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## **Knowledge and Beliefs about Cancer in African American Population**

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### **ABSTRACT**

Cancer is the second most common cause of death in the United States, taking the lives of one in four Americans each year (American Cancer Society [ACS], 2015). A total of 1,658,370 new cancer cases and 589,430 deaths from cancer were projected to occur in the United States in 2015 (ACS, 2015). In 2013, approximately 176,630 new cancer cases and 64,880 deaths from cancer were projected to occur in African American communities. The majority of diagnoses were cancers of the prostate, lung, colon, rectum, breast, and colorectal region (ACS, 2013). For most cancers, African Americans have the highest death rate, and shortest survival rate, of any racial or ethnic sub-groups (ACS, 2013). Individual perception, knowledge, beliefs, and awareness systems can influence the cancer evaluation process and the ability to fight the disease. The health belief model (HBM) is a conceptual framework used to explain an individual's behavior based on the individual's belief or perception. This paper reports on an analysis of a sample of self-identified African American respondents to the Health Information National Trends Survey (HINTS) data HINT4 cycle3, to explore an association of African Americans' knowledge, beliefs and the processes of cancer information-seeking behavior based on the HBM and demographic information. The results showed that African Americans with a higher level of education were significantly more likely to access common sources of cancer information. Perceived benefits and cues-to-action were significantly associated with the common sources of cancer information sought whereas perceived susceptibility, perceived severity, perceived barrier, and self-efficacy were not. African Americans' perceptions and beliefs of cancer may be enhanced through health education, mass media campaigns, and a wider availability of health information online.

**Keywords:** African Americans; knowledge; beliefs; cancer information; health belief model; HINTS data

## INTRODUCTION

Cancer is the second most common cause of death in the United States, taking one out of four lives (American Cancer Society [ACS], 2015). A total of 1,658,370 new cancer cases and 589,430 deaths from cancer were projected to occur in the United States in 2015 (ACS, 2015). African Americans were 13% (42 million) of the overall United States population in 2013 (ACS, 2013). This group of Americans experience several health status disparities, including worse outcomes after a cancer diagnosis (ACS, 2013). In 2013, approximately 176,630 new cancer cases and 64,880 deaths from cancer were projected among African Americans (ACS, 2013). In African Americans, lung cancer was the leading cause of death among men (29%) and women (21%) followed by prostate cancer (15%) in men and breast cancer (19%) in women in 2013 (ACS, 2013). One in two African American men and one in three African American women will be diagnosed with cancer in their lifetime (ACS, 2013). The death rate from cancer among African Americans is 27% higher among men and 11% higher among women than other ethnic groups (ACS, 2014).

### Rationale for Study

For most cancers, African Americans have the highest death rate and shortest survival rate of any racial or ethnic groups in the United States (ACS, 2013). Multiple factors influence whether an individual gets cancer or not, but once diagnosed, multiple approaches can be applied to control the disease from metastasizing and to improve survival rates. Lack of health coverage and low socioeconomic conditions are well-documented factors associated with cancer disparities in minority groups (National Cancer Institute, n.d.). However, individual perceptions, knowledge, beliefs, and awareness systems may also influence the cancer evaluation process and the ability to fight the disease but have not been extensively explored in the African American population.

### Significance of Study

Several reports suggest that disadvantaged and minority groups in the U.S., including African Americans, differ in their health beliefs and perceptions from the majority population. Davis, Buchanan, and Green (2013) described a consistent belief among most minorities, including African Americans, that they had a lower chance of getting cancer than Whites. However, African Americans in general perceived cancer as a death sentence in one study (Im, 2008), and in another most non-white minorities believed that everything causes cancer (Orom, Kiviniemi, Underwood, Ross, & Shavers, 2010), while a third investigation showed that some African American women believed cancer was contagious (Phillips, Cohen, & Moses, 1999). Pain experience was also linked with attitudes toward cancer (Im, 2008). Because of cancer pain, fear of jeopardizing personal relationship was linked with reluctance to seek treatment by African American women (Phillips et al., 1999). Most African Americans have approached religion to heal from the cancer pain (Dilorio, Steenland, Goodman, Butler, Liff & Roberts, 2011).

