

Cancer Screening Among Asian Americans

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Abstract Cancer screening tests such as mammograms, Pap smears, and colonoscopies can help detect cancer at an early stage, before symptoms appear. Some screening tests such as colonoscopy and Pap smears can also detect precancerous abnormal tissue, which if removed can prevent the occurrence of cancer. Generally, the earlier cancer is detected, the easier it is to treat. Survival and mortality outcomes are also much better for cancer detected at an early versus late stage. However, in addition to benefits, some screening tests carry risks, and finding the cancer early does not always improve the person's health or help the person live longer [1].

This chapter will examine the utilization of cancer screening tests among selected Asian American ethnic groups and describe the research on factors that are associated with screening. We will give examples of interventions to promote cancer screening that have been tested in Asian American populations and summarize both the scientific knowledge and research gaps regarding cancer screening. The chapter will close with recommendations and next steps for research and practice on cancer screening among Asian Americans.

Keywords Chinese Americans • Japanese Americans • Filipino Americans • Southeast Asians • Vietnamese Americans • Korean Americans • Hmong • Breast cancer screening • Cervical cancer screening • Colorectal cancer screening • Hepatitis B virus testing • Correlates of screening • Interventions to promote cancer screening

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Introduction

Cancer screening tests such as mammograms, Pap smears, and colonoscopies can help detect cancer at an early stage, before symptoms appear. Some screenings tests such as colonoscopy and Pap smears can also detect precancerous abnormal tissue, which if removed can prevent the occurrence of cancer. Generally, the earlier cancer is detected, the easier it is to treat. Survival and mortality outcomes are also much better for cancer detected at an early versus late stage. However, some screening tests carry risks, and finding the cancer early does not always improve the person's health or help the person live longer.

Many organizations, including the American Cancer Society, issue cancer screening guidelines, but the guidelines issued by the US Preventive Services Task Force are the most commonly referenced and utilized. The US Preventive Services Task Force, which is an independent, volunteer panel of national experts in prevention and evidence-based medicine, develops recommendations for or against screening tests based on a review of high-quality scientific evidence and by weighing the potential benefits and harms of each screening test. The Task Force also periodically updates its recommendations based on new scientific evidence [2]. Table 1 shows the current recommendations relevant for cancer screening. Only tests that receive a Grade A or B are recommended.

Few studies have examined utilization of cancer screening tests among Asian American populations, and most have focused on utilization of *mammograms* for early detection of breast cancer, *Pap smears* for early detection of cervical cancer, and *fecal occult blood tests and colonoscopies* for the prevention and early detection of colorectal cancer. Compared to other racial/ethnic groups in the USA, Asian Americans have a relatively high risk of infection with hepatitis B virus (HBV), which accounts for 80% of liver cancer cases in this group. HBV testing can lead to earlier detection and hence potentially reduce the onset of serious sequelae of chronic liver disease. In addition, testing and, if indicated, vaccination can reduce HBV transmission (see Chap. 10). Thus, *hepatitis B testing* is recommended for Asian American populations, and studies have been conducted on this topic in a number of Asian American ethnic groups.

There is scant research among Asian Americans on *human papillomavirus (HPV) testing*, on the utilization of *lung cancer screening* and on *BRCA risk assessment* for high-risk Asian American groups. Asian Americans experience high incidence and mortality rates of stomach cancer (see Chap. 11). *Stomach cancer screening* using photofluorography or upper endoscopy is recommended in some Asian countries (e.g., Japan and South Korea). However, we will not discuss screening for stomach cancer in this chapter since there is no screening recommendation in the USA. *Prostate cancer screening* using prostate-specific antigen is no longer recommended by the US Preventive Services Task Force and will also not be discussed.

As described in the previous and subsequent chapters, specific Asian ethnic groups in the USA exhibit varying risk profiles of cancer incidence and mortality due to differences in migration history, lifestyle, and environmental exposures. In addition, there are vast differences among Asian ethnic groups with respect to

Table 1 US Preventive Services Task Force recommendations relevant for cancer screening

Topic	Description (date of most recent recommendation)	Grade
Breast cancer screening	The USPSTF recommends biennial screening mammography for women aged 50–74 years (November 2009)	B
Cervical cancer screening	The USPSTF recommends screening for cervical cancer in women aged 21–65 years with cytology (Pap smear) every 3 years or, for women aged 30–65 years who want to lengthen the screening interval, screening with a combination of cytology and human papillomavirus (HPV) testing every 5 years (March 2012)	A
Colorectal cancer screening	The USPSTF recommends screening for colorectal cancer using fecal occult blood testing (annually), sigmoidoscopy (every 5 years), or colonoscopy (every 10 years) in adults beginning at age 50 years and continuing until age 75 years. The risks and benefits of these screening methods vary (October 2008)	A
Lung cancer screening	The USPSTF recommends annual screening for lung cancer with low-dose computed tomography in adults aged 55–80 years who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery (December 2013)	B
Hepatitis B screening: nonpregnant adolescents and adults	The USPSTF recommends screening for hepatitis B virus infection in persons at high risk for infection (May 2014)	B
Hepatitis B screening: pregnant women	The USPSTF strongly recommends screening for hepatitis B virus infection in pregnant women at their first prenatal visit (June 2009)	A
BRCA risk assessment and genetic counseling/testing	The USPSTF recommends that primary care providers screen women who have family members with breast, ovarian, tubal, or peritoneal cancer with one of several screening tools designed to identify a family history that may be associated with an increased risk for potentially harmful mutations in breast cancer susceptibility genes (<i>BRCA1</i> or <i>BRCA2</i>). Women with positive screening results should receive genetic counseling and, if indicated after counseling, BRCA testing (December 2013)	B
Prostate cancer screening	The USPSTF recommends against prostate-specific antigen (PSA)-based screening for prostate cancer (May 2012)	D

Notes. A: The USPSTF recommends the service. There is high certainty that the net benefit is substantial
 B: The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial
 D: The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits

socioeconomic status, acculturation, access to care, and other factors that are known to impact cancer screening rates. Therefore, it is important to examine cancer screening in specific Asian ethnic groups, rather than in all Asian ethnic groups combined, to obtain a fine-grained picture of screening uptake as well as factors that may facilitate or impede screening.

