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Rationale, Procedures, and Response Rates for the 2015 Administration of NCI's Health Information National Trends Survey: HINTS-FDA 2015

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Abstract

The National Cancer Institute (NCI) developed the Health Information National Trends Survey (HINTS) to monitor population trends in cancer communication practices, information preferences, health risk behaviors, attitudes, and cancer knowledge. The U.S. Food and Drug Administration (FDA) recognized HINTS as a unique data resource for informing its health communication endeavors and partnered with NCI to field HINTS-FDA 2015. HINTS-FDA 2015 was a self-administered paper instrument sent by mail May 29 to September 8, 2015, using a random probability-based sample of U.S. postal addresses stratified by county-level smoking rates, with an oversampling of high and medium-high smoking strata to increase the yield of current smokers responding to the survey. The response rate for HINTS-FDA 2015 was 33% (N = 3,738). The yield of current smokers (n = 495) was lower than expected, but the sampling strategy achieved the goal of obtaining more former smokers (n = 1,132). Public-use HINTS-FDA 2015 data and supporting documentation have been available for download and secondary data analyses

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since June 2016 at http://hints.cancer.gov. NCI and FDA encourage the use of HINTS-FDA for health communication research and practice related to tobacco-related communications, public knowledge, and behaviors as well as beliefs and actions related to medical products and dietary supplements.

The National Cancer Institute (NCI) developed the Health Information National Trends Survey (HINTS) program in response to recommendations from an external steering committee to monitor population trends in cancer communication practices, information preferences, risk behaviors, attitudes, and cancer knowledge. The HINTS program, referenced as a leading source of data on cancer communication by federal and academic entities, provides unique population data on changing patterns, needs, and information opportunities in health; identifies changing health communication trends and practices; assesses cancer information access and usage; and provides information about how cancer risks are perceived.

The HINTS program is specifically designed to address health communication issues that have not been adequately studied through other national data collection efforts. The need for communication surveillance has been heightened by trends unanticipated when HINTS began. These trends include investment through the Health Information Technology for Economic and Clinical Health Act (Blumenthal & Tavenner, 2010) to increase adoption of health information technologies; the emergence of participative, social media (Chou, Hunt, Beckjord, Moser, & Hesse, 2009; Prestin, Vieux, & Chou, 2015); the recent ascendancy of mobile connected health technologies (Hesse, Greenberg, & Rutten, 2016); and a disquieting trend from the HINTS data showing an increase in confusion over recommendations for preventing and controlling cancer (Befort, Nazir, Engelman, & Choi, 2013; Ramirez et al., 2013).

The development and communication of messages about cancer prevention, detection, diagnosis, treatment, and survivorship require comprehensive understanding of individuals' access to cancer-related information, perceived trust in information sources, and cancer- and health-related knowledge and factors that facilitate or hinder communication and resultant health behaviors. HINTS provides data to inform decisions about topics and methods of information dissemination by the national cancer program, public health agencies, and the research community as well as to monitor the impact of cancer information in the public information environment. The purpose of funding a nationally representative, probability-based survey to assess health communication processes has been to provide behavioral and communication scientists with population estimates of the prevalence of cancer-relevant knowledge, attitudes, and information-seeking practices and health behaviors in the U. S. adult population.

A Brief History of HINTS Data Collection Efforts

An abbreviated description of HINTS data collections from 2003 to 2015 can be found in Table 1, including an overview of the 2015 administration, HINTS-FDA, which is further described in this article.

As of early 2016, the HINTS program had more than 3,300 registered data users and more than 280 peer-reviewed publications and books in addition to more than 35 technical reports and HINTS briefs. At least six communities have used or adapted HINTS for local data collection efforts (HINTS Hualapai 2008, HINTS Puerto Rico 2009, Hong Kong Family HINTS 2011, HINTS China 2012, HINTS Appalachia 2011–2013, HINTS Guam 2013), though NCI was involved in facilitating only two of those endeavors (HINTS Puerto Rico and HINTS Appalachia) and therefore could not offer public access to data from the remaining endeavors as addenda to the national sample.

