CANCER SCREENING BEHAVIORS AMONG ASIAN AMERICANS

IN HOUSTON, TEXAS

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CANCER SCREENING BEHAVIORS AMONG ASIAN AMERICANS IN HOUSTON, TEXAS

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Cancer is the second-leading cause of death in the United States, and Asian Americans/Pacific Islanders are the only racial/ethnic group for which cancer is the leading cause of death. Regular cancer screenings help to identify precancerous lesions and cancer at an earlier stage, when the cancer is more treatable. Ethnic disparities in participation in cancer screenings are also striking, and evidence indicates that Asian Americans may have lower rates of cancer screening participation than other racial/ethnic groups. The Health of Houston Survey 2010 (HHS 2010) is an address-based survey, administered via telephone, website, and mail, of over 5,000 respondents in Houston and Harris County that provides recent data on the health status and needs of the Houston community. HHS 2010 researchers oversampled for Asians and Vietnamese Americans in order to obtain a sample size large enough to obtain statistical power. This dataset provides a unique opportunity to examine the cancer screening behaviors and predictors of Vietnamese and Chinese Americans living in Houston, Texas.

This study was a secondary data analysis of HHS 2010 data. The data were analyzed to compare the breast, cervical, and colorectal cancer screening compliance rates

of Vietnamese and Chinese Americans with other racial/ethnic groups in Houston, Texas. Key predictors of participation and barriers to cancer screening were identified.

The results of this study indicate that in Houston, Vietnamese Americans and Asian Americans as a whole have strikingly lower rates of participation in cancer screenings compared to other ethnic groups. Chinese Americans had the highest rate of noncompliance for mammography of all ethnic groups; Asian Americans and Vietnamese Americans also had high rates of noncompliance. Similarly, Vietnamese and Asian Americans had high rates of noncompliance with colorectal cancer screening recommendations. Importantly, Vietnamese, Chinese, and Asian Americans had by far the worst pap test participation, with noncompliance rates more than double that of all other racial/ethnic groups. In general, the findings indicated several key predictors in cancer screening behaviors, including English language proficiency, years lived in the United States, health insurance, college education, and income; however, the significance and patterns of these variables varied by ethnic group as well as cancer site.

This secondary analysis highlights the disparities in cancer screening participation among Vietnamese, Chinese, and Asian Americans in Houston, Texas and indicate the need to identify Asian Americans as a high-risk group in need of health promotion attention. Barriers to screening and educational needs appear to be specific to each target ethnic group. Thus, health educators and health professionals in Houston must focus on the specific educational needs of the key ethnic groups that make up the Houston population. Further, more ethnic-specific research is needed to examine the health behaviors and needs of Houston's Asian American subgroups.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

BACKGROUND

Literature Review

Cancer is the second-leading cause of death in the United States, after heart disease (Murphy, Xu & Kochanek, 2012). According to the U.S. National Center for Health Statistics, Asian Americans/Pacific Islanders are the only racial/ethnic group for which cancer is the leading cause of death (U.S. National Center for Health Statistics, 2010). Compared to other racial/ethnic groups, Asian Americans experience higher rates of cancers with infectious origins, including cancers of the cervix, stomach, and liver (The Office of Minority Health, 2011).

Screenings are critical to the early detection of breast, cervical, and colorectal cancer and significantly reduce cancer deaths. Regular screenings help identify precancerous lesions and cancer at an earlier stage, when the cancer is more treatable (Centers for Disease Control and Prevention, 2011a). However, Asian Americans receive less frequent cancer screenings compared to non-Hispanic whites (Kandula, Wen, Jacobs, & Lauderdale, 2006). Researchers agree that more research is needed on the rates of participation in cancer screenings among Asian American ethnic groups. Asian Americans are often considered as a homogenous population, which often results in the aggregation of data that may obscure important differences between ethnic groups (The Office of Minority Health, 2011). As Asians are concentrated in specific geographic areas (Lai & Arguelles, 2003), the need for local or regional studies is critical.

For this project, I conducted a secondary data analysis of data from the Health of Houston Survey 2010 in order to describe the cancer screening practices of Asian Americans

in Houston, Texas, home to the fourth-largest Asian population in the United States. This study compared the interethnic differences in cancer screening behaviors of Vietnamese and Chinese with other racial and ethnic groups, and will aim to identify correlates of Vietnamese American participation in cancer screenings.

Asian Americans

The United States Census Bureau defines Asian Americans as "people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent" (Humes, Jones, & Ramirez, 2011). Between 2000 and 2010, the Asian American population was the fastest growing ethnic population in the United States, growing by 46 percent. Over 14.7 million Asian Americans live in the United States and currently make up five percent of the United States' population; another three million people identify as Asian in combination with another race (Humes, Jones, & Ramirez, 2011). Houston has the fourth-largest Asian American population in the United States, with 126 thousand Asians Americans living within the city (Barnes & Bennett, 2002; U.S. Census Bureau, 2010b) and the Houston-Sugar Land-Baytown Metropolitan Statistical Area (MSA) has the third-largest Vietnamese population of all MSAs in the country (Nguyen, 2011).

Asians in the United States represent numerous eras of immigration. Immigrants' experiences are shaped by their reasons for leaving their home countries, national policy, receptivity of the host country, and numerous other factors (Segal, 2002). The Chinese and the Japanese were among the first Asian immigrants to arrive in the United States, with the majority of these groups arriving in the mid- to late- nineteenth century. Indians, Koreans, and Filipinos emigrated in the early twentieth century, with a second wave of Koreans

arriving in the United States due to the devastation and aftermath of the Korean War. The 1965 amendments to the Immigration Act of 1924 created a surge in Asian immigration. Large numbers of immigrants from India, the Philippines, China, and South Korea arrived as professionals and students in health, science, and technology. Another group of immigrants arrived as refugees from China, Vietnam, Cambodia, and Laos. Others arrived as a result of family reunification policies (Segal, 2002).

Asian Americans have relatively high socioeconomic status (income, education level, and occupational status) compared to other ethnic groups (Segal, 2002). However, Asian Americans' social histories have shaped their experience of immigration and the process of acculturation. Immigrants who have been in the United States for a longer period of time, like the Japanese, Chinese, and Filipinos, some having lived in the United States for several generations, tend to be more acculturated, have higher levels of English proficiency, and higher socioeconomic status than more recent immigrant groups (Segal, 2002). Among more recent immigrants, an individual's status as either a voluntary or involuntary immigrant also shapes their immigration experience. Southeast Asians, including the Vietnamese, commonly arrived in the United States as refugees or involuntary immigrants. With lower levels of education, affluence, and less English-speaking abilities, Southeast Asians typically face greater barriers to economic and professional success compared to other Asian immigrants who are usually highly educated and voluntarily emigrate from their home countries. These immigration patterns have resulted in disparities arising within Asian American ethnic groups, with some groups having much higher levels of socioeconomic status and

acculturation than others (Segal, 2002). Researchers should take these differences into consideration and examine Asian ethnicities separately.

Asian Americans are a heterogeneous group with diverse languages and cultures, yet most research and existing health census data on Asian Americans are only available as aggregated data and not about specific ethnic subgroups, e.g. Vietnamese and Chinese. Beginning in the year 2000, disaggregated data collection on distinct Asian Americans and Native Hawaiian and Pacific Islanders (AANHPI) sub-groups began; however, the vast majority of public health data are still aggregated. The lack of data on Asian American subgroups poses a significant challenge for health researchers, and at the state and regional level, limited data on Asian Americans make it difficult to provide reliable morbidity rates and restrict the development of policy and regional health services (Deapen, Liu, Perkins, Bernstein, & Ross, 2002; Srinivasan & Guillermo, 2000). Aggregating Asian Americans into one racial group overlooks the health care needs of culturally and linguistically distinct groups. This is reflected by a lack of health services and "invisibility" (Srinivasan & Guillermo, 2000) of Asian American's public health needs (Srinivasan & Guillermo, 2000).