Data Sources to Estimate Cancer Screening Rates

There is no national resource that allows for estimation of cancer screening rates among Asians in the USA. Therefore, screening estimates must be compiled from a patchwork of sources of varying breadth and quality. Most information on cancer screening for the general US population is obtained from survey research, and this is the case for the information on Asians as well. Among Asian Americans, surveys have generally been conducted by telephone or in face-to-face settings. Some surveys have included randomly selected samples of participants (population-based sample), while others have utilized convenience samples, often recruited with the help of community organizations that serve members of the target population. In both type of surveys, screening is assessed through self-reports, which may suffer from recall bias and social desirability response bias.

Very few *population-based surveys* that assess cancer screening have included sufficient Asian American participants, thereby limiting ability to analyze data and report screening rates for specific Asian American groups [3]. Some surveys such as the California Health Interview Survey have included adequate samples of a few of the largest Asian ethnic groups to be able to obtain subgroup level estimates of screening rates. The California Health Interview Survey is a telephone survey that has been conducted every 2 years since 2001 in English, Spanish, Chinese (Mandarin and Cantonese dialects), Vietnamese, and Korean. The survey oversamples Asian ethnic groups so that each group's total sample of adults reaches a target of 500 [4]. Because California is home to about 5.5 million Asian Americans, almost one third of all Asian Americans in the USA [5], and because the California Health Interview Survey is conducted in four Asian languages which allows non-English speakers to participate, its data are frequently used to estimate cancer screening among Asian Americans nationally (e.g., [6–8]). However, even population-based surveys including the California Health Interview Survey have several limitations: Recent immigrants who may have limited English fluency and who do not speak one of the survey languages cannot participate. Surveys usually include only a few questions each on a large number of topics and do not provide much detail on cancer screening and on factors that are associated with screening such as awareness of a screening test or barriers to screening. Since these surveys are designed to assess health issues in the general population, they may only ask questions on health topics that are relevant for the majority of respondents; health issues that are important for Asian Americans but not for all racial/ethnic groups, such as hepatitis B testing and vaccination, may not be assessed in these surveys. Population-based surveys typically do not provide data on smaller Asian American groups such as the Hmong, Thai, Native Hawaiians, and Pacific Islander populations.

Community surveys are often conducted in specific Asian American ethnic groups in various Asian languages, typically with help from Asian American community organizations. While some community surveys recruit participants in a systematic fashion, such as through community directories or by selecting common names from telephone directories [9, 10], others use snowball sampling or recruit individuals at specific locations such as faith-based organizations, Asian grocery

stores, and nail salons [11, 12]. Surveys are often conducted face-to-face, taking advantage of existing relationships with community members and allowing interviewers to establish some rapport with respondents. These convenience samples often include individuals with low levels of income and education and recent immigrants who may be less likely to respond if they received a “cold call” from a university or survey firm asking them to participate in a survey. Many of these surveys are conducted in a single Asian American ethnic group, but comparison of screening rates across Asian ethnic groups and across surveys is usually possible because most surveys assess cancer screening using standard questions such as “have you ever had (specific screening test)?” and, if yes, “when did you receive the last (specific screening test) for routine screening?” Comparison of knowledge and beliefs related to specific screening tests across Asian ethnic groups can be more challenging because there is less homogeneity in how questions are phrased and because translations into many different Asian languages can introduce small differences in meaning. Few community-based surveys include more than one Asian American ethnic group [13–15].

Both population-based samples and convenience samples have strengths and limitations. Therefore, we use both as data sources for reporting screening rates and factors that are associated with screening among Asian Americans. More recently, *electronic health records* have been utilized to assess cancer screening and to conduct comparisons among members of various racial/ethnic groups [16]. Electronic health records are usually considered the gold standard for assessing receipt of medical care and don’t suffer the limitations of self-report. However, even if obtained from a large health-care organization serving an ethnically diverse patient population, electronic health records only include patients with access to care, and some reports are further limited to “active” patients who have used at least one primary care-related visit during a specific time period, for example, the past 2 years [16]. While these data sources are informative, many patients without health insurance, who often have the lowest cancer screening rates [17], are not included in electronic health records.

Cancer Screening Rates Among Asian Americans

Mammography Screening

Although some organizations such as the American Cancer Society recommend mammography screening for women 40 years and older, the US Preventive Services Task Force currently recommends biennial mammography screening only for women between 50 and 74 years of age. Many reports on mammography screening include women 40 years and older, especially if they are based on studies that were conducted before the US Preventive Services Task Force changed their guidelines from women 40 years and over to women 50–74 years of age. Estimates for screening rates vary among different surveys, but most surveys indicate that Asian American women underutilize mammography screening relative to White and

Table 2 Breast and cervical cancer screening rates among Asian American ethnic groups, California Health Interview Survey 2011–2012 (mammogram in past 2 years) and 2007 (Pap test in past 3 years), % (95% confidence interval)

Asian American ethnic group	Had a mammogram in the past 2 years (women 40+)	Had a Pap test in the past 3 years (women 18+)
Filipina	78.2 (70.2–86.2)	75.4 (68.7–82.2)
Vietnamese	75.6 (67.8–83.4)	76.2 (66.1–86.3)
Chinese	72.8 (66.9–78.7)	64.9 (58.8–71.0)
Korean	51.8 (42.6–60.9)	71.0 (63.4–78.5)
South Asian	68.8 (57.0–80.6)	73.4 (63.3–83.5)
Japanese	84.1 (77.3–90.9)	75.2 (66.3–84.1)

Source: http://healthpolicy.ucla.edu/publications/Documents/PDF/2014/mammogramsfactsheet_apr2014.pdf and AskCHIS

African American women. For example, in the 2010 National Health Interview Survey, 64% of Asian American women 50–74 years of age reported receipt of a mammogram in the past 2 years, compared to 73% of non-Hispanic White and African American women [3].

