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Ethnic Differences in Prevalence and Barriers of HBV Screening and Vaccination Among Asian Americans

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Abstract

Our study identifies the prevalence of HBV virus (HBV) screening and vaccination among Asian Americans, and ethnic differences for factors associated with screening and vaccination behaviors. In 2009–2010 we recruited 877 Korean, Chinese, and Vietnamese Americans 18 years of age and above through several community organizations, churches and local ethnic businesses in Maryland for a health education intervention and a self-administered survey. Prevalence of HBV screening, screening result and vaccinations were compared by each ethnic group. We used logistic regression analysis to understand how sociodemographics, familial factors, patient-, provider-, and resource-related barriers are associated with screening and vaccination behaviors, using the total sample and separate analysis for each ethnic group. Forty-seven percent of participants reported that they had received HBV screening and 38% had received vaccinations. Among the three groups, the Chinese participants had the highest screening prevalence, but lowest self-reported infection rate; Vietnamese has the lowest screening and vaccination prevalence. In multivariate analysis, having better knowledge of HBV, and family and physician recommendations was significantly associated with screening and vaccination behaviors. Immigrants who had lived in the US for more than a quarter of their lifetime were less likely to report ever having been screened (OR = 0.39, 95% CI: 0.28–0.55) or vaccinated (OR = 0.62, 95% CI: 0.44–0.88). In ethnic-specific analysis, having a regular physician (OR = 4.46, 95% CI: 1.62–12.25) and doctor's recommendation (OR = 2.11, 95% CI: 1.05–4.22) are significantly associated with Korean's vaccination behaviors. Health insurance was associated with vaccination behaviors only among Vietnamese (OR = 2.66, 95% CI: 1.21–5.83), but not among others.

Keywords

HBV infection; Asian Americans; HBV prevalence; Health care access barriers

Introduction

Chronic HBV virus (HBV) infection leads to severe liver diseases, including cirrhosis and hepatocellular carcinoma (HCC). People who are chronically infected with HBV have a much higher risk of HCC than those not infected [1–3]. From 1975 to 2005 HCC incidence rates in the United States have tripled and Asian/Pacific Islanders continue to have the highest liver cancer mortality among all other races since 1992–2005 [4]. Foreign-born immigrants suffer higher risks of getting HCC: 80% of Asian/Pacific Islander patients in the National Cancer Institute SEER registries between 2000 and 2005 were born outside the United States [4].

Several surveys showed that Asian Americans have low HBV screening rate, ranging from 7.5 to 43% for self-reported screening rate by region and various Asian ethnic groups [5–9]. Underutilization of HBV treatment, immunization, and testing for Asian immigrants highlighted several barriers for this population. Hu [10] categorized barriers to HBV care among Asian and Pacific Islander Americans into three major categories: provider-related, patient-related, and resource-related. Provider-related barriers include physician recommendations and communication with physicians about HBV. Physician recommendations are associated with several cancer screening behaviors for Asian Americans, such as mammography, pap testing and colorectal cancer screening [11, 12], and for HBV screening behaviors [13–15].

Patient-related barriers include the most contributory factors associated with HBV screening- knowledge about HBV [7, 13, 14] and other person-level factors, such as English fluency [7] and socioeconomic status [7, 15]. Higher educational attainment has been consistently associated with HBV screening behavior [9, 13]. Other sociodemographic factors that are associated with HBV screening behaviors include age and gender. Studies found that men were more likely to have HBV screening among Vietnamese Americans [7]. Being older and married were factors associated with HBV screening for Vietnamese American men [8].

Resource-related barriers include not having a regular source of care and lack of health insurance [10]. Asian Americans have lower health insurance coverage compared to White Americans [16]. Lack of health insurance is an important factor contributing to underutilization of health care and affects cancer incidence and mortality via lower preventive behaviors and delayed detection, which in turn affects cancer patients' survivorship and palliative care [17]. In the literature, lack of a regular source of care and health insurance coverage were associated with HBV screening behaviors [8, 14]. For immigrants, a social network is an important factor associated with health care seeking behavior. Recommendations from friends or family members for HBV screening were associated with screening behaviors [13, 18]. Among Vietnamese Americans a family history of HBV was associated with screening behavior before but not after adjusting for sociodemographics and several personal-, physician-, and resource-related factors [[15].].