Overview of Asian American Health Disparities

At first glance, it appears that Asian Americans, as a group, do not suffer from health inequalities; Asian American women have the longest life expectancy of any other ethnic group in the United States (Office of Minority Health, 2012). In reality, it is difficult to make generalizations about Asian Americans' health status. While the health of Asian Americans as a whole is roughly equivalent to that of non-Hispanic whites, some Asian ethnicities – particularly Vietnamese – have significantly worse health outcomes than the majority of the

population (Frisbie, Cho, & Hummer, 2001). In particular, Asian Americans have a high risk for infectious diseases, including hepatitis B, and tuberculosis, have a high prevalence of smoking, liver disease, and chronic obstructive pulmonary disease (The Office of Minority Health, 2011). Data from California also indicate that Asian American face striking health inequalities, including a high burden of chronic and infectious diseases, low rates of cancer screening, and high rates of mental illness (California Asian Pacific Islander Joint Legislative Caucus, 2009).

Disparities in cancer incidence between Asian subgroups and other racial groups are particularly striking and may reflect the immigration history of each group (McCraken et al., 2007). Groups who immigrated more recently, such as Vietnamese Americans, have a much higher incidence of stomach and liver cancers compared to other groups in the United States. Groups who have resided in the United States for a longer period of time, for example, Japanese and Filipino Americans, typically have cancer rates for each cancer site that more closely resemble other racial/ethnic groups in the United States (McCraken et al., 2007).

Ethnic disparities in participation in cancer screenings are also striking. For example, in California, Asian American women are the least likely of all ethnic groups to have been screened for cervical cancer (29% noncompliance, compared to 18% noncompliance for American Indian/Alaska Natives, 15% noncompliance for Latinas, and 12% noncompliance for non-Hispanic blacks) (California Asian Pacific Islander Joint Legislative Caucus, 2009).

There are limited national data on cancer incidence and mortality for Asian American ethnic groups, although one Los Angeles-based study indicated that recently, Asian American breast cancer rates have increased more rapidly than other groups (Deapen et al.,

2002). Most of the cancer data available on Asian subgroups at a national level are from the Surveillance, Epidemiology, and End Results (SEER) program. However, the SEER data are limited to the regions in which the data were collected (McCracken et al., 2007). Based upon the data as a whole, Asian Americans appear to experience relatively good health. However, when the data are disaggregated into specific ethnic groups, the health disparities experienced by various subgroups becomes apparent (The Office of Minority Health, 2011). For example, in California, Vietnamese American women in California have the highest rates of cervical cancer compared to other Asian groups, and have twice the likelihood of mortality from cervical cancer than non-Hispanic Whites. Vietnamese men are over seven times more likely to develop liver cancer than non-Hispanic white men; they have substantially higher mortality rates and incidence of liver cancer than all other Asian groups. Due to their relatively recent immigration history, they are more likely to have risk factors associated with liver cancer, including increased exposure to hepatitis B and C and *Helicobacter pylori* (Jemal et al., 2008). Asian American ethnic subgroups experience a wide range of health outcomes that reflect the population's range of historical and social backgrounds (Frisbie et al., 2001; McCraken et al., 2007; Srinivasan & Guillermo, 2000). Researchers hypothesize that immigration status – specifically nativity and duration of time living in the United States – is particularly influential in health (Frisbie et al., 2001). However, the distinct social histories and their effects on the health of Asian American ethnic groups is largely ignored in policy and practice (Frisbie et al., 2001; McCraken et al., 2007; Srinivasan & Guillermo, 2000), and Asian Americans are underrepresented compared to other ethnic minorities in health studies nationwide (Frisbie et al., 2001).

Cancer Screening Among Asian Americans

Screenings are critical to the early detection of breast, cervical, and colorectal cancer. Regular screenings help identify precancerous lesions and cancer at an earlier stage, when the cancer is more treatable, thus reducing cancer deaths (Centers for Disease Control and Prevention, 2011a). Breast cancer is typically identified using mammography. Pap tests, used to identify abnormal cells in the cervix, are used to screen for cervical cancer. Fecal occult blood testing, sigmoidoscopy, and colonoscopy are used for colorectal cancer screening (Centers for Disease Control and Prevention, 2011b). The U.S. Preventative Services Task Force (USPSTF) recommends that women of age 50 to 74 years be screened biennially for breast cancer and that women get screened for cervical cancer every three to five years, depending on their age (USPSTF, 2009; USPSTF, 2012). USPSTF recommends that adults 50 to 75 years old be screened every ten years for colorectal cancer (USPSTF, 2008). It is estimated that routine screening can reduce breast cancer mortality by 20 to 25 percent, cervical cancer mortality by 20 to 60 percent, and colorectal cancer mortality by at least 60 percent, (Centers for Disease Control and Prevention, 2008).

Given the importance of screening in the early detection of cancer, the relatively low screening rates among Asian Americans are of particular concern, despite Asian American's relatively low incidence and mortality rates for cancer (Clegg, Li, Hankey, Chu, & Edwards, 2002; Kagawa-Singer & Pourat, 2000). Asian Americans receive less frequent cancer screenings compared to non-Hispanic Whites (Kandula et al., 2010), which increases the risk of diagnoses at later stages (Kagawa-Singer & Pourat, 2000). In one study, higher levels of education, lower levels of poverty, and having health insurance and a usual source of care

were positively associated with cervical cancer and breast cancer screening, yet it appears that ethnic disparities exist beyond issues surrounding education and access (Kagawa-Singer & Pourat, 2000). Kagawa-Singer and Pourat (2000) found that Asian Americans and Pacific Islander women, even those who had higher education, income, insurance coverage, and access to health care, were less likely to be screened for cervical and breast cancer compared to their white counterparts. While the authors did not present any possible explanations for this disparity, they highlighted the need for over-sampling of Asian ethnic subgroups in order to support further statistical analyses. The authors also noted that most studies of Asian Americans are limited to the more educated segment of the population due to language limitations of health surveys (Kagawa-Singer & Pourat, 2000).

Considerable variation in cancer screening rates exists between Asian American ethnic subgroups. A study by Lee, Ju, Vang, and Lundquist (2010) suggested that Asian American women were more likely to receive cervical cancer screenings than mammograms. Compared to Non-Hispanic white, Chinese, Filipino, South Asian, Japanese, and Vietnamese women, Korean American women were the least likely to receive cancer screening. Japanese American women were the most likely to be screened for breast cancer, but the second-least likely to be screened for cervical cancer (Lee, Ju, Vang & Lundquist, 2010). In the same study, private health insurance and having a usual source of care were strong predictors of breast and cervical cancer screening (Lee, Ju, Vang, Lundquist, 2010). Other researchers suggested that disparities in cancer screening behaviors exist due to cultural differences. For example, Kandula, Wen, Jacobs & Lauderdale (2006) found that Asian American immigrants were more likely to cite lack of symptoms as a primary reason for not seeking cancer

screenings. The researchers used nativity, years lived in the United States, and English language proficiency as indicators of acculturation that may mediate cancer screening behaviors. They found that foreign-born, recent immigrants had lower rates of cervical and breast cancer screening; lower rates of colorectal cancer screening was associated with speaking no English at home (Kandula et al., 2006).

Public Health Significance

Cancer is the leading cause of death among Asian Americans nationwide, yet there has been a lack of research on the cancer screening behaviors and overall burden of cancer in the Asian American population. Because Asian Americans are geographically concentrated in specific areas nationwide, regional studies would provide valuable data. The heterogeneity of the Asian American population supports the need for disaggregated data to better understand the patterns of health behaviors, morbidity, and mortality within this diverse group. Presently, decisions regarding health programs, research, and funding are determined by aggregated data that suggest that Asian Americans have relatively good health outcomes (Lee et al., 2010; Srinivasan & Guillermo, 2000). This practice does a disservice to ethnic subgroups with the higher rates of disease that may benefit from increased attention and awareness among public health and medical professionals. In order to better serve their clients, health providers need to learn more about the health status of Asian American subgroups; this requires further data collection about the health and community characteristics of each ethnic subgroup.