Based on the data from the 2011–2012 California Health Interview Survey (http://healthpolicy.ucla.edu/publications/Documents/PDF/2014/mammograms-factsheet_apr2014.pdf, accessed 11/12/14), 72% of Asian American women 40 years and older reported receipt of a recent mammogram in the past 2 years, compared to 83% of African American, 81% of White, and 77% of Latina women. Screening rates among women 40 years and older from different Asian American ethnic groups ranged from 52% (95% confidence interval 43–61%) among Korean American women to 84% (95% confidence interval 77–91%) among Japanese American women (see Table 2), a difference of 32% points. Screening rates are slightly higher among women 50 years and older, but the screening pattern remains unchanged.

One of the Healthy People 2020 national goals for improving the health of Americans is to increase the proportion of women who receive a mammogram according to the guidelines to 81% (<https://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives>, accessed 11/20/14). Japanese American women residing in California have already achieved this goal and Filipina-, Vietnamese-, and Chinese Americans residing in California can potentially achieve this goal. However, given the current screening rate, it is unlikely that South Asian- and Korean American women will achieve this goal by 2020.

Cervical Cancer Screening

Asian American women also underutilize cervical cancer screening, but disparities among Asian American ethnic groups are less pronounced than for mammography screening. Based on the 2007 California Health Interview Survey, which assessed receipt of a Pap test but not HPV screening, adherence to screening guidelines

ranges from 65% among Chinese American women to 76% among Vietnamese women, a difference of 11% points (see Table 2). Screening rates in all Asian American groups are substantially lower than rates among non-Hispanic Whites (87%), African Americans (88%), and Latinas (85%). The Healthy People 2020 goal is to increase the proportion of women who receive cervical cancer screening according to the guidelines to 93%. Given the current screening rate, it is unlikely that any Asian American ethnic group will achieve this goal by 2020.

Colorectal Cancer Screening

The American Cancer Society recommends receipt of a guaiac-based fecal occult blood test (FOBT) or fecal immunochemical test (FIT) ever year, *or* flexible sigmoidoscopy every 5 years, *or* colonoscopy every 10 years, *or* double-contrast barium enema every 5 years, *or* CT colonography (virtual colonoscopy) every 5 years for men and women 50 years and over at average risk for developing colorectal cancer. The US Preventive Services Task Force recommends colorectal cancer screening tests only for individuals between age 50 and 75. Between 2001 and 2009, the California Health Interview survey assessed receipt of a stool blood test and sigmoidoscopy or colonoscopy in five cross-sectional surveys. Figure 1 shows the proportion of respondents 50 years of age and older who are adherent to colorectal cancer screening guidelines based on receipt of a fecal occult blood test within the past 12 months or a colonoscopy or sigmoidoscopy within the past 5 years, since not all survey years distinguished between these two procedures. Estimates include colorectal cancer screening for any reason to maintain consistency across survey years and are standardized to the age and gender distribution of the 2001 California population. Analyses were conducted using survey replicate weights for Asian ethnic groups with sufficient sample size [18].

As shown in Fig. 1, there is an upward trend in colorectal cancer screening utilization among all racial/ethnic groups. The proportion of Asian Americans that are up to date with colorectal cancer screening is estimated to be above 60% in 2009, which is slightly lower than the estimate for Whites and African Americans. The lower panel in Fig. 1 suggests that disparities in colorectal cancer screening widened from 2001 to 2005 and narrowed between 2005 and 2009. In 2009, the last survey year in which colorectal cancer screening was assessed in the California Health Interview Survey, higher screening rates were observed among Japanese-, Chinese-, and Vietnamese Americans and lower screening rates among Korean- and Filipino Americans. There were no statistically significant differences in screening rates between males and females in any of these Asian ethnic groups (AskCHIS).

The Healthy People 2020 goal is to increase the proportion of adults 50–75 years who receive a colorectal cancer screening according to the guidelines to 70.5%. While Japanese-, Chinese-, and Vietnamese Americans residing in California are close to achieving this goal, it is uncertain that Korean- and Filipino Americans will achieve the 2020 goal, given the current screening rates and temporal trends. It should also be noted that screening rates in California are relatively high compared

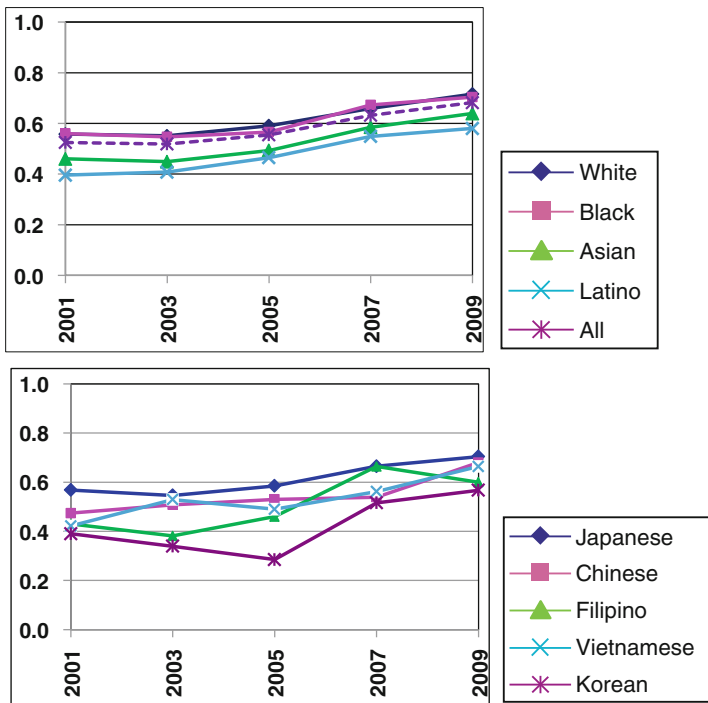


Fig. 1 Estimated age- and gender-standardized proportion of California residents aged 50 years and older who are adherent to colorectal cancer screening guidelines, California Health Interview Survey 2001–2009 (2001–2005 data were previously published in [18])

to other states. Based on data from the Behavioral Risk Factor Surveillance System, California ranks number 14 out of 51 states with regard to colorectal cancer screening prevalence [19]. According to the data from the 2010 National Health Interview Survey, only 46% of Asians residing in the USA are up to date with colorectal cancer screening [19].