The introduction of HBV vaccines and immunization strategies are the most effective measures for prevention of HBV transmission. Routine vaccinations for infants and adolescents have successfully reduced HBV infection incidence in the United States [19]. Far fewer studies have examined factors associated with vaccination behaviors compared to HBV screening behaviors among Asian adults. According to 2005 National Health and Nutrition Examination Survey data, about 42% of Asian, Pacific Islander, Native American, and multiracial adults 18 years of age and older have completed three shots of HBV vaccination [20]. Similar to screening behaviors, education level, household income, and HBV knowledge were significant for Vietnamese Americans [7]. We found that further

research was needed to understand vaccination prevalence by ethnic group and how the difference in prevalence may be contributed by the culture, patient-, resource-, and physician-related factors and barriers.

Asian Americans are a diverse population with different immigration and cultural background for each ethnic group; this could strongly affect their utilization of health care services [21]. Most studies that examined prevalence and factors associated with HBV screening and vaccination behaviors, however, did not compare the differences across ethnic groups. Our study assesses the prevalence and factors associated with self-reported screening and vaccination behaviors among Chinese, Korean, and Vietnamese American adults recruited in Maryland. This is one of the first studies that focuses on the comparison of ethnic differences among Asian Americans for HBV screening and vaccination behaviors. Due to the unique cultural backgrounds and HBV-related policies where immigrants came from endemic regions [22, 23], we hypothesized to observe differences in prevalence and factors associated with screening and vaccination behaviors among these three Asian ethnicities.

Methods

Recruitment Procedures

We recruited 877 Chinese, Korean, and Vietnamese Americans from various community-based organizations, faith-based organizations, language schools, and Asian grocery markets and restaurants, nail salons, universities, and individual networks: churches and language schools for Chinese Americans (N = 303); churches, grocery stores and restaurants for Korean Americans (N = 294); churches, temples, restaurants and nail salons for Vietnamese Americans (N = 280). We recruited participants on a voluntary basis who were at least 18 years old and had never participated in other HBV educational programs [24].

Survey Procedures

Participants were randomly assigned to either the intervention or control group based on their organizations. Participants in the intervention group and the control group filled in a paper form of self-administered questionnaires before they received the intervention or control group educational program. Data collection was conducted from November 2009 to June 2010.

Surveys were translated into ethnic languages: Chinese, Korean, and Vietnamese. Trained bilingual research assistants assisted participants who had reading problems. Overall, 10% of the 877 participants chose to fill in an English version rather than an ethnic version of the questionnaire.

Study Variables

Dependent Variables—Participants were asked to report whether they had ever received HBV screening and, if they had, what were the results of the screening test. Participants were also asked to report whether they had received vaccination for HBV virus and how many shots they had completed.

Independent Variables

Sociodemographics: Sociodemographic variables include gender, education (college educated or higher vs. did not go to college), employment (employed vs. not), age (age 18–34 vs. age 35 or older). Percent lifetime in the United States was calculated by current age divided by the number of years living in the United States and was used as a dichotomized variable (<=25 vs. >25%).

Patient-Related Barriers: Knowledge of HBV virus transmission modes was measured by ten questions, asking participants whether they thought HBV could be spread by the ten transmission modes, such as, from infected mother to child during childbirth, by eating food prepared by an infected person, or by sharing a toothbrush with an infected person [25, 26]. Participants scored 1 for answering each statement correctly and 0 for a wrong answer or not knowing the answer. Total scores ranged from 0 (all wrong) to 10 (all correct).

