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Meeting the Healthy People 2020 Goals: Using the Health Information National Trends Survey to Monitor Progress on Health Communication Objectives

BRADFORD W. HESSE and **ANNA GAYSYNSKY**

National Cancer Institute, Bethesda, Maryland, USA

SANA VIEUX

Patient Centered Outcomes Research Institute, Washington, District of Columbia, USA

ALLISON OTTENBACHER, RICHARD P. MOSER, KELLY D. BLAKE, and WEN-YING SYLVIA CHOU

National Cancer Institute, Bethesda, Maryland, USA

ELLEN BECKJORD

University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Abstract

The *Healthy People (HP)* initiative outlines a comprehensive set of goals aimed at improving the nation's health and reducing health disparities. Health Communication has been included as an explicit goal since the launch of HP 2010. The *Health Information National Trends Survey (HINTS)* was established as a means of exploring how the changing information environment was affecting the public's health, and is therefore an ideal tool for monitoring key health communication objectives included in *Healthy People* agenda. In this paper, we apply an integrative data analysis strategy to over 10 years of HINTS data to demonstrate how public health surveillance can be used to evaluate broad national health goals, like those set forth under the Healthy People initiative. We analyzed just one item from the HINTS survey regarding Internet access in order to illustrate what public health surveillance tools, like HINTS, can reveal about important indicators that are of interest to all those who work to improve the health of the public. The results of our analyses show that reported Internet penetration has exceeded the HP 2020 target of 75.4%. HINTS data also allowed us to model the effects of various socio-demographic factors, which revealed persistent differences based on age and education, with the oldest age groups and those with less than a college education falling short of the HP 2020 target as of 2013. Furthermore, although differences by race/ethnicity were observed, our analyses suggest that the race in itself accounts very little of the variance in Internet access.

Much of the discussion in the traditional evaluation literature, especially with respect to communication programs, has customarily revolved around reviewing the progress made by a specific entity (or set of entities) in reaching an articulated communication goal. The

emphasis was typically placed on using either formative evaluation techniques to improve the delivery of programs by those entities, or summative techniques to help make future resource allocation decisions possible among strategic planners (Rossi, Lipsey, & Freeman, 2004). At times, though, evaluation questions may transcend individual programs. As a case-in-point, the “Healthy People” initiative promoted by the Department of Health and Human Services (DHHS) serves as an orienting guide for the many researchers, practitioners, and programs focused on improving the health and wellbeing of the general population (U.S. Department of Health and Human Services, 2012). Attempts to evaluate global initiatives like these should assess the extent to which populations are achieving the aims articulated within the Healthy People strategic documents, and endeavor to identify possible barriers that prevent the realization of desired objectives in order to review the locus and nature of possible strategies that may aid in overcoming these obstacles. In this paper, we analyze over 10 years of data from the National Cancer Institute’s Health Information National Trends Survey (HINTS) to demonstrate how public health surveillance can be leveraged to improve situational awareness in a rapidly changing communication environment and measure progress toward the health communication goals of Healthy People 2020.

The Healthy People Initiative

The *Healthy People* (HP) initiative is a program that transcends the individual communication campaign to serve as a broad touchstone for public health professionals, policy makers, and the public. The program traces its roots back to the U.S. Surgeon General’s (SG) Report of 1979, which called for coordinated activity to reach national goals in prevention and healthy living (U.S. Surgeon General, 1979). Many of the original objectives of the program focused explicitly on improving the health and safety of infants, children, adolescents, and adults. Administrative records from hospitals played an important role for documenting progress on these early goals. Goals of the program expanded over the years as the *Healthy People* community began broadening its focus to include an emphasis on social determinants of health and on reducing the persistence of health disparities (U.S. Surgeon General, 1979). Health Communication was included as an explicit goal in the HP 2010 objectives, with a particular emphasis on ensuring that the health information benefits of the Internet be expanded equally to all communities within the U.S. The topic area was expanded further to include the equitable use of health information technologies to improve personal health.

Why Health Communication and Information Technology?

To understand the rationale for including health communication and health information technology goals in the HP 2010 and HP 2020 objectives, it is worthwhile to consider the zeitgeist of the times. At the turn of the millennium, when the HP 2010 goals were being finalized, a lot of discussion was occurring in the public sphere regarding the projected influence that new communication media would have on health and wellbeing. Rice and Colleagues reported that the use of health-related search terms on Web-based search engines was higher than many had anticipated, meaning that individuals with access to the Internet

were bypassing traditional gatekeepers to obtain the information they needed to make vital health decisions on their own (Rice & Katz, 2001).

