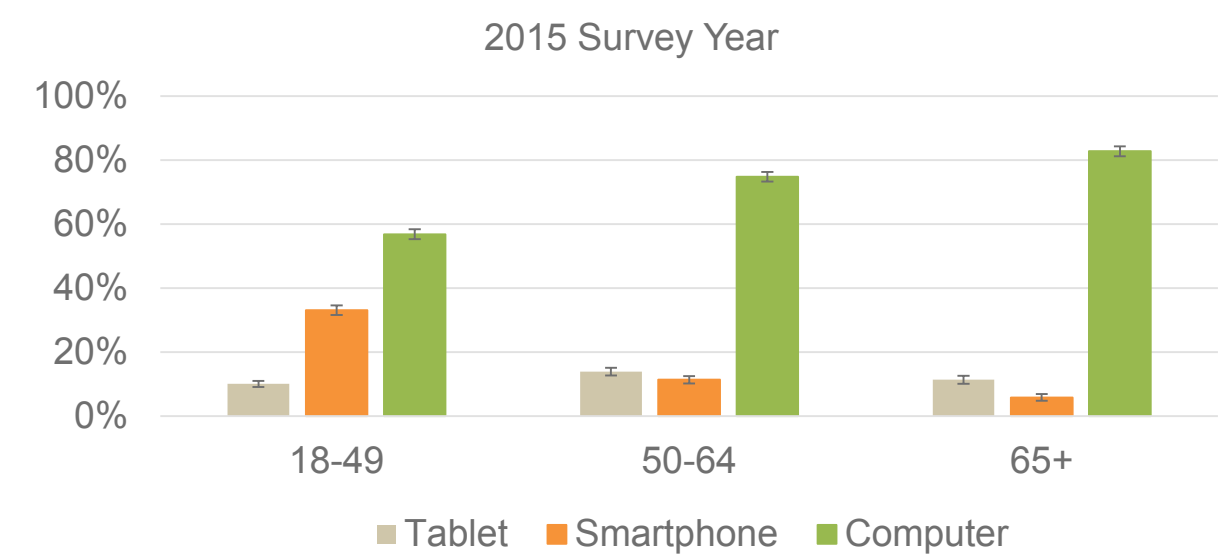
Device Category	Device Type	2014			2015			Change (2014-2015)
		Count	Percent	Overall Percent	Count	Percent	Overall Percent	
Tablet	iPad	302	9.1%	12.5%	268	8.1%	11.8%	→ -0.7%
	Android Tablet	113	3.4%		84	2.5%		
	Kindle Fire Tablet	0	0.0%		33	1.0%		
	Nook Tablet	0	0.0%		1	0.0%		
	Tablet Other	0	0.0%		4	0.1%		
Smartphone	iPhone	147	4.4%	13.0%	267	8.1%	19.4%	↑ 6.4%
	WinPhone	9	0.3%		15	0.5%		
	Android Phone	270	8.1%		346	10.5%		
	BlackBerry	3	0.1%		4	0.1%		
	iPod	4	0.1%		8	0.2%		
Computer	Mac	218	6.6%	73.5%	231	7.0%	68.4%	↓ -5.2%
	ChromeBook	0	0.0%		19	0.6%		
Uncategorized	WinPC	2227	67.0%	68.4%	2007	60.8%	68.4%	
	Other	32	1.0%		14	0.4%		

* Differences referenced throughout the poster were found significant at the 0.05 level using pairwise t-tests in the SUDAAN software.⁷