Provider-Related Barriers: We asked whether a physician had ever recommended that they receive HBV screening (yes vs. no).

Resource-Related Barriers: Resource-related barriers were measured by whether participants had health insurance (yes vs. no) and whether they have a physician they see regularly (yes vs. no). Health insurance coverage included private insurance, Medicare, Medicaid and other public insurance.

Familial Factors: We used two measures to assess familial-related factors in association with HBV screening and vaccination behaviors, including: having someone in the family that had HBV infection, and friends' or family recommendations for screening. For close associates' recommendations, we asked whether their family members or friends ever suggested that they obtain HBV screening.

Analysis

Prevalence of HBV screening, screening result and vaccinations were compared by each ethnic group. For bivariate analysis we compared sociodemographics, familial factors, patient-, provider-, and resource-related barriers between those who had been screened/vaccinated and those who never did for each ethnic group, using Chi-square and *t* tests. For multivariate analysis we used logistic regression analyses to understand all the factors associated with screening and vaccination behaviors, using the total sample and separate analysis for each ethnic group. We analyzed data using STATA statistical software version 11 [27].

Results

Prevalence of HBV Screening and Vaccination Behaviors

Of the 877 participants, 47% reported in the baseline questionnaires that they had received HBV screening (Table 1). Chinese participants had the highest self-reported screening prevalence (54%), followed by Korean (46%) and Vietnamese (39%). For screening results, 12% of those who had been screened reported being infected, 78% not infected, and 10% did not know their infection status. Comparing the three ethnic groups, the Chinese had the lowest self-reported infection rate (5%) and least number of people claiming that they did not know their infection status (4%). Koreans had 18% infections rates and Vietnamese had 15% and similar rates for not knowing their infection status (16 and 14%, respectively).

After excluding those already infected with HBV, we found that about 38% of participants had received vaccinations; of those who had received vaccinations, only half reported that they completed the three shots as recommended. Chinese participants had the highest self-reported vaccination rate (46%); Vietnamese participants had the highest self-reported completion rate for the three shots out of those who had received vaccinations (59%).

Sociodemographic Characteristics of the Sample

In our sample, slightly more participants were female (58.5%) than male and the average age was about 45 years (Table 2). About 78% of participants were 35 years of age or older;

overall, about 60% had lived in the United States for more than 25% of their lifetime. About 64% of the sample was college educated or higher, while education level varied across the three ethnic groups (Table 2). About 59% of the sample had a regular physician and about 66% had health insurance coverage, yet only less than 20% reported that their physicians had ever recommended HBV screenings. About 14% of the sample reported that someone in their family was infected with HBV virus and almost a quarter of the sample had been recommended for HBV screening by a friend or family member.

Bivariate Analysis of Factors Associated with Screening and Vaccination Behaviors

Without adjusting for other factors, participants who reported having had HBV screening were significantly more likely to be male, college educated or higher and those who had lived in the United States less than 25% of the lifetime in the overall sample combining three ethnicities, using Chi-squared tests or *t* test (Table 2). Patient-, provider-, and resources-related barriers were significantly associated mostly with screening behaviors. Having family history of HBV and having family or friends' recommendations for screening were associated with screening behaviors.

For vaccination behaviors, age, education, age of immigration, patient-, provider-, and resource-related barriers were significantly associated using the total sample (Table 2). The bivariate analysis for vaccination was similar to screening behaviors, except that vaccination behavior was associated with being younger than 35 years but not for screening behaviors (Table 2). In the bivariate analysis, gender and having a regular physician were not significantly associated with vaccination behaviors.