Within the U.S. Department of Health and Human Services, the Office of Disease Prevention and Health Promotion and the Office of the National Coordinator for Health Information Technology rely on HINTS as a data source to assess progress on several health communication and health information technology objectives for Healthy People 2020 as well as to monitor changes in the adoption of health information technology as stimulated by the Health Information Technology for Economic and Clinical Health Act of 2009. In addition to the Office of the National Coordinator for Health Information Technology and Office of Disease Prevention and Health Promotion, other federal agencies and nongovernmental organizations that have contributed either funding or items to the HINTS program over the years include the Centers for Disease Control and Prevention (CDC), the U.S. Food and Drug Administration (FDA), and the Patient-Centered Outcomes Research Institute (PCORI). Further details about past HINTS administrations have been published elsewhere (Finney Rutten et al., 2012; Nelson et al., 2004).

Rationale: HINTS-FDA

FDA recognized HINTS as a unique data source for informing its health communication endeavors and partnered with NCI to field HINTS-FDA in 2015. Three offices and centers within FDA partnered with NCI to create a HINTS survey (HINTS-FDA 2015) to assess tobacco-related communications, public knowledge, and behaviors, and beliefs and actions related to medical products and dietary supplements. FDA’s Center for Food Safety and Applied Nutrition will use the data to examine how consumers understand the nature of cancer and certain cancer-related labeling statements that may appear on dietary supplement products. The FDA Office of the Commissioner will provide results from the data to appropriate centers to learn more regarding consumers’ attitudes about how they wish to deal with recalls and product warnings. For the tobacco-relevant items, FDA’s Center for Tobacco Products has specific plans to use the data to meet its mandate from the Family Smoking Prevention and Tobacco Control Act to regulate the manufacturing, marketing, and distribution of tobacco products in the United States. This includes the authority in the Family Smoking Prevention and Tobacco Control Act to regulate cigarettes, cigarette tobacco, roll-your-own tobacco, and smokeless tobacco. And through its recently asserted deeming of jurisdiction, FDA also has asserted the authority to regulate all products that meet the statutory definition of tobacco products, including electronic cigarettes, hookah tobacco, cigars, pipes, and other products—a foundational step that will allow FDA the authority for future rule making related to these products (U.S. FDA, 2016). Included in its authorities are some of the most significant changes to U.S. tobacco labeling in almost 30 years: graphic health warnings for cigarettes; new warnings for smokeless tobacco products;

new warnings on electronic cigarettes, cigars, and hookah; and restrictions on the use of modified risk claims (such as “light” cigarettes) without authorization (Andrews, Choiniere, & Portnoy, 2015; Ashley & Backinger, 2012; Husten & Deyton, 2013).

Methods

HINTS-FDA 2015 was approved by the Office of Management and Budget in April 2015 (Office of Management and Budget No. 0925–0538). HINTS-FDA 2015 was deemed exempt by the National Institutes of Health’s Office of Human Subjects Research in June 2014 and was approved by the main contractor’s (Westat, Inc.’s) institutional review board in July 2014.

Instrument Development

Priority constructs for HINTS-FDA included medical devices; communications related to product recalls; labeling statements on dietary supplements; knowledge of cancer and cancer risk perceptions; and topics to inform FDA’s regulatory authority over tobacco, such as risk perceptions about new tobacco products, perceptions of product harm, and tobacco product claims and labels. By utilizing the protocol developed for HINTS 4, that is, a paper-based survey instrument mailed to sampled households through a postal frame, HINTS-FDA maximized opportunities to display images of tobacco products and to measure knowledge, attitudes, beliefs, and intentions about these products. The instrument included the HINTS communication core, which is a battery of items consistently used in HINTS administrations, related to media use and attention and Internet access and usage.

Both English and Spanish instruments underwent several rounds of cognitive testing from December 2013 through March 2014 with 30 total participants purposively recruited by Westat, Inc. (20 English interviews, 10 Spanish interviews). Processes and results of cognitive testing for some of the HINTS-FDA tobacco items will be published elsewhere (Kaufman et al., 2016). The final HINTS-FDA 2015 instrument is available at http://hints.cancer.gov/docs/Instruments/HINTS_FDA_English_Annotated_Survey.pdf.