Houston, Texas has the fourth-largest Asian American population in the United States (Barnes & Bennett, 2002). The 2010 Census determined that 126 thousand Asians live in

Houston (U.S. Census Bureau, 2010b); Vietnamese composed the largest ethnic group, with 35 thousand individuals. Chinese were the second-largest Asian group, with 28 thousand people, and Asian Indians accounted for 26 thousand people within the Asian-alone category. Filipinos, Koreans, and Japanese made up the majority of other Asians residing in Houston (U.S. Census Bureau, 2010b). Despite this diversity, there is little data on the cancer screening behaviors of these populations. This study examined the cancer screening behaviors of Vietnamese and Chinese Americans living in Houston, Texas, using data from the Health of Houston Survey (HHS) 2010.

The HHS 2010 is an address-based survey, administered via telephone, website, and mail, of over 5,000 respondents in Houston and Harris County that provides recent data on the health status and needs of the Houston community (Health of Houston Survey, 2011a). In the HHS, researchers oversampled for Asians – Vietnamese in particular – in order to obtain a sample size large enough to obtain statistical power (Health of Houston Survey, 2011b). Thus, this dataset provided a unique opportunity to examine the cancer screening behaviors and predictors of Vietnamese and Chinese Americans living in Houston, Texas. This secondary data analysis provided valuable insight on the health behaviors and needs of Houston's Asian American population and may serve as a useful resource to public health professionals in administrative, community-based, and advocacy settings.

Hypothesis, Research Question, Specific Aims or Objectives

1. Compare the breast, cervical, and colorectal cancer screening practices of Vietnamese and Chinese Americans with other racial/ethnic groups in Houston, Texas

2. Identify the key predictors of participation in cancer screening among Vietnamese Americans in Houston, Texas

Approach. A secondary data analysis of data from the Health of Houston Survey 2010 was completed. The prevalence of breast, cervical, and colorectal cancer screenings were calculated for Vietnamese Americans, Chinese Americans, Asian Americans, African Americans, Hispanics, and non-Hispanic whites. Population estimates were derived from weighted data that were specifically oversampled for Asian and Vietnamese Americans. Chi-squared tests were used to examine potential correlates of cancer screening, including insured status, English language proficiency, years lived in the U.S., education, and income, in order to identify the characteristics of Vietnamese individuals who have and have not received routine cancer screening.

METHODS

Study Design

This study utilized secondary data analysis methods to estimate the prevalence of breast, cervical, and colorectal cancer screenings of Vietnamese, Chinese, and other Asian Americans in Houston, Texas, and their association with risk factors, including insured status, English language proficiency, education, and income. This study utilized data from the HHS 2010, a cross-sectional, address-based survey of households in Houston and Harris County, Texas.

Data

The HHS 2010 is a cross-sectional, address-based survey of households in Houston and Harris County, Texas, based out of the University of Texas Health Science Center at

Houston Institute for Health Policy. The data set contains information on health status, medical conditions, behaviors, insurance coverage, and access to health care services. The study spanned from April 2010 until September 2011, with data collection occurring from October 2010 through March 2011 (Health of Houston Survey, 2011b).

The HHS 2010 used a multi-dimensional sampling design, stratified by Super-Public Use Microdata Areas (SuperPUMA) and by the concentration of ethnic populations by household density and ethnic status. For the purposes of stratification, ethnic status was determined by residents' surnames. This allowed for researchers to obtain reliable data for Vietnamese and Other Asians, in addition to numerous other groups, as well as estimates of the entire Harris County and City of Houston population. Adults and children within each household were randomly selected as study subjects. Survey data were weighted to the 2010 U.S. Census population estimates for Houston (Health of Houston Survey, 2011b). The data set includes data on 5116 households, 5116 adults, and 1378 children, living across 7 Public Use Microdata Areas and 28 zip code areas (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center 2012a).

The HHS 2010 used an address-based design, combining telephone (CATI), web, and mail survey options in English, Spanish, and Vietnamese. HHS 2010 Survey topics included: demographics, health status, access to health care, health care utilization, cancer screening behaviors, health behaviors, and social and environmental factors.

Study Subjects

Individual-level data from all eligible participants with cancer screening data was used in this study. The age criteria were determined by the HHS 2010 researchers in order to match U.S. Preventative Services Task Force recommendations and Healthy People 2020 goals. Participants were restricted to individuals 50 to 74 years of age for colorectal cancer screening, women ages 21 to 65 years old for cervical cancer screening, and women ages 40 to 74 years for breast cancer screening (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2012b).

The sample consisted of 5,122 participants, 84% were between 21 and 65 years of age (the target age for cervical cancer screening), 52% between 40 and 70 years of age (the target age range for mammography), and 33% were between the ages of 50 and 75 years (the target age group for colorectal cancer screening) [Table 2]. The sample consisted of 704 Asian Americans, including 331 Vietnamese and 191 Chinese American participants [Table 1]. Of all ethnic groups, Hispanics and Vietnamese were the least likely to have health insurance, with 54% of Hispanics and 35% of Vietnamese lacking health insurance coverage of any kind. Hispanics were the least likely to have an income greater than or equal to the Federal Poverty Level (50%), while 70% of non-Hispanic whites participants had annual household incomes that fell at least 200% of the Federal Poverty Level. In terms of educational level, the Chinese participants had the highest frequency of participants who were college graduates (66%), while Hispanic participants, in general, had the lowest levels of education. By far, non-Hispanic whites and non-Hispanic blacks had the highest rates of U.S.-born

participants (93% and 91%, respectively), while Asian Americans had the lowest frequency of participants born in the U.S. (15% of Asian Americans, 15% of Vietnamese, and 21% of Chinese).

There was substantial variation among Asian subgroups, as only 19% of Vietnamese had graduated from college, compared to 66% of Chinese and 45% of Asian Americans as a whole. Vietnamese also had the highest proportion of individuals who had limited English proficiency (72%), compared with 42% of Chinese, 48% of Asians as a whole, and 58% of Hispanics.

Measures

Outcome variables.

Breast cancer screening. All female participants ages 40 to 74 years were asked up to three questions about their breast cancer screening behaviors. *A mammogram is an x-ray of each breast to look for breast cancer. Have you ever had a mammogram?* Participants were given three possible answer choices: *Yes, No, Don't Know.* Women who had never had a mammogram were asked an open-ended, follow-up question: *what is the ONE most important reason why you have NEVER had a mammogram?* (Health of Houston Survey, 2010). The web-based and telephone surveys asked an additional question to determine the most recent time women participants had had a mammogram; answer choices included *within the past year, within the past 2 years, within the past 3 years, within the past 5 year,* and *5 or more years ago* (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2011). From these variables, HHS 2010

researchers calculated a variable to indicate the percentage of women who, as recommended in the U.S. Preventative Task Force Recommendations, had a mammogram in the past two years (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2012b). This derived variable was the key breast cancer screening variable for this secondary analysis. The most frequent responses to the question "*What is the ONE most important reason why you have NEVER had a mammogram?"* were used to identify some of the key barriers affecting Vietnamese women's participation in mammography.

Cervical cancer screening. Female participants ages 21 to 65 years old were asked up to three questions about their cervical cancer screening behaviors. All women were asked the following question: "*A Pap test is a test for cancer of the cervix. Have you ever had a Pap test?"* Participants were given three possible answer choices: "*Yes, No, Don't Know."* Women who had never had a Pap test were asked an open-ended, follow-up question: "*What is the ONE most important reason why you have NEVER had a Pap test?"* (Health of Houston Survey, 2010). The web-based and telephone surveys asked an additional question to determine the most recent time women participants had been screened for cervical cancer; answer choices included "*Within the past year, within the past 2 years, within the past 3 years, within the past 5 year,* and *5 or more years ago"* (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2011). From these variables, HHS 2010 researchers calculated a variable to indicate the percentage of women who, as recommended in the U.S. Preventative Task Force

Recommendations, had a Pap smear in the past three years. The age range was restricted in order to correspond to the Healthy People 2020 goal (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2012b). This derived variable was used as the primary cervical cancer screening variable of the analysis. The most frequent responses to the question "*What is the ONE most important reason why you have NEVER had a Pap test?"* were used to identify some of the key barriers affecting Vietnamese women's participation in cervical cancer screenings.