Multivariate Analysis of Factors Associated with Screening and Vaccination Behaviors

In multivariate analysis using the total sample in Table 3, Asian Americans who had college education or higher and lived in the United States less than 25% of their lifetime were more likely to have had HBV screening or vaccination. Older participants were more likely to have had screening, although not in significant numbers; participants younger than age 35 were more likely to have received vaccination significantly (OR = 0.44, 95% CI: 0.29–0.66). Knowledge of HBV (screening: OR = 1.18, 95% CI: 1.10–1.26; vaccination: OR = 1.20, 95% CI: 1.12–1.29), physician recommendations (s: OR = 4.61, 95% CI: 2.81–7.54; v: OR = 2.09, 95% CI: 1.30–3.37), and being recommended by friends or family for screening (s: OR = 3.03, 95% CI: 1.96–4.69; v: OR = 2.01, 95% CI: 1.28–3.15) remained significantly associated with screening and vaccination behaviors after adjusting for sociodemographics and other barriers. Having health insurance was no longer significantly associated with screening or vaccination behaviors, while having a regular physician was associated only with screening behaviors (OR = 1.61, 95% CI: 1.10–2.35), but not with vaccination behaviors.

Ethnic-specific multivariate analyses of screening behaviors are presented in Table 4. Several factors were consistently associated with screening or vaccination behaviors across all three ethnic groups. For screening behavior (Table 4), immigrants in all three ethnic groups who had stayed in the United States longer (more than a quarter of lifetime) were significantly less likely to be screened. Our study populations that have received physician recommendations for HBV screening had at least more than three times the likelihood of having been screened than those who had not received recommendations. Yet, there were different patterns for screening behavior across the three ethnic groups (Table 4). Having a regular physician was significantly associated with screening behavior for Vietnamese (OR = 2.35, 95% CI: 1.19–4.63), but not with the other ethnicities. Also, after adjusting for sociodemographics and other barriers screening behavior was associated with higher knowledge of HBV, but it was not significant among the Vietnamese group. Different from

the rest of the ethnic groups, family or friends' recommendations for screening did not show significance in the Chinese group and neither did education level for the Korean group.

Ethnic-specific multivariate analyses for vaccination are presented in Table 5. For Koreans, physician recommendations for screening (OR = 4.46, 95% CI: 1.62–12.25), having a regular physician (OR = 2.11, 95% CI: 1.05–4.22), and having higher education (OR = 2.59, 95% CI: 1.35–4.96) were significantly associated with vaccination behaviors. For Chinese, none of the provider- or resource-related barriers were associated with vaccination behaviors; being younger (OR = 0.22, 95% CI: 0.09–0.57), having higher education (OR = 2.74, 95% CI: 1.18–6.36), higher knowledge of HBV (OR = 1.32, 95% CI: 1.16–1.49), and having family or friends' recommendations (OR = 3.23, 95% CI: 1.28–8.12) were significantly associated. For the Vietnamese group, being younger (OR = 0.39, 95% CI: 0.20–0.78), having higher knowledge of HBV (OR = 1.17, 95% CI: 1.03–1.32), and having health insurance (OR = 2.66, 95% CI: 1.21–5.83) were significantly associated with vaccination behaviors.

Discussion

We identified the variation of prevalence and factors of self-reported screening and vaccination behaviors among three Asian American ethnic groups. Previous studies have not compared ethnic-specific differences in barriers for HBV screening behaviors based on various cultural and immigration background. Asian Americans and immigrants are disproportionately affected by chronic HBV and liver cancer. A large proportion of people infected with HBV were unaware of their disease status and even if diagnosed, many of them were not receiving treatment [28]. An important step for better management of severe liver diseases caused by HBV is to encourage high-risk populations to get screening and vaccination. Our findings also confirm that physician recommendations and being a newer immigrant are important factors for HBV prevention behaviors. Our research also suggested that there are substantial differences for self-reported infection rates and factors associated with screening and vaccination behaviors among Chinese, Korean, and Vietnamese Americans.

