

# Heterogeneity in Trust of Cancer Information among Hispanic Adults in the United States: An Analysis of the Health Information National Trends Survey

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## ABSTRACT

**Background:** Hispanics are differentially burdened by inequities in cancer outcomes. Increasing knowledge about cancer and cancer services among Hispanics may aid in reducing inequities, but little is known about what information sources are considered most effective or most trusted by this diverse population. The goal of this study was to examine heterogeneity in trust of cancer information from various media sources among U.S. Hispanic adults.

**Methods:** Using data from the Health Information National Trends Survey (HINTS) 4, Cycles 2 and 4 and HINTS 5, Cycle 2, we examined nine trust questions, divided into four domains of health communication sources [doctor, government health/charitable organizations, media (including Internet), and family/friends and religious organizations]. Independent variables examined were gender, Hispanic ethnic categories (Mexican American, Cuban/Puerto Rican, and other Hispanics), age, education, income, language, and nativity. We used multivariable

logistic regression with survey weights to identify independent predictors of cancer information source use and trust.

**Results:** Of the 1,512 respondents, trust in sources ranged from 27% for radio to 91% for doctors. In multivariable models, Cubans/Puerto Ricans were twice as likely to trust cancer information from print media compared with Mexican Americans. Hispanics 75 years and older were nearly three times as likely to trust cancer information from religious organizations compared with those ages 18 to 34. Hispanic women were 59% more likely to trust cancer information from the Internet compared with men.

**Conclusions:** Subgroup variability in source use and trust may be masked by broad racial and ethnic categories.

**Impact:** Among Hispanics, there is significant variation by ethnicity and other sociodemographics in trust of sources of cancer information across multiple constructs, with notable implications for disseminating cancer information.

## Introduction

Hispanics are the largest and fastest growing racial ethnic minority in the United States, accounting for approximately 60 million people (1). Cancer is the leading cause of death in this population, and despite lower combined cancer incidence overall, Hispanics are at increased relative risk for infection-related cancers (e.g., stomach and liver cancers) and are more likely to be diagnosed with later stage cancers than non-Hispanic whites (2, 3). However, there is also remarkable heterogeneity in cancer incidence and mortality within the Hispanic population, particularly as it relates to ethnicity and the length of time living in the United States (4–7). More thorough assessments of this heterogeneity have revealed notable disparities in cancer-specific outcomes for subpopulations of Hispanics. For example, Cubans and Puerto Ricans have higher cancer mortality rates than other Hispanic subgroups (4, 5). Further, age-adjusted mortality of lung cancer deaths among Cuban males is more than twice that of

Central and South Americans, whereas Central and South Americans have the highest rates of stomach cancers among Hispanics (4, 5).

Several factors explain these disparities, including length of time in the United States, higher rates of tobacco use among Puerto Ricans and Cubans, and the associated increase in diet- and obesity-related cancers (5, 8). In addition, lack of knowledge about cancer services, exacerbated by relatively limited access to those services, is considered a major contributor to disparate outcomes in cancer among Hispanics (9, 10). The ubiquity of the Internet and the widespread adoption of smartphones have made health information more attainable across all racial and ethnic groups, potentially serving as channels to address these observed cancer inequities (11). Data from the Pew Research Center showed that Internet use among Hispanics grew from 64% to 84% between 2009 and 2015, thus nearing the reported Internet use of non-Hispanic whites (89% in 2015); however, large digital and informational gaps remain (12). Recent evidence suggests that Hispanics are more likely to depend completely on smartphones for any Internet access compared with non-Hispanic whites (22% vs. 12%), and that they are twice as likely to cut off service to those smartphones because of expense (13). Hispanics also exhibit lower health information-seeking through the Internet than do non-Hispanic whites, and when information is sought, the experience is frequently perceived as more effortful and more frustrating than it is for their non-Spanish speaking counterparts (14–18). These experiences often lead to varying degrees of confidence and trust in the information and the source of the related information (19, 20).

The health information-seeking behaviors and motivations of Hispanics, particularly trust in various sources of cancer information, remain unclear. The most recent data on health information seeking has been limited to single sources of information (e.g., online only), and isolated to specific Hispanic populations, linguistically, ethnically,

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and geographically (21–24). Studies not limited to Hispanic populations have demonstrated that eHealth literacy is associated with perceived trust in online health communication channels and sources, which may have significant implications for the Hispanic population given the digital use and access-related gaps mentioned previously (25). Health Information National Trends Survey (HINTS) analyses in 2003 assessed variations of trust in different sources of information, but critical social and technologic advancements have occurred in the 16 years since those analyses, and ethnic variation was virtually unaddressed (26).