3. Demographic Characteristics of Respondents by Device Type

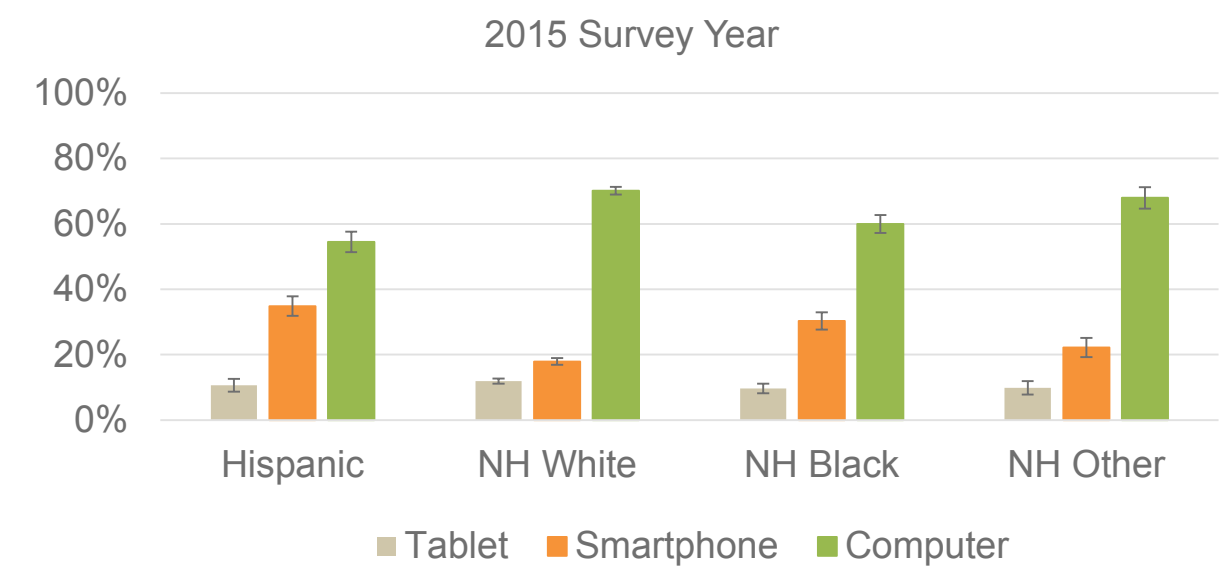
Distributions of NIFS respondent age, race/ethnicity, household income, and education level by device type are similar to previous studies^{8,9} and to general population smartphone ownership estimates.^{3,10}

- Smartphone use was more prevalent among persons aged 18-49 years and computer use was more prevalent among persons aged 65 years and older, while a difference in tablet use was found only between persons aged 18-49 years and persons aged 50-64 years.



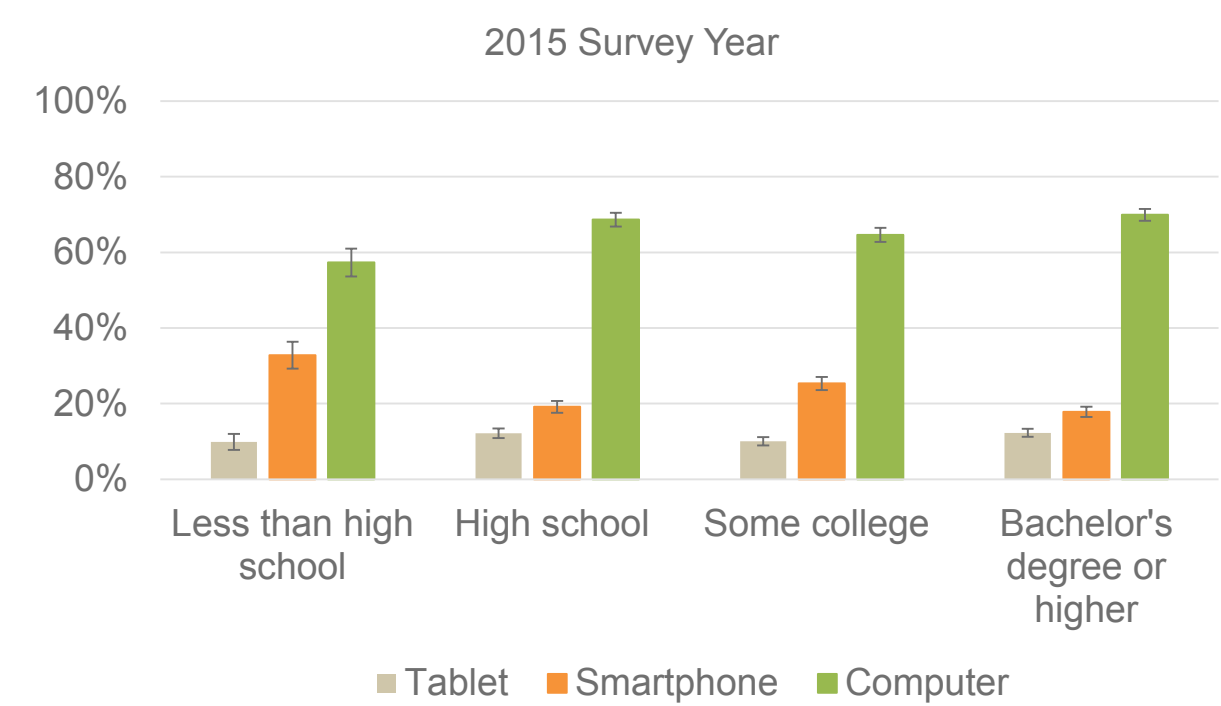
The following findings are presented for 2015 and are similar to findings from 2014:

- Hispanic and non-Hispanic (NH) black respondents responded on smartphones at higher rates than NH white respondents.