From the participants' self-reported data, the Chinese American sample in the Baltimore-Washington Metropolitan Area has the highest screening rate among the three ethnicities, yet they have the lowest self-reported infection rate. The self-reported rate may be an underestimated number compared to actual screening results, partially because some people may not comprehend a screening result without clear explanation from their physicians, did not follow up, or forget their status. Studies that tested serum HBsAg among Asian American immigrants show that HBV infection rates could range widely depending on the study populations and locations, such as 4.3% in a Rocky Mountain area and 14.8% in a New York City sample [5, 6]. The self-reported infection rate in our Chinese sample (5%) is much lower than the Chinese sample gathered in New York City (21.4%) or the Korean sample and Vietnamese sample in our study (18 and 15%, respectively) [5].

One possible explanation for this result is that the infection status may be underreported because of the stigma against chronic HBV among Chinese Americans and our data was collected by self-report. China has a long history of stigma against people infected with HBV, mainly due to the loss of employment opportunity and education admission policies against chronic HBV patients. For example, since the 1980s children infected with chronic HBV virus were not allowed to go to ordinary kindergartens in Guangzhou, China [29]. Only recently, there were clear governmental regulations against HBV discrimination. In 2007 there were regulations prohibiting employers from rejecting job applications by people with chronic HBV [30]. In 2009 the Ministry of Health proposed regulations assuring

children who are HBV positive to enter kindergarten and allowing people with chronic HBV to work in the food industry [30]. To protect people's right to work regardless of their HBV status, in February 2011, the Ministry of Health prohibited hospitals from carrying out HBV tests for companies as part of pre-employment physical examinations [31]. These changes of regulations within the past 5 years might not have changed persistent misunderstandings and discrimination among Asian Americans and immigrants. Hence, underreporting may be one explanation for the lower infected rate among Chinese Americans in our study. We need serological HBV testing to confirm this hypothesis and better survey methods to deal with potential underreporting of HBV status.

In our study sample, the Vietnamese group had the lowest self-reported screening and vaccination prevalence compared to Chinese and Korean populations. Since HBV vaccines were introduced and covered nationwide in immigrants' home countries in different years, more research is needed to target specific ethnic groups for screening and vaccination. In China, HBV vaccination was first introduced in 1985; in 2002 it was extended to all newborns at no cost. By 2005, infant coverage was 72% [32]. For South Korea, national coverage started in 1992; by 2005 infant coverage reached 92% [32]. HBV vaccination was first introduced in Vietnam in 1997 and covered nationally in 2003; by 2005, infant coverage reached 94% [32]. The later introduction and prevalence of HBV vaccines could be the reason why immigrants from some Asian countries have lower coverage, which should be addressed by raising awareness among physicians, other health care providers, and among immigrants themselves.

We found that being a newer immigrant was associated with more frequent HBV screenings compared to those who had lived in the United States for more than a quarter of their lifetime. This may also be contributed by the variation of when HBV vaccinations were introduced in each country. In our study, the average age of arriving in the United States was about 30 years and more than 50% of the total sample was above 40 years of age. These immigrants did not benefit from the child HBV vaccination policies since the policies were introduced in the 1990s. There may be a certain age cohort who immigrated in a time period that made them more vulnerable for missing HBV preventive services in both their home country and the US. Identifying the age and time of arriving in the US for immigrants could help to effectively target populations at high risk.

Several factors significantly associated with immigrants' screening and vaccination behaviors were consistent with the literature, such as knowledge of HBV, physician recommendations and family or friends' recommendations [7, 13, 14]. Conversely, after adjusting for sociodemographics and patient and provider-related barriers in the full sample or ethnic-specific analysis, we did not find that having health insurance was significantly associated with most screening and vaccination behaviors [8, 14]. A few reasons may explain this discrepancy compared to the literature. It could be that those who did obtain screening and vaccinations had these preventive behaviors back in Asia, so whether they currently had health insurance in the US was not associated with their preventive behaviors. In our multivariate model, other important factors such as knowledge of HBV and physician recommendations, may have stronger effects than the health insurance issue. In addition, to be protected for life, HBV screening needs to be conducted only once in a lifetime and vaccinations obtained once. This is quite different from other cancer screenings. The cost of liver cancer prevention behaviors through HBV screening is rather cheaper than other cancer prevention behaviors. If they are knowledgeable about HBV, immigrants without health insurance may be more likely to choose liver cancer prevention than other cancer prevention behaviors due to the lower cost. Future studies should test whether the cost of each preventive behavior is part of the decision-making process for immigrants.

