

Leveraging Breadth and Depth: Strategies to Characterize Population Diversity to Address Cancer Disparities in the DF/HCC Catchment Area



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Abstract

Background: NCI-Designated Cancer Centers provide key cancer research, prevention, and treatment services to members of their catchment area. Characterization of these areas may be complex given the diverse needs of the populations within, particularly those from low socioeconomic position (SEP). The purpose of this paper is to describe the characterization of the Dana-Farber/Harvard Cancer Center (DF/HCC) catchment area through using a two-pronged approach.

Methods: Participants ($n = 1,511$) were recruited through (i) an online, probability-based survey ($n = 1,013$) and (ii) a supplementary, in-person survey from priority groups (African Americans, Latinos, blue-collar workers, low SEP, homeless; $n = 498$) within Massachusetts. Study staff worked closely with community partners across the state to reach individuals who may not usually be included in online surveys.

Results: There were several differences across samples, with the community-based sample having a higher percentage of

low SEP, low education, African Americans, and Latinos compared with the online sample. Differences were also noted in the cancer-related behaviors of the samples, with the community-based sample having higher rates of smoking, particularly within those who were homeless or make less than \$20,000 per year. Fewer community-based subgroups were current with cancer screenings, and more showed more indication of potential communication inequalities compared with statewide estimates.

Conclusions: The sampling strategy used to characterize of the DF/HCC catchment area provided broad, statewide estimates and additional focus on vulnerable populations, highlighting several potential areas for intervention.

Impact: This study provides data to highlight the value of using multiple sampling strategies when characterizing cancer center catchment areas.

Introduction

The NCI-Designated Cancer Centers are a cornerstone in addressing research, prevention, and treatment of cancer in the United States. They are funded to offer broad-ranging services that span activities such as outreach, resource provision, support for research infrastructure, and treatment. Each NCI-Designated Cancer Center is expected to serve people within its catchment area, or the geographic area and population that a cancer center primarily serves. NCI has an ongoing mission to work with cancer centers to properly identify and "characterize" the catchment areas for each center (1).

This is particularly critical in addressing cancer disparities, as the burden of cancer is distributed unequally across population subgroups, such as African Americans and Latinos (2–4). Individuals from lower socioeconomic position (SEP) have higher rates of cancer mortality and lower survival rates compared

with their higher SEP counterparts (5). Lower SEP individuals often experience "communication inequalities" (6), or the unequal distribution of communication resources, which affects how information is accessed, processed, and acted upon. For example, low SEP individuals may have greater internet connectivity challenges to access important health-related messages, or have fewer resources to comply with health recommendations compared with their higher SEP counterparts (7), characteristics that have implications for cancer communications at the regional and national levels.

The groups in greatest need of cancer services—particularly those from lower SEP and minority groups—may represent a smaller proportion of the catchment area population as a whole. There are often barriers to gathering data on vulnerable groups in adequate numbers, and reaching them may require specialized strategies for their inclusion in adequate numbers to power subgroup analyses. First, members of so-called hard-to-reach groups, such as low SEP or homeless individuals, may not participate in, or be reached by, large-scale phone- or internet-based survey strategies due to lack of reliable connectivity to phone or internet (8). Second, members of certain groups may historically distrust research institutions, making them less likely to participate in health-related studies (9). To reach these populations, it often takes fostering long-term community partnerships to gain the trust of organizations that provide the entrance needed to access and work with these groups (10).

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One of the most potent vehicles to characterize the catchment area population groups is the Health Information National Trends Survey (HINTS), a nationally representative data collection effort by the NCI contributing to the state of the science for cancer communications and surveillance. Although the scope of HINTS is at a national level, NCI has recently funded cancer centers across the nation with the goal of extending the reach of HINTS priority measures to (i) provide detailed estimates within their particular catchment areas and (ii) characterize these catchment areas by using a number of sampling strategies and data collection techniques. A key focus for each center was to carefully define and describe their catchment area, gathering key data from priority groups using a number of sampling strategies in order to better characterize their local population in terms of risk factors, health behaviors, and information needs.

Given the potential for health and communication inequalities, it is vital for cancer center catchment areas include adequate numbers of members of vulnerable groups in their samples to properly characterize the myriad needs and challenges that may be present for specific population groups. However, to reach members of these groups may require strategies to extend reach beyond traditional methods such as phone or internet surveys, suggesting the need for multiple sampling strategies to reach diverse individuals.