Additionally, the domain of the Internet in the 1980's and 1990's was the purview of defense contractors and computer engineers – communities that had been traditionally well educated and male dominated. This created a justifiable concern that the diffusion of new health information technologies might overwhelmingly favor the professional and well-to-do classes while excluding vulnerable minorities through an inadvertently hewn “digital divide” (Kreps et al., 2007; U.S. Department of Commerce, 1995). For example, Berland and colleagues (Berland et al., 2001) observed that websites positioned for the dissemination of evidence-based health information tended to present information on their public-facing pages that exceeded the average health information seeker's literacy levels. Furthermore, this health information content was rarely provided in Spanish or any other foreign language.

There was also concern expressed over how average Americans might interact with the new information environment to improve their health. In 2000, for example, the American Medical Association cautioned patients in a press release to “make a new year's resolution” not to go online before talking to their physicians (Shapiro, 2007). More generally, Eng and colleagues noted that the unregulated Web might make it possible for commercial interests to misrepresent health information for ulterior profit motives and cautioned about the potential for deleterious health effects for a population online (Eng, Gustafson, & United States. Dept. of Health and Human Services. Office of Disease Prevention and Health Promotion. Science Panel on Interactive Communication and Health., 1999).

Not surprisingly, then, the health communication objective in HP 2010 placed a priority on monitoring the utilization of health-related websites for the purpose of doing no harm as well as monitoring the effectiveness of patient-provider communication (Office of Disease Prevention and Health Promotion, 2001). The health communication goal was expanded in HP 2020 to include objectives regarding the usage of health information technologies.

The Health Information National Trends Survey (HINTS)

In 1999, a group of health communication scholars convened by the National Cancer Institute (NCI) recommended that a national surveillance vehicle be developed to track the public's use of a changing information environment for health-related goals. In response, the NCI funded the *Health Information National Trends Survey*, or HINTS (Nelson et al., 2004). The HINTS program was designed to be a routinely conducted, national probability sample survey of the general adult population aged 18 years and older in non-institutional residences in the U.S. The first version of the survey was conducted in the winter of 2002-2003 using a list-assisted, Random Digit Dial (RDD) technique with a resulting sample size of 6,369 completed interviews. The second was conducted in 2005 with 5,586 completed interviews using the RDD methodology, but also with a pilot experiment using web survey technology. The third round of data collection was conducted in the winter of 2007/2008 yielding 4,081 completed interviews via telephone (RDD frame) and another 3,582 interviews via paper-and-pencil, postal frame.

The 2007-2008 split frame survey was conducted to explore the feasibility of switching from a telephone-only sample of (non-institutional) households in the U.S. to an alternative frame based on a newly available list of addresses released by the U.S. Postal Service. Reasons for the split frame were threefold. First, response rates among national RDD surveys were dropping precipitously due to the advent of caller ID, call blocking strategies, increased “spamming” from telemarketers, respondent fatigue, and publicity surrounding the national “do not call list.” Second, data from the Federal Communications Commission revealed that the number of households with landline telephones, especially among younger populations, was dropping as many households began relying exclusively on cell phones. This was creating the potential for a coverage bias in the HINTS survey due to insufficient representation of cell-only households. Third, the split frame survey was conducted to generate data on the feasibility of a postal-only sample and to provide information on process differences between the two modalities.

Following the embedded field experiment, the HINTS program management team reworked its administrative priorities to incorporate proposed changes to the survey design. It also reworked its content strategy to be more flexible in tracking frequent changes in the health information environment. At around the same time, the Office of Disease Prevention and Health Promotion – the organizational home of the Healthy People Initiative – asked the HINTS program to serve as a data source for tracking the new health information technology goals included in the newly established HP 2020, and in following the policy objectives established by the Health Information Technology for Economic and Clinical Health (HITECH) ACT of 2009 (Title XIII of the American Recovery and Reinvestment Act of 2009). The HITECH Act set ambitious goals for the integration of information technology into health care delivery (Gold, McLaughlin, Devers, Berenson, & Bovbjerg, 2012). To accommodate both the methodological and content changes, the new survey was scoped to include a postal frame only and was launched so as to collect data across four cycles to shorten time between assessments (Finney Rutten et al., 2012). Technical details for each wave of the survey are depicted in Table 1.