Hepatitis B Testing

Because Asian Americans are at increased risk for hepatitis B infection and resulting liver disease and liver cancer (see Chap. 10), the US Preventive Services Task Force and the American Association for the Study of Liver Diseases recommend screening for hepatitis B and subsequent vaccination, if appropriate [20, 21]. Screening is important because approximately 65% of those who are infected with hepatitis B do not know that they are infected [22]. Screening is an effective method of limiting the spread of hepatitis B by identifying uninfected individuals who will need vaccination to prevent future infection and by identifying infected individuals who will need monitoring or treatment and counseling to reduce verti-

cal (from mother to child) and horizontal transmission to close contacts (e.g., household members). The standard test for hepatitis B infection involves the detection of the hepatitis B surface antigen, HBsAg [23].

Despite their elevated disease risk, hepatitis B testing rates among Asians in the USA are suboptimal with estimates ranging from 11 to 65 % based on self-reports in different Asian ethnic groups [9, 12, 24–31]. As shown in Table 3, only few studies have assessed hepatitis B testing rates in Asian American samples. The huge

Table 3 Hepatitis B screening rates among Asian American ethnic groups

Citation	Asian American population, study area	% ever screened for HBV	Study sample, age, source of study sample, survey method, and year(s) of study
Taylor et al. (2006) [28]	Chinese immigrants in Seattle	48	<i>N</i> =395, ages 20–64 years; identified through Chinese last names from a telephone directory; in-person interviews; survey cooperation rate 58 %; 2005
Tanaka et al. (2014) [24]	Chinese immigrants in Washington, DC area	65	<i>N</i> =252, age >50 years; recruited from Chinese-speaking physicians’ offices; patients had at least one doctor’s visit in the past 2 years; telephone survey; response rate 49 %; 2008–2011
Bastani et al. (2007) [29]	Korean in Los Angeles, CA	56	<i>N</i> =141 adults; recruited at 5 Korean churches and one Korean-serving primary care clinic; in-person interviews, self-administered questionnaires or self-administered in a group setting; 2003
Bastani et al. (2015) [31]	Korean in Los Angeles, CA	35	<i>N</i> =866 adults; recruited at 52 Korean churches; face-to-face survey; 2007–2010
Strong et al. (2012) [25]	Chinese, Korean, and Vietnamese in Maryland	54, 46, and 39	303 Chinese, 294 Korean, and 280 Vietnamese adults; recruited at community organizations, faith-based organizations, language schools, grocery stores, and nail salons; self-administered survey; 2009–2010
Ma et al. (2010) [12]	Chinese, Korean, Vietnamese, and Cambodian in Greater Philadelphia area, New Jersey, and New York City	38, 32, 20 and 11	718 Chinese, 289 Korean, 305 Vietnamese, and 291 Cambodian adults; recruited at Asian American community organizations; in-person interviews; 2005–2006
Grytdal et al. (2009) [30]	Cambodian in Massachusetts; Vietnamese in California	49; 63	353 Cambodian adults, 1696 Vietnamese adults; CDC Racial and Ethnic Approaches to Community Health Risk Factor Survey; telephone survey; interview completion rate 25–31 %; 2010
Nguyen et al. (2010) [26]	Vietnamese in Northern California and Washington, DC	62	<i>N</i> =1704 adults; identified through Vietnamese surnames; telephone survey; response rate 27.4 %; 2007–2008
Taylor et al. (2011) [27]	Cambodian in Seattle	50	<i>N</i> =667, ages 18–64; identified through Cambodian last names from a telephone directory; in-person interviews; completion rate 70 %; 2010
Chen et al. (2013) [9]	Hmong in Greater Sacramento CA area	18	<i>N</i> =490 adults; identified through Hmong surnames; telephone survey; 2007–2008

variations in screening rates, even among different studies conducted in the same Asian ethnic group, are probably due to sample differences in demographic characteristics, as well as the variety of sampling and recruitment strategies and interviewing methods that were used.

Correlates of Screening Among Asian Americans

Individual health behaviors related to cancer screening are influenced by a complex myriad of individual, health system, community, and societal level factors. In the following section, we use a conceptual framework, the Health Behavior Framework, to systematically address the multiple determinants of cancer screening and to summarize some of the major findings among Asian Americans. The **Health Behavior Framework** (Fig. 2) is a multidimensional model derived from varying theoretical orientations [32]. It assumes that individual variables and provider and health-care system factors influence behavioral intentions which in turn influence health behavior. Intentions do not automatically translate into behavior. Rather, this connection depends on the absence of barriers and/or presence of supports which may function at the level of the individual (e.g., cultural beliefs), the health system (e.g., practice patterns), or society (e.g., impoverished neighborhood). Some model variables are mutable and are therefore potential targets for interventions (e.g., individual and provider and health-care system factors), while others are immutable, such as demographic factors. Despite some differences, the major drivers of behavior tend to be similar across populations. The Health Behavior Framework