Colorectal cancer screening. Colorectal cancer screening behaviors were determined by two measures in the HHS 2010. Participants ages 50 to 75 years old were asked if they had ever received a blood stool test and a sigmoidoscopy or colonoscopy. Participants who reported having these tests done at least once in their lifetimes were asked an open-ended question to determine the single most important reason for never having a blood stool test or colonoscopy/sigmoidoscopy. The web-based and telephone surveys asked an additional question to determine the most recent time participants had been screened using each method; answer choices for the blood stool test included "*within the past year, within the past 2 years, within the past 3 years, within the past 5 year,* and *5 or more years ago,"* and time intervals for the most recent sigmoidoscopy or colonoscopy were "*within the past 5 years, more than 5 but less than 10 years,* and *more than 10 years"* (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2011). Based on these results, a variable was constructed by the HHS 2010 researchers to calculate the frequency of compliance with U.S. Preventative Task Force

recommendations for colon cancer screening. This derived variable served as the key colorectal cancer variable for this study. The most frequent responses to the questions "*What is the ONE most important reason why you have NEVER had a sigmoidoscopy/colonoscopy?"* and "*What is the ONE most important reason why you have NEVER had a blood stool test?"* were used to identify key barriers affecting Vietnamese individual's participation in colorectal cancer screening.

Key predictor variables.

Insured status. The primary independent variable of interest was participants' insured status. This outcome variable was based on two variables in the HHS 2010: current health insurance status and type of health insurance. The HHS 2010 researchers determined participants' current health insurance status using the question, "*Are you CURRENTLY covered by any of the following types of health insurance or health coverage plans?*" (Health of Houston Survey, 2010). The variable describing an individual's type of health insurance was calculated from a series of survey items combined to determine if participants had private insurance, Medicare, other public health insurance, or no insurance (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2012b). Responses were grouped into three categories: privately insured, publically insured, and not insured.

English language proficiency. English language proficiency was measured based on responses to the HHS 2010 question, *"Since you speak a language other than English at home, we are interested in your own opinion of how well you speak English. Would you say*

you speak English very well, well, not well, or not at all?". This question was asked only to participants in the Web-based and telephone surveys who reported speaking a language other than English at home (Health of Houston Survey, 2010). Responses were based on a 4-point Likert scale and will be grouped into the following categories: English-only, bilingual (speak another language at home and speak English *very* well), and limited English proficient (speak English *well, not well,* or *not at all).*

Education. The survey contained one question measuring education level: "*What is the highest grade of education you have completed and received credit for?"* Answer choices included: "*no formal education; grades 1 through 8 (elementary); grades 9 through 11 (some high school); grade 12 or GED (high school graduate); college from 1 year to 3 years (some college or technical school); college 4 years or more (college graduate); post-bachelors education (master, doctorate, etc.)"* (Health of Houston Survey, 2010). For analysis, categories were combined and coded as: less than high school, high school graduate (including *some college)*, college graduate (*college graduate* and *post-bachelors*).

Income. Income was assessed with an open-ended question, which asked the following: "*What is your best estimate of your household's combined annual income from all sources before taxes last year? (Include money from jobs, social security, retirement income, unemployment payments, public assistance and so forth. Also include income from interest, dividends, net income from business, farm, or rent and any other money income. Do not include gifts.*)" (Health of Houston Survey, 2010). From this information, researchers created a variable indicating participants' incomes based on percentages of the federal

poverty limit (FPL). These categories were used in the secondary data analysis. They included: *under 100 percent FPL, 100 to 199.9 percent FPL,* and *200 percent FPL and over* (Institute for Health Policy, University of Texas School of Public Health, University of Texas Health Science Center Houston, 2012b).

Years Lived in the U.S. Nativity was assessed by asking all adult participants, "*In what country were you born?"* Adults not born in the United States were asked, "*About how many years have you lived in the United States?"* In the secondary analysis, respondents were grouped into U.S.-born, those living in the U.S. for less than five years, those living in the U.S. for 5 to 9 years, those living in the U.S. for 10 to 14 years, and those who have lived in the U.S. for at least 15 years.

Data Analysis

The aims of this study were to compare the cancer screening practices of Asian Americans with other racial groups in Houston, Texas. Specifically, interethnic differences in cancer screening practices were examined by comparing participation in cancer screening of Vietnamese and Chinese Americans, and the key predictors of participation in cancer screening among Vietnamese Americans were identified.

Appropriate descriptive statistics were used to characterize the Vietnamese, Chinese, and Asian American populations in Houston. Frequency tables and proportions were generated for all categorical variables. Next, the frequency of compliance with the colorectal cancer screening, cervical cancer screening, and breast cancer screening guidelines, in the

Asian American, Non-Hispanic white, African American, Hispanic, Vietnamese, and Chinese populations was calculated, as described below. These data were compared with each other and the overall Houston population at-large. Population weights provided in the HHS 2010 dataset were applied to estimate the screening rates for the population of Houston and Harris County.

Frequencies were calculated for the answers to the questions determining primary reasons for not receiving cancer screenings in order to describe some of the barriers Vietnamese Americans face in receiving cancer screenings. Chi-squared tests were used to determine the correlates of cancer screening behaviors among Vietnamese, Chinese, and Asian Americans. The analyses were conducted using *Stata 12*.

Human Subjects, Animal Subjects, or Safety Considerations

This study used data from the HHS 2010. The data set is available to the public, following submission of a public use file data agreement form. The data set does not contain personal identifiers. Prior to data analysis, the proposed study was reviewed and approved by the University of Texas School of Public Health Office of Research. The proposal was determined to be Exempt by the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects (study # HSC-SPH-12-0603). The researcher completed human subjects ethics training through the Collaborative Institutional Training Initiative prior to the beginning of the project.

RESULTS

Breast cancer screening

Along with Hispanics, Asians lagged behind the overall Houston population in terms of compliance with breast cancer screening guidelines [Table 3]. Only 59% of Asians were compliant compared to 64% of Houstonians. Of all racial/ethnic groups, non-Hispanic blacks had the best compliance rate, with 74% of the population in compliance with USPTF recommendations, while Hispanics were the worst (56%). Among the 331 Vietnamese and 191 Chinese women surveyed in the HHS 2010, the Vietnamese had 58% and the Chinese had 42% compliance with breast cancer screening guidelines. Chinese Americans had the lowest rates of mammogram compliance of all racial/ethnic groups.

Cervical cancer screening

Asian Americans – specifically, Vietnamese – had the lowest rates of compliance with USPTF cervical cancer screening guidelines among the major racial/ethnic groups [Table 3]. Asians Americans as a whole had a compliance rate of only 52%, compared to a compliance rate of 82% among non-Hispanic whites and non-Hispanic blacks, 81% compliance among Hispanics, and an overall compliance rate of 80% among the Houston population as a whole. In comparison, less than half of Vietnamese Americans surveyed (48%) and 58% of Chinese Americans had a pap test in the past three years.

Colorectal cancer screening.

Among HHS 2010 respondents, 51% of Asian American complied with colorectal cancer screening guidelines [Table 3]. Asian Americans lagged behind the overall Houston population (58%) in terms of colorectal cancer screening compliance. Non-Hispanic whites

had the best compliance rates of the major racial groups examined (64%), followed by non-Hispanic blacks (57%). The Hispanic population had the poorest rates of compliance of all racial/ethnic groups, with only 45% of participants adhering to colorectal cancer screening guidelines. Within the Asian population, 54% of Vietnamese Americans and 70% of Chinese Americans met USPTF colorectal cancer screening recommendations. Chinese Americans had the best compliance of all racial/ethnic groups examined.