There is an increase interest in health information in the general public (Czaja, Manfredi, & Price, 2003). However, not everyone diagnosed with a serious disease actively seeks information beyond what is given by care providers (Czaja, Manfredi, & Price, 2003). A significant percentage of individuals (minorities in particular) from the lowest income and education groups mistrust mass media health information (Davis et al., 2013). A study about human papillomavirus (HPV), for example, indicated that a disparity in cervical cancer screening continues in minority women, particularly African Americans, due to sociocultural beliefs on acceptability of cervical cancer (Johnson, Mues, Mayne, & Kiblawi, 2008). Some African

American men had lack of appropriate communication, distrust, fear and low participating behavior in prostate cancer screening (Vernon, 1999).

Using the 2003 health information national trends survey (HINTS) data, Ramanadhan and Viswanath (2006) analyzed cancer history and information-seeking status among ethnic/race groups by examining the socio-demographic profiles of four groups: non-information-seeking patients, non-information-seeking public, information-seeking patients, and the information-seeking public. They found strong variations between groups. The non-information-seeking patients had low income and lower level of education within groups while a large number of non-information-seekers (20% non-information-seeking patients and 18% non-information-seeking public compared to 13% information-seeking patients and 9% information-seeking public) responded that there was nothing else could be done to reduce cancer risks. Non-information-seeking patients and non-information-seekers in general, trusted in physicians more than other information sources. About 32% of non-information-seeking patients reported that they had somewhat more trust in cancer information on the Internet, compared to 77% of the information-seeking public, and 72% of information-seeking patients. There was no difference in information-seeking behavior between African Americans and Whites, whereas Hispanics were more likely to be non-seekers of cancer information.

African Americans may not, for a variety of complex reasons, be accessing or receiving important information regarding the risk factors for cancer, preventive behaviors, and recommendations for screening and treatment through health communication strategies. To gain a more complete understanding of cancer risks, beliefs, and the communication channels in the African American population, a study regarding African Americans' perspectives of and beliefs about cancer, and their processes for seeking information regarding cancer is relevant for further research.

#### Statement of Purpose

The purpose of this study was to examine the perceptions and beliefs about cancer of a sample population of self-identified African Americans from the HINTS survey data.

#### Statement of Hypothesis

The first objective of this study was to determine the association between knowledge and cancer information-seeking behavior of self-identified African Americans from the HINTS survey data, HINTS3 Cycle3 (*H1*). The second objective was to determine the association between beliefs and cancer information-seeking behavior of the same sample population (*H2*).

#### Statement of IRB approval

The ATSU-AZ Institutional Review Board exempted this study (IRB protocol # 2014 – 209).

## **METHODS**

### Participants

Health Information National Trends Survey (HINTS) is a nationally representative survey of data collected by the National Cancer Institute about American public view of cancer-related information. A sample of respondents to the HINT survey gathered from self-identified members of the African American population ( $N = 585$ ) from the most recent dataset, HINTS4 cycle3 updated in June 2014, was used for this applied research project. The survey data used to observe how adults 18 years and older use different communication methods to gain health information for themselves and their family members. The HINTS data is freely available for public use. The HINTS4 cycle3 dataset had 3,185 total respondents, of which 3,124 had

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complete responses and 61 had partial responses to the survey. The survey provides updates on changing health patterns and needs for health information (NCI, n.d.). The HINTS4 cycle3 survey questionnaires were expected to be completed within 20 - 30 minutes. The participation for the survey was voluntary and responses were anonymous; no identifying information was collected.

### Design

This correlation study sought to identify an association between education level and cancer information-seeking behavior among an African American sample population. The data were analyzed using participants' demographic information, information seeking media variables, and health belief model (HBM) constructs.

The HINTS4 Cycle3 survey employs a two-stage design (Westat, 2014). In the first stage, a stratified sample of addresses was selected from the residential address list used by Marketing Systems Group. In the second-stage, one adult over 18 years of age per household was selected. The sample frame of the addresses was grouped based on the areas with a high concentration of minority populations, the addresses with a low concentration of minority populations, and the addresses located in the counties from the Central Appalachia region regardless of minority populations. A total number of 12,010 addresses were selected for HINTS4 cycle3, of which 7,790 were from a high-minority stratum, 4,123 were from a low-minority stratum, and 97 were from the Central Appalachia stratum. Two toll-free telephone numbers for English-speaking and Spanish-speaking respondents regarding survey questions were provided in the questionnaire mailing. The questionnaires were mailed from September 5 to October 31, and were collected by December 30, 2013, with a total of 3,185 eligible questionnaires returned. A \$2 pre-paid monetary incentive was included in the mailing to encourage higher participation.