Prior analyses have explored racial and sociodemographic differences in trust of health information and found non-Hispanic black respondents exhibited significantly higher levels of trust in charitable and religious organizations relative to non-Hispanic white respondents (27). Other studies have analyzed English- and Spanish-speaking Hispanic respondents separately and revealed that Spanish-speaking Hispanics reported significantly higher levels of trust in radio relative to non-Hispanic white respondents (28, 29). To our knowledge, no existing studies have explored differences in trust of cancer-related information between Hispanic ethnic subgroups. There is significant cultural heterogeneity between the ethnicities that compose the Hispanic population, but there is limited research exploring whether this diversity contributes to differences in trust in sources of cancer information (30, 31). Similarly, remarkable interethnic differences in health outcomes and disparities in those outcomes exist far beyond cancer-specific outcomes (6, 7, 32, 33). For example, prevalence of hypertension has been observed to vary widely among Hispanic groups, with the lowest prevalence in South American women (17.2%) and the highest in Dominican men (34.3%; 34). Heiss and colleagues found that the prevalence rates of metabolic syndrome among Hispanic women ranged from 27% in South Americans to 41% in Puerto Ricans; among men, prevalence ranged from 27% in South Americans to 35% in Cubans (35). Differential diabetes prevalence rates among Latinos have been observed, with 10.2% in South Americans and 13.4% in Cubans to 17.7% in Central Americans, 18% in Dominicans and Puerto Ricans, and 18.3% in Mexicans (36). Additional studies have reported significantly lower levels of diabetes knowledge and self-management among Mexicans when compared with Puerto Ricans (37). This variability (e.g., in comorbidities and other health-related outcomes) may similarly have an impact on cancer information-seeking behaviors, motivations, and trust.

In this study, we aimed to assess Hispanic within-group heterogeneity regarding trust in varying sources of cancer information, particularly as it relates to Hispanic ethnic categories, English language proficiency, length of residence in the United States, gender, age, education, and income. We hypothesized that significant differences in trust of cancer information, particularly with respect to trust in cancer information from the Internet, would emerge based on socioeconomic status (SES), English language proficiency, and age such that Hispanics who are younger, of higher SES, and with greater English language proficiency would be more likely to trust information from the Internet when compared with participants who were older, of lower SES, and limited English proficiency.

## Materials and Methods

### HINTS methodology

Data for this study came from the NCI's HINTS, a publicly available and nationally representative sample of the noninstitutionalized adult population of the United States. The sample for this study came from

respondents who self-identified as Hispanic or Latino ( $N = 1,512$ ) from the following three HINTS cycles: HINTS 4 Cycle 2, collected from October 2012 to January 2013; HINTS 4 Cycle 4 collected from August 2014 to November 2014; and HINTS 5 Cycle 2, collected from January 2018 to May 2018. The sampling design for HINTS has been described extensively (38, 39). On the basis of mailed self-administered questionnaires, the overall response rates were 40.0% for HINTS 4 Cycle 2; 34.4% for HINTS 4 Cycle 4; and 33.0% for HINTS 5 Cycle 2. Spanish-speaking households were identified in one of three ways: (i) sampling from Census tracts with relatively high proportions of linguistically isolated households, defined as a household in which everyone over age 14 speaks a language other than English and does not speak English very well, (ii) Hispanic surname match, and (iii) respondent requested a Spanish-language survey. For HINTS 4 Cycle 2, 121 questionnaires (3.3%) were completed in Spanish; for HINTS 4 Cycle 4, 156 questionnaires (4.2%) were completed in Spanish; and for HINTS 5 Cycle 2, 14 questionnaires (<1%) were completed in Spanish. Note that in HINTS 5 Cycle 2, the survey protocol changed such that respondents had to call in to request a Spanish-language questionnaire rather than being sent both an English and Spanish questionnaire in the first mailing if the addresses were flagged as potentially Spanish-speaking during the oversampling of linguistically-isolated areas or as being a household with a potentially Hispanic surname.

### Primary outcomes

The primary outcomes for this analysis were participants' responses to the following nine questions: "In general, how much would you trust information about cancer from: (1) a doctor or other health care professional, (2) government health organizations, (3) charitable organizations, (4) religious organizations or leaders, (5) friends and family, (6) the Internet, (7) television, (8) radio, (9) newspapers or magazines." For each source, response options were "a lot, some, a little, or not at all." The response variable is ordinal with four ordered categories. We dichotomized the response variables into low levels of trust (not at all or a little) versus high levels of trust (some or a lot) due to rejection of the proportional odds assumption.

### Predictors and covariates

Primary predictors of interest were Hispanic ethnic categories (categorized as Mexican American, Cuban/Puerto Rican, and other Hispanics), gender, age, education, income, English language proficiency, place of birth, and length of residence in the United States. We estimated length of residence in the United States by subtracting the year of entry to the United States reported by the respondents from the year the survey was collected; we then categorized the variable as less than 10 years or 10 or more years. For English language proficiency, in HINTS 4 Cycle 2, only those born outside the United States were asked this question. In both HINTS 4 Cycle 4 and HINTS 5 Cycle 2, all participants were asked about English language proficiency. Because of this difference, we categorized HINTS 4 Cycle 2 participants who reported being born in the United States as speaking English "very well" for the English language proficiency item. The following covariates were identified *a priori* based on support from the literature and were included for adjustment in the multivariable analyses: personal cancer history, family cancer history, smoking status, and HINTS cycle.