Key predictors of adherence

A significance level of 0.05 and a margin of error of 0.05 would require sample sizes of 337, 347, and 385 people for breast, cervical, and colorectal cancer screenings, respectively. Due to an insufficient sample size of Chinese American individuals (n=191), key predictor variables for Chinese American cancer screening behaviors were not determined in this study.

Among Asian Americans as a whole, insured status emerged as a key predictor of cervical and breast cancer screening adherence, but not in colorectal cancer screening behaviors, with public or private insured individuals having significantly higher adherence rates than the uninsured [Table 4]. College education and higher income also emerged as key predictors for cervical cancer screening adherence among Asian American women (p=0.0365 and p=0.0043, respectively). However, level of education and income were not key predictors for breast or colorectal cancer screening adherence among Asian Americans. Immigration status and years lived in the United States only emerged as a key predictor for breast cancer screenings (p=0.006).

The most curious finding emerged from the analysis of English language proficiency as a potential factor in cancer screening behaviors. Among Asian Americans as a whole, English proficiency was a significant variable for breast and cervical cancer screenings, but the pattern was not consistent. For cervical cancer screening behaviors, bilingual women were the most likely to adhere to recommendations; however, Asian women who spoke only English were the least likely to have met USPTF guidelines (p=0.0217). In contrast, Asian women who spoke only English were the most likely to have adhered to breast cancer screening guidelines (p=0.007). One clear conclusion that can be made is that limited English proficiency is associated with lower levels of cervical and breast cancer screening behaviors.

In general, the findings indicate several key predictors in cancer screening behaviors. As shown in Table 5, English-proficient Vietnamese individuals were at least twice as likely to adhere to cervical cancer screenings than those with limited English speaking ability (p=0.0176). Years lived in the United States was also a significant predictor of cervical cancer screening adherence: US-born Vietnamese Americans were the most likely to adhere to cervical cancer screening guidelines, and in general, for foreign-born Vietnamese, screening adherence rates were higher among those who had lived in the U.S. for longer periods of time (p=0.0056). It is important to note that trends are distinct for each type of cancer screening examined.

Barriers to cancer screening

Of Vietnamese participants who had never been screened for cancer, reasons for not adhering to USPTF recommendations were variable based on the type of cancer screening in

question. Reasons given by Chinese and Asian American women for not having been screened for cancer were similar to those given by Vietnamese Americans, though some reasons varied. With regards to mammography, the Chinese participants, like the Vietnamese, most frequently cited "avoidance and disinterest" as the reason for never having a mammogram (76% and 44%, respectively), and "cost or no insurance" was the second-most endorsed barrier to screening (16% and 28%, respectively) [Figure 1]. Among all Asians, "cost or no insurance" was the most frequent reason given (45%), while "avoidance and disinterest" was the second-most common reason for not having a mammogram (42%).

Reasons for not having a pap smear test were again similar. Chinese and Asian women cited "avoidance and disinterest" (39% and 35%, respectively) and "lack of knowledge" (22% and 27%, respectively) as reasons for not being screened for cervical cancer [Figure 2]. In comparison, the most common answer given by Vietnamese women was "lack of knowledge" (45%), and the second-most frequent reason was "avoidance and disinterest" (22%).

Among adult respondents who had never had a colonoscopy, "avoidance and disinterest" was a frequent response; it was the most common reason for not being screened by Vietnamese and Chinese (31% and 32%, respectively) and the second-most frequent response by all Asians (28%) [Figure 3]. "Lack of knowledge" was also a common response, being the second-most common response by both Vietnamese (25%) and all Asians (28%). Among Chinese, "cost or no insurance" was the second-most common response (26%).

Reasons for not having a bloodstool test were the most consistent among all Asian participants [Figure 4]. "Lack of knowledge" was the most frequent reason given by

Vietnamese, Chinese, and Asian participants (50%, 42%, and 44%, respectively). "Avoidance and disinterest" (17% and 13%) was the second-most frequent response given by Vietnamese and all Asians, respectively, while "Access issues" were cited as the second-most common reason for Chinese Americans for not having a bloodstool test (17%).

DISCUSSION

The results of this study indicated that in Houston, Vietnamese Americans and Asian Americans as a whole have strikingly lower rates of participation in cancer screenings compared to other racial/ethnic groups in the Houston area. Chinese Americans had the lowest compliance with breast cancer screening recommendations of all ethnic groups; Asian Americans (particularly Vietnamese Americans) had similarly low rates of compliance, with only Hispanic women experience lower rates of mammography. Similarly, Vietnamese—and more broadly, Asian Americans—had poor compliance with colorectal cancer screening recommendations, with rates of compliance far worse than all other racial/ethnic groups with the exception of Hispanics. Importantly, Asian Americans (including both Vietnamese and Chinese) had by far the worst pap test participation, with compliance rates at half that of all other racial/ethnic groups. The results are supported by a number of other studies on other regional samples across the US that indicate that Asian Americans have low rates of cancer screenings compared to other ethnic groups (California Asian Pacific Islander Joint Legislative Caucus, 2009; Kandula, Wen, Jacobs, & Lauderdale, 2006). Further, in the literature, Pap screening rates among Vietnamese American women are consistently low despite the high incidence of cervical cancer in this population (Ma et al., 2012).

In addition to the strikingly low rates of compliance rates of Vietnamese, Chinese, and Asian Americans' cervical cancer screening behaviors and poor breast cancer screening compliance among Chinese Americans, this study identified a few other key findings that have important implications for practice. Limited English language proficiency was strongly associated with low rates of cervical and breast cancer screening. The results of this study indicated that an estimated 72% of the Vietnamese American population in Houston is limited English proficient. Given the apparent importance of English speaking ability in cancer screening behaviors and the strikingly low cancer screening rates among Asian Americans in Houston, these results indicate a need for culturally and linguistically competent preventative health services. The results are consistent with prior studies that indicate that cancer screening disparities have cultural components that persist beyond education and access issues (Kagawa-Singer & Pourat, 2000). However, past research has been primarily limited to English-speaking participants, as many health surveys have not been conducted in Asian languages (Kagawa-Singer & Pourat, 2000). Health promotion materials need to be available in multiple languages. Further, culturally-competent cancer prevention outreach programs and health providers will be key to addressing this disparity in preventative health service utilization.

To some degree, however, language was an inconsistent predictor of health screenings in this study. Specifically, Vietnamese American women with limited English language proficiency were less likely to be screened for cervical cancer compared to their English-proficient counterparts, however this relationship was not as well established for mammography. Here, it may be useful to look at language as a proxy measure of culture.

Language proficiency has been used in other studies as measures of acculturation, the adoption of behaviors and cultural norms of a dominant or host culture (Hunt, Schneider, & Comer, 2004; Lee, Nguyen, & Tsui, 2011; *Random House*, 2010). The women with limited English proficiency may also be less acculturated to the U.S. and its health care system. Ma et al. (2011) describe a combination of cultural, linguistic, educational, knowledge, and socioeconomic barriers that contribute to Vietnamese American women's low cervical cancer screening rates. According to the authors, many Vietnamese women perceived the Pap smear to be an invasive procedure. Further, due to community stigma associated with sexual relations and the cultural value of modesty, women tend to avoid gynecological examinations and hence are not screened for cervical cancer (Ma et al, 2011). In this study, this stigma may have been captured by the reasons participants gave for not being screened for cancer. One of the key barriers noted in the findings – "avoidance and disinterest" – could reflect issues of cultural stigma.

It is also possible that these group differences may stem from different immigration histories. Vietnamese tend to be more recent immigrants to the US than other Asian ethnic groups. In this study, Vietnamese had a greater proportion of individuals who had lived in the U.S. for under 10 years compared to the Chinese and all Asian groups. Vietnamese women were also less likely to have a college degree and to have health insurance than almost all other racial/ethnic groups, and had the lowest rates of English-language proficiency (28%) of all racial/ethnic groups examined. Thus, this study highlights the tremendous heterogeneity of the Asian American population, and the results support the need to continue investigating the health needs of specific Asian ethnic groups.

