



Short communication

Surveying a nationally representative internet-based panel to obtain timely estimates of influenza vaccination rates[☆]

Katherine M. Harris^{a,*}, Matthias Schonlau^b, Nicole Lurie^a

^a RAND Corporation, Arlington, VA, United States

^b RAND Corporation, Pittsburgh, PA, United States

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ABSTRACT

We studied the feasibility of using an internet-based panel survey to obtain timely and accurate population-based data on influenza vaccination. We surveyed a nationally representative sample of US adults ($n=3043$) via the internet about use of influenza vaccination during the 2007–8 influenza vaccination season. We compared the internet-based rates to those from the 2004 and 2008 National Health Interview Surveys (NHIS). The internet-based rates were comparable to those from the NHIS and were obtained in less than six weeks following the end of influenza vaccination season. We conclude that an internet-based approach can yield accurate estimates of end-of-season influenza vaccination rates in time to support improved management of the subsequent season.

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1. Introduction

The federal government's Healthy People 2010 initiative set 10-year targets for increasing influenza vaccination [1]. However, vaccination rates for adults remain well below these targets [2,3]. Progress toward 2010 targets requires improving management of vaccine distribution and administration.

There are many approaches to process improvement [4], but common to all is timely data to identify deficiencies and measure progress toward performance targets. In order to inform ordering and distribution decisions, vaccination rate data should be routinely available soon after the end of influenza vaccination season [5] and include rates for subgroups indicated in ACIP recommendations or for subgroups where there is reason to be concerned about under-vaccination.

Current reporting of influenza vaccination rates from the National Health Interview Survey (NHIS) and the Behavioral Risk Factor Surveillance Survey (BRFSS) is not timely enough, specific enough, or comprehensive enough to support improved management. Because NHIS interviews are conducted throughout the year, annual NHIS estimates released each June based a ques-

tion about influenza vaccine in the prior 12 months refer to the prior two influenza vaccination seasons [6]. NHIS estimates released each September based on interviews conducted during the first quarter of the calendar year may not include vaccines administered in January and early February, so may underestimate coverage [2,7]. Neither NHIS release includes information about high-risk subgroups. Centers for Disease Control and Prevention (CDC) reports vaccination rates from the BRFSS for a variety of clinically and policy-relevant subgroups at the national and state-level. However, these reports occur on an occasional basis [8,9].

To address this data gap, we explore the feasibility of obtaining data on vaccination rates by conducting an internet-based survey using a nationally representative survey panel soon after the end of the 2007–8 influenza vaccination season. Surveys of internet panels can be conducted rapidly because respondents are recruited in advance of the survey, demographic information is already available and all panelists can be surveyed simultaneously.

We assessed feasibility by measuring the timeline required to obtain analyzable data and by assessing accuracy by comparing internet panel estimates to two sources of influenza vaccine rates derived from the NHIS [2,10].