The purpose of this paper is to (i) describe the efforts of one cancer center [the Dana-Farber/Harvard Cancer Center (DF/HCC)] to represent different population groups within their catchment area and (ii) highlight key demographic and behavioral differences found between probability-based and purposive samples among priority groups in the catchment area. The goal is to show both the value of representative statewide data and the added importance of data from groups that are often characterized as "hard to reach."

The DF/HCC

The DF/HCC is an NCI-Designated Comprehensive Cancer Center comprised of five academic medical centers and two Harvard schools in the Boston area (11). Through the combined scientific strengths of its institutions, the DF/HCC is positioned to reach individuals across the state of Massachusetts (MA) through innovative clinical-, basic-, translational-, and population-based research programs. The DF/HCC also includes a center-wide initiative to address health disparities, with a focus on cancer issues within communities of color (12).

The catchment area of the DF/HCC spans the entire state of MA and its more than 6.8 million residents (13), including diverse population groups with varied cancer risk profiles (4). MA has a higher overall incidence of cancer for both males and females compared with the United States as a whole, as well as higher incidence rates for breast and lung cancers (4). Although only 11% of residents live below the poverty line across the state as a whole, higher concentrations of poverty exist (13), which are also home to large racial/ethnic minority populations and correspond with significantly higher cancer mortality rates compared with the U.S. average. Also of note is the rising number of individuals experiencing homelessness in the state, estimated at over 21,000 in 2015 (14). Homeless individuals have higher incidence and mortality rates for many cancers, and later-stage cancer diagnoses, compared with the general MA population (15).

Materials and Methods

Mass HINTS

The Mass HINTS study aimed to extend the reach of HINTS to examine cancer- and health communication-related behaviors of MA residents through (i) an online, statewide representative sample of approximately $n = 1,000$, and (ii) a supplementary, community-based sample of approximately $n = 500$ from five population subgroups that are often underrepresented in large surveys: (a) African Americans, (b) Hispanics, (c) people of lower SEP, (d) blue-collar workers, and (e) homeless individuals. This two-phase strategy was used to ensure reaching a breadth of MA individuals across the state, and a depth of respondents from populations who may be most in need of outreach and services from the DF/HCC. Within this study, we obtained informed consent and conducted all research in accordance with recognized ethical guidelines. This study was approved by the Harvard University Institutional Review Board.

Inclusion/exclusion criteria

The inclusion criteria for the study were MA residence, age between 25 and 74 years, and speaking English or Spanish. Within our community-based sample, we also worked to recruit groups that had at least one of the following characteristics: African American or Latino; had a high school education or less; had an income of under \$20,000 per year; in a blue-collar occupation (such as construction); lived mostly in a homeless shelter or outside over the previous 2 months (16). We constructed tailored screening forms for each site to determine this information.

Statewide (online) survey

To gather a representative sample from across the state, we partnered with GfK, a survey research company that maintains a nationwide online probability-based panel (KnowledgePanel). Panel members are recruited using probability selection algorithms for both random-digit dial telephone and address-based sampling methods, creating a household sampling frame that recruits houses with landlines, unlisted numbers, cell phone-only households, and houses either with or without internet access. Potential panelists are sent a recruitment letter and complete a profile survey before becoming panel members. If a household does not have a computer and/or access to the internet from home, the household is given a web-enabled device (laptop or netbook) along with free monthly internet access.

To meet our sample size (target $n = 1,000$), GfK worked with their partner vendor, ResearchNow. Approximately half ($n = 544$, 54%) of the participants were drawn from the probability-based KnowledgePanel, and the others ($n = 469$, 46%) were drawn from ResearchNow. For recruitment into this study, GfK identified potentially eligible panel members (including both eligible KnowledgePanel and ResearchNow panelists) and sent them an invitation email with a brief description of the study and survey link. Compensation for the online survey was through the GfK points system, which are then redeemable for cash or prizes. Although the panelists from ResearchNow were not probability based, GfK provided a special weighting structure (see below) that would provide statewide representative estimates from this combined panel. Data collection occurred over a 2-week period in July 2017.