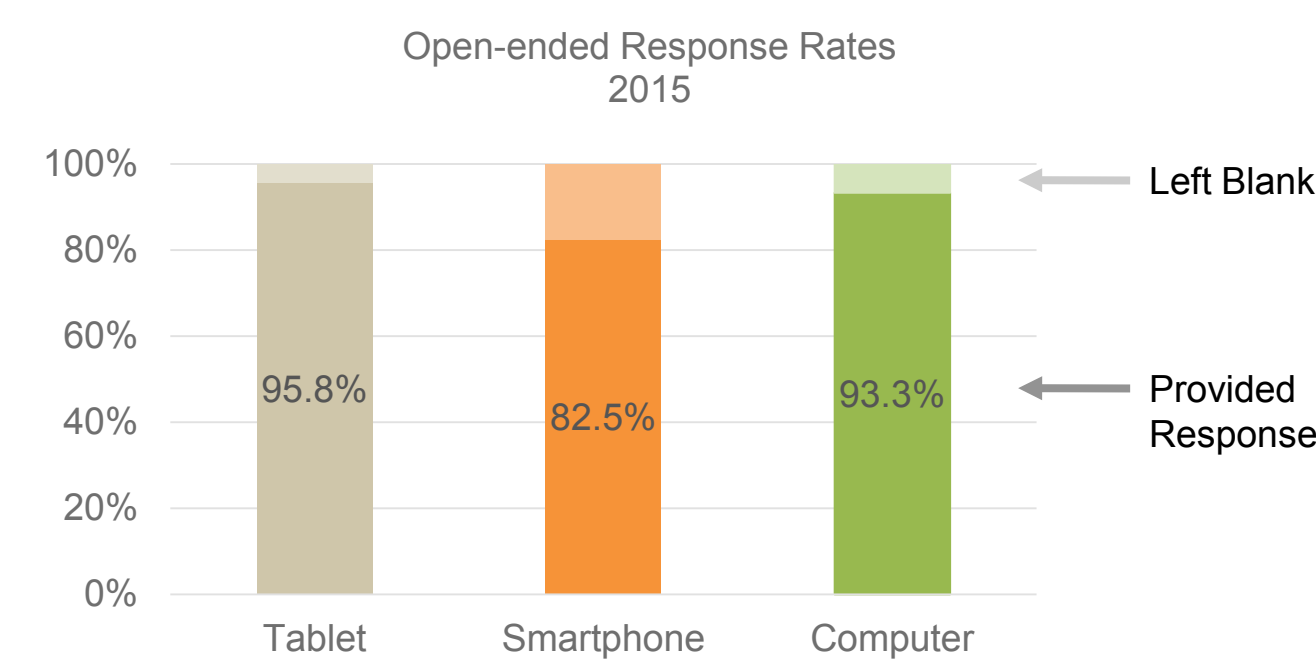
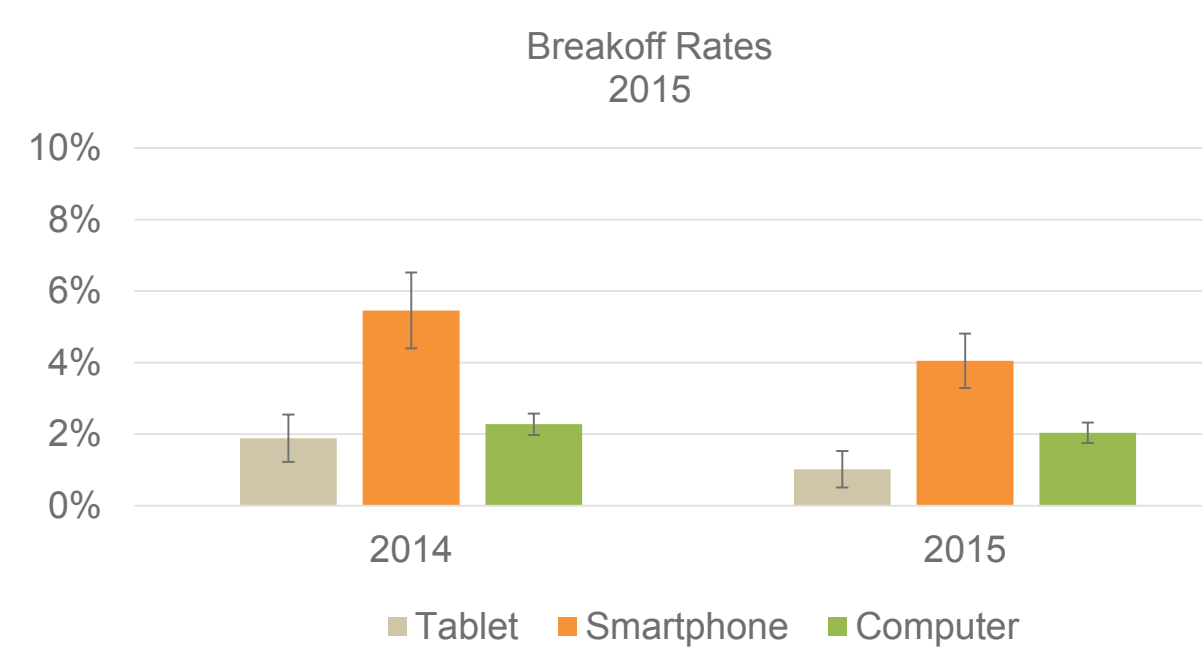
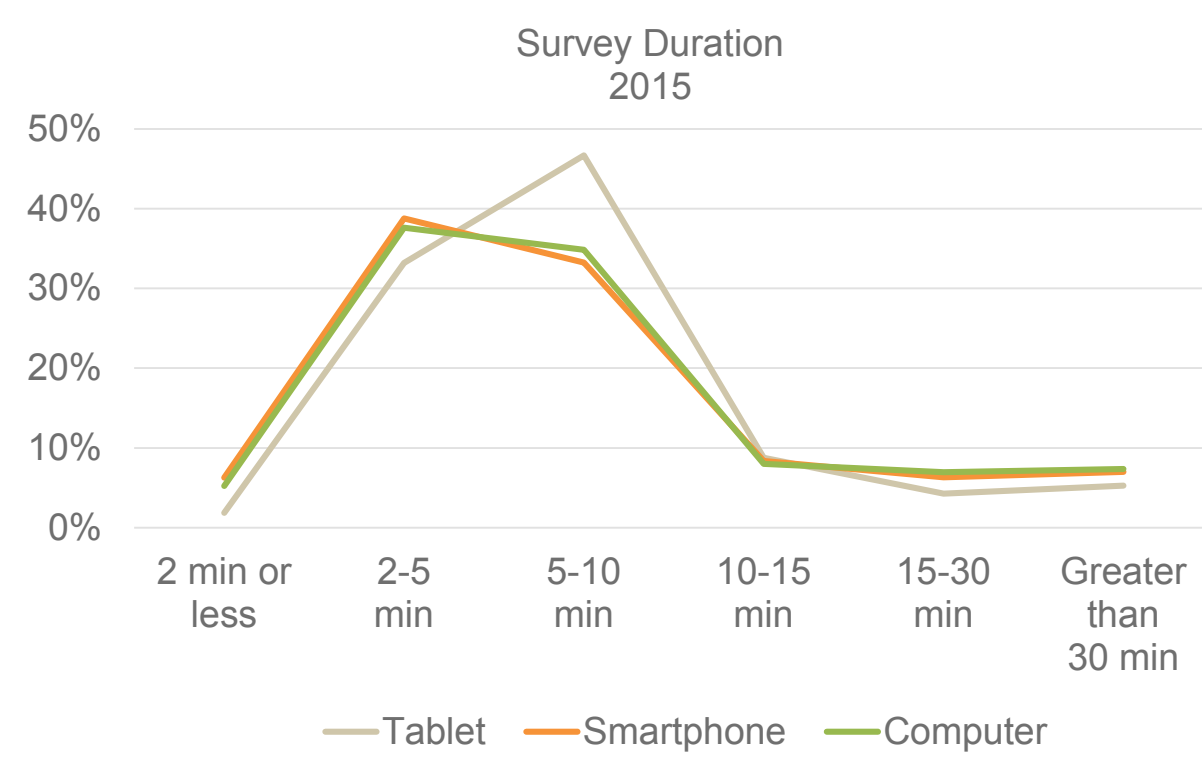
- Respondents in the lowest household income category (<\$35,000) had a smaller percentage of tablet usage than those in the higher income categories.