2. Methods

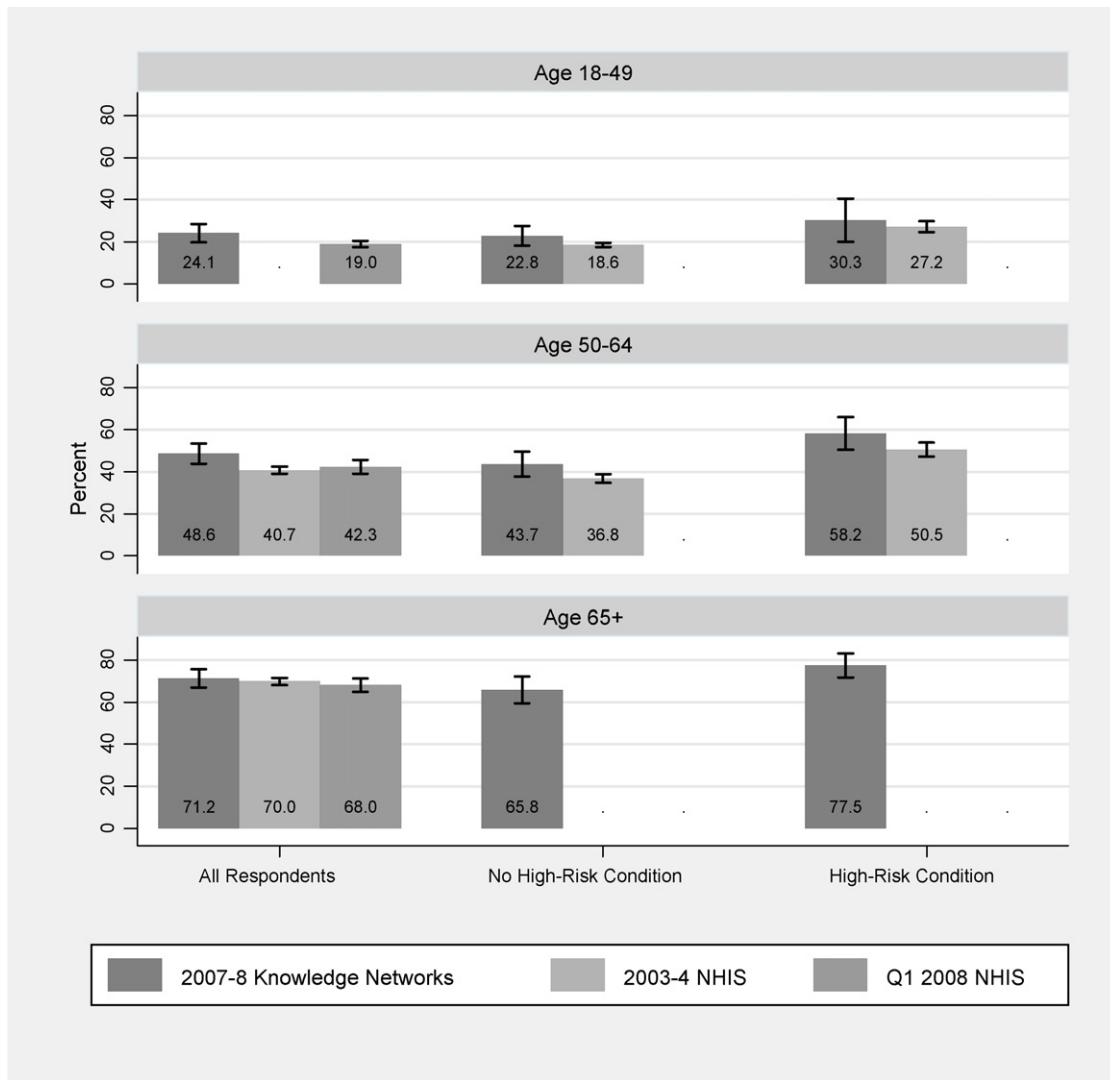
2.1. Survey design

We used the Knowledge Networks survey panel to conduct a nationally representative survey of influenza vaccine

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* Corresponding author at: RAND Corporation, 1200 Hayes Street, Arlington, VA 22202-5050, United States. Tel.: +1 703 413 1100x5466; fax: +1 703 413 8111.

E-mail address: kharris@rand.org (K.M. Harris).



Note: Brackets denote 95% confidence intervals. Lu et al. (2008) did not report NHIS-based coverage estimates for the general population age 18–49 and high-risk and non high-risk individuals age 65 and older. CDC did not report estimates by risk status.

Fig. 1. Influenza vaccination rates from Knowledge Networks and National Health Interview Survey by Risk Status and Age Group. Note: Brackets denote 95% confidence intervals. Lu et al. [10] did not report NHIS-based coverage estimates for the general population age 18–49 and high-risk and non high-risk individuals age 65 and older. CDC did not report estimates by risk status.

use during the 2007–8 influenza vaccination season. Knowledge Networks operates a nationally representative online research panel consisting of roughly 40,000 households. Panelists are initially recruited with known probabilities using random digit dialing. They agree to respond to surveys in exchange for small financial incentives or free internet access. (Additional information about Knowledge Networks can be obtained at <http://www.knowledgenetworks.com/knpanel/index.html>.) Studies using the Knowledge Networks panel have been widely published in the peer-review literature [11–14]. Our survey procedures and questionnaire were approved by the RAND Human Subject Projection Committee.