Sampling Procedures

The HINTS target population is the civilian noninstitutionalized population of adults ages 18 or older in the United States. Because of the unique nature of the HINTS-FDA instrument and the specific goals of FDA, the regular sampling strategy of HINTS was altered in an effort to include more current and former smokers in the study. Through the use of county-level smoking rates obtained from the 2003 Behavioral Risk Factor Surveillance System (BRFSS; Inter-University Consortium for Political and Social Research, 2013), addresses were grouped into four sampling strata of high, medium-high, medium-low, and low smoking rates (high ≥25.1%, medium-high = 21.2%–25.0%, medium-low = 15.0%–21.1%, and low <15.0%). The 2003 county-level smoking rates (the most recent year for which county-level smoking estimates were available nationwide) were adjusted by the ratio of 2011 state-level BRFSS smoking rates so that when county rates were aggregated to the state level they would be in agreement with the 2011 BRFSS state-level smoking estimates.

The high and the medium-high strata were then oversampled in an attempt to increase the yield of current smokers responding to HINTS-FDA.

An equal probability sample of residential addresses was selected from within each explicit sampling stratum. The sampling frame of addresses was obtained from the Marketing Systems Group and consisted of residential addresses based on the U.S. Postal Service Computerized Delivery Sequence File. The total number of addresses selected for HINTS-FDA was 13,001: 3,566 from the high smoking stratum, 3,831 from the medium-high smoking stratum, 4,693 from the medium-low smoking stratum, and 911 from the low smoking stratum. Relative to a proportional design, the high and medium-high smoking strata were oversampled by 60% and 20%, respectively, whereas the medium-low and low smoking strata were undersampled by 20% and 47%, respectively.

In an effort to recruit Spanish-speaking households by identifying addresses for which Spanish-language materials may be needed, addresses were flagged in three ways: if they were located in linguistically isolated areas (as identified by the U.S. Census Bureau), if the household was associated with a Hispanic surname according to auxiliary frame data, and by respondent request if Spanish-language materials were sent to respondents who called Westat to request them.

Data Collection

HINTS-FDA was a self-administered paper instrument sent by mail May 29 through September 8, 2015, to a random sample of U.S. postal addresses. Because the sample was of households rather than individuals, all mailings were addressed to “Resident.” Sampled households were sent a $2 prepaid monetary incentive to encourage participation. Including prepaid monetary incentives is an established method of increasing participation in surveys (Mercer, Caporaso, Cantor, & Townsend, 2015). The HINTS-FDA sample used a similar sample design as past HINTS administrations: a two-stage design wherein a sample of addresses was selected from a file of residential addresses in the first stage and one adult was selected from within each sampled household in the second stage. Consistent with prior HINTS administrations, data collection for HINTS-FDA used the next birthday method (Salmon & Nichols, 1983) to select one adult respondent in the household. Directions were included on the survey instrument instructing household members on how to select the survey respondent following this method.

The mailing protocol followed a modified Dillman (Dillman, Smyth, & Christian, 2009) approach with a total of four mailings: an initial mailing, a reminder postcard, and two follow-up mailings. Because the appropriate survey respondent from within the household had not yet been identified by household members, all survey mailings and reminders were addressed to “Resident.” All households in the sample received the first mailing and reminder postcard, and only nonresponding households received the subsequent survey mailings. Most households received one survey per mailing (in English), although households that were flagged as potentially Spanish speaking received two surveys per mailing (one English and one Spanish).

Two toll-free telephone numbers were provided to respondents in each mailing—one was used for English calls and one was used for Spanish calls. Callers stating that they did not want to participate in the study were coded as “refusal” and removed from any subsequent mailings. The two toll-free lines together received 34 calls throughout the HINTS-FDA field period. One third (32%) of the in-bound calls were to request Spanish materials. A total of 16 calls were not resolved because the study representatives were never able to reach the respondent after he or she had left a message on the study voicemail.