### Survey Eligibility

A survey was considered complete if at least 80 percent of the questions were answered from sections A and B. Partial completion was declared when 50 to 79 percent of questions were answered, and surveys were deemed incomplete and discarded if fewer than 50 percent of questions returned (Westat, 2014). If the same household returned more than one questionnaire, only the first one received was accepted. For the same questionnaire returned by a different household member, the next birthday rule was applied (to verify age of 18 years), and the questionnaire that complied was accepted, the rest were discarded (Westat, 2014).

### Instrumentation

Each returned questionnaire was scanned using the Scanner Management Services (SMS) system to keep track of returned questionnaire and avoid duplication. Out of 12,010 questionnaires sent 3,185 were complete, 79 were refused, 1,612 were returned undelivered, and 7,134 were not returned by December 30, 2013 (Westat, 2014). All completed questionnaires were scanned to capture the data using a high-speed Tele Form scanner, and were validated using HINTS specifications. Decisions made on data issues were recorded into the data decision log, which contained respondent ID, the value triggering edit, the updated value, and the reason for update.

A total of 38 entries were captured into the data decision log. A quality assurance staffer reviewed both the hard copy and the scanned version of the questionnaire item-by-item for data integrity and the correctness. A complete, cleaned HINTS4 Cycle3 dataset available in SPSS format in the National Cancer Institute's Health Information National Trends Survey website was used for statistical computations.

### Health Belief Model

The health belief model (HBM) is a conceptual framework used to explain an individual's behavior based on the individual's belief or perception (Davis et al., 2013). The main constructs of the HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues-to-action, and self-efficacy.

For perceived susceptibility, the participants were asked how likely they were to get cancer in their lifetime. Answers were recorded in a rating scale (very unlikely, unlikely, neither unlikely nor likely, likely and very likely) then were sorted into unlikely (very unlikely and unlikely); neither (neither unlikely nor likely); and likely (likely and very likely). For perceived severity, the participant's view on the severity of cancer was also analyzed with a response rating scale (strongly agree, somewhat agree, somewhat disagree and strongly disagree) to the statement "When I think about cancer, I automatically think about death." The results were sorted into agree (strongly agree and somewhat agree); and disagree (somewhat disagree and strongly disagree). Perceived benefit was captured by asking whether the participants were confident or not with responses from another rating scale (completely confident, very confident, somewhat confident, a little confident and not confident at all) to the statement "Overall, how confident are you that you could get advice or information about health or medical topics if you needed it?" The results were sorted into confident (completely confident and very confident); somewhat confident (somewhat confident and a little confident); and not confident (not confident at all). Perceived barriers was analyzed based on response to the statement "There are so many different recommendations about preventing cancer, it's hard to know which ones to follow," and captured on an-agree/disagree rating scale (strongly agree, somewhat agree, somewhat disagree and strongly disagree). The results were sorted into agree (strongly agreed and somewhat agree); and disagree (somewhat disagree and strongly disagree). Cues-to-action were captured based on the dichotomous response (yes/no) to the question "Have you ever looked for information about cancer from any source?" Self-efficacy was captured with agreement or disagreement with the statement "There is not much you can do to lower your chances of getting cancer." Disagreement with the statement was considered higher level of self-efficacy.

#### Common Cancer Information-Seeking Sources

Participants were supposed to choose only one source of information for their search of cancer related information. There were 13 options provided in the questionnaire. To simplify the question, best common sources were categorized into Internet, doctors/other health providers (cancer organization, telephone information number, complementary/alternative or unconventional practitioner), brochures/books/other printed materials (brochures, pamphlets, etc., books, library, magazines, newspapers), family/friends (family, friend/co-worker), and none (those who did not choose any of the categories. A total of 130 participants selected "no" to the lead in question A1 in the questionnaire, "Have you ever looked for information about health or medical topics from any source?" For the sake of computation, we considered their response as none).