It is important to note the differences in key barriers to screening by ethnic group as well as cancer site, as this highlights the need for ethnically-specific health promotion materials. Health educators and health professionals in Houston must focus on the specific health promotion needs of the key ethnic groups that make up the Houston population. Outreach efforts should be culturally and linguistically appropriate and focus on providing information that will fill gaps in community knowledge and reduce cultural stigma that appears to be associated with cancer screenings. One outreach approach, recently undertaken by the CDC, focuses on sending the message to Asian American women that "if you don't take care of yourself, you can't take care of your family" (Gynecology Medical News, 2011).

Furthermore, the results of this study indicate the need to identify Asian Americans as a high-risk group in order to stimulate support for promoting cancer screenings in the Vietnamese and Asian American communities. These health promotion programs should be based on the barriers and educational needs specific to each target group. While these results may serve as a basis for renewed attention towards Asian Americans as a high-risk group, more ethnic-specific research is needed to examine the health behaviors and needs of Houston's Asian American subgroups.

CONCLUSION

This study analyzed data on the cancer screening behaviors of Vietnamese and Chinese Americans from the HHS 2010 in order to compare adherence to cancer screening guidelines among Vietnamese, Chinese, and other racial/ethnic groups and identify demographic variables associated with adherence to cancer screening guidelines.

The strengths of this study included its use of data from the HHS 2010, which oversampled for Vietnamese Americans and allowed researchers to obtain estimates of the entire Harris County and City of Houston population. As has been noted in the literature, more research is needed on the rates of participation in cancer screenings among Asian American ethnic groups (Office of Minority Health, 2011). Further, surveys were available in English as well as Vietnamese, making the survey more accessible to non-English speakers (Health of Houston Survey, 2011b).

Key limitations of this study included the inability to obtain p-values for some of the predictors of cancer screening among Vietnamese Americans. Due to the relatively small sample size and sampling design, not all cell values were sufficient to conduct significance testing for each independent variable. Another key limitation to this study was its use of cross-sectional data, which only captured the population at one point in time and hence could not examine causality.

Despite these limitations, this secondary analysis of the cancer screening data in the HHS 2010 highlighted the disparities in cancer screening participation among Vietnamese, Chinese, and Asian Americans in Houston, Texas.

APPENDICES

Appendix A: UTHSC Committee Approval Letter

School of Public Health
Office of Research
Associate Dean for Research

MEMORANDUM

TO: Amy Carvalho

FROM: Laura Mitchell, PhD
Associate Dean for Research

RE: Thesis Proposal

DATE: September 14, 2012

TITLE: Cancer Screening Behaviors Among Asian Americans in Houston, Texas

Your proposal has been reviewed and approved by the UT School of Public Health Office of Research. Your proposal was determined to be Exempt by the University of Texas Health Science Center at Houston Committee for the Protection of Human Subjects as study # HSC-SPH-12-0603. You may proceed with your research.

CC: Dr. Linda Lloyd
Anne Baronitis, Student Affairs

Note: Other committee member(s) include Dr. Dennis Kao

Tables and Figures

Table 1: Racial/ethnic makeup of Houston population, Health of Houston Survey 2010 Estimates.

Race/Ethnicity	Sample Size (n)	Population Estimate*	Percent of Total Houston Population (%)	Percent of Total Houston Population, 2010 Census Estimates[1] (%)
Vietnamese	331	51,649	1.8	1.8
Chinese	191	24,083	0.8	1.3
Asian (all)	704	142,761	4.9	6.2
Non-Hispanic White	2,070	1,091,311	37.6	25.7
Non-Hispanic Black	967	504,016	17.4	23.3
Hispanic	1,248	1,068,678	36.8	43.6

[1]Data source: U.S. Census Bureau (2010a).

Table 2: Demographic characteristics of study participants 18 years and older by racial/ethnic group

	Vietnamese (%)	Chinese (%)	Asian (%)	White (%)	Black (%)	Hispanic (%)	Overall (%)
Gender							N=5122
Male	61.1	66.8	64.1	54.7	39.9	45.4	49.4
Female	38.9	33.2	35.9	45.3	60.1	54.3	50.4
Age (years)							
18-64	93.6	94.5	91.5	83.1	95.8	95.8	89.2
65+	6.4	5.5	8.5	16.9	4.0	4.0	10.6
Screening Age							
Breast (40-75)	54.9	54.1	54.1	60.0	59.3	41.9	52.6
Cervical (21-65)	91.4	89.6	90.0	81.4	85.4	85.6	83.9
Colorectal (50-75)	34.3	34.3	34.4	42.5	38.5	19.9	32.9
Years Lived in the US (years)							N=5122
US-born	15.1	21.2	15.1	92.6	91.1	34.3	66.4
<5 yrs.	13.09	3.0	9.6	0.2	0.7	3.6	2.0
5-9 yrs.	5.1	5.1	4.0	0.4	0.8	9.2	3.9
10-14 yrs.	3.9	11.0	7.4	1.1	0.5	11.4	5.2
15+ yrs.	62.8	59.7	63.9	5.7	6.9	41.6	22.6
Highest Level of Education							N=5116
Less than high school	14.3	16.5	11.4	5.7	14.6	42.3	21.1
High school graduate	66.5	17.3	43.7	57.4	71.2	50.3	56.8
College Graduate	19.2	66.1	44.9	36.9	14.2	7.5	22.1
Annual Household Income							N=5122
Under 100% FPL	21.6	20.2	21.7	12.6	38.6	49.8	31.5
100-199.9% FPL	24.7	24.2	23.9	17.4	21.1	25.3	21.9
200% and over FPL	53.7	55.6	54.3	70.1	40.4	24.9	46.6
English							N=4670
English-Only	14.0	27.4	19.3	94.1	95.8	17.9	65.1
Bilingual	14.0	30.6	32.2	5.2	3.6	24.1	12.7
Limited English Proficiency	72.0	42.0	48.5	0.7	0.6	58.0	22.1
Insured Status							N=5122
Privately	52.4	74.7	61.0	67.4	46.8	32.5	50.3
Publically	13.0	5.6	13.6	21.1	28.4	13.6	19.1
Uninsured	34.6	19.7	25.4	11.5	24.8	53.9	30.7

Table 3: Rates of compliance with cancer screening guidelines according to race/ethnicity

Race/Ethnicity	Breast Cancer Screening: Percent compliant	Cervical Cancer Screening: Percent compliant	Colorectal Cancer Screening: Percent compliant
Asian American	58.7%	51.7%	51.5%
Vietnamese	58.4%	47.9%	53.6%
Chinese	41.6%	57.9%	70.0%
Non-Hispanic White	66.7%	82.3%	64.1%
Non-Hispanic Black	73.5%	81.6%	57.1%
Hispanic	56.1%	80.9%	45.4%
Overall	64.0%	80.4%	58.0%

Table 4: Key predictors of adherence to cancer screening recommendations among Asian Americans in Houston, Texas[a]

Independent Variables	Breast Cancer Screening		Cervical Cancer Screening		Colorectal Cancer Screening	
	% who meet CDC recommen-dations	p-value	% who meet CDC recommen-dations	p-value	% who meet CDC recommen-dations	p-value
Insured Status		na		na		0.3601
		0.0034**		0.0847*		
Not Insured	29.5%		36.0%		35.7%	
Private Insurance	74.2%		61.8%		56.8%	
Public Insurance	76.1%		62.2%		55.0%	
English Language		na		na		0.5302
English-Only	41.9%		79.6%		42.4%	
Bilingual	97.2%		71.1%		41.2%	
Limited English	58.6%		39.0%		55.9%	
Education		na		0.2404		0.9856
Less than HS	44.4%		51.1%		49.5%	
HS Graduate	46.2%		41.0%		50.2%	
College Graduate	79.2%		61.5%		51.4%	
Income		na		0.1687		0.4382
<100% FPL	31.9%		37.4%		53.4%	
100-199% FPL	58.8%		69.6%		37.4%	
≥200% FPL	84.0%		50.2%		56.1%	