- Comparison of education levels showed higher rates of smartphone response in the "Less than high school" and "Some college" categories than in the "High school" and "Bachelor's degree or higher" categories.



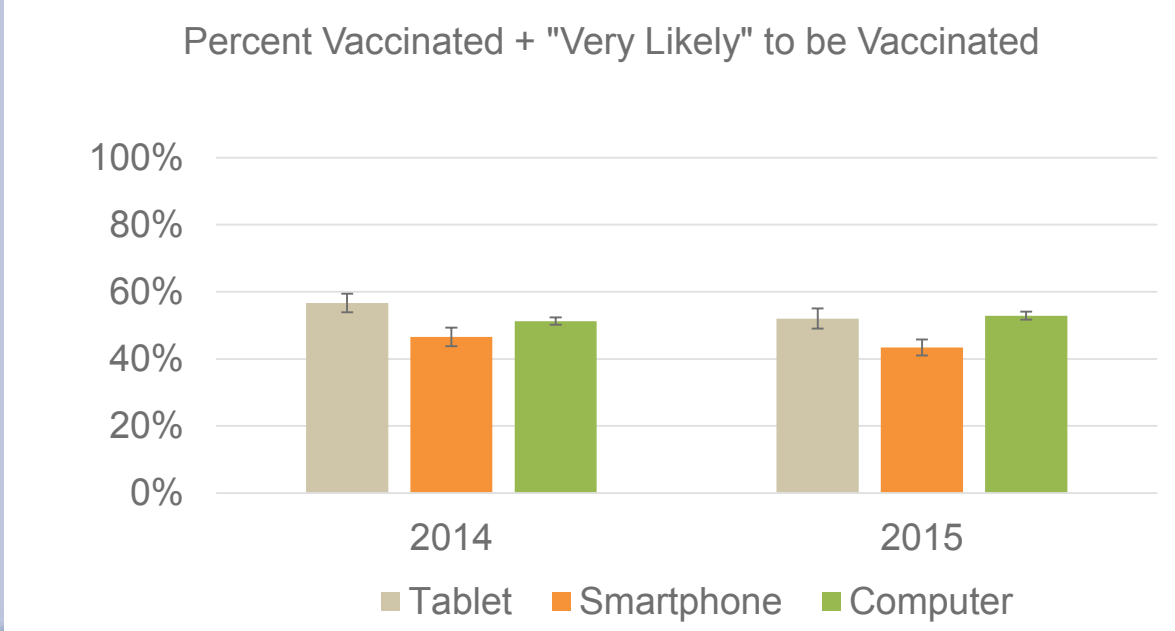
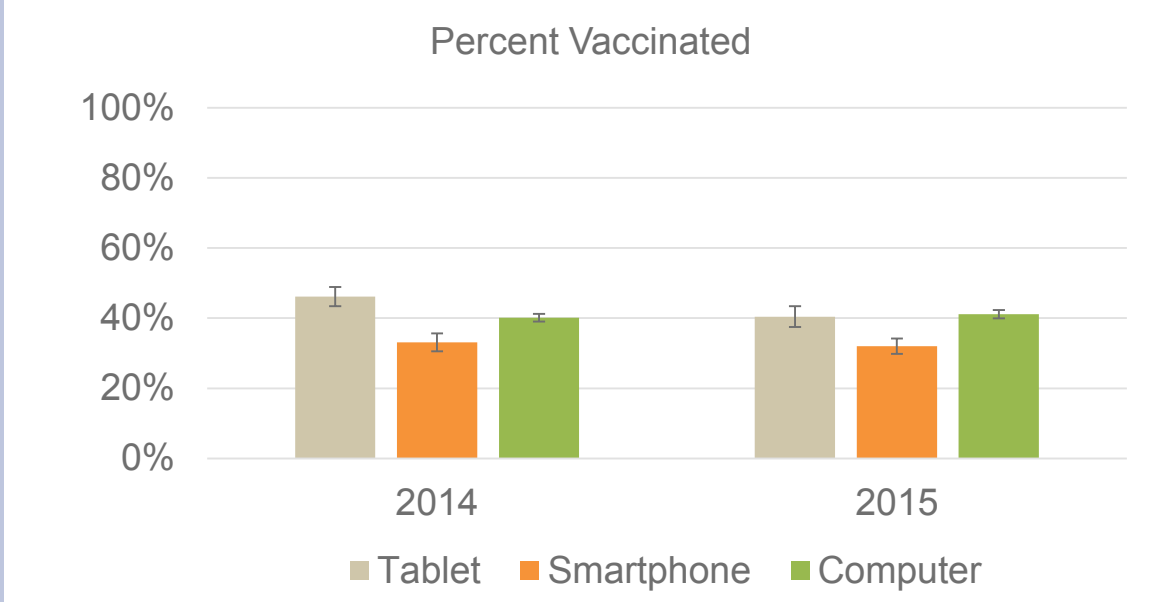
4. Respondent Survey Behavior by Device Type