Imputation

After being processed, each returned questionnaire was scanned, verified, and cleaned. Imputation procedures were conducted on some items using the following rationale and procedures. Hot-deck imputation (Andridge & Little, 2010) was used to replace missing responses with imputed data for age, sex, educational attainment, marital status, race, ethnicity, and health insurance coverage. These are the same items that were used in the raking procedure of the HINTS-FDA weighting process. Hot-deck imputation is a data processing procedure in which a case with a missing value for a specific variable is assigned the corresponding value of a similar case in the same imputation class. The data record that supplies the imputed value is referred to as the *donor*. In a hot-deck approach, the resulting distribution preserves the distribution of values observed for respondents in the sample. Imputation classes are defined on the basis of variables that are thought to be correlated with the item with missing values. A donor is then randomly selected within an imputation class to supply the imputed value. For the public-use data set, an imputed income variable also was added for use in data analysis.

For four variables featuring a mark-only-one response instruction, imputation was carried out for the questionnaires on which multiple responses were recorded. Those variables assessed channels from which respondents had most recently sought health information (WhereSeekHealthInfo); the type of information sought about electronic cigarettes (ECigInfoSeek); the size of cigars, cigarillos, or little filtered cigars usually smoked (SizeCigarsSmoked); and sexual orientation (SexualOrientation). Responses where a missing value of −5 (multiple responses selected) was applied were imputed. This occurred for 365 respondents for WhereSeekHealthInfo, 61 respondents for ECigInfoSeek, one respondent for SizeCigarsSmoked, and three respondents for SexualOrientation. A respondent’s multiple answers were replaced with a single imputed answer that had the same distribution over the multiple answers as occurred in the single-answer responses.

Weighting and Variance Estimation

Every sampled adult who completed a questionnaire in HINTS-FDA received a full-sample weight and a set of 50 replicate weights. The full-sample weight is the weight that is used to calculate population and subpopulation estimates from the data collected in HINTS-FDA. Replicate weights are used to compute standard errors for these estimates to account for the complex sampling design. The name of the final full-sample weight variable in HINTS-FDA is PERSON_FINWT0, and the name of the 50 replicate weight variables are PERSON_FINWT1–PERSON_FINWT50.

The weighting process encompasses the procedures used to create the final full-sample and replicate weights for the survey respondents. The weights were designed to reflect adults ages 18 or older in the civilian noninstitutionalized population of the United States when summed. The use of sampling and replicate weights ensures valid inferences and variance estimates from the responding sample to the target population, correcting, to the extent possible, for nonresponse and noncoverage biases. The replicate weights were calculated for variance estimation using the delete one jackknife replication method. Computing the full-sample and replicate weights for HINTS-FDA consisted of the following steps: calculating household-level base weights, adjusting for household nonresponse, calculating person-level initial weights, and calibrating the person-level weights to population counts from the 2014 U.S. Census Bureau's American Community Survey (also known as *control totals*).

More details on sampling and weighting can be found in the HINTS-FDA methodology report, which was released with the public-use data set at http://hints.cancer.gov.

Results

Sample Size and Response Rate

The final response rate for HINTS-FDA was 33%, with a sample of 3,738 respondents. Response rates were calculated using the RR2 formula of the American Association of Public Opinion Research. Sample characteristics can be found in Table 2. The response rate for HINTS-FDA was comparable to previous postal administrations of HINTS. Response rates have ranged from 31% in 2008 to 40% in 2012, with response rates for other data collection years falling within that range.