Table 4: Key predictors of adherence to cancer screening recommendations among Asian Americans in Houston, Texas[a]

(Continued) Independent Variables	Breast Cancer Screening: % who meet CDC recommen-dations	p-value	Cervical Cancer Screening: % who meet CDC recommen-dations	p-value	Colorectal Cancer Screening: % who meet CDC recommen-dations	p-value
Years lived in the U.S.		0.1304		0.0060**		0.2272
US-Born	2.9%		73.0%		56.9%	
<5 years	84.5%		14.3%		5.3%	
5-9 years	46.8%		40.8%		44.3%	
10-14 years	65.2%		64.2%		35.6%	
15+ years	59.7%		58.3%		53.9%	
Age		0.8828		0.4782		0.1763
21 to 39	--		46.3%		--	
40 to 49	53.7%		68.7%		--	
50 to 59	60.1%		49.7%		44.4%	
60 to 65	63.8%		59.8%		55.6%	
66 to 69	51.4%		--		90.3%	
70 to 75	74.5%		--		73.8%	
Gender		na		na		0.0994
Male	--	--	--	--	43.4%	
Female	--	--	--	--	65.2%	

[a] P-values were not able to be calculated for all variables (denoted by a "na"). Due to the use of weighted data that were stratified by SuperPUMA, cell counts were insufficient for significance testing. All p-values that were able to be obtained were included on the table.
*denotes significance at 10% level
**denotes significance at 5% level

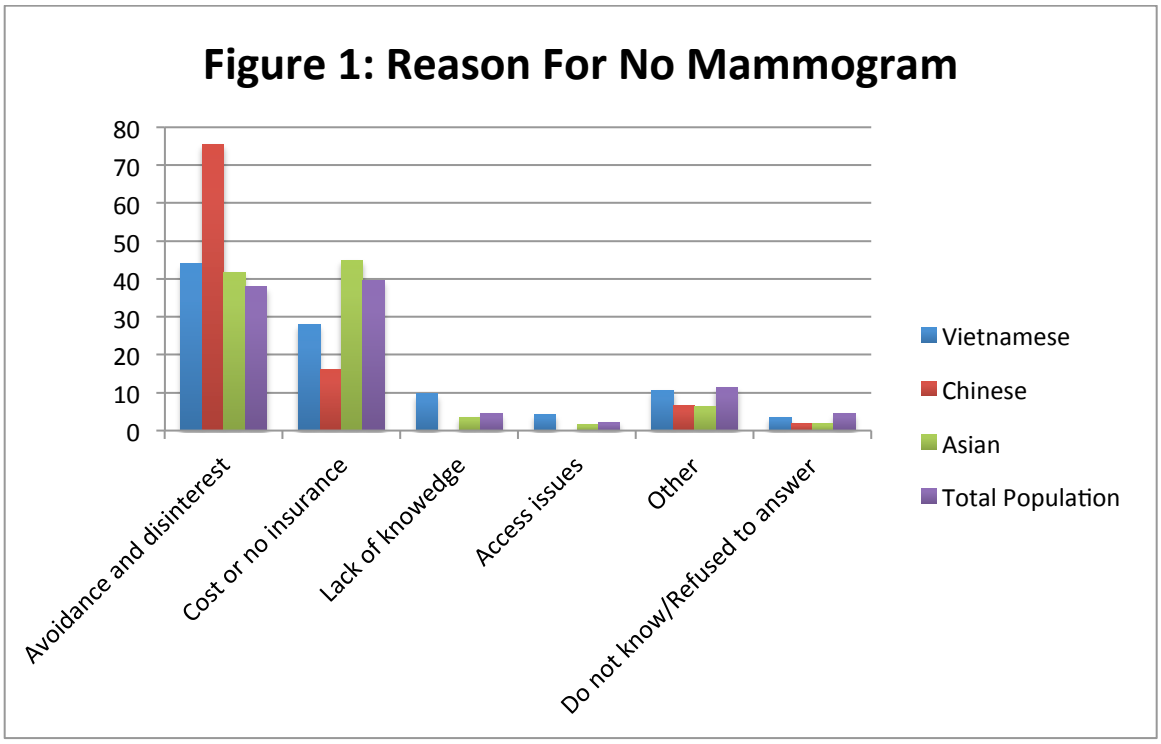
Table 5: Key predictors of adherence to cancer screening recommendations among Vietnamese Americans in Houston, Texas[a]

Independent Variables	Breast Cancer Screening		Cervical Cancer Screening		Colorectal Cancer Screening	
	% who meet CDC recommen-dations	p-value	% who meet CDC recommen-dations	p-value	% who meet CDC recommen-dations	p-value
Insured Status		na		na		na
Not Insured	44.1%		32.7%		30.5%	
Private Insurance	64.7%		65.8%		72.9%	
Public Insurance	77.4%		60.3%		37.6%	
English Language		na		0.0176**		na
English-Only	36.7%%		100.0%		16.8%	
Bilingual	100.0%		76.4%		73.2%	
Limited English	61.3%		37.0%		53.4%	
Education		na		0.5172		na
Less than HS	49.5%		54.7%		50.9%	
HS Graduate	65.0%		42.8%		54.8%	
College Graduate	42.3%		60.6%		50.4%	
Income		na		0.6914		na
<100% FPL	45.8%		48.0%		31.0%	
100-199% FPL	63.7%		63.4%		48.2%	
≥200% FPL	67.2%		39.9%		72.1%	

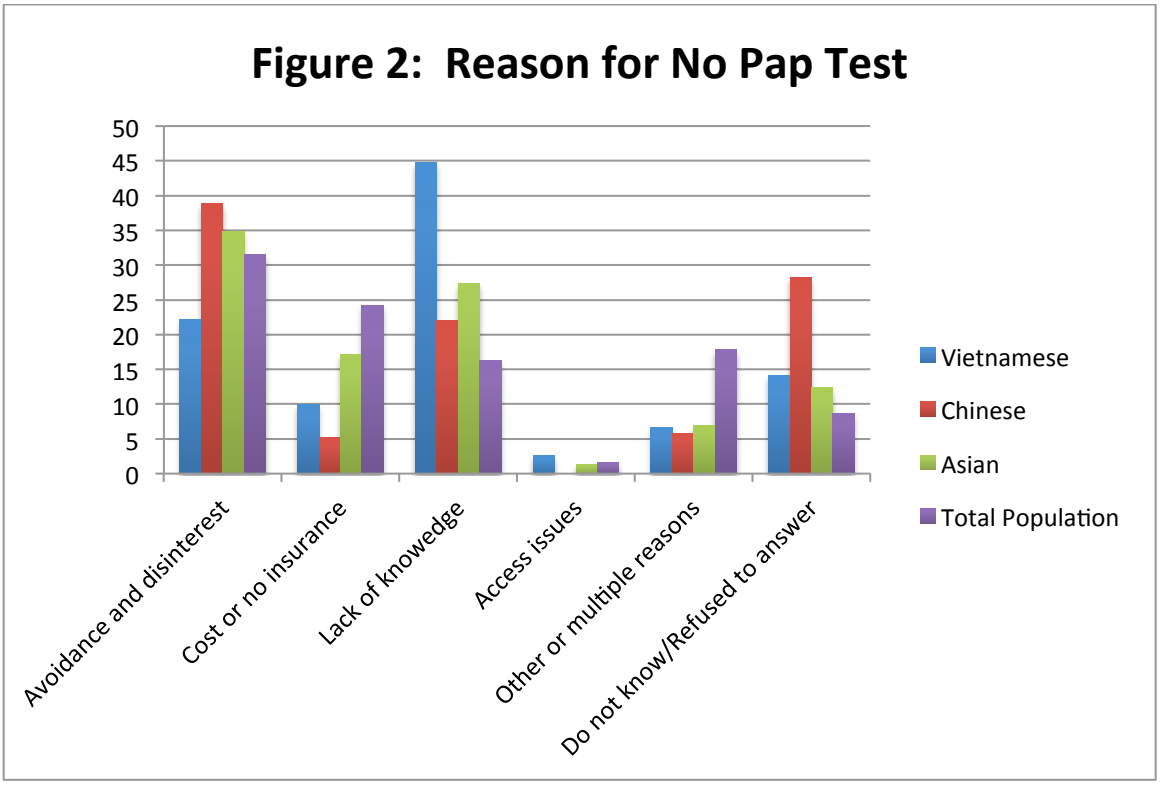
Table 5: Key predictors of adherence to cancer screening recommendations among Vietnamese Americans in Houston, Texas[a]