### Statistical analysis

For each trust variable, we modeled the odds of reporting a high level of trust in the source of cancer information. To identify independent

predictors of trust in source of cancer information, we conducted a series of multivariable logistic regression models on the dichotomized trust outcome and adjusted the model for smoking status, personal cancer history, family cancer history, and HINTS cycle. Missing responses were imputed using hot-deck imputation method to preserve the distribution of observed responses (40, 41). Each observation with missing data was imputed 20 times and the imputed weight was recalibrated to preserve the national representative survey weight. For each of the trust outcomes, missingness was examined by ethnicity and SES, and was observed to be nondifferential.

All analyses were conducted using SAS 9.4 using complex survey methodology with jackknife replicate weights for accurate standard errors, with all analyses weighted to provide nationally representative estimates. Consistent with prior literature utilizing multivariable logistic regression models to assess relationships between sociodemographic characteristics and trust variables in the HINTS data, results are reported without correction for multiple-hypothesis testing (19, 26, 38). Results with  $P$ -value  $\leq 0.05$  were deemed statistically significant.

## Results

### Participant characteristics

From the three combined HINTS cycles, a total of 1,521 respondents self-identified as Hispanic or Latino, with 46% of respondents reporting Mexican or Mexican American ethnicity, 16% Cuban or Puerto Rican, and 37% reporting a different Hispanic ethnic background. As presented in **Table 1**, 45% of respondents were foreign born, with only 4% reporting having been in the United States for less than 10 years. Fifty percent of the respondents were male, approximately 68% were under the age of 50, and over half reported having some college education or more.

As displayed in **Table 2**, the proportion of respondents reporting a high level of trust in cancer information from specific sources ranged from 27% for radio to approximately 91% for doctors. A large proportion of respondents also reported a high level of trust in cancer information from government health agencies (68%), the Internet (63%), and charitable organizations (53%). The proportions of trust in sources of cancer information across all demographic characteristics is presented in **Table 2**.

### Multivariable logistic regression model results

#### Trust in doctors or health care providers

As displayed in **Table 3**, the fully adjusted logistic regression model revealed that participants who had family members whom were diagnosed with cancer were 2.4 times more likely to trust cancer information from a doctor compared with participants who did not have a family member diagnosed with cancer [95% confidence interval (CI), 1.08–5.23]. In addition, from HINTS 4 Cycle 2 to HINTS 4 Cycle 4, there was a 67% decrease in the odds of reporting a high level of trust in cancer information from doctors (95% CI, 0.15–0.75).

#### Government health and charitable organizations

Within the governmental health and charitable organization domains (**Table 4**), Hispanic participants with lower levels of education were significantly less likely to trust cancer information from government health agencies compared with respondents with a college degree or more; those with at most a high school degree were 49% less likely to trust cancer information from government

**Table 1.** Sociodemographic characteristics of Hispanic HINTS participants ( $n = 1,512$ ).

Variables	<i>n</i>	Unweighted (%)	Weighted % (SE)
Gender			
Male	581	38.43	49.58 (1.66)
Female	858	56.75	46.67 (1.69)
Missing	73	4.83	3.94 (0.74)
Age group			
18–34	284	18.78	33.80 (1.69)
35–49	463	30.62	34.13 (1.72)
50–64	429	28.37	21.19 (1.30)
65–74	202	13.36	5.90 (0.51)
>75	116	7.67	3.87 (0.55)
Missing	18	1.19	1.11 (0.62)
Highest level of school completed			
≤High school	618	40.87	45.75 (1.77)
Some college	455	30.09	31.98 (1.69)
College graduate or more	421	27.84	21.23 (1.39)
Missing	18	1.19	1.04 (0.41)
Hispanic categories			
Mexican American	708	46.83	46.16 (2.24)
Cuban or Puerto Rican	247	16.34	15.89 (1.83)
Other	557	36.84	37.95 (2.38)
Annual household income			
Less than \$20,000	420	27.78	20.28 (1.31)
\$20,000 to <\$35,000	227	15.01	15.52 (1.54)
\$35,000 to <\$50,000	216	14.29	18.98 (1.83)
\$50,000 to <\$75,000	202	13.36	14.28 (1.40)
\$75,000 or more	306	20.24	22.02 (1.89)
Missing	141	9.33	8.92 (1.08)
Born in the United States			
Yes	814	53.84	54.86 (2.04)
No	694	45.90	45.01 (2.05)
Missing	4	0.26	0.14 (0.08)
Smoking status			
Current	186	12.30	15.55 (2.13)
Former	271	17.92	13.55 (1.10)
Never	1,044	69.05	70.22 (2.01)
Missing	11	0.73	0.69 (0.34)
Ever diagnosed as having cancer?			
Yes	134	8.86	5.37 (0.72)
No	1,377	91.07	94.58 (0.72)
Missing	1	0.07	0.05 (0.05)
Any family member ever had cancer?			
Yes	858	56.75	54.94 (2.09)
No	634	41.93	44.32 (2.06)
Missing	20	1.32	0.74 (0.26)
How well do you speak English?			
Very well	973	64.55	66.18 (1.76)
Well	243	16.07	15.41 (1.48)
Not well	219	14.48	13.32 (1.23)
Not at all	63	4.17	4.40 (0.79)
Missing	14	0.93	0.68 (0.25)
Years in the USA			
<10 years	51	3.37	3.69 (0.68)
≥10 years or U.S. born	1,402	92.72	92.55 (0.95)
Missing	59	3.90	3.77 (0.66)