Missing data, multiple responses selected in error, commission error and others were considered not declared and were excluded from the analysis.

#### Data Analysis

Data analysis was performed using SPSS Statistics Version 22 (IBM Corp., Armonk, NY). The frequency distribution of demographic variables of the sample population ( $N = 585$ ) included gender, age group, education, income, marital status, occupation, diagnosed as having cancer, and most recent source of health information was analyzed using descriptive statistics. Associations of the relationship between education level and belief and cancer-information-

seeking behavior within a sample population of self-identified African Americans from the HINT survey data, HINT4 Cycle3 were determined performing chi-square tests using HBM constructs as dependent variables and the common cancer information seeking sources as independent variables. The test of association was at  $\alpha = 0.05$  in two tailed chi-square tests with 95% confidence interval (CI), and the level of  $p < .05$  was considered statistically significant.

## RESULTS

A sample of self-identified members of the African American population ( $N = 585$ ) responded to the survey, HINTS4 Cycle3 (Table A1), among which female participation was higher (69.4%) than male (27.0%). Approximately 35.6% of the African Americans were between the ages of 18 to 49 years, and 38.1% were between the ages of 50 to 64 years. African American participants with post-secondary degrees equaled those with only a high school diploma (26.8% each). Forty-one percent had annual household incomes below \$19,999 and approximately 30% of the respondents had household incomes in between \$20,000 and \$49,999. Most African Americans were married or living as married (32.4%), followed by divorced or separated (27.2%), single or never been married (26.7%) and widowed (10.8%). Almost half were employed (46.3%) and a little over one-fifth (21.4%) were retired. Only 9.4% of the responding African Americans indicated they had been diagnosed with cancer. Prostate (2.4%), breast (2.2%), and renal (0.7%) cancers were the most common cancers reported. The Internet (30.6%) was the most common source of health information followed by doctors or other health providers (16.8%), brochures/books/other printed materials, etc. (9.9%), and family/friends (4.6%). Approximately 22.2% did not seek cancer information from any sources on the list.

The first objective of the study (*H1*) was to determine the association between education level and cancer information-seeking behavior among the self-identified African American sample population. The results indicated that African Americans with less than a high school education depended more on their - physicians or other healthcare providers (20.0%) for their health information (Table B1). As the level of education increased, a higher number of the survey participants' behaviors related to cancer information-seeking media sources also increased and changed. Use of the Internet was higher amongst those with some college level education or more (43.3%) than those with high school or below educational level (3.4%). The association between education level and cancer seeking behavior was statistically significant ( $p = 0.000$ ).

The second objective of the study (*H2*) was tested to determine the association between beliefs (health belief model constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barrier, cues-to-action, and self-efficacy) and cancer information-seeking behavior among self-identified African American sample population from the HINT survey, HINTS4 Cycle3.

Perceived susceptibility (Table C1): The highest percentage of African Americans from the survey selected the option "neither", as opposed to "likely" or "unlikely" to get cancer in their lifetime (43.7%). Among the rest, their belief in getting cancer was thought to be more unlikely (29.8%) than likely (26.6%). The perceived susceptibility of cancer was not significantly associated with participants' common source of cancer information ( $p = 0.450$ ).

Perceived severity (Table C2): Most survey respondents agreed (59.2%) with the severity statement that when they think of cancer, they automatically think of death. These subjects were most likely to seek information from the Internet (63.8%). However, the

association between the source of cancer information and severity was not significant ( $p = 0.146$ ).

Perceived benefits (Table C3): The majority of the participants were confident in their ability to get advice or information regarding health or medical topics when they needed (60.0%). There was a significant association between confidence of ability to get advice on health information and the source of cancer information ( $p = 0.014$ ).

Perceived barrier (Table C4): A high percentage of respondents agreed (69.0%) with the statement: “There are so many different recommendations about preventing cancer; it’s hard to know which ones to follow.” Those who agreed used the Internet far more commonly (72.6%) than the 27.4% of those who disagreed. However, there was no statistical association between perceived barrier and the sources of cancer information used ( $p = 0.248$ ).