Oversampling Smokers

The stratification by smoking rate was found to be effective in identifying areas with high smoking rates; however, the number of smokers was less than what had been expected from the predictions when designing the sample. The expectation was that the sample would yield 654 smokers, but the actual number was 495. The shortfall was due to two unexpected results. The first was that the estimated smoking rates by stratum (see Table 3) differed somewhat from predictions. In particular, the medium-low smoking stratum was found to have a current smoking rate of only 10%, which was well below the 15%–21.1% that was predicted for the stratum based on the BRFSS data used to define it. Note that the design did yield the expected number of former smokers (n = 1,132) and maintained efficiency under a complex sample design. The second reason for the shortfall was that the response rate was slightly lower than expected (2 percentage points) and undeliverable rates were higher in certain strata than expected. The higher undeliverable rate was most evident in the high smoking stratum, and the higher undeliverable rates led to a lower sample yield. The combination of the response rate and undeliverable rates resulted in fewer households responding to the survey, thus yielding fewer current smokers. Despite this shortfall, we contend that the overall advantage of using small area estimates to form the strata made it the most efficient sampling strategy; however, the use of BRFSS data that were more than 10 years old reduced the effectiveness of the design. The combination of the declines since 2003 in the percentage of the population that are current smokers and the date of the

stratification information reduced the effectiveness of the oversampling strategy. This is evident from the fact that the design was very accurate when predicting lifetime smokers but missed the predictions for those who were current smokers. Our results indicate that when faced with a similar choice of using outdated local data versus less direct, but more up-to-date, stratification variables (e.g., correlates of smoking), it may not make much of a difference. However, if more recent local data were available, we would recommend using the more direct measures of smoking as the main stratification variable, as we attempted to do in this study.

The shortfall in the response rate and mail delivery rates are also resource considerations. As with any survey endeavor, the response rate could be increased if more resources were available. For example, a larger incentive or an extra mailing could be administered, or a reserve sample could be released, even targeting certain strata, if the number of current smokers was not at the desired level early in the recruitment process. Each of these options would lead to a higher yield of current smokers in terms of absolute numbers but also has costs in terms of time and money. Similarly, the undeliverable rate could be monitored as data collection proceeds. If it is higher than expected, a supplemental sample could be released. This too would require more resources to conduct the mailing as well as additional time to complete the data collection.

Conclusion

HINTS is a unique data collection vehicle that uses probability methods to produce national estimates for health communication–related constructs and variables. HINTS-FDA 2015 focused on communication aspects of tobacco product use, beliefs, and knowledge, and beliefs and behaviors related to medical devices and dietary supplements.

Following the HINTS program's commitment to open data, HINTS-FDA data, supporting documentation, and the full methodology report have been available for public use as of June 2016 at http://hints.cancer.gov. The website also includes HINTS-FDA data as part of its online codebook, where users can see topline estimates for each HINTS item. NCI and FDA encourage secondary data analyses using HINTS-FDA.

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Table 1

Data collection history, HINTS, 2003–2015.

Administration (year)	Data collection period	Mode	*N*	Response rate
HINTS 1 (2003)	October 2002–April 2003	RDD	6,369	33%
HINTS 2 (2005)	February 2005–August 2005	RDD (plus a methodological experiment to allow a portion of the sample to complete the survey online)	5,586	21%
HINTS 3 (2008)	January 2008–April 2008	Postal and RDD	3,582 (mail), 4,092 (RDD)	30.9% (mail), 24.2% (RDD)
HINTS Puerto Rico (2009)	April 2009–June 2009	RDD	639	76%
HINTS 4 Cycle 1 (2011–2012)	October 2011–February 2012	Postal	3,565	37.91%
HINTS 4 Cycle 2 (2012–2013)	October 2012–January 2013	Postal	3,630	39.97%
HINTS 4 Cycle 3 (2013)	September 2013–November 2013	Postal	3,185	35.19%
HINTS 4 Cycle 4 (2014)	August 2014–November 2014	Postal	3,677	34.44%
HINTS-FDA (2015)	May 2015–Sept 2015	Postal	3,738	33.04%

Note. HINTS = Health Information National Trends Survey; RDD = random-digit dialing; FDA = Food and Drug Administration.

Table 2

Sample characteristics (unweighted frequencies and weighted percentages), HINTS-FDA 2015 (N = 3,738).