health agencies (95% CI, 0.27–0.96) and those with some college were 52% less likely to trust cancer information from government health agencies (95% CI, 0.25–0.90). Former smokers were 1.84 (95% CI, 1.09–3.10) times more likely to report high levels of trust in cancer information from government health agencies as opposed

to respondents who had never smoked. Hispanic participants living in the United States less than 10 years were nearly nine times more likely to trust in government health agencies (95% CI, 2.74–27.38) when compared with those living in the United States for more than 10 years or those who were U.S. born.

**Table 2.** Participants' trust in sources of cancer information (*n* = 1,512).

Trust outcomes	<i>n</i>	Unweighted (%)	Weighted % (SE)
Trust cancer information from doctor			
A lot	1,014	67.06	68.86 (2.05)
Some	352	23.28	21.84 (1.84)
A little	71	4.7	4.88 (1.28)
Not at all	32	2.12	1.48 (0.37)
Missing	43	2.84	2.94 (0.63)
Trust cancer information from family or friends			
A lot	116	7.67	7.88 (1.45)
Some	559	36.97	36.32 (2.03)
A little	523	34.59	35.45 (2.09)
Not at all	134	8.86	9.48 (1.21)
Missing	180	11.90	10.87 (1.23)
Trust cancer information from newspapers or magazines			
A lot	74	4.89	5.83 (1.30)
Some	589	38.96	35.08 (1.88)
A little	486	32.14	35.63 (1.98)
Not at all	173	11.44	12.14 (1.25)
Missing	190	12.57	11.31 (1.14)
Trust cancer information from radio			
A lot	54	3.57	5.10 (1.31)
Some	380	25.13	22.22 (1.60)
A little	527	34.85	38.37 (2.17)
Not at all	344	22.75	21.99 (1.59)
Missing	207	13.69	12.32 (1.26)
Trust cancer information from Internet			
A lot	309	20.44	20.80 (1.73)
Some	664	43.92	42.86 (2.18)
A little	264	17.46	20.14 (1.69)
Not at all	99	6.55	5.80 (0.77)
Missing	176	11.64	10.40 (1.20)
Trust cancer information from television			
A lot	113	7.47	8.22 (1.48)
Some	538	35.58	34.80 (2.26)
A little	474	31.35	31.75 (2.00)
Not at all	197	13.03	13.52 (1.29)
Missing	190	12.57	11.71 (1.32)
Trust cancer information from government health agencies			
A lot	453	29.96	32.94 (2.02)
Some	598	39.55	35.81 (2.07)
A little	200	13.23	16.57 (1.61)
Not at all	89	5.89	5.10 (0.80)
Missing	172	11.38	9.58 (1.11)
Trust cancer information from charitable organizations			
A lot	204	13.49	13.72 (1.56)
Some	587	38.82	39.10 (1.92)
A little	376	24.87	25.82 (1.73)
Not at all	148	9.79	9.86 (1.07)
Missing	197	13.03	11.50 (1.20)
Trust cancer information from religious organizations and leaders			
A lot	111	7.34	8.07 (1.13)
Some	425	28.11	25.32 (1.70)
A little	450	29.76	32.94 (2.12)
Not at all	338	22.35	23.05 (1.61)
Missing	188	12.43	10.62 (1.14)