Cues-to-action (Table C5): More than half of African Americans from the survey (52.6%) had searched for information regarding cancer. Higher proportion (68.5%) of African Americans who looked for information about cancer, searched for it in brochures, books and other printed materials. There was a statistically significant association between cancer information searching behavior and cancer information sources ( $p = 0.000$ ).

Self-efficacy (Table C6): Higher numbers of survey respondents disagreed (62.5%) with the statement: “There is not much you can do to lower your chance of getting cancer” and used more leading cancer information sources than those who agreed (37.5%). However, there was no significant statistical association between cancer information sources and the disagreement ( $p = 0.461$ ).

## DISCUSSION

In the studies of demographically diverse HINTS survey participants a decade ago, education level was a strong influence on information-seeking and non-seeking status in cancer survivors and the public who identify as racial/ethnic minorities (Giordano, Leafman, Citrin & Wallace, 2015; Ramanandhan & Viswanath, 2006). Our findings also demonstrate differences based on the education level of self-identified African Americans who recently responded to the most recent HINTS questionnaire. The survey respondents’ cancer information seeking behavior increased and changed as educational level increased: from doctors/other health providers (31.6%) at high school or below level of education to Internet (43.3%) with bachelor’ degree or higher level of education (Table A1). This finding correlates with Ramanandhan & Viswanath’s (2006) study, that those with higher education level and higher income level were much likely to seek health information than those with less education and lower income level. From the minority perspective, Giordano et al., (2015) also used HINTS 2007 data to demonstrate increased use of the Internet for cancer-information-seeking behavior among Hispanics with higher education level.

Davis et al. (2013) applied the health belief model to examine racial/ethnic differences in the beliefs about cancer and cancer prevention in their study using HINTS 2007 data in order to design an intervention to decrease cancer-related health disparities. Their study found no differences between racial or ethnic groups for perceived severity, perceived barriers, and cues-to-action; however, perceived susceptibility, perceived beliefs, and self-efficacy were associated with race or ethnicity (Davis et al, 2013). Our analysis indicated perceived benefit and cues-to-action were statistically associated with cancer information-seeking behavior, but there was no statistical association between perceived susceptibility, perceived severity, perceived barrier, and self-efficacy with the self-identified sample population of African Americans’ cancer

information-seeking behavior. Our findings were consistent with the Davis et al. (2013) findings, that most African Americans were indifferent in their belief of getting cancer in their lifetime or believed in a low chance of getting cancer (neither 43.7% and unlikely 29.8%; Table C1); when think about cancer they automatically think of death (agree 59.2%; Table C2); overall they are confident that they could get advice or information about health or medical topic if they needed it (confident 60.0%; Table C3); there are many different recommendations about preventing cancer, it's hard to know which ones to follow (agree 69.0%; Table C4); there is not much they can do to lower their chance of getting cancer (disagree 62.5%; Table C6). However, the response to the HBM construct Cues-to-action question "have you ever looked for information about cancer from any sources?" is different. Most self-identified members of the African American population from the survey responded "yes" (52.6%; Table C5) in our study compared to a very low response (16.2%) in Davis et al., study. With the Internet becoming a major source of health information for an increasing percentage of the population, it could be possible that an increased number of concerned African Americans from the survey might have searched information online either for themselves or for their loved ones (Giordano et al., 2015; Hesse et al., 2005).

The Davis et al. (2013) study found that most African Americans believed they had a low chance of getting cancer, and 80% of the overall respondents (Hispanic, White, African American and Asian) believed if cancer is detected early, it can be cured. For perceived susceptibility, Hispanics, Asians and African Americans were found to be more likely to believe they had a lower chance of getting cancer than Whites (Consedine, Magai, Horton, Neugut, & Gillespie, 2005; Davis et al., 2013; Gwede et al., 2010; Honda & Neugut, 2004). Of the HBM constructs, perceived severity (believing in cancer automatically made the cancer patients think of death) from our study was consistent (59.2% agreed; Table C2) with the previous findings (Consedine et al., 2005; Im, 2008).