Our findings suggest that having a regular physician and physician recommendations are significantly associated with vaccination behaviors among Korean Americans; health insurance did not show association with either screening or vaccination behaviors. The Korean sample in our study had the lowest health insurance coverage among the three ethnic groups (52 vs. 78% for Chinese, 69% for Vietnamese). The lower health insurance coverage among Korean Americans is an alarming issue concerning health outcomes in the long term [33]. This may explain why physician recommendations are more important than having insurance for Korean immigrants to receive vaccinations. More research effort is needed to examine how health insurance coverage affects health care utilization among Asian immigrants.

An important limitation of our study is that the prevalence of chronic HBV infection was self-reported, without the confirmation of serological testing. This may underestimate the infection rate due to the history of stigma against HBV in some cultures. Also, we do not have data on when and for what purpose participants obtained HBV screening tests. Factors associated with screening may be very different from the general population for those who obtained screening due to having jobs involved with blood-borne pathogens in the medical field, or screening during pregnancy for women. Our study results are not generalizable to other Asian populations in the US. Our recruitment is based on a convenience sampling method, recruiting through community-based organizations, faith-based organizations, and others and differed by each ethnicity group. It is possible that people were more interested in or knowledgeable about HBV, then self-selected to our study. Therefore, it is possible that our findings may not accurately report the prevalence of HBV screening and immunization practice of general Asian American populations in the region. We tried to diversify the sample by recruiting in markets and restaurants to recruit immigrants with lower socioeconomic backgrounds, but still our study results should not be generalized to other Asian immigrant samples collected by different methods and in other locations. The extent of generalizability of our study findings can be assessed when the United States 2010 Census data become publicly available.

In summary, our study used a sample of adult Chinese, Korean and Vietnamese Americans recruited in Maryland and found that education, knowledge of HBV, and physician recommendations are consistently associated with screening and vaccination behaviors. We also found that prevalence and factors for HBV preventive behaviors differ among each ethnic group. We should continue the effort to improve HBV knowledge among immigrants and encourage physician practices to recommend screening for high-risk groups. Only less than one-third of primary care physicians were found to routinely assess risk factors against HBV and vaccinate patients with risk factors in a national survey conducted in year 2006 [34]. Immigrants with lower education and lower HBV knowledge are particularly vulnerable and in need of physicians' reminders. More research is needed to examine how culture and immigration backgrounds of each Asian ethnic group may affect preventive health behaviors. Based on the differences of patient-, resource-, and physician-related barriers associated with HBV preventive behaviors among each ethnic group, we should design comprehensive interventions, but with focus on certain factors for each Asian ethnic group.