Community survey

In order to supplement the statewide data, we conducted intensive in-person data collection in community settings in selected locations within MA from June through September 2017. A description of survey administration sites and numbers recruited from each location may be found in Table 1. Careful consideration was given to what sites might best represent our populations of interest. Furthermore, we have deep connections in several Massachusetts communities, having cultivated a relationship through over 10 years working with local community groups to conduct surveys, deliver interventions, and provide trainings and other resources (10, 17, 18). We leveraged these partnerships throughout our study in order to gain access to population groups and community-based survey administration sites. Often, this required presenting information about our project at working group or city council meetings in order to promote interest and buy-in to our project. Once potential sites were identified, one of two community liaisons or our project director first contacted the leadership at the site to introduce the survey and gauge interest. Once a dialogue was established, the staff worked to set up a time to conduct the survey in a designated location within the site.

Recruitment occurred through a multiphase approach. In many locations, participants were recruited through viewing the posted flyer or by referral from the organization (e.g., being informed about the survey at the front desk at a community center, or by staff at a homeless shelter) and then visiting the survey administration site on a walk-in basis. In some locations, our staff conducted community outreach prior to the survey administration and scheduled times for individuals to arrive and take the survey. In one location (the training center), staff arranged to have instructors at the center direct eligible students to the survey administration site, and all took the survey at the same time between classes.

On survey administration day, a staff of 3 to 8 was present at the location, dependent on anticipated crowd size. One to two staff members sat at an intake desk at which potential participants were screened using a screening form to determine Massachusetts residence, age, homeless status, education, and occupation. This information was then entered into a spreadsheet that tracked the number of participants that were included in our target population groups. Once participants were deemed eligible for participation, they were then given a copy of the consent form to read or to have read to them. The in-person survey was available in both English and Spanish. Surveys were administered on paper and then entered into REDCap electronic data capture tool hosted at Dana-Farber Cancer Institute (19) by trained research assistants

(10% double entered). The final, cleaned REDCap file was then exported into STATA for analysis.

Measures

All measures that appear in this paper were drawn from the HINTS repository of measures (20).

Health status. Participants were asked if they had ever been diagnosed with cancer. Next, they were asked to indicate if they had ever been told by a doctor or health professional that they had diabetes or high blood sugar; high blood pressure or hypertension; a heart condition such as a heart attack, angina, or congestive heart failure; chronic lung disease, asthma, emphysema, or chronic bronchitis; or depression or anxiety disorder.

Cancer-related health behaviors. Smoking status was assessed first by asking if participants had ever smoked at least 100 cigarettes in their entire life, yes or no. Those who said yes were then asked if they now smoked every day, some days, or not at all. Those who indicated they now smoked every day or some days were classified as a current smoker. Participants were also asked how many cups of fruits or vegetables they eat each day.

Cancer screening. Women were asked if they ever had a mammogram, and if yes, when they had their most recent mammogram. We assessed current adherence to screening recommendations for women over 45 if they had a mammogram within the past year and were between 45 and 54, or had a mammogram in the past 2 years and were 55 or older (21).

We also asked participants over the age of 50 about their colorectal cancer screening behaviors. First, we asked if participants had ever "used a special kit at home to determine whether the stool contains blood," then asked them how long it had been since their last blood stool test. Participants were also asked if they had ever had a sigmoidoscopy or colonoscopy, and when their last test was. Individuals were deemed current with colorectal cancer recommendations if they (i) had used a blood stool kit within the last year, and/or (ii) had a sigmoidoscopy in the past 5 years, and/or (iii) had a colonoscopy in the past 10 years (21).

Health information seeking. Participants were asked if they had ever looked for health information from any source. Those who indicated that they had ever looked for health information were then asked based on their most recent source if they agreed with the following statements: "It took a lot of effort to get the information you needed"; "You felt frustrated during your search for information"; "You felt concerned about the quality of information"; and "The information you found was hard for you to

Table 1. Types of sites, total number surveyed at each site, and target population groups within the community-based survey

| Location type | Community (A, B, C, D, E) | Total number surveyed | Number of visits to location | Target population groups |
|----------------------------------|---------------------------|-----------------------|------------------------------|-------------------------------------|
| Community center | A | 88 | 2 | African American, Hispanic, low SEP |
| Community center | A | 47 | 1 | African American, Hispanic, low SEP |
| Community center | A | 36 | 1 | African American, Hispanic, low SEP |
| YMCA | C | 21 | 1 | African American, low SEP |
| Soup kitchen | B | 82 | 2 | Homeless, low SEP |
| Homeless shelter | D | 63 | 1 | Homeless, low SEP |
| Training center | E | 69 | 2 | Blue-collar workers |
| Senior living facility (workers) | D | 23 | 1 | Blue-collar workers |
| Public library | B | 85 | 2 | Latino, low SEP |

understand." Answer choices ranged from strongly agree, agree, disagree, or strongly disagree.