Beliefs pertaining to specific cultural groups were considered to play a role in one's susceptibility to cancer. In the Hispanic community, childbirth, menses, sex, and stress were considered to play a role in susceptibility (Johnson et al., 2008). In African Americans, administrative processes (delayed appointment scheduling, long patient wait time, and limited availability of physicians), perception of racism, poor communication skills and lack of family support are established health care barriers (Johnson et al., 2008). A variety of misconceptions and stigma imposed in the Asian communities discouraged screening of those individuals who seek care (Johnson et al., 2008). These findings, the health status, perceptions, and beliefs indicate the need for cancer prevention awareness, motivation initiatives, and the importance of education in minority communities.

It has been shown that culturally influential people, such as celebrities, can promote greater health awareness via the mass media by motivating concerned individuals and communities to seek help (Niederdeppe, 2008). African American women were more likely than women from other ethnic groups to change their health behavior per their physicians' recommendations (Brandon & Proctor, 2010). As Internet usage grows and improves, more health information is accessed online (Hesse et al., 2005). Our results also support higher number of internet users in all categories particularly among African Americans with higher education. As such, there should be proper checks and balances on what is available and how much can be used when it comes to cancer prevention information. Different racial/ethnic cancer prevention groups, particularly African American groups, need further research on media initiatives, women's participation, and Internet use.

### **Limitations**

The statistical analysis in this survey was based on cross-sectional data. Cross-sectional data consists of a single measurement regarding the participant's beliefs at the specific time of survey, versus data from multiple time points. The data collected is self-reported psychology and mental health data for which researchers widely believe that there can be threats to the validity (Chan, 2009). HINTS data was not designed to test HBM but was used to identify relevant variables in understanding cancer and cancer prevention beliefs (David et al., 2013; Myer et al., 2007).

## CONCLUSION

Our results indicate African Americans with higher-levels of education were better informed about the chance of getting cancer than those with lower educational levels. African Americans' perceptions and beliefs about cancer can be enhanced through education, mass media campaigns, and a wider availability of health information online.

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**Appendix A**

Table 1: Demographic Characteristic Distribution of African Americans from the Health Information National Trends Survey, HINTS4 Cycle3 data (N = 585)

Characteristic		<i>n</i>	Valid Percent
Gender	Male	158	27.0
	Female	406	69.4
	Not declared	21	3.6
Age Group	18-34	66	11.3
	35-49	142	24.3
	50-64	223	38.1
	65-74	94	16.1
	75+	46	7.9
	Not declared	14	2.4
Education	Less than high school	63	10.8
	High school graduate	157	26.8
	Some college	195	33.3
	Bachelor's degree and more	157	26.8
	Not declared	13	2.2
Income	\$0 to \$19,999	241	41.2
	\$20,000 - \$49,999	177	30.2
	\$50,000 - \$99,999	121	20.7
	\$100,000 - \$ 199,999	22	3.8
	\$200,000 or more	16	2.7
	Not declared	8	1.4
Marital Status	Married/living as married	190	32.4
	Divorced/separated	159	27.2
	Single, never been married	156	26.7
	Widowed	63	10.8
	Multiple response	6	1.0
	Not declared	11	1.9
Occupation	Employed	271	46.3
	Retired	125	21.4
	Disabled	77	13.2
	Unemployed	57	9.7
	Homemaker/student/others	29	5.0
	Multiple response	18	3.1
	Not declared	8	1.4
Diagnosed as having cancer	Yes	55	9.4
	No	522	89.2
	Not declared	8	1.4
Affected by most common type of cancer (from those who responded 'yes' to diagnosed as having cancer)	Prostate	14	2.4
	Breast	13	2.2
	Renal	4	0.7
	Cervical	3	0.5
	Colon	3	0.5

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	More than one cancer checked	5	0.9
	Other cancers	10	1.7
	Not declared	8	1.4
Most recent source of health information	Internet	179	30.6
	Doctors/other health providers	98	16.8
	Brochures/books/other printed materials	58	9.9
	Family/Friends	27	4.6
	None	130	22.2
	Not declared	93	15.9

*Note:* Figures were rounded to nearest tenths.