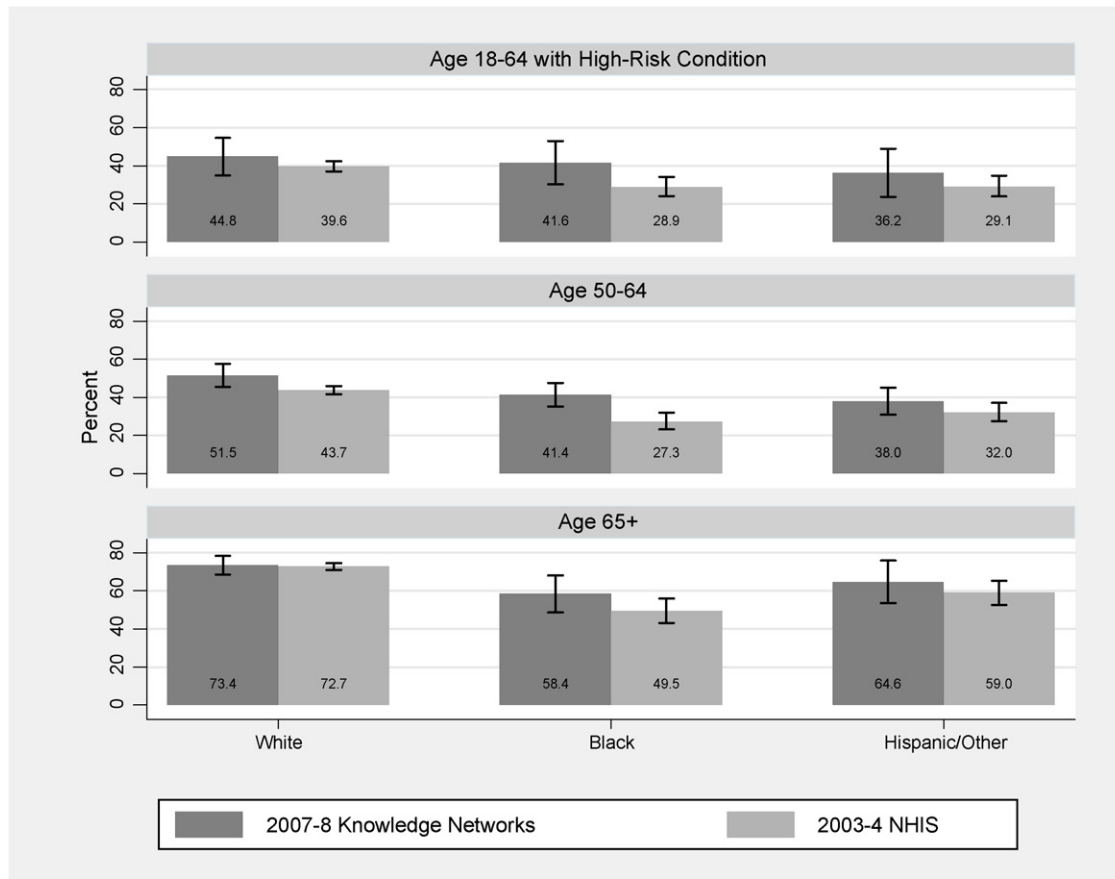
We stratified our sample by age and race and administered it to a random subsample of 4458 panelists 18 years and older. The sample size was designed to obtain coverage estimates with a margin of error of ± 4.0 percentage points for each of three racial categories and ± 2.5 percentage points for each of three age categories.

2.2. Measurement

We measured vaccine use by asking respondents “Did you get a flu vaccine in the last flu season?” Consistent with federal influenza vaccine recommendations [15], we measured risk of influenza complications by asking whether respondents had “ever been diagnosed with any of the following health problems?” These problems included diabetes, heart disease, asthma, chronic lung disease, immune system problems, kidney disease, and blood disorders.

2.3. Analytic approach

We calculated vaccination rates for subgroups defined on the basis of age, high-risk status, and race/ethnicity to be comparable with estimates from the 2004 NHIS reported by Lu et al. [10] and from the first quarter of the 2008 NHIS reported by CDC [2]. We considered influenza vaccination rates reported by Lu et al.



Note: Brackets denote 95% confidence intervals. Lu et al. (2008) reported NHIS estimates for Hispanics only.

Fig. 2. Influenza vaccination rates from Knowledge Networks and National Health Interview Survey by Race and Age Group. Note: Brackets denote 95% confidence intervals. Lu et al. [10] reported NHIS estimates for Hispanics only.

[10] to offer the most appropriate comparison. Lu et al. report estimates for policy-relevant subgroups based on high-risk status and race/ethnicity not included in first quarter estimates published by CDC. Estimates reported by Lu et al. also refer more specifically to the 2003–4 influenza vaccination season spanning September 2003 through January 2004 because they are based on responses about vaccination in the past 12 months obtained from interviews conducted during the seven month period between February and August 2004. The fact that influenza vaccination rates have remained stable between 2003 and the present, with the exception of those measured during the influenza vaccine shortage during the 2004–5 season [2], makes it reasonable to compare estimates from the 2004 NHIS to estimates derived from our Knowledge Networks survey. Estimates from the first quarter of 2008 reported September 2008 were the most recent available at the time this study was conducted [2]. However, first quarter may understate influenza vaccination rates because individuals interviewed in early January they are subsequently vaccinated later in the month.

We considered Knowledge Network and NHIS estimates to be comparable when the 95 percent confidence interval surrounding the Knowledge Network estimates included NHIS-based point estimates. All analyses were conducted using STATA 9.0. Sampling weights were used to correct for oversampling (e.g., Hispanics, Blacks, phone numbers that can be matched to an address, oversampling of large states). They also reflect a post stratification adjustment to the most recent Current Population Survey to adjust to the correct marginal distributions of age, gender,

race/ethnicity, educational attainment, geographic distribution, and internet access.