Using HINTS to Track Healthy People Goals

Authors of the HP 2010 and the HP 2020 objectives articulated a vision for the 21st Century in which patients, healthcare providers, and public health practitioners would be able to access up-to-date communications through a National Health Information Infrastructure, as envisioned by the National Committee on Vital and Health Statistics (National Committee on Vital and Health Statistics, 2001). In 1998, however, only 26% of U.S. households had access to the Internet at home (<http://www.pewinternet.org/2007/06/21/the-internet-circa-1998/>). There was legitimate concern among policy makers, especially at the Federal Communications Commission, that diffusion of the new infrastructure should be monitored closely so as to avert widening the gap between the “*information haves*” and the “*information have-nots*.”

For this reason, a specific *Healthy People* goal was established to “increase the proportion of persons with access to the Internet” (Office of Disease Prevention and Health Promotion, 2001). HP 2010 set its original aspirational target to 80% household Internet penetration by

the end of the decade based on a “better than best” target setting method. Although the increase in Internet penetration rates over the course of the ensuing years would be rapid, it soon became apparent that the trajectory would not achieve an 80% penetration rate as quickly as hoped. Using HINTS data, the Office of Disease Control and Prevention reset the Healthy People 2020 goal to aim for a more achievable 10% increase over the 2007-2008 penetration rate of 68.54% (+/- 2.33%). There were very little data available in 2000 to set specific goals based on subpopulation access.

Monitoring Overall Progress in Internet Access with HINTS Data

To track progress toward *Healthy People's* Internet access goal, data were analyzed across each administration of the HINTS survey from the question: “Do you ever go on-line to access the Internet or World Wide Web, or to send and receive e-mail?” Demographic questions were asked based on a standard format as required of Federal surveys by the Office of Management and Budget following standards set by the U.S. Bureau of the Census. An integrative data analytic strategy (Moser et al., 2013) was used to track changes in Internet utilization across all administrations of HINTS.

In Figure 1, we provide a descriptive overview of Internet use across five waves of data collection spanning a time period from 2003 to 2013. Standard error bars for each of the points in the HINTS surveillance line describe confidence intervals for the weighted population estimates. The HP 2020 goal of 75.4% penetration is overlain on the graph as a reference. As can be seen from the figure, reported Internet penetration rose above the newly adjusted HP 2020 target line at a point between the HINTS 3 and HINTS 4 administrations. The overall linear increase was statistically significant with the odds of Internet access increasing by a factor of 2.36 for adults in 2013 compared to adults in 2003 (OR: 2.36, 95% CI: 2.05-2.70). From an evaluation perspective, the HINTS data provided a quantitative anchor for monitoring and recalibrating *Healthy People* goals as needed.

Exploring Subpopulation Differences

The other important contribution that the HINTS program provides is to offer insight into the differential adoption curves associated with subpopulations. To illustrate, we present trend lines based on the unadjusted predicted marginal values for gender, age, education, and race/ethnicity in Figure 2. The figure is subdivided into four quadrants with trend comparisons presented for gender, age group, education, and race/ethnicity respectively. Separate trend lines depicted within each graph illustrate variability across levels of the variable being explored. The HP 2020 target of 75% adoption is superimposed for comparison purposes.

The chart in the upper left quadrant of the figure presents trend plots for the unadjusted predicted marginal values associated with Internet access as predicted separately for males and females. Gender was an important concern at the beginning of the new millennium. Much of the discussion about computer usage in the early 1990's pointed to worries over how male domination within the computer industry might overshadow broader usage of electronic resources once computer technology diffused throughout the general public (Shashaani, 1993). In contrast to that negative prediction, the HINTS surveillance data

portray diffusion curves that are highly similar across males and females. By 2003, the first year of the HINTS surveillance effort, the percentage of overall access attributable to males and females was almost equivalent. By 2005, and again in 2008 and in 2012, it appears that slightly more females reported being online than males, with that difference closing slightly by 2013. Both genders exceeded the HP 2020 targets by 2012.