**Table 3.** Multivariable logistic regression results for trust in cancer information from doctors.

Variables	Trust cancer information from doctor ( <i>N</i> = 1,478)	
	Odds ratio	95% CI
Gender		
Male	1.00	1.00–1.00
Female	1.99	0.89–4.44
Age group		
18–34	1.00	1.00–1.00
35–49	1.24	0.44–3.51
50–64	0.84	0.24–2.88
65–74	0.46	0.13–1.65
>75	0.97	0.27–3.49
Highest level of school completed		
≤High school	0.70	0.24–2.02
Some college	0.66	0.20–2.16
College graduate or more	1.00	1.00–1.00
Hispanic Categories		
Mexican American	1.00	1.00–1.00
Cuban or Puerto Rican	1.34	0.49–3.72
Other	0.47	0.21–1.05
Annual household income		
Less than \$20,000	1.64	0.37–7.35
\$20,000 to <\$35,000	3.65	0.80–16.79
\$35,000 to <\$50,000	<b>9.49</b>	<b>2.44–36.87</b>
\$50,000 to <\$75,000	2.10	0.65–6.76
\$75,000 or More	1.00	1.00–1.00
Born in the United States		
Yes	1.00	1.00–1.00
No	1.25	0.42–3.66
Smoking status		
Current	0.78	0.22–2.73
Former	1.33	0.46–3.87
Never	1.00	1.00–1.00
Ever diagnosed as having cancer?		
Yes	0.59	0.23–1.56
No	1.00	1.00–1.00
Any family member ever had cancer?		
Yes	<b>2.37</b>	<b>1.08–5.23</b>
No	1.00	1.00–1.00
Survey year		
HINTS 4 Cycle 2	1.00	1.00–1.00
HINTS 4 Cycle 4	<b>0.33</b>	<b>0.15–0.75</b>
HINTS 5 Cycle 2	0.70	0.29–1.69
How well do you speak English?		
Very well	1.00	1.00–1.00
Well	0.66	0.16–2.74
Not well	1.15	0.34–3.88
Not at all	1.78	0.16–19.62
Years in the USA		
<10 years	2.95	0.14–63.41
≥10 years or U.S. born	1.00	1.00–1.00

Note: Bolded estimates are statistically significant at *P* < 0.05.

**Media**

**Table 5** displays the results for the multivariable model results for trust in cancer information across various media channels. Cuban/Puerto Rican respondents were nearly twice as likely to report a high level of trust in cancer information from newspapers or magazines when compared with Mexican/Mexican American participants (95% CI, 1.12–3.41). Respondents 75 years of age or more were two

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**Table 4.** Multivariable logistic regression results for trust in cancer information from government health agencies and charitable organizations.

Variables	Trust cancer information from government health agencies (N = 1,349)		Trust cancer information from charitable organizations (N = 1,324)	
	OR	95% CI	OR	95% CI
Gender				
Male	1.00	1.00–1.00	1.00	1.00–1.00
Female	1.45	0.99–2.14	1.12	0.78–1.60
Age group				
18–34	1.00	1.00–1.00	1.00	1.00–1.00
35–49	1.02	0.54–1.94	1.00	0.63–1.61
50–64	0.90	0.43–1.88	0.68	0.40–1.13
65–74	0.76	0.38–1.51	1.00	0.58–1.74
>75	1.34	0.54–3.33	1.30	0.68–2.48
Highest level of school completed				
≤High school	<b>0.51</b>	<b>0.27–0.96</b>	0.67	0.43–1.04
Some college	<b>0.48</b>	<b>0.25–0.90</b>	0.70	0.42–1.15
College graduate or more	1.00	1.00–1.00	1.00	1.00–1.00
Hispanic categories				
Mexican American	1.00	1.00–1.00	1.00	1.00–1.00
Cuban or Puerto Rican	0.95	0.42–2.18	1.22	0.72–2.08
Other	1.00	0.68–1.45	0.90	0.59–1.36
Annual household income				
Less than \$20,000	0.68	0.34–1.35	0.78	0.44–1.36
\$20,000 to <\$35,000	1.07	0.50–2.29	1.02	0.60–1.73
\$35,000 to <\$50,000	1.39	0.63–3.09	1.21	0.72–2.05
\$50,000 to <\$75,000	0.79	0.38–1.64	1.24	0.67–2.28
\$75,000 or more	1.00	1.00–1.00	1.00	1.00–1.00
Born in the United States				
Yes	1.00	1.00–1.00	1.00	1.00–1.00
No	0.66	0.40–1.11	1.00	0.63–1.60
Smoking status				
Current	1.04	0.52–2.07	1.58	0.87–2.86
Former	<b>1.84</b>	<b>1.09–3.10</b>	1.01	0.67–1.52
Never	1.00	1.00–1.00	1.00	1.00–1.00
Ever diagnosed as having cancer?				
Yes	0.68	0.34–1.37	0.65	0.34–1.26
No	1.00	1.00–1.00	1.00	1.00–1.00
Any family member ever had cancer?				
Yes	0.94	0.61–1.45	1.06	0.74–1.53
No	1.00	1.00–1.00	1.00	1.00–1.00
Survey year				
HINTS 4 Cycle 2	1.00	1.00–1.00	1.00	1.00–1.00
HINTS 4 Cycle 4	0.84	0.51–1.40	0.93	0.62–1.41
HINTS 5 Cycle 2	0.76	0.44–1.29	0.79	0.53–1.18
How well do you speak English?				
Very well	1.00	1.00–1.00	1.00	1.00–1.00
Well	1.25	0.68–2.29	1.01	0.55–1.86
Not well	1.00	0.48–2.08	0.84	0.48–1.47
Not at all	0.87	0.29–2.59	1.19	0.54–2.63
Years in the USA				
<10 years	<b>8.66</b>	<b>2.74–27.38</b>	1.45	0.30–6.90
≥10 years or U.S. born	1.00	1.00–1.00	1.00	1.00–1.00

Note: Bolded estimates are statistically significant at  $P < 0.05$ .

times more likely (95% CI, 1.09–3.63) to report a high level of trust in cancer information from newspapers or magazines when compared with respondents under 35 years of age. Trust in print media among Hispanics went down over time, with respondents being 46% less likely

to report high trust in print media between 2012 and 2018 (95% CI, 0.37–0.77). Finally, participants who reported not speaking English at all were 55% less likely to report a high level of trust in cancer information from print media (95% CI, 0.22–0.92).