Demographics. We asked participants their age, race/ethnicity, income, education, and gender. Homeless status was assessed by asking where the participant lived most in the past 2 months, with choices including house/apartment/room, with friend or family, hospital, homeless shelter, or anywhere outside (16), classifying those as homeless who selected homeless shelter or anywhere outside. To assess blue collar status, we asked participants open-ended questions about their job title and what kind of work they do. We used the U.S. Bureau of Labor Statistics (22) definition of blue collar or service jobs to categorize these responses as blue collar positions for the study.

Data analysis

Data weighting. For the online sample, GfK used their weighting and calibration methodology (23) to provide a weighting variable that would provide a population estimate for the state. The active pool of panelists is first weighted to the geodemographic benchmarks from the latest supplement of the Current Population Survey. Then, GfK provides study-specific post-stratification weights using the latest 2015 American Community Survey data as benchmarks (such as gender by age, race/ethnicity, education, and income).

Analyses. We then provided frequencies for the GfK sample (applying the appropriate weights) and the community-based sample. We also provided frequencies for selected subgroups of interest from our community-based sample. First, we included frequencies for participants by race (white, African American, or Latino). We then provided frequencies for those with low SEP (with an income of under \$20,000 per year) and homeless individuals. For the latter two categories, participants may be represented from multiple categories to illustrate our power for different subgroup analyses (e.g., a participant's data may fall in both the homeless and low SEP categories, or the low SEP and white categories).

Results

Demographic comparisons

The final sample included 1,511 participants, with 1,013 from the GfK statewide panel and 498 from community settings (Table 2). Within the weighted statewide estimates, the survey was comprised of 77% non-Hispanic white, 6% African American, and 9% Latino. Thirty-three percent of the community-based sample was non-Hispanic white, with 21% African American and 38% Latino. Approximately half of each sample was female. There were distinct differences in the income and education distribution between the two samples. In the statewide sample, 60% had an income of \$75,000 or more; in contrast, 51% of the community-based sample had an income of less than \$20,000 per year. Furthermore, while 2% of the statewide sample had less than a high school education, 23% of the community-based sample fell in this range. Almost all of the homeless individuals in the study were recruited through the community-based survey. Many of the community-based participants fell into several priority population categories (Table 3); for example, an African American participant may also classify as low SEP, homeless, and/or blue collar.

Table 2. Demographic breakdown of the online and community-based samples

| | Online, n (weighted%) | Community-based, n (%) |
|-----------------------------|--------------------------|---------------------------|
| Total | 1,013 | 498 |
| Race/ethnicity | | |
| White | 894 (76.9) | 166 (33.3) |
| African American | 28 (6.1) | 105 (21.1) |
| Latino | 44 (9.4) | 188 (37.8) |
| Other | 47 (7.6) | 39 (7.8) |
| Age | | |
| 25-34 | 150 (20.9) | 150 (30.7) |
| 35-44 | 136 (13.4) | 99 (20.3) |
| 45-54 | 94 (11.6) | 48 (9.8) |
| 55+ | 633 (47.5) | 192 (39.3) |
| Female | 619 (52.6) | 240 (48.5) |
| Income | | |
| Under \$20,000 | 76 (8.2) | 249 (50.6) |
| \$20,000-\$34,999 | 110 (9.4) | 45 (9.2) |
| \$35,000-\$49,999 | 104 (6.8) | 43 (8.7) |
| \$50,000-\$74,999 | 168 (15.5) | 36 (7.3) |
| \$75,000+ | 554 (60.0) | 57 (11.6) |
| Education | | |
| Less than high school | 7 (1.9) | 112 (22.63) |
| High school or GED | 163 (29.3) | 149 (30.1) |
| Some college | 286 (24.6) | 110 (12.5) |
| Bachelor's degree or higher | 557 (44.3) | 80 (16.2) |
| Homeless | 1 (0.1) | 84 (17.0) |
| Blue collar | 63 (6.2) | 104 (20.9) |

Health conditions

Across health conditions (Table 4), there was a higher percentage of diagnosis of depression or anxiety disorder, as well as diagnosis of chronic lung disease or emphysema, across all population subgroups compared with the statewide estimates, with highest percentages of both condition groups among homeless individuals. There was a higher percentage of diabetes within all community-based subgroups compared with the statewide estimate.