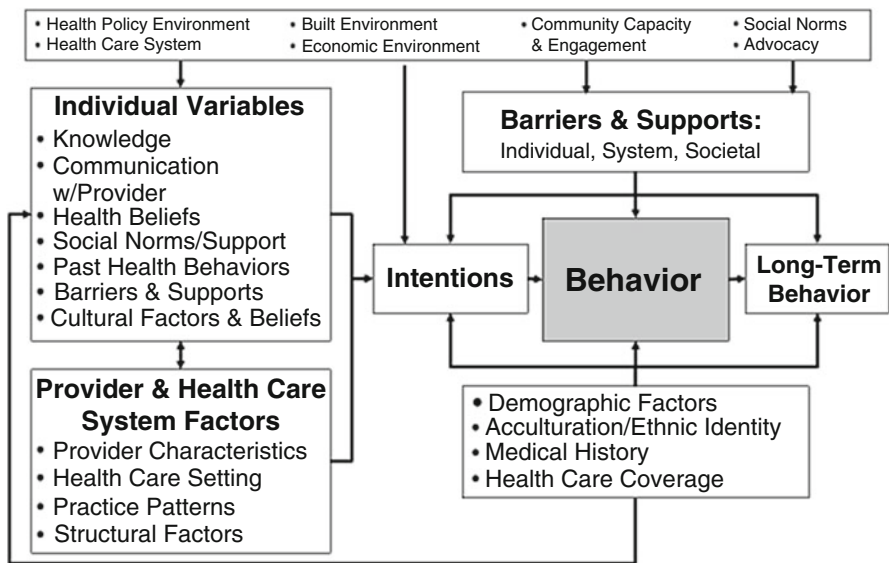


Fig. 2 The Health Behavior Framework

also recognizes the influence of broad socio-ecological factors on cancer screening such as health-care policy and social norms. These factors are theoretically mutable, for example, through health-care reform and long-term community engagement activities or campaigns.

Frequently, factors that have the potential to influence cancer screening and screening behaviors are identified at the same point in time through a survey [7, 11, 25]. This cross-sectional research design allows us to identify *correlates* of screening. Other studies examine the effects of factors identified at baseline on subsequent screening behaviors [33]. Such a longitudinal study design provides stronger evidence than cross-sectional data regarding *predictors* of cancer screening.

Demographic Factors, Acculturation, and Health-Care Coverage

Being married, higher level of income, being proficient in English, and having health insurance have been consistently associated with cancer screening among Asian American ethnic groups, including colorectal cancer screening [11, 34, 35], breast and cervical cancer screening [7, 11, 36], and hepatitis B testing [12, 37]. Several studies have examined the associations between acculturation and cancer screening using various measures of acculturation, such as length of residency in the USA, percent of lifetime in the USA, language proficiency, and language use. Generally, immigrants who have assimilated to the behaviors and beliefs of the host society are better able to obtain health care and have higher screening rates [11], but this is not always the case. A study among Vietnamese Americans found *lower* hepatitis B screening rates among those who had lived in the USA for more than 10 years and spoke Vietnamese less fluently compared to more recent immigrants. The authors suggest that efforts to promote testing in the USA have focused on more recent immigrants and that recent immigrants may be receiving medical care in immigrant and/or refugee clinics, where the providers may be more aware of the need for hepatitis B testing in Asian populations [26]. A study that examined the relative impact of access to care versus acculturation on breast and cervical cancer screening among Asian American women concluded that access explained more variation than acculturation alone for most Asian American ethnic groups that were studied [38]. Since demographic factors and acculturation are not mutable factors, they help to identify population groups with the lowest cancer screening rates that can then be targeted for screening promotion programs rather than inform the content of intervention programs to promote screening.

Individual Variables

Individual variables that influence cancer screening have been widely studied in many different Asian American ethnic groups. The most important variables that have emerged are not being aware of the screening test and the need for screening and

lack of physician recommendation to receive screening [25, 26, 29, 33, 34, 39–41]. For cancer screening tests that require periodic retesting (breast, cervical, colorectal cancer screening), having had a test in the past is an important predictor of future testing [42]. Health beliefs are generally associated with cancer screening in the expected direction: screening is associated with high perceived susceptibility, high perceived severity of the disease, and low barriers to cancer screening [29, 37, 43].

Provider and Health-Care System Factors

The influence of provider and health-care system factors on cancer screening has not been comprehensively assessed among Asian Americans, although most cancer screening tests require a physician exam or referral, suggesting that these factors are extremely important. Strategies that fall into this category and have been shown to increase cancer screening include physician education, physician reminder systems, physician assessment and feedback regarding the proportion of patients that are up-to-date with cancer screening guidelines, and reminder mailings for patients [44–47]. Patient navigation is another strategy that has been shown to increase cancer screening in several Asian American ethnic groups [9, 47–49]. One study in an outpatient health-care organization serving a large number of Asian Americans in Northern California found that screening completion for breast and cervical cancer was positively associated with patient-provider gender concordance, i.e., female physicians had significantly higher breast and cervical cancer screening rates among their Asian American patients [16]. This finding corresponds well with the fact that many Asian American women prefer a female provider for these exams [50, 51].

Barriers to Cancer Screening

Many of the variables discussed above can be conceptualized as barriers, including lack of health insurance, lack of knowledge/awareness of specific screening tests and guidelines, lack of a physician recommendation to get tested, and health beliefs that do not support routine checkups in the absence of symptoms. These are common barriers for many ethnic groups, including Asian Americans. Other barriers that are frequently cited by Asian Americans are lack of time to obtain a screening test, not knowing where to obtain the test, lack of transportation, fear of finding a health problem, and embarrassment or shame [12, 29, 34]. A few studies have reported culturally specific attitudes and beliefs that may function as barriers to cancer screening in specific Asian American ethnic groups, such as the belief that illness is a matter of karma or fate [52, 53]. However, these barriers are less frequently assessed and are not endorsed by all Asian American ethnic groups and not for all cancer screening tests [29].

Overall, correlates of cancer screening among Asian American ethnic groups are similar to those of other US populations. In addition to barriers to screening that are

faced by most ethnic groups, Asian Americans also experience culturally specific barriers to screening which need to be addressed in screening promotion efforts.

Intervention Research to Promote Cancer Screening Among Asian Americans

To address the low utilization of cancer-related screening tests among Asians Americans, many intervention studies have been implemented to test the most effective ways to increase screening participation. The majority of these studies have been conducted in metropolitan areas with relatively large Asian populations such as Los Angeles, San Francisco, Seattle, New York, and Washington, DC.