Women were 1.6 times more likely to report a high level of trust in cancer information from the Internet compared with male respondents (95% CI, 1.10–2.32). Survey respondents from HINTS 5 Cycle 2 were nearly half as likely to report a high level of trust in cancer information from the Internet compared with respondents from HINTS 4 Cycle 2 (95% CI, 0.37–0.85).

#### Religious organizations/friends and family.

As displayed in **Table 6**, trust in cancer information from family and friends was not differential by sociodemographic characteristics or Hispanic subgroups. An association between age and trust in cancer information from religious organizations was observed, such that there was a high level of trust in cancer information for those responders who were 50 years or older as opposed to those under 50. When compared with participants in the 18 to 34 age group, the likelihood of reporting a high level of trust in cancer information from religious organizations ranged from 1.68 for participants in the 50 to 64 years category to 2.27 for participants in the 75 years or older age group.

In fully adjusted models, women were 60% more likely to trust cancer information from religious organizations compared with men (95% CI, 1.08–2.28).

## Discussion

This is the first study assessing Hispanic heterogeneity regarding trust in varying sources of cancer information using a nationally representative sample. It suggests that intra-ethnic differences in trust of cancer-related information varies by the sources from which that information is attained, and yields several other important findings across several demographic characteristics, including differences according to age, length of time living in the United States, and in some instances, ethnicity.

Consistent with prior evidence analyzing population-wide trust in health information, this study shows high levels of trust in doctors across Hispanic subgroups (19). Despite moderate levels of trust in cancer-related information from government health agencies, Hispanics who have been in the United States for less than 10 years were significantly more likely to trust in cancer information received from government health agencies than Hispanics who have been in the U.S. longer than 10 years. This may reflect a lack of other available and trustworthy sources of information available to those who recently immigrated to the United States (17). Our findings may also reflect cohort differences in trust of government agencies among recent Hispanic immigrants compared with Hispanics that immigrated in earlier decades or differences in circumstances before immigrating or the political and social climate of the United States upon arrival (42–44). However, as these findings are independent of socio-demographic factors such as age, Hispanic ethnic group, and language, these findings may also reflect a growing distrust in government health agencies, either because prior interactions have proved unsuccessful or untrustworthy (14, 15), or alternatively, because increased access to other sources of information results in greater self-efficacy and less reliance on these specific sources (16). However, as our results confirm high levels of trust in cancer-related information from physicians, these findings may have implications for the ability to leverage existing physician–patient relationships, given that patient–