**Appendix B**

Table 1: Association of the relationship between knowledge and cancer information-seeking behavior, chi-square result

Most common sources of cancer information					
Educational level	Internet ( <i>n</i> = 178)	Doctors/ other health providers ( <i>n</i> = 95)	Brochures/ books/other printed materials ( <i>n</i> = 57)	Family/ friends ( <i>n</i> = 26)	None ( <i>n</i> = 127)
Less than high school ( <i>n</i> = 52, 10.8%)	<i>n</i> = 6 (3.4%)	<i>n</i> = 19 (20.0%)	<i>n</i> = 8 (14.0%)	<i>n</i> = 3 (11.5%)	<i>n</i> = 16 (12.6%)
High school graduate ( <i>n</i> = 130, 26.9%)	<i>n</i> = 23 (12.9%)	<i>n</i> = 30 (31.6%)	<i>n</i> = 19 (33.3%)	<i>n</i> = 7 (26.9%)	<i>n</i> = 51 (40.2%)
Some college ( <i>n</i> = 165, 34.2%)	<i>n</i> = 72 (40.4%)	<i>n</i> = 23 (24.2%)	<i>n</i> = 18 (31.6%)	<i>n</i> = 7 (26.9%)	<i>n</i> = 45 (35.4%)
Bachelor's degree and more ( <i>n</i> = 136, 28.2%)	<i>n</i> = 77 (43.3%)	<i>n</i> = 23 (24.2%)	<i>n</i> = 12 (21.1%)	<i>n</i> = 9 (34.6%)	<i>n</i> = 15 (11.8%)

Note: Figures were rounded to nearest tenths.

$p = 0.000$ , two-tailed.

**Appendix C**

Table 1: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: perceived susceptibility, chi-square result

Most common sources of cancer information					
How likely are you to get cancer in your lifetime?	Internet ( <i>n</i> = 165)	Doctors/ other health providers ( <i>n</i> = 64)	Brochures/ books/other printed materials ( <i>n</i> = 49)	Family/ friends ( <i>n</i> = 20)	None ( <i>n</i> = 105)
Unlikely ( <i>n</i> = 120, 29.8%)	<i>n</i> = 43 (26.1%)	<i>n</i> = 22 (34.4%)	<i>n</i> = 15 (30.6%)	<i>n</i> = 4 (20.0%)	<i>n</i> = 36 (34.3%)
Neither ( <i>n</i> = 176, 43.7%)	<i>n</i> = 83 (50.3%)	<i>n</i> = 23 (35.9%)	<i>n</i> = 20 (40.8%)	<i>n</i> = 8 (40.0%)	<i>n</i> = 42 (40.0%)
Likely ( <i>n</i> = 107, 26.6%)	<i>n</i> = 39 (23.6%)	<i>n</i> = 19 (29.7%)	<i>n</i> = 14 (28.6%)	<i>n</i> = 8 (40.0%)	<i>n</i> = 27 (25.7%)

Note: Figures were rounded to nearest tenths.

$p = 0.450$ , two-tailed.

Table 2: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: perceived severity, chi-square result

Most common sources of cancer information					
When I think about cancer, I automatically think about death	Internet ( <i>n</i> = 174)	Doctors/ other health providers ( <i>n</i> = 89)	Brochures/ books/other printed materials ( <i>n</i> = 55)	Family/ friends ( <i>n</i> = 27)	None ( <i>n</i> = 116)
Agree ( <i>n</i> = 273, 59.2%)	<i>n</i> = 111 (63.8%)	<i>n</i> = 46 (51.7%)	<i>n</i> = 30 (54.5%)	<i>n</i> = 20 (74.1%)	<i>n</i> = 66 (56.9%)
Disagree ( <i>n</i> = 188, 40.8%)	<i>n</i> = 63 (36.2%)	<i>n</i> = 43 (48.3%)	<i>n</i> = 25 (45.5%)	<i>n</i> = 7 (25.9%)	<i>n</i> = 50 (43.1%)

Note: Figures were rounded to nearest tenths.

$p < 0.146$ , two-tailed.