Study designs that involve concurrent comparison groups and prospective measurement of outcomes, and document actual receipt of screening tests, provide the strongest evidence for the effectiveness of cancer control interventions [54, 55]. This section focuses on studies that used experimental designs (i.e., randomized individuals or groups of people to experimental and control status) or quasi-experimental designs (i.e., compared an experimental group with a nonequivalent control group, no random assignment) and included screening test completion, assessed by self-report or provider report, as an outcome. Control groups for these studies either received no intervention, usual care, a minimal screening-related intervention (e.g., pamphlet), or a non-screening-related intervention (e.g., a physical activity program).

Cancer control interventions can be classified as provider directed (e.g., physician reminders) or client directed (e.g., health education). Client-directed interventions include one-on-one education (tailored or non-tailored), group education, small media (audiovisual and print), navigation (to reduce structural barriers to screening), and mass media [56]. Most previous cancer control initiatives for Asian Americans involved multiple intervention components [55].

Interventions to increase the use of cancer-related screening tests by Asian groups have been delivered in health-care settings, in community settings, and to entire communities. The interventions that were delivered in community settings can be broadly categorized as lay health worker (LHW) outreach or community-based group education. LHW outreach interventions have included one-on-one or group education combined with small media and/or peer navigation. Community-based group education interventions have been delivered by Asian health educators and usually included other components.

The following sections provide information about interventions that were delivered in health-care settings, LHW outreach and community-based group education interventions, one-on-one education and small media interventions, and community-level interventions. These studies focused on individuals who were nonadherent to breast, cervical, and colorectal cancer screening guidelines as well as individuals who had never been screened for HBV. As discussed previously, guidelines for cancer screening have changed over time. Eligibility criteria for cancer control intervention studies were based on the guidelines when they were conducted. Table 4 gives examples of individual and cluster-randomized controlled trials that evaluated cancer control inter-

Table 4 Examples of individual and cluster randomized trials that resulted in increased cancer screening rates

Intervention type(s) Publication	Participant characteristics Study location(s)	Experimental group intervention component(s) Control group intervention	Primary evaluation method(s) Sample size(s)	Key finding(s)
Breast cancer screening				
LHW outreach Nguyen et al. [61]	Vietnamese ≥40 years Santa Clara County, California	Group education Peer navigation Media-based education Mammography media-based education	Baseline survey Follow-up survey after an interval of 5 months 1,100 randomized 1,089 with follow-up data	Mammography in the previous 2 years increased significantly in the experimental group (65–82%, $p < 0.001$) but not in the control group (74–76%, $p > 0.05$)
Group education Lee et al. [67]	Korean immigrant ≥40 years No mammogram in past year Cook County, Illinois	Group education Couples discussion activity Nutrition group education	Follow-up survey 15 months after intervention 428 randomized 395 with follow-up data	56% of the experimental group and 42% of the control group reported mammography ($p = 0.004$)
Group education Lee-Lin et al. [68]	Chinese immigrant ≥40 years No mammogram in past year Portland, Oregon	Group education Telephone counseling Navigation English language mammography brochure	Follow-up survey 12 months after intervention 300 randomized 280 with follow-up data	71% of the experimental group and 43% of the control group reported mammography ($p < 0.001$)
Cervical cancer screening				
LHW outreach Small media Taylor et al. [64]	Chinese 20–69 years No Pap test in past 2 years or not intending to get Pap test in next 2 years Seattle, Washington Vancouver, British Columbia	<i>Experimental 1:</i> One-on-one education Chinese language video and print materials Peer navigation <i>Experimental 2:</i> Chinese language video and print materials None	Follow-up survey 6 months after randomization 482 randomized 402 with follow-up data	39% of experimental group 1, 25% of experimental group 2, and 15% of the control group reported Pap testing (experimental group 1 versus control, $p < 0.001$; experimental group 2 versus control, $p = 0.03$; experimental group 1 versus experimental group 2, $p = 0.02$)

<p>LHW outreach Mock et al. [60]</p>	<p>Vietnamese ≥18 years Santa Clara County, California</p>	<p>Group education Peer navigation Media-based education Pap testing media-based education</p>	<p>Baseline survey Follow-up survey after an interval of 4 months 1,005 randomized 952 with follow-up data</p>	<p>Pap testing ever increased significantly in the experimental group (66–82%, $p < 0.001$) and the control group (70–76%, $p < 0.001$) but the experimental group increase was significantly greater than the control group increase ($p < 0.001$)</p>
<p>LHW outreach Taylor et al. [62]</p>	<p>Vietnamese 20–79 years No Pap test in past 3 years (aged 20–69) Never had Pap test (aged 70–79) Seattle, Washington</p>	<p>One-on-one education Vietnamese language video and pamphlet Physical activity print materials</p>	<p>Follow-up survey 6 months after randomization 234 randomized 174 with follow-up data</p>	<p>33% of the experimental group and 18% of the control group reported Pap testing ($p = 0.02$)</p>
<p>Colorectal cancer screening</p>				
<p>Health care system Tu et al. [57]</p>	<p>Chinese 50–78 years No FOBT in past year or colonoscopy in past 10 years Seattle, Washington</p>	<p>One-on-one education Chinese language video and print materials FOBT kit and instruction sheet Usual care</p>	<p>Medical records review 6 months after randomization 210 randomized</p>	<p>70% of the experimental group and 28% of the control group completed FOBT ($p < 0.001$)</p>
<p>Group education Maxwell et al. [70]</p>	<p>Filipino 50–70 years No FOBT in past year, sigmoidoscopy in past 5 years or colonoscopy in past 10 years Los Angeles, California</p>	<p><i>Experimental 1:</i> Group education Filipino language information packet and pamphlet FOBT kit Reminder letter <i>Experimental 2:</i> Same as experimental group 1 but no FOBT kit Physical activity group education</p>	<p>Follow-up survey 6 months after intervention 548 randomized 432 with follow-up data</p>	<p>30% of experimental group 1, 25% of experimental group 2, and 9% of the control group completed colorectal cancer screening in an intent-to-treat analysis (experimental group 1 versus control, $p < 0.001$; experimental 2 versus control, $p < 0.001$; experimental group 1 versus experimental group 2, $p > 0.05$)</p>