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References

1. Ganem D, Prince AM. Hepatitis B virus infection– natural history and clinical consequences. *New England Journal of Medicine*. 2004; 350(11):1118–1129. [PubMed: 15014185]
2. Beasley RP. Hepatitis B virus. The major etiology of hepatocellular carcinoma. *Cancer*. 1988; 61(10):1942–1956. [PubMed: 2834034]
3. McMahon BJ. The natural history of chronic hepatitis B virus infection. *Hepatology*. 2009; 49(5 suppl):S45–S55. [PubMed: 19399792]
4. Altekruse SF, McGlynn KA, Reichman ME. Hepatocellular carcinoma incidence, mortality, and survival trends in the United States from 1975 to 2005. *Journal of Clinical Oncology*. 2009; 27(9): 1485–1491. [PubMed: 19224838]
5. Centers for Disease Control and Prevention (CDC). Screening for chronic hepatitis B among Asian/Pacific Islander populations–New York City, 2005. *MMWR Morbidity Mortality Weekly Report*. 2006; 55(18):505–509. [PubMed: 16691180]
6. Lee H, Hontz I, Warner A, Park SJ. Hepatitis B infection among Asian American Pacific Islanders in the Rocky Mountain area. *Applied Nursing Research*. 2005; 18(1):2–6. [PubMed: 15812729]
7. Ma GX, Shive SE, Fang CY, Feng Z, Parameswaran L, Pham A, et al. Knowledge, attitudes, and behaviors of hepatitis B screening and vaccination and liver cancer risks among vietnamese Americans. *Journal of Health Care for the Poor and Underserved*. 2007; 18(1):62–73. [PubMed: 17337798]
8. Choe JH, Taylor VM, Yasui Y, Burke N, Nguyen T, Acorda E, et al. Health care access and sociodemographic factors associated with hepatitis B testing in Vietnamese American men. *Journal of Immigrant and Minority Health*. 2006; 8(3):193–201. [PubMed: 16791529]
9. Taylor VM, Jackson JC, Chan N, Kuniyuki A, Yasui Y. Hepatitis B knowledge and practices among Cambodian American women in Seattle, Washington. *Journal of Community Health*. 2002; 27(3): 151–163. [PubMed: 12027266]
10. Hu KQ. Hepatitis B virus (HBV) infection in Asian and Pacific Islander Americans (APIAs): How can we do better for this special population? *American Journal of Gastroenterology*. 2008; 103(7): 1824–1833. [PubMed: 18479498]
11. Liang W, Wang JH, Chen MY, Mandelblatt JS. Language use and the receipt of cancer screening recommendations by immigrant Chinese American women. *Journal of Womens Health (Larchmt)*. 2009; 18(2):201–207.
12. Juon H, Kim M, Shankar S, Han W. Predictors of adherence to screening mammography among Korean American women. *Preventive Medicine*. 2004; 39(3):474–481. [PubMed: 15313086]
13. Coronado GD, Taylor VM, Tu SP, Yasui Y, Acorda E, Woodall E, et al. Correlates of hepatitis B testing among Chinese Americans. *Journal of Community Health*. 2007; 32(6):379–390. [PubMed: 17940869]
14. Taylor VM, Yasui Y, Burke N, Nguyen T, Chen A, Acorda E, et al. Hepatitis B testing among Vietnamese American men. *Cancer Detection and Prevention*. 2004; 28(3):170–177. [PubMed: 15225896]
15. Nguyen TT, McPhee SJ, Stewart S, Gildengorin G, Zhang L, Wong C, et al. Factors associated with hepatitis B testing among Vietnamese Americans. *Journal of General Internal Medicine*. 2010; 25(7):694–700. [PubMed: 20306150]
16. Huang K, Carrasquillo O. The role of citizenship, employment, and socioeconomic characteristics in health insurance coverage among Asian subgroups in the United States. *Medical Care*. 2008; 46(10):1093–1098. [PubMed: 18815516]
17. Ward E, Halpern M, Schrag N, Cokkinides V, DeSantis C, Bandi P, et al. Association of insurance with cancer care utilization and outcomes. *CA Cancer Journal for Clinicians*. 2008; 58(1):9–31.
18. Taylor VM, Yasui Y, Burke N, Choe JH, Acorda E, Jackson JC. Hepatitis B knowledge and testing among Vietnamese-American women. *Ethnicity and Disease*. 2005; 15(4):761–767. [PubMed: 16259505]
19. Alter MJ. Epidemiology and prevention of hepatitis B. *Seminars in Liver Disease*. 2003; 23(1):39–46. [PubMed: 12616449]