- Survey duration by device type was similar except for the 2- to 5-minute and 5- to 10-minute time periods.
- There were no differences in median completion time among respondents by device type.
- Smartphone respondents were more likely to break off early from the survey than tablet or computer respondents.
- Smartphone respondents selected "Other – please specify" answer options at a lower rate, 2.0%, compared with tablet or computer respondents, 4.3% and 4.5%, respectively.
- When smartphone respondents did select "Other – please specify" answer options, they provided an actual open-ended response less frequently than tablet and computer respondents.



5. Substantive Outcomes by Device Type

- Smartphone respondents were vaccinated at lower rates than tablet or computer respondents for both 2014 and 2015.
- Similar results were found when examining those vaccinated or "very likely" to be vaccinated for both 2014 and 2015.



- Estimated association of reported vaccination status with device type, controlling for age, race/ethnicity, gender, income, education, and health status, was estimated through a logistic model and is presented below.

Parameter	Wald F-statistic	P value
Overall Model	14.87	<0.0001
Device Category	0.10	0.9039
Age Category	49.38	<0.0001
Race/Ethnicity	0.54	0.6572
Sex	3.14	0.0766
Household Income	0.60	0.6170
Education Category	9.41	<0.0001
High-Risk Medical Condition	21.06	<0.0001

- Once demographics are controlled for, device type is no longer associated with vaccination status.
- Demographic variables found to be significantly associated with vaccination status were age, education, and having a high-risk medical condition.

6. Additional Findings

- After controlling for demographics, we tested and found no significant association between device type and the following other substantive questions:
 - Vaccinated + "Very Likely" to be vaccinated.
 - How effective do you think getting a flu vaccination is in preventing the flu?
 - In general, if you do not get a flu vaccination, what do you think your chances are of getting the flu?
 - How safe do you think the flu vaccine is?

7. Limitations

- Without random assignment by device type we can only control for known variables in our multivariable model and therefore cannot eliminate all known and unknown factors that may be associated with device choice and survey outcomes.
- Optimizing the appearance of the survey content on mobile devices may have limited device effects seen in earlier studies.
- Variability within device type and category in terms of screen size and model year may mask further differences.
- Smaller sample sizes among smartphone respondents limit ability to test detailed cross-tabulations, particularly among those aged ≥65 years.
- Previous work has found NIFS vaccination estimates to differ from those obtained from the Behavioral Risk Factor Surveillance System and National Health Interview Survey for certain demographic subgroups.¹¹

8. Conclusions and Future Work

Conclusions:

- The demographics and behavior of smartphone respondents differ significantly from those of tablet and computer respondents.
- Tablet and computer respondents show similar survey behaviors (breakoff rates, survey length) and similar vaccination behavior (percent vaccinated or very likely to be vaccinated).
- Differences in vaccination rates across device types can be explained by demographic differences.
- Findings suggest that the data quality for open-ended responses on smartphones may not be as high as on tablets and computers.

Future work:

- Further analysis of open-ended responses by device type, including response length and clarity.
- Continued monitoring and analysis of trends in smartphone adoption for online survey taking among general population and respondent device used in future NIFS surveys.

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More Information

*Presenting author: Michael Bostwick

Phone: 919.541.7047

Email: mbostwick@rti.org

RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709

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