(continued)

Table 4 (continued)

Intervention type(s) Publication	Participant characteristics Study location(s)	Experimental group intervention Control group intervention	Primary evaluation method(s) Sample size(s)	Key finding(s)
One-on-one education Small media Walsh et al. [80]	Vietnamese 50–79 years Santa Clara County, California	<i>Experimental 1:</i> Telephone counseling Vietnamese language brochure FOBT kit <i>Experimental 2:</i> Same as experimental group 1 but no telephone counseling Usual care	Baseline survey Follow-up survey after an interval of 12 months 793 with baseline data 640 with follow-up data	FOBT in the previous 12 months increased in experimental group 1 (53–79%), experimental group 2 (56–65%) and the control group (46–58%) but the experimental group 1 increase was significantly greater than the control group increase ($p=0.006$) and the experimental group 2 increase ($p<0.001$)
Hepatitis B screening				
LHW outreach Chen et al. [9]	Hmong 18–64 years No previous HBV test Greater Sacramento, California	One-on-one education Peer navigation Nutrition LHW outreach	Follow-up survey 6 months after randomization 260 randomized 217 with follow-up data	24% of the experimental group and 10% of the control group reported HBV testing ($p=0.006$)
Health care system Hsu et al. [45]	Chinese or Vietnamese 18–64 years No record of HBV test Sacramento, California	Provider prompt Usual care	Medical records review 3 months after clinic visit 175 randomized	34% of the experimental group and 0% of the control group completed HBV testing ($p<0.001$)
LHW outreach Taylor et al. [63]	Kampuchean (Cambodian) 18–64 years No previous HBV test Greater Seattle, Washington	One-on-one education Khmer language video and pamphlet Physical activity LHW outreach	Follow-up survey 6 months after randomization 250 randomized 199 with follow-up data	22% of the experimental group and 3% of the control group reported HBV testing ($p<0.001$)
Group education Bastani et al. [31]	Korean 18–64 years No previous HBV test Los Angeles, California	Group education Korean language print materials Physical activity and nutrition group education	Follow-up survey 6 months after intervention 1123 randomized 961 with follow-up data	19% of the experimental group and 6% of the control group reported HBV testing ($p<0.001$)

ventions for Asian Americans. The tabulated examples are trials that demonstrated an intervention effect in primary analyses that included the whole study group. Quasi-experimental studies, negative trials, and trials that only demonstrated an intervention effect in secondary subgroup analyses are not included in the table.

Evaluations of Interventions Delivered in Health-Care Settings

Tu and colleagues have conducted two studies of colorectal cancer screening interventions for patients of a community clinic system serving Asian patients. Both interventions were delivered during routine clinic visits. In the first study, Chinese patients who were eligible for screening were randomized to a health educator intervention group or usual care control group. The intervention had a highly significant effect on fecal occult blood testing (FOBT) completion rates [57]. In the second study, trained medical assistants routinely provided Vietnamese language videos and pamphlets at an experimental clinic but not at a control clinic. Adherence to screening guidelines did not increase significantly in either clinic during the intervention period. However, subgroup analyses showed a significant intervention effect for guideline adherence among patients who were nonadherent at baseline [58].

Provider prompts about HBV testing were evaluated in a cluster-randomized trial, with primary care physician as the randomization unit. The study group included Chinese and Vietnamese patients of a primary care clinic network who had no record of HBV testing. Experimental group physicians received electronic health record prompts before scheduled appointments. Patients of experimental group physicians were significantly more likely to complete HBV testing than patients of control group physicians [45].

Lay Health Worker Outreach Trials

The Vietnamese Community Health Promotion Project in San Francisco has conducted one quasi-experimental study and two trials of LHW group education. The quasi-experimental study focused on both breast and cervical cancer screening. LHWs conducted over 200 small-group educational sessions and distributed small media in an experimental area (Tenderloin District of San Francisco). Mammography and Pap testing rates increased significantly in the Tenderloin District but not in the control area (Sacramento) [59]. One of the trials addressed breast cancer screening and the other trial addressed cervical cancer screening. Both trials compared LHW group education and peer navigation combined with media-based education to media-based education alone. The combined intervention was more effective in increasing mammography, as well as Pap testing levels [60, 61].

Multiple trials have evaluated LHW outreach interventions for Asian groups that included one-on-one education combined with small media and/or peer navigation. These trials focused on promoting Pap testing among women who underutilized Pap

testing or HBV testing among men and women who had never been tested for HBV. All but one of these studies were conducted in the Pacific Northwest. The LHW interventions were effective in promoting Pap testing in Chinese and Vietnamese communities, as well as HBV testing in Kampuchean (Cambodian) and Hmong communities [9, 62–64]. However, they were not effective in promoting Pap testing among Kampuchean (Cambodian) women or HBV testing among Chinese men and women [65, 66].

Community-Based Group Education Studies

Two trials have documented that group education, delivered in community settings, can positively impact mammography completion rates among immigrant women who have not been recently screened. One of these studies evaluated group education for Korean immigrant women and their husbands combined with a couple discussion exercise that was subsequently completed at home [67]. The other study evaluated group education combined with telephone counseling and navigation for Chinese immigrant women [68].

Los Angeles researchers conducted cluster-randomized trials of breast and cervical cancer screening group education, as well as colorectal cancer screening group education (with or without the provision of FOBT kits) for Filipinos. Both trials involved group education by Filipino health professionals [69, 70]. In the breast and cervical cancer screening trial, equivalent increases in mammography and Pap testing rates were observed in experimental and control arms. However, mammography increased significantly more in the experimental arm than in the control arm among recent immigrants [69]. In the colorectal cancer screening trial, experimental arm participants were significantly more likely to be adherent to screening guidelines than control group participants at follow-up (regardless of whether or not they received FOBT kits) [70]. In another trial in the Korean community, this Los Angeles group found that small-group education and small media significantly increased HBV testing [31].