The proportional rise in Internet access attributable to differences in age and education, by contrast, remained consistently separated across most years of the survey. With respect to the age group variable, there appeared to be an average separation of almost 60% between the youngest and the oldest age groups, with the younger groups showing a persistently higher rate of reported access. The gaps between low and high users narrowed slightly by 2013, with a sharp rise in usage noted for the oldest age groups. By 2013, only the youngest three age groups rose above the HP 2020 goal (although if the linear trends continue, all age groups might be expected to reach the goal by 2020).

Likewise within the education graph there was a fairly persistent inequality in Internet access, with approximately 59% separating those with the highest level of education from the most poorly educated across a decade of HINTS data collection. Only the top two education groups – those with college degrees or at least some college education – rose above the HP 2020 goal by 2013, though the linear trend for those with at least a high school education appeared to be rising favorably, so that this group may reach the goal by the end of the decade as well. Prospects do not seem as positive for those who did not finish high school, however, with data from the 2013 administration of HINTS actually showing a slight decrease in Internet use among this group.

Data for the race/ethnicity profiles appear to depict what may be a more promising trend, at least from the perspective of the unadjusted marginal values. The difference between the group showing the highest breadth of penetration, Asian American/Pacific Islanders, and the group with the lowest breadth of penetration, Hispanic Americans, began at a 50% difference in 2003. By 2012 and 2013, that difference had shrunk to a little over 10% with all groups coming very close, if not exceeding, the HP 2020 goal.

As instructive as these types of evaluative analyses were, the HINTS survey also allowed for a more sophisticated treatment of these trends over time, using multivariable logistic regression to model the independent, adjusted contribution of key socio-demographic factors on the probability of having Internet access. A deeper analysis of the previously observed age and socioeconomic status disparities in Internet access provides a descriptive focus on communication inequality (Blake, Flynt-Wallington, & Viswanath, 2011; Viswanath, 2006; Viswanath, Ramanadhan, & Kontos, 2007), which has been offered as one of several structural social determinants of health (Berkman & Kawachi, 2000; Phelan, Link, Diez-Roux, Kawachi, & Levin, 2004).

In Figure 3 we present a set of statistical models in which the unique variance attributable to each of the four illustrative socio-demographic factors has been graphed across administrations of the HINTS survey. Point estimates in these models represent fully adjusted marginal values, after taking into account the co-variation attributable to other

sources. The gender model, for example, presents adjusted values after controlling for variance accounted for by race, occupation, income, population density, education, and age. The age group model presents adjusted values after accounting for race, occupation, income, population density, education, and gender; etc.

For the first three models depicted in Figure 3 the trends appear to approximate the relative positions and general direction of the unadjusted values from Figure 2. The stark exception to that rule lies in the fourth model in the figure exploring the unique contribution of race and ethnicity. In this case, the ordinal positions associated with each racial/ethnic group appear different from their unadjusted counterparts, as are the time-by-variable interactions across the five administrations. What the model may suggest is what other socio-demographic analyses frequently show: the unique variance attributed to self-reported racial and ethnic categories is often markedly diminished once income, education and other sources of social influence are taken into account. With respect to the determinants of the digital divide, we see that age and socio-economic status (as measured by education and income) continue to predict likelihood for accessing the Internet more consistently than self-reported measures of race or ethnicity. Therefore, the concern that health information delivered solely on the Internet may not reach certain pockets of the population is legitimate. Traditional platforms and channels, such as mass media and interpersonal health navigation support, remain important for certain underserved populations, including some older adults and lower-income communities.

Exploring Associations and Generating Hypotheses with HINTS

A lot more changed during the first decade of the millennium than might be represented in a singularly focused analysis of Internet penetration. The unanticipated rise of social media and mobile technologies, as well as the new uses for networked information technology related to clinical care as incentivized by the HITECH Act, all merit in-depth exploration through HINTS. Questions concerning the rise of social media, for example, were added in 2007-2008, with some trend-changing patterns noted on the populations who benefit from health-related uses of social media (Chou, Hunt, Beckjord, Moser, & Hesse, 2009). Items related to mobile technologies, including smart phone adoption, were added in 2011 to explore the theoretical implications of an *m-Health* revolution (Riley et al., 2011). Questions related to the use of electronic health records, the public's use of email to communicate with their doctors, patients' use of online pharmaceutical ordering and so on, were also added to track the impact of health information technology diffusion (Beckjord et al., 2007; Beckjord, Rechis, Nutt, Shulman, & Hesse, 2012; Hesse, Moser, & Rutten, 2010). Other additions to the survey allow scientists to explore special topics such as direct-to-consumer pharmaceutical advertising, the emergence of marketing information on new tobacco products and electronic cigarettes, and changes in attention to and trust in traditional health journalism to name just a few.