**Table 5.** Multivariable logistic regression results for trust in cancer information from media sources.

Sociodemographics	Trust cancer information from newspapers or magazines (N = 1,331)		Trust cancer information from radio (N = 1,314)		Trust cancer information from Internet (N = 1,345)		Trust cancer information from television (N = 1,331)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender								
Male	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Female	1.31	0.94-1.81	1.00	0.71-1.42	<b>1.60</b>	<b>1.10-2.32</b>	1.18	0.83-1.67
Age group								
18-34	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
35-49	1.14	0.71-1.85	1.07	0.63-1.81	1.03	0.58-1.84	0.98	0.64-1.50
50-64	1.11	0.67-1.82	0.99	0.58-1.72	1.12	0.66-1.90	1.10	0.68-1.79
65-74	1.66	0.94-2.95	1.16	0.62-2.18	1.00	0.50-2.03	0.93	0.51-1.67
>75	<b>1.99</b>	<b>1.09-3.63</b>	1.29	0.66-2.52	1.80	0.87-3.75	1.52	0.81-2.83
Highest level of school completed								
≤High school	0.72	0.45-1.16	1.02	0.59-1.78	0.81	0.41-1.60	1.29	0.81-2.05
Some college	0.97	0.61-1.53	0.97	0.57-1.65	0.98	0.51-1.88	1.14	0.70-1.87
College graduate or more	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Hispanic categories								
Mexican American	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Cuban or Puerto Rican	<b>1.95</b>	<b>1.12-3.41</b>	1.20	0.66-2.20	0.97	0.50-1.88	1.02	0.58-1.78
Other	1.11	0.77-1.61	1.05	0.72-1.52	0.90	0.60-1.34	0.97	0.68-1.36
Annual household income								
Less than \$20,000	0.99	0.55-1.78	0.95	0.53-1.69	0.58	0.31-1.06	1.21	0.64-2.26
\$20,000 to <\$35,000	1.00	0.58-1.71	1.13	0.62-2.07	0.73	0.35-1.52	1.19	0.65-2.18
\$35,000 to <\$50,000	1.16	0.66-2.04	1.22	0.63-2.38	0.72	0.38-1.38	1.36	0.73-2.54
\$50,000 to <\$75,000	1.68	0.97-2.93	1.51	0.82-2.79	0.87	0.47-1.63	1.09	0.62-1.90
\$75,000 or more	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Born in the United States								
Yes	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
No	1.22	0.75-1.97	0.99	0.59-1.66	0.96	0.62-1.46	1.01	0.60-1.71
Smoking status								
Current	1.27	0.75-2.13	1.36	0.75-2.48	1.26	0.67-2.37	1.29	0.70-2.36
Former	1.04	0.66-1.62	1.06	0.63-1.79	0.99	0.57-1.71	0.95	0.66-1.38
Never	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Ever diagnosed as having cancer?								
Yes	0.69	0.38-1.24	0.56	0.31-1.00	1.08	0.56-2.06	0.68	0.36-1.29
No	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Any family member ever had cancer?								
Yes	0.87	0.61-1.24	0.87	0.59-1.28	1.02	0.68-1.53	1.07	0.75-1.53
No	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Survey year								
HINTS 4 Cycle 2	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
HINTS 4 Cycle 4	0.73	0.48-1.12	1.09	0.69-1.73	0.71	0.45-1.12	1.15	0.74-1.80
HINTS 5 Cycle 2	<b>0.54</b>	<b>0.37-0.77</b>	0.94	0.62-1.44	<b>0.56</b>	<b>0.37-0.85</b>	0.71	0.46-1.11
How well do you speak English?								
Very well	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00
Well	1.20	0.69-2.08	1.36	0.74-2.50	1.00	0.56-1.80	1.22	0.68-2.20
Not well	0.82	0.49-1.38	1.18	0.73-1.93	0.75	0.40-1.41	0.84	0.51-1.40
Not at all	<b>0.45</b>	<b>0.22-0.92</b>	0.95	0.41-2.19	0.66	0.27-1.63	0.55	0.23-1.30
Years in the USA								
<10 years	0.72	0.15-3.44	1.80	0.51-6.36	0.50	0.11-2.27	1.17	0.34-4.07
≥10 years or U.S. born	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00	1.00	1.00-1.00

Note: Bolded estimates are statistically significant at  $P < 0.05$ .

physician communication has been observed in influencing both cancer treatments and outcomes (45-47). As length of stay within the United States serves as a limited proxy for understanding acculturation, further research with Hispanic populations should explore associations of acculturation factors and changes to trust in sources of cancer-related information over time (48, 49).

Trust in print media as sources of cancer-related information was a unique interethnic variation observed in this study, with Cubans and Puerto Ricans being more likely to trust newspaper and magazine sources than other Hispanic ethnic populations. Although we adjusted for factors related to health literacy, such as English language proficiency and education, this finding may

**Table 6.** Multivariable logistic regression results for trust in cancer information from friends and family, and religious organizations.

Variables	Trust cancer information from family or friends (N = 1,341)		Trust cancer information from religious organizations (N = 1,333)	
	OR	95% CI	OR	95% CI
Gender				
Male	1.00	1.00-1.00	1.00	1.00-1.00
Female	1.37	0.94-2.01	<b>1.57</b>	<b>1.08-2.28</b>
Age group				
18-34	1.00	1.00-1.00	1.00	1.00-1.00
35-49	1.14	0.71-1.83	1.51	0.96-2.38
50-64	1.00	0.61-1.65	<b>1.68</b>	<b>1.04-2.70</b>
65-74	1.24	0.72-2.15	<b>1.93</b>	<b>1.11-3.37</b>
>75	0.94	0.50-1.76	<b>2.27</b>	<b>1.20-4.32</b>
Highest level of school completed				
≤High school	1.04	0.63-1.72	0.69	0.43-1.10
Some college	0.86	0.51-1.46	0.87	0.56-1.37
College graduate or more	1.00	1.00-1.00	1.00	1.00-1.00
Hispanic categories				
Mexican American	1.00	1.00-1.00	1.00	1.00-1.00
Cuban or Puerto Rican	0.73	0.42-1.25	0.92	0.50-1.68
Other	1.03	0.69-1.54	0.92	0.63-1.35
Annual household income				
Less than \$20,000	1.04	0.53-2.07	1.40	0.81-2.45
\$20,000 to <\$35,000	1.39	0.75-2.57	1.56	0.87-2.81
\$35,000 to <\$50,000	1.32	0.74-2.38	1.43	0.84-2.46
\$50,000 to <\$75,000	1.87	0.95-3.67	<b>2.00</b>	<b>1.10-3.66</b>
\$75,000 or more	1.00	1.00-1.00	1.00	1.00-1.00
Born in the United States				
Yes	1.00	1.00-1.00	1.00	1.00-1.00
No	0.77	0.47-1.28	1.30	0.85-1.98
Smoking status				
Current	1.10	0.54-2.24	1.09	0.56-2.10
Former	0.88	0.58-1.31	0.98	0.60-1.61
Never	1.00	1.00-1.00	1.00	1.00-1.00
Ever diagnosed as having cancer?				
Yes	0.92	0.47-1.80	0.73	0.41-1.29
No	1.00	1.00-1.00	1.00	1.00-1.00
Any family member ever had cancer?				
Yes	1.41	0.99-2.02	1.20	0.82-1.76
No	1.00	1.00-1.00	1.00	1.00-1.00
Survey year				
HINTS 4 Cycle 2	1.00	1.00-1.00	1.00	1.00-1.00
HINTS 4 Cycle 4	0.71	0.45-1.11	0.82	0.54-1.24
HINTS 5 Cycle 2	0.94	0.60-1.47	<b>0.65</b>	<b>0.42-1.00</b>
How well do you speak English?				
Very well	1.00	1.00-1.00	1.00	1.00-1.00
Well	0.96	0.49-1.86	1.15	0.68-1.93
Not well	0.81	0.45-1.45	1.04	0.59-1.83
Not at all	0.79	0.39-1.63	0.68	0.30-1.53
Years in the USA				
<10 years	1.81	0.48-6.83	1.64	0.37-7.18
≥10 years or U.S. born	1.00	1.00-1.00	1.00	1.00-1.00