Researchers from the Center for Asian Health in Philadelphia have evaluated group education combined with navigation, including arranging appointments with clinical partners, language translation, assisting with paperwork, and transportation. Their studies have focused on cervical cancer screening among Chinese women, recruited from four Asian community organizations (two experimental and two control), and colorectal cancer screening among older Koreans, recruited from six churches (three experimental and three control). At baseline, study participants were nonadherent to screening guidelines. While these studies had relatively small sample sizes, they both demonstrated a strong intervention effect ($p < 0.001$) [48, 49].

One evaluation of group education included multiple Asian groups (Chinese, Koreans, and Vietnamese). This study focused on HBV testing. Experimental group participants were recruited through 15 community organizations in Baltimore, and control group participants were recruited through 12 community organizations in Washington, DC. Group education was provided by Asian health educators and included use of Asian language videos and photonovels. Control group participants

received an English language brochure about HBV. The intervention had a significant effect on HBV testing rates among participants who were untested at baseline [15].

Trials of One-on-One Education and Small Media

Wu and colleagues examined the effect of telephone counseling about mammography for Chinese women who were nonadherent to screening guidelines. Control group participants received an English language mammography brochure. While mammography uptake after 4 months was equivalent in the experimental and control groups, there was a significant intervention effect among women with insurance coverage for breast cancer screening [71]. A comparative effectiveness trial tested two alternative mammography videos for Chinese women who had not received a mammogram in the previous year. Participants were randomized to receive a culturally targeted video, generic video, or fact sheet. All the small media were provided in Chinese. Primary analyses that included all randomized women found neither of the videos was effective. However, secondary analyses found the culturally targeted video was effective among a subgroup of women with low acculturation [72]. Another three-arm trial addressed approaches to promoting FOBT among Vietnamese patients of a primary care clinic network. Both experimental groups received a culturally and linguistically tailored brochure and FOBT kit by mail, and one of the experimental groups also received telephone counseling (provided by Vietnamese community health advisors). The trial findings indicated that telephone counseling was effective in increasing FOBT completion rates, but the culturally tailored brochure was not [73].

Quasi-experimental Studies of Community-Level Interventions

Four quasi-experimental studies evaluated breast and/or cervical cancer screening community interventions for Korean and Vietnamese women in California. The interventions included use of Asian language mass media combined with other components such as distribution of Asian language educational materials, workshops at Korean churches, and continuing medical education for Vietnamese physicians. Only one of these studies had positive findings [74–78].

Nguyen and colleagues assessed the impact of a community intervention to increase colorectal cancer screening levels among Vietnamese. Intervention components included a Vietnamese language media campaign, distribution of Vietnamese language educational materials, and continuing medical education for Vietnamese physicians. The proportions of participants who had never received a colonoscopy or sigmoidoscopy increased significantly in the experimental community (44 % at preintervention to 65 % postintervention) and a control community (37 % at preintervention to 47 % postintervention), but the increase was significantly greater in the experimental community. There was no intervention effect for FOBT [79].

Discussion

While intervention studies with positive findings are more likely to be published than intervention studies with negative findings, there is reasonably good evidence that LHW outreach and community-based group education (combined with other intervention components) can increase the use of cancer-related screening tests among Asian Americans [80]. However, trials of LHW outreach and community-based group education have not all demonstrated intervention effects. Since many Asian immigrant communities are relatively small and self-contained with strong social and extended family networks, it is possible that educational messages were disseminated to control groups in some of the negative trials [65, 66].

Researchers have reported relatively modest or no intervention effects from most quasi-experimental studies of community-level interventions to increase mammography and Pap testing levels among Asian women [55, 80]. Some of these interventions may have had insufficient reach, and their components may have lacked adequate intensity [75, 77]. Other factors that may have contributed to negative study results include the diffusion of intervention components from experimental to control communities, as well as the implementation of unanticipated and competing cancer screening programs in control communities [75, 77, 78].

The majority of cancer control intervention studies with Asian participants have used self-reports of screening test completion to measure outcomes [55]. There is some evidence that the reliability and validity of survey responses among Asians is relatively low, possibly because of a cultural tendency toward acquiescence [55, 81, 82]. While a few studies have attempted to verify self-reports with provider reports, Asian naming systems can result in the misfiling of test results, and health-care facilities that lack computerized technology can have difficulty locating medical records [62, 63, 83]. Recent initiatives to increase the use of electronic health records should facilitate the use of provider reports for outcome ascertainment in future studies [84].

Recommendations and Next Steps

In order to monitor cancer screening rates and to identify groups that underutilize cancer screening tests, it is important to continue to collect detailed information on ethnicity and acculturation among Asian Americans when assessing cancer screening. As many Asian Americans have limited English proficiency, it will be critical to provide linguistically appropriate access to health care to facilitate screening test use. In addition to promoting cancer screening in clinical settings, community venues can reach Asian Americans that may not have a regular health-care provider. Most cancer control interventions for Asian Americans have focused on Chinese, Koreans, and Vietnamese, and there is little information about evidence-based interventions for other large Asian groups (e.g., Indians) or for smaller groups such as the Hmong [5, 80]. Additionally, very few interventions have been tailored for use

in more than one Asian group [55, 80]. More research is needed on how to balance the need for culturally appropriate interventions in settings that serve multiple ethnic groups, which is the case in most clinics. Finally, most interventions have sought to change individual factors (e.g., beliefs about screening tests) rather than factors related to health-care providers and systems [80]. Future cancer control research initiatives should develop and evaluate interventions for previously understudied Asian groups. They should also focus on the health-care system and other interventions that could be tailored to multiple Asian groups.

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