The HINTS program is designed to facilitate more than population tracking of Internet access. By analyzing data relevant to constructs derived from behavioral theories, scientists can utilize the HINTS platform as a converging touchstone to work being done in the laboratory. An early evaluation of trust patterns across channels, for example, revealed that

patients' trust in physicians did not erode as reports of Internet usage for health information rose (Hesse et al., 2005). As a result, health communication scientists have begun to modify their original expectations of the Internet as a disintermediating technology (as it was in the travel industry) and have instead reoriented their views to account for the use of Internet information in the context of participative sense-making (Eysenbach, 2009). In this sense, publicly available surveillance data can serve as a catalyst for further research conducted within health systems or within communication laboratories to elaborate on mechanisms that may be accounting for the population-wide findings derived from HINTS data.

To encourage community participation in exploring the myriad new relationships tracked by HINTS, the program's management team has made a special effort to make the data available to, and accessible by, a multitude of audiences. Every question is given its own dynamically generated web page with appropriately weighted population estimates across response categories, with similarly computed sample calculations, meta data, links to harmonized data across surveys, and methodological notes. The original, de-identified data sets are made available for download once the data are cleaned and prepared for analysis. A set of HINTS briefs is available for download as well. The briefs, provided in both English and Spanish, allow public health planners to review synopses of peer-reviewed scientific publications that use HINTS data, with a special emphasis on how to apply the findings to their own work. Grant writers can access population estimates in tabular and graphic form for inclusion in applications for funding.

In all of these provisions, the program encourages the health communication community to explore HINTS assets following open-science principles (Hesse, 2010) and to use the data as a point of triangulation for health situational awareness (Hall, Correa, Yoon, & Braden, 2012; Thacker, Qualters, & Lee, 2012) as they community strives together to realize the promise of Healthy People goals.

Conclusion

Authors of the *Healthy People* strategic planning documents placed special emphasis on the changes they envisioned from the emergence of a national information infrastructure for health. Such a platform, they argued, would allow healthcare providers, scientists, public health planners, and members of the public to "work together in contributing to personal and community health" (U.S. Surgeon General, 1979). The National Cancer Institute's HINTS program was launched in 2001, in part to serve as a vehicle for assessing changes in the public's use of new media technologies for making the "vital decisions" (Fox & Rainie, 2002) they confront regarding their own health and the health of their loved ones. By applying public health surveillance methodologies in an open-access way, the HINTS program has worked to create a new participative platform for collectively taking stock of the nation's progress toward reaching health communication goals.

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Figure 1.
Overall progress toward Healthy People goals across administrations of HINTS.

Figure 2.
Unadjusted Predicted Marginals for Using the Internet by Gender, Age Group, Education, and Race-Ethnicity.

Figure 3. Fully adjusted Predicted Marginals for Using the Internet by Gender, Age Group, Education, and Race-Ethnicity; adjusts for gender, occupation, income, population density, education, and age.

Table 1

Overview of HINTS Field Administrations

	HINTS 3				HINTS 4			
	HINTS 1	HINTS 2	Telephone	Postal	Cycle 1	Cycle 2	Cycle 3	Cycle 4
Field Start Date	10/28/02	2/21/05	1/7/08	1/15/08	10/25/11	10/9/12	9/28/13	pending
Field End Date	4/11/03	8/12/05	4/27/08	4/28/08	2/7/12	1/11/13	12/31/13	pending
Mode	RDD	RDD	RDD	Paper	Paper	Paper	Paper	pending
Household Resp. *	55.0%	34.0%	42.4%	40.0%	37.0%	40.0%	35.2%	pending
Individual Resp. *	62.8%	61.0%	57.2%	77.4%	NA	NA	NA	pending
Sample Size	6,369	5,586	4,081	3,582	3,959	3,630	3,185	pending

* Response rates were calculated following guidelines recommended by the American Association for Public Opinion Research (AAPOR), RR2.