Note: Bolded estimates are statistically significant at  $P < 0.05$ .

reflect differences in other dimensions of health literacy as well as differences in access to and preferences for ethnic print media. Although our study, to our knowledge, is the first nationally representative study to identify ethnic differences in trust of cancer-related information from print media, prior studies have sug-

gested that there may be benefits to utilizing ethnic print media to promote cancer prevention behaviors among Hispanics (50, 51). Our study found that non-English speaking respondents had relatively lower levels of trust in print media, which may reflect a lack of access to ethnic print media. The benefits of utilizing ethnic print media for health information, however, may be greatest to patients with low English proficiency, which is associated with poor health literacy across ethnicities (52). Despite these findings, print media remains a potent but relatively untapped resource for providing health information to racial and ethnic minorities (53). Further understanding of the specific sources of print media that are most trusted and utilized for cancer-related information is needed. Our findings have strong implications for the use of print media, not only for providing information but also for disseminating information. Increased trust in print media may reflect its ability to be shared between trusted individuals. Further research should aim to understand how print media is shared and disseminated between Hispanic populations. Such research may provide insights into effective means for public health initiatives as well as research recruitment.

One particularly prominent finding in this study was that older Hispanics were more likely than younger Hispanics to trust in health information from nonmedical sources, such as family, Internet, and faith-based organizations. This may reveal a natural progression of trust networks with aging, or a digital age gap previously alluded to: social networks, including faith-based organizations, may be the only accessible and culturally tailored sources of cancer information available to older Hispanic populations. This finding also highlights the utility of leveraging community resources and the Internet to provide cancer information. As the availability of cancer information has become more widespread from technological advancements, health care and public educational approaches could include family and friends, as well as religious organizations to ensure dissemination of cancer information and messaging.

Strengths of our study include the novel exploration of within-group heterogeneity among Hispanics. The use of probability sampling used for HINTS yields results that are nationally representative of non-institutionalized adults in the United States, extending the geographic limitations from prior studies using community-, city-, and state-specific samples to survey Hispanic populations. Additional strengths include the use of several HINTS cycles to assess changes in trust in cancer-related information within the United States over time, as well as the inclusion of sociocultural factors including length of time in the United States, English language proficiency, and individual and family cancer history.

Although our research has yielded several important additions to the literature examining cancer-related information seeking among Hispanics, this study has several limitations which should be considered when interpreting results. Although we were able to compare differences between several major ethnic groups (e.g., Mexican and Mexican Americans, Puerto Ricans, and Cubans), small sample sizes of other Hispanic ethnic groups may have limited our ability to detect differences between other groups such as those of Central or South American origin. Further, trust in information sources was limited to broad categories; as such, specific digital platforms (e.g., Facebook, Instagram), government health agencies, and ethnic media sources were not examined, which may limit channel-specific strategies for intervention. Finally, although the data were from a probability-based national sample utilizing a full sample weight and 50 replicate weights that

calculated household-level and person-level weights, adjusted for household nonresponse, and calibrated the person-level weights to population control totals from the U.S. Census Bureau's American Community Survey to correct for nonresponse and noncoverage biases, it is possible that estimates derived from Hispanic respondents in HINTS may not be representative of Hispanics in the United States overall.

Given the diversity of health disparities affecting the Hispanic population, this study has important implications for modifying cancer-related information and the methods by which it is shared to Hispanic subgroups. Understanding the sources of information that are most trusted by the populations most difficult to reach provides insight into potential targets for communication; leveraging sources of trust is critical to reaching the intended audience.

### Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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