Roughly 40% of the statewide sample had smoked at least 100 cigarettes in their lifetime. The community-based samples of whites, low SEP, and homeless had higher rates of smoking—78%, 63%, and 83%, respectively. This pattern was reflected for current smokers, and those who now smoke every day; more than 80% of homeless individuals are current smokers, eight times that of the statewide estimate. Higher rates of ever and current smoking were also higher among the white community-based sample compared with the statewide sample. Higher percentages of the population subgroups also consumed less than $\frac{1}{2}$ a cup of vegetables per day compared with the statewide estimate.

Cancer screening

In both the statewide- and community-based samples, the majority of women over the age of 45 had ever had a

Table 3. Overlap of sample characteristics of the community-based sample (row%)

| | Low SEP | Homeless | Blue collar |
|------------------|-------------|------------|-------------|
| White | 86 (51.8%) | 48 (29.3%) | 50 (30.1%) |
| African American | 50 (47.62%) | 9 (8.7%) | 18 (17.1%) |
| Latino | 98 (52.1%) | 23 (12.4%) | 28 (14.9%) |
| Low SEP | 100% | 72 (29.5%) | 28 (11.2%) |
| Homeless | 72 (85.7%) | 100% | 3 (3.57%) |
| Blue collar | 28 (26.9%) | 3 (2.9%) | 100% |

Table 4. Health status and health behaviors, online and community-based samples

| | Online MA population estimate | Community-based survey total (n = 498) | Community-based subsamples | | | | |
|--|-------------------------------|--|----------------------------|--------------|------------------|-------------------|-------------------|
| | | | White (n = 166) | AA (n = 105) | Latino (n = 188) | Low SEP (n = 249) | Homeless (n = 84) |
| Medical diagnoses | | | | | | | |
| Cancer | 8.7% | 5.9% (29) | 7.2% (12) | 8.7% (9) | 3.7% (7) | 7.2% (18) | 3.6% (3) |
| Depression or anxiety disorder | 21.7% | 38.6% (192) | 47.0% (78) | 23.8% (25) | 40.4% (76) | 50.2% (125) | 59.5% (50) |
| Chronic lung disease, asthma, emphysema | 8.5% | 16.9% (84) | 18.1% (30) | 17.1% (18) | 16.0% (30) | 17.3% (43) | 21.4% (18) |
| High blood pressure or hypertension | 30.5% | 27.7% (138) | 29.0% (48) | 33.3% (33) | 24.5% (46) | 33.3% (83) | 27.4% (23) |
| Diabetes or high blood sugar | 9.0% | 18.1% (90) | 11.5% (19) | 21.0% (22) | 23.4% (44) | 20.1% (50) | 14.3% (12) |
| Heart attack, angina, congestive heart failure | 4.5% | 6.0% (30) | 5.4% (9) | 6.7% (7) | 6.3% (12) | 7.2% (18) | 7.1% (6) |
| Smoked 100 cigarettes in life (yes) | 40.4% | 54.8% (270) | 78.1% (128) | 43.3% (46) | 41.5% (78) | 63% (156) | 82.9% (68) |
| Current smoker | 10.8% | 41.1% (199) | 58.5% (96) | 34.6% (36) | 32.8% (60%) | 54.6% (132) | 80.0% (64) |
| Smoke every day (among smokers) | 20% | 59.3% (160) | 65.6% (84) | 54.4% (25) | 57.7% (45) | 73.1% (114) | 82.3% (56) |
| Eat 1/2 cup or less of fruit per day | 37.3% | 29.0% (144) | 30.1% (51) | 23.8% (25) | 30.3% (57) | 32.9% (82) | 38.1% (32) |
| Eat 1/2 cup or less of vegetables per day | 29.3% | 33.9% (168) | 35.5% (59) | 25.7% (27) | 35.1% (66) | 41.4% (103) | 46.4% (39) |

mammogram, with many population groups reflecting a percentage near the statewide estimate (Table 5). Similarly, close to 80% of women over the age of 45 were current with their mammography guidelines, with lower percentages within the white and homeless subgroups.

Out of adults age 50 and older, 81% of the statewide sample was current for colorectal cancer screening guidelines. However, these percentages were lower within the community-based samples, with most groups having less than half having been screened for colorectal cancer with the recommended timeframe.