(Continued) Independent Variables	Breast Cancer Screening: % who meet CDC recommen-dations	p-value	Cervical Cancer Screening: % who meet CDC recommen-dations	p-value	Colorectal Cancer Screening: % who meet	p-value
Years lived in the U.S.		na		0.0056**		na
US-Born	--		80.07%		--	
<5 years	0.0%		10.1%		0.0%	
5-9 years	44.6%		38.6%		49.2%	
10-14 years	89.6%		66.5%		55.6%	
15+ years	60.0%		62.0%		56.2%	
Age		na		0.1328		na
21 to 39	--		35.3%		--	
40 to 49	40.1%		--		66.4%	
50 to 59	71.5%		62.0%		46.6%	
60 to 65	78.2%		73.7%		60.8%	
66 to 69	18.0%		--		90.2%	
70 to 75	57.7%		--		57.4%	
Gender		na		na		na
Male	--		--		49.4%	
Female	--		--		64.5%	

[a] P-values were not able to be calculated for all variables (denoted by a "na"). Due to the use of weighted data that were stratified by SuperPUMA, cell counts were insufficient for significance testing. All p-values that were able to be obtained were included on the table.
*denotes significance at 10% level
**denotes significance at 5% level



Source: 2010 Health of Houston Survey.



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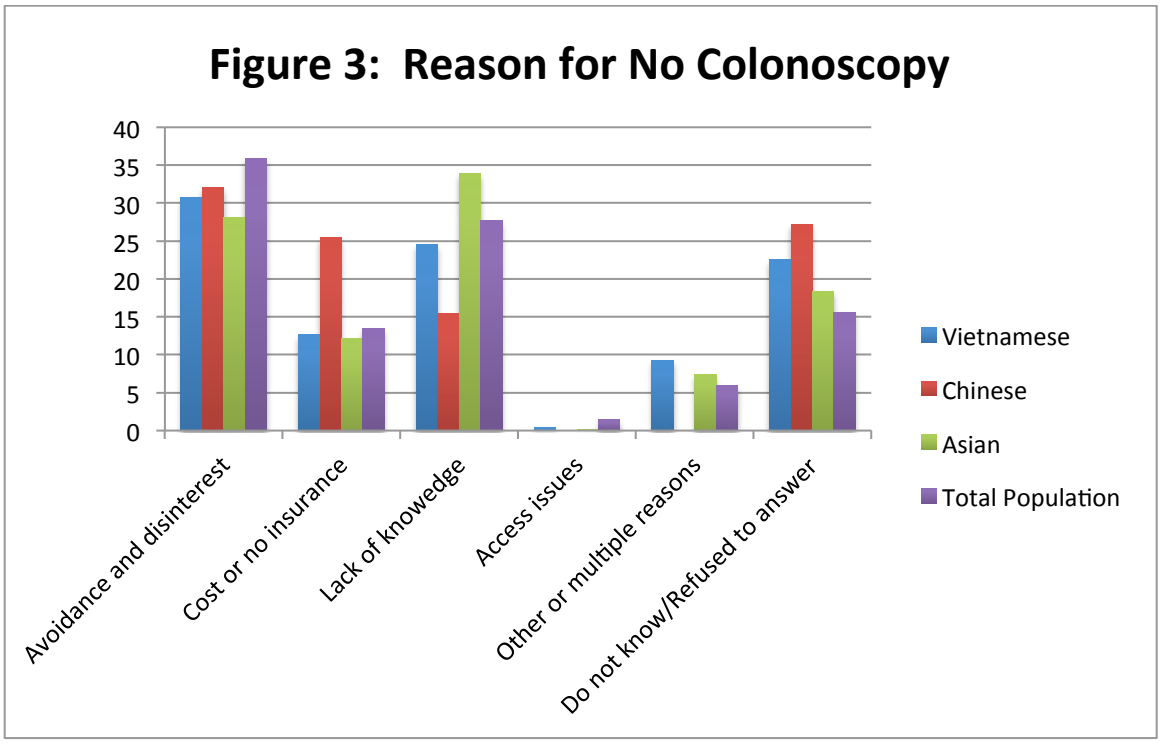

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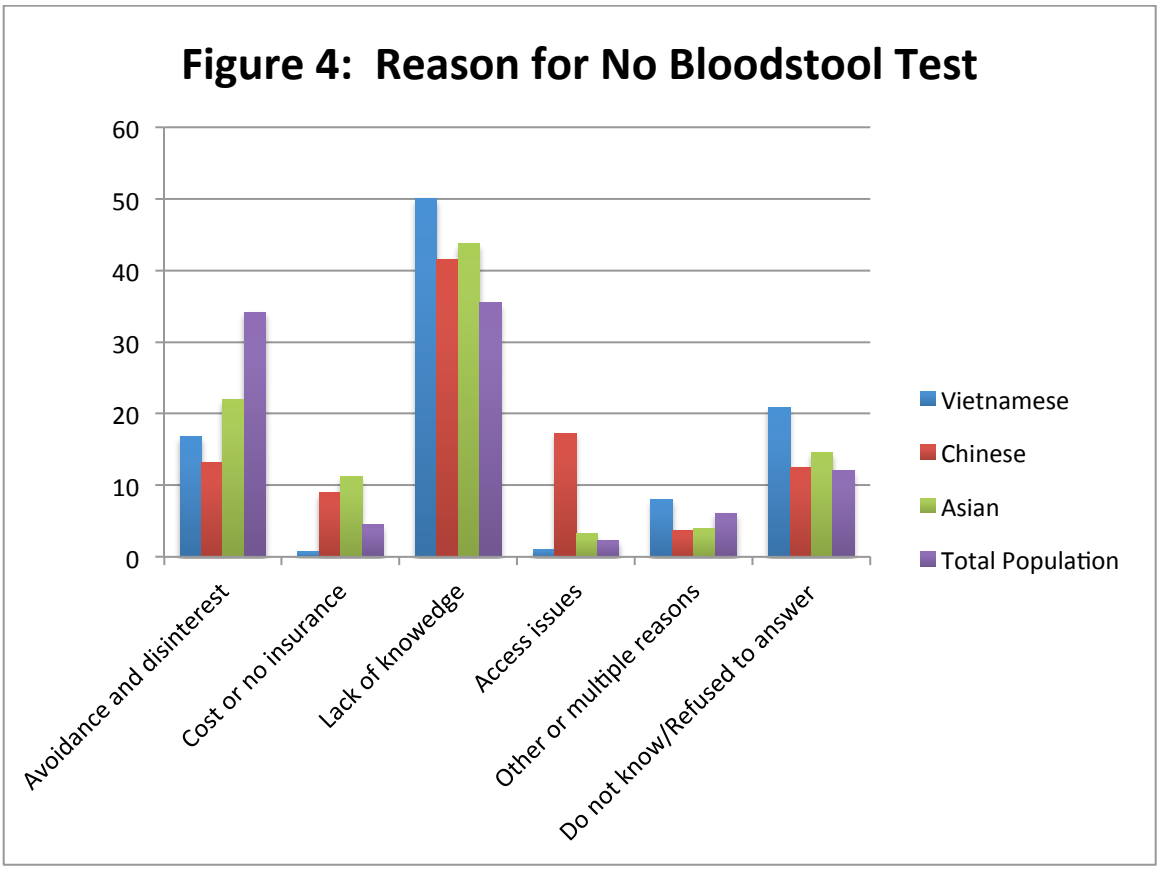

Source: 2010 Health of Houston Survey.

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