20. Ayers JW, Juon HS, Lee S, Park E. Hepatitis B vaccination prevalence and its predictors among Asian, Pacific Islander, Native American, and multiracial adults in the national health and nutrition examination survey. *Journal of Immigrant and Minority Health*. 2010; 12(6):847–852. [PubMed: 19967403]
21. Kwong SL, Stewart SL, Aoki CA, Chen MS Jr. Disparities in hepatocellular carcinoma survival among Californians of Asian ancestry, 1988 to 2007. *Cancer Epidemiology, Biomarkers and Prevention*. 2010; 19(11):2747–2757.
22. Murakami H, Van Cuong N, Huynh L, Hipgrave DB. Implementation of and costs associated with providing a birth-dose of hepatitis B vaccine in Viet Nam. *Vaccine*. 2008; 26(11):1411–1419. [PubMed: 18262312]
23. Centers for Disease Control and Prevention (CDC). Progress in hepatitis B prevention through universal infant vaccination—China, 1997–2006. *MMWR Morbidity and Mortality Weekly Report*. 2007; 56(18):441–445. [PubMed: 17495790]
24. Chen L, Juon HS, Lee S. Acculturation and BMI among Chinese, Korean and Vietnamese adults. *Journal of Community Health*. 2011; 10.1007/s10900-011-9476-1
25. Taylor VM, Seng P, Acorda E, Sawn L, Li L. Hepatitis B knowledge and practices among Cambodian immigrants. *Journal of Cancer Education*. 2009; 24(2):100–104. [PubMed: 19431024]
26. Taylor VM, Jackson JC, Pineda M, Pham P, Fischer M, Yasui Y. Hepatitis B knowledge among Vietnamese immigrants: Implications for prevention of hepatocellular carcinoma. *Journal of Cancer Education*. 2000; 15(1):51–55. [PubMed: 10730805]
27. StataCorp. *Stata Statistical Software*. 2009 Release 11, 2009.
28. Cohen C, Holmberg SD, McMahon BJ, Block JM, Brosgart CL, Gish RG, et al. Is chronic hepatitis B being undertreated in the United States? *Journal of Viral Hepatitis*. 2011; 18(6):377–383. [PubMed: 21143343]
29. Lai AC, Salili F. Stress in parents whose children are hepatitis B virus (HBV) carriers: a comparison of three groups in Guangzhou, China. *Child: Care, Health and Development*. 1996; 22(6):381–396.
30. Juan, S. [Accessed 5/11, 2011] Hepatitis B tests for jobs set to stop. 2009. Available at: http://www.chinadaily.com.cn/china/2009-12/30/content_9244044.htm
31. Juan, S. [Accessed 5/11, 2011] Stop screening would-be workers. 2011. Available at: http://www.chinadaily.com.cn/china/2011-02/14/content_11998999.htm
32. Lesmana L, Leung N, Mahachai V, Phiet P, Suh D, Yao G, et al. Hepatitis B: Overview of the burden of disease in the Asia-Pacific region. *Liver International*. 2006; 26:3–10. [PubMed: 17051681]
33. Chen JY, Swonger S, Kominski G, Liu H, Lee JE, Diamant A. Cost-effectiveness of insuring the uninsured: The case of Korean American children. *Medical Decision Making*. 2009; 29(1):51–60. [PubMed: 19129157]
34. Daley MF, Hennessey KA, Weinbaum CM, Stokley S, Hurley LP, Crane LA, et al. Physician practices regarding adult hepatitis B vaccination: A national survey. *American Journal of Prevention and Medicine*. 2009; 36(6):491–496.

Key Messages

- This study used a sample of adult Chinese, Korean, and Vietnamese Americans recruited in Maryland and found that education, knowledge of HBV, and physician recommendations were consistently associated with screening and vaccination behaviors. We should continue the effort to improve HBV knowledge among immigrants and encourage physician practices to recommend screening for high-risk groups.
- Prevalence and factors for HBV screening and vaccination behaviors differ among each ethnic group.
- Being a newer immigrant is associated with higher screening behaviors compared to those who have lived in the US for more than a quarter of the lifetime. This may contribute to the variation of when HBV vaccinations were introduced in each country.

Table 1
Prevalence of self-reported HBV screenings and vaccinations among Chinese, Korean and Vietnamese