Health communication

The majority of all groups had searched for health information at some time (Table 6). Although 24% of statewide participants perceived that their search took a lot of effort, higher percentages of each the community-based subgroups indicated this problem. For example, 43% of low SEP individuals, and 55% of homeless individuals, indicated that it took a lot of effort to find needed information. Among each group, approximately half indicated that they were concerned about the quality of the health information they encountered during their search. Among community-based subgroups, close to one third felt health information was hard to understand.

Discussion

This study sought to describe the process of gathering data from the DF/HCC catchment area and to illustrate differences observed between the statewide sample and community-based subgroups. To gather these data, we relied on a 2-fold strategy that allowed for a broad reach across the state using an online, probability-based panel, and fieldwork that drew upon our relationships within community partners and our knowledge of the best ways to reach participants in certain locations across the state. Although this strategy was resource intensive, our comparisons of frequencies

on topics such as demographics, health status, cancer screening, and health communication highlight the need to include diverse groups in this research.

The use of an online panel to reach across the state for a representative group of participants is a timely and efficient way to gather data across a large catchment area such as the DF/HCC, particularly given GfK's robust recruitment strategies. These statewide results indicate that, on the whole, current smoking rates are low, and screening rates for breast and colorectal cancers are high. Importantly, these data also provide a benchmark that adds context to the findings seen within the community-based samples.

Despite these benefits, having a representative sample may preclude the inclusion of adequate numbers of members of important subgroups. Although the number of African Americans in the online sample (28 of 1,013 participants) is reflective of their prevalence in MA as a whole, these numbers would preclude meaningful subgroup analyses. Furthermore, although the online sample was predominantly white, the white group within the community-based survey had higher rates of smoking and lower rates of cancer screening than the online sample, suggesting that the whites in the community-based sample drew from a group that may be more difficult to include in online or mainstream survey efforts. The importance of focusing on lower income communities is also echoed in a recent Community Health Needs Assessment conducted by the Dana-Farber Cancer Institute (24). Priority communities of the institute had median incomes that were significantly lower than the city average, and predominantly African American neighborhoods surveyed within the assessment still consistently see higher mortality rates from common cancers compared with other areas, despite strong screening rates (24). Without the purposeful oversample of these populations in our community-based survey, we would have been underpowered to detect important differences between groups. Furthermore, the fact that community-based participants often fit multiple of our

Table 5. Screening behaviors of the online and community-based samples

| | Online MA population estimate | Community-based survey total (n = 498) | Community-based subsamples | | | | |
|--|-------------------------------|--|----------------------------|--------------|------------------|-------------------|-------------------|
| | | | White (n = 166) | AA (n = 105) | Latino (n = 188) | Low SEP (n = 249) | Homeless (n = 84) |
| Ever had a mammogram (females 45+) | 96.4% | 93.2% (110) | 76.5% (13) | 95.2% (40) | 96.1% (49) | 93.9% (61) | 62.5% (5) |
| Current for mammography guidelines (females 45+) | 80.4% | 74.8% (89) | 58.8% (10) | 76.2% (32) | 78.9% (41) | 80.0% (52) | 22.2% (2) |
| Ever had a blood stool test (50+) | 32.4% | 31.8% (61) | 22.6% (12) | 37.5% (18) | 34.6% (27) | 29.8% (31) | 35.7% (10) |
| Ever had a sigmoidoscopy or colonoscopy (50+) | 82.0% | 55.7% (107) | 50.9% (27) | 66.7% (32) | 53.9% (42) | 55.8% (58) | 39.3% (11) |
| Current for colorectal cancer guidelines (50+) | 81.0% | 44.8% (86) | 37.7% (20) | 52.1% (25) | 44.8% (35) | 46.2% (48) | 35.7% (10) |