Characteristic	*n* (weighted %)
Sampling stratum (county smoking rate)	
High smoking rate	1,038 (10.33)
Medium-high smoking rate	1,059 (29.48)
Medium-low smoking rate	1,367 (45.65)
Low smoking rate	274 (14.55)
Age	
18–29	256 (20.01)
30–44	627 (25.57)
45–59	1,044 (25.82)
60–74	1,169 (17.81)
75+	532 (7.94)
Refused or missing	110 (2.85)
Sex	
Female	2,018 (48.17)
Male	1,497 (46.46)
Refused or missing	223 (5.37)
Ethnicity	
Not Hispanic	3,177 (78.54)
Hispanic	241[a] (14.81)
Mexican	94 (7.85)
Puerto Rican	30 (1.50)
Cuban	16 (0.55)
Other Hispanic/multiple Hispanic	101 (4.91)
Refused or missing	320 (6.65)
Race	
Black	326 (13.60)
American Indian or Alaska Native	131 (2.38)
Asian (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian)	152 (6.14)
Native Hawaiian, Guamanian or Chamorro,	19 (1.37)
Samoan, other Pacific Islander	
White	3,129 (74.27)
Refused or missing	137 (5.16)
Race/ethnicity (collapsed variable)	
Non-Hispanic White	2,633 (66.91)
Non-Hispanic Black	232 (11.71)
Non-Hispanic other	260 (7.92)
Hispanic	200[a] (11.97)
Refused or missing	413 (10.97)
Marital status	

Characteristic	*n* (weighted %)
Married	1,932 (51.46)
Living as married	107 (4.48)
Divorced	563 (8.04)
Widowed	432 (5.53)
Separated	82 (2.27)
Single, never been married	538 (26.41)
Refused or missing	84 (1.81)
Education	
Less than high school	237 (10.72)
High school degree	727 (20.71)
Vocational training or some college	1,132 (32.34)
Bachelor's degree or higher	1,578 (34.72)
Refused or missing	64 (1.52)
Income[b]	
<$20,000	664 (18.58)
$20,000–$34,999	506 (13.54)
$35,000–$49,999	415 (12.40)
$50,000–$74,999	605 (14.64)
>$75,000	1,112 (32.20)
Refused or missing	436 (8.64)
Urban/rural status (RUC2013)	
Urban	3180 (85.08)
Rural	558 (14.92)
Sexual orientation	
Heterosexual, or straight	3,408 (89.76)
Homosexual, or gay or lesbian	67 (2.13)
Bisexual	38 (1.87)
Something else	57 (2.12)
Refused or missing	168 (4.06)
Smoking status[c]	
Never smoker	2,029 (58.98)
Current smoker	495 (14.61)
Former smoker	1,132 (24.48)
Refused or missing	82 (1.92)

Note. Weighted percentages may not sum to 100% in any given category because of refused, missing, or multiple responses selected in error. HINTS = Health Information National Trends Survey; FDA = Food and Drug Administration; RUC2013 = Rural Urban Continuum Code, U.S. Department of Agriculture.

[a]The estimate of Hispanics under "ethnicity" differs from the estimate under "race/ethnicity (collapsed variable)" because the latter estimate excludes respondents with missing values for race.

[b]Income presented here is not imputed.

[c]Smoking status was defined as follows: never smoker = reported not smoking at least 100 cigarettes in their lifetime; current smoker = reported at least smoking 100 cigarettes in their lifetime plus currently smoking some days/every day; former smoker = reported at least smoking 100 cigarettes in their lifetime plus currently smoking not at all.

Table 3

Response rate and current smoker rates overall and by stratum.

	Smoking stratum				
	High	**Medium-high**	**Medium-low**	**Low**	**Overall**
Approximate number of households in stratum (×100)	19,672	28,180	51,786	15,123	114,761
Stratum-specific response rate	34.6	32.5	33.0	33.2	33.0
Observed smoking rate,[a] weighted, by stratum	25.0	21.6	10.9	7.1	14.6
2003 BRFSS smoking rates used to define stratum (county level)	≥25.1	21.2–25.0	15.0–21.1	<15.0	—

Note. BRFSS = Behavioral Risk Factor Surveillance System.

[a]The definition of a current smoker is someone who has smoked at least 100 cigarettes and is currently smoking every day or some days.

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