3. Results

3.1. Response rate and timeliness

After a two-week pilot test, the survey was fielded over a three and a half week period between February 14th and March 10th 2008. The survey yielded 3043 completed surveys for an overall response rate of 68 percent of invited panel members. Knowledge Network provided analyzable data to the project team electronically 3 days after the survey closed.

3.2. Vaccination rates

Overall, 37.6% (95% CI: 34.5–40.7%) of adults 18 and older were vaccinated against influenza during the 2007–8 season. Among high-risk individuals between the ages of 18 and 64, 42.4% (95% CI: 35.3–49.5%) reported being vaccinated, compared to the 2010 target of 60%; among those age 65 and over, 71.2% (95% CI: 66.9–75.5%) reported having been vaccinated compared to the 2010 target of 90%. Reported vaccination rates were higher for individuals 18 and older at risk of influenza complications 52.5% (95% CI: 46.8–58.2%) ($p < 0.001$) compared to their counterparts not at risk 32.3% (95% CI: 28.7–36.0%). In the general population of adults, vaccination rates were higher ($p = .002$) for whites (40.8%, 95% CI: 36.8–44.9) than for both blacks (32.1%, 95% CI: 26.3–37.9) and Hispanics/others (29.4%,

95% CI: 23.6–35.1%). Likewise, among adults 18 and older with high-risk conditions, vaccination rates were higher ($p=0.84$) among whites (56.5, 95% CI: 48.9–64.0) than for both blacks (46.8, 95% CI: 36.8–56.8) and Hispanics/others (41.9, 95% CI: 30.9–53.0).

3.3. Comparisons to the NHIS-based estimates

Overall, vaccination rates obtained from Knowledge Network panelists mirror those from the 2004 NHIS and the first quarter 2008 NHIS. Vaccination rates from all three sources were higher among those who were older, high-risk, and white (See Figs. 1 and 2). While the 2007–8 Knowledge Network estimates were uniformly higher than the NHIS-based estimates, the Knowledge Network 95% confidence intervals included 14 of the 18 NHIS-based point estimates shown in Figs. 1 and 2. Knowledge Network estimates were within 6 percentage points of the first quarter 2008 NHIS estimates for all adults age 18–49, 50–64, and 65 and older (See Fig. 1). Knowledge Network estimates were within 6 percentage points of the 2003–4 NHIS estimate for individuals age 18–49 with and without high-risk conditions, whites age 18–64 with high-risk conditions (See Fig. 1), whites age 65 and older, and Hispanics/others age 65 and older (See Fig. 2). The gap between the 2007–8 Knowledge Network estimates and 2004–5 NHIS estimates is largest for blacks, differing by 13.3 percentage points for those with high-risk conditions, by 14.1 percentage points for those age 50–64, and 8.9 percentage points for those age 65 and older.

4. Discussion

Our results demonstrate that it is possible, through the use of an internet-based survey panel, to obtain national influenza vaccination rate estimates that are comparable to a large, national health survey and available to analyze within 6 weeks following the end of influenza vaccination season. It may be possible to obtain analyzable data as early as 1 month after the end of influenza vaccination season with the elimination or acceleration of pilot testing. This approach could potentially be useful in obtaining national-level coverage estimates during the middle of influenza season in time to inform resource planning issues surrounding the promotion and administration of late-season vaccination.

Even if the reporting of federal data were accelerated, an internet-based survey designed especially for measuring influenza vaccination may be uniquely informative. Such a survey can be rapidly modified to accommodate questions about emerging topics (e.g., vaccination in non-traditional settings) or key subgroups (e.g., young adults or health care workers). Rapid modifications of large, multipurpose surveys, like the NHIS or the Behavioral Risk Factor Surveillance Survey, can be difficult to implement because questionnaire changes must be made according to established procedures and require reducing time spent on other topics [16].

The Knowledge Networks rates generally reflected the same patterns in vaccination rates across subgroups obtained from the NHIS. Nonetheless, the Knowledge Networks rates were uniformly higher after weighting to the US population. Potential explanations for these differences include differences in the methodologies used by Knowledge Networks and CDC including sampling design (RDD vs. area probability sample), questionnaire administration (internet vs.

face-to-face interview), questionnaire content (focus on influenza vaccination vs. multipurpose) and subtle differences in the wording of questions.

In summary, timely data on influenza vaccine coverage rates is required to achieve substantial increases the recommended use of influenza vaccine, particularly among minority populations and high-risk individuals. Our study showed that internet-based surveys can provide national data coverage rates for key subgroups in time to implement mid-course changes in the planned management of the upcoming flu season.

Acknowledgement

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