Table 6. Health communication behaviors of the online and community-based samples

| | Online MA population estimate | Community-based survey total (n = 498) | Community-based subsamples | | | | |
|--|-------------------------------|--|----------------------------|--------------|------------------|-------------------|-------------------|
| | | | White (n = 166) | AA (n = 105) | Latino (n = 188) | Low SEP (n = 249) | Homeless (n = 84) |
| Ever searched for health information | 85.0% | 84.5% (419) | 83.1% (138) | 86.7% (91) | 87.2% (164) | 81.1% (202) | 76.2% (64) |
| It took a lot of effort to get the information needed ^a | 23.6% | 39.3% (165) | 34.1% (47) | 42.4% (39) | 42.7% (70) | 43.4% (88) | 54.7% (35) |
| Felt frustrated during search ^a | 23.3% | 31.2% (130) | 33.8% (46) | 23.9% (22) | 34.4% (56) | 29.0% (58) | 45.2% (28) |
| Hard to understand ^a | 16.47% | 28.2% (116) | 29.6% (40) | 28.9% (26) | 28.8% (46) | 29.3% (58) | 29.7% (19) |
| Concerned about quality ^a | 46.1% | 50.1% (209) | 50.0% (68) | 57.2% (52) | 47.0% (77) | 46.5% (94) | 48.4% (31) |

^aReflects participants who indicated agree or strongly agree.

priority categories (e.g., low SEP and African American) will allow for a more nuanced analysis.

Administration within the community context often requires a degree of agility; for example, situations may arise within the community that must be handled with respect to the community partners involved. Furthermore, survey sites may have additional challenges that impede administration (e.g., small quarters and lack of internet connection). These challenges underscore the importance of having community champions in the field that can provide the proper context for addressing challenges and can liaise as needed on researchers' behalf in uncertain situations. Furthermore, community contacts can help to guide the best strategies for deliberate recruitment of certain groups for richer data collection efforts.

Taken together, findings from the two samples highlight opportunities for outreach for the DF/HCC and other researchers and practitioners and provide data on vulnerable populations, aligning with the center's strong focus on addressing health disparities. These findings work in concert to show areas that are of issues for some, or all, groups. For example, while smoking in the state of MA is low on the whole, high rates of smoking persist in lower SEP samples, particularly among the homeless. These higher numbers also coincide with higher diagnoses of lung diseases within these groups. Furthermore, findings suggest that low SEP individuals may not be current with their colorectal cancer screenings and may need additional reminders or resources in order to complete the required tests. It is also of note that within and beyond the community samples, there were reports of concerns about health information quality. However, while there were some reports of health communication difficulties across all samples, the higher percentages of difficulty (e.g., a lot of effort needed to find information) among low SEP subgroups such as the homeless also point to the presence of continued impacts of communication inequalities in these groups. Future studies may delve more deeply into communication-based challenges, including barriers to information seeking such as quality (e.g., how do participants define "quality" information).

There are noted similarities between the samples; for example, rates of mammography are, for many subgroups, similar to the statewide estimates. Future research with these data may probe the factors that facilitate healthy behaviors within some populations, but may not be available to, or equally beneficial for, others. Taken together, these findings provide fertile ground for future research, intervention, and outreach efforts for the DF/HCC partners. Furthermore, our involvement with community partners lays the groundwork for future collaborations to best reach low SEP individuals with needed health information and resources.

Limitations

Our convenience sampling strategies produced subgroup samples that, while informative, may not be representative for subgroups as a whole across the state. For example, although the goal of our survey administration in a soup kitchen was to reach homeless individuals, some reached were those with low SEP who were food insecure, but not homeless. Furthermore, there may be differences between the homeless who seek services at our targeted locations versus those who do not. However, we feel that the added value of intensive work with our community partners to reach those who may otherwise not have a voice in a catchment area assessment is a valuable addition to our work.

Conclusion

Although providing state-level estimates is vital to gaining a picture of the catchment area as a whole, targeted recruitment of vulnerable populations, particularly those living in higher poverty areas, is also crucial in order to provide adequate sample sizes to represent the needs of the DF/HCC's vulnerable residents.

Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Authors' Contributions

Conception and design: R.F. McCloud, K. Viswanath

Development of methodology: R.F. McCloud, M.A. Bekalu, K. Viswanath

Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): M.A. Bekalu, N. Maddox

Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): R.F. McCloud, N. Maddox, K. Viswanath

Writing, review, and/or revision of the manuscript: R.F. McCloud, M.A. Bekalu, K. Viswanath

Administrative, technical, or material support (i.e., reporting or organizing data, constructing databases): R.F. McCloud, N. Maddox, S.J. Minsky, K. Viswanath

Study supervision: R.F. McCloud, S.J. Minsky, K. Viswanath

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Leveraging Breadth and Depth: Strategies to Characterize Population Diversity to Address Cancer Disparities in the DF/HCC Catchment Area

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