Table 3: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: perceived benefits, chi-square result

Most common sources of cancer information					
Overall, how confident are you that you could get advice or information about health or medical topics if you needed it?	Internet ( <i>n</i> = 177)	Doctors/ other health providers ( <i>n</i> = 97)	Brochures/ books/other printed materials ( <i>n</i> = 58)	Family/ friends ( <i>n</i> = 27)	None ( <i>n</i> = 121)
Confident ( <i>n</i> = 288, 60.0%)	<i>n</i> = 108 (61.0%)	<i>n</i> = 72 (74.2%)	<i>n</i> = 28 (48.3%)	<i>n</i> = 17 (63.0%)	<i>n</i> = 63 (52.11%)
Somewhat/little confident ( <i>n</i> = 180, 37.5%)	<i>n</i> = 65 (36.7%)	<i>n</i> = 24 (24.7%)	<i>n</i> = 26 (44.8%)	<i>n</i> = 10 (37.0%)	<i>n</i> = 55 (45.5%)
Not confident ( <i>n</i> = 12, 2.5%)	<i>n</i> = 4 (2.3%)	<i>n</i> = 1 (1.0%)	<i>n</i> = 4 (6.9%)	<i>n</i> = 0 (0.0%)	<i>n</i> = 3 (2.5%)

Note: Figures were rounded to nearest tenths.

$p < 0.014$ , two-tailed.

Table 4: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: perceived barrier, chi-square result

Most common sources of cancer information					
There are so many different recommendations about preventing cancer, it's hard to know which ones to follow	Internet ( <i>n</i> = 175)	Doctors/ other health providers ( <i>n</i> = 87)	Brochures/ books/other printed materials ( <i>n</i> = 55)	Family/ friends ( <i>n</i> = 27)	None ( <i>n</i> = 118)
Agree ( <i>n</i> = 319, 69.0%)	<i>n</i> = 127 (72.6%)	<i>n</i> = 52 (59.8%)	<i>n</i> = 41 (74.5%)	<i>n</i> = 19 (70.4%)	<i>n</i> = 80 (67.8%)
Disagree ( <i>n</i> = 143, 31.0%)	<i>n</i> = 48 (27.4%)	<i>n</i> = 35 (40.2%)	<i>n</i> = 14 (25.5%)	<i>n</i> = 8 (29.6%)	<i>n</i> = 38 (32.2%)

Note: Figures were rounded to nearest tenths.

$p < 0.248$ , two-tailed.

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Table 5: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: cues-to-action, chi-square result

Most common sources of cancer information					
Have you ever looked for information about cancer from any source?	Internet ( <i>n</i> = 177)	Doctors/ other health providers ( <i>n</i> = 98)	Brochures/ books/other printed materials ( <i>n</i> = 54)	Family/ friends ( <i>n</i> = 26)	None ( <i>n</i> = 130)
Yes ( <i>n</i> = 255, 52.6%)	<i>n</i> = 102 (57.6%)	<i>n</i> = 56 (57.1%)	<i>n</i> = 37 (68.5%)	<i>n</i> = 13 (50.0%)	<i>n</i> = 47 (36.2%)
No ( <i>n</i> = 230, 47.4%)	<i>n</i> = 75 (42.4%)	<i>n</i> = 42 (42.9%)	<i>n</i> = 17 (31.5%)	<i>n</i> = 13 (50.0%)	<i>n</i> = 83 (63.8%)

Note: Figures were rounded to nearest tenths.

$p < 0.000$ , two-tailed.

Table 6: Association of the relationship between beliefs and the cancer information-seeking behavior based on health belief model (HBM) construct: self-efficacy, chi-square result

Most common sources of cancer information					
There is not much you can do to lower your chances of getting cancer	Internet ( <i>n</i> = 175)	Doctors/ other health providers ( <i>n</i> = 88)	Brochures/ books/other printed materials ( <i>n</i> = 56)	Family/ friends ( <i>n</i> = 27)	None ( <i>n</i> = 118)
Agree ( <i>n</i> = 174, 37.5%)	<i>n</i> = 66 (37.7%)	<i>n</i> = 34 (38.6%)	<i>n</i> = 15 (26.8%)	<i>n</i> = 10 (37.0%)	<i>n</i> = 49 (41.5%)
Disagree ( <i>n</i> = 290, 62.5%)	<i>n</i> = 109 (62.3%)	<i>n</i> = 54 (61.4%)	<i>n</i> = 41 (73.2%)	<i>n</i> = 17 (63.0%)	<i>n</i> = 69 (58.5%)

Note: Figures were rounded to nearest tenths.

$p < 0.461$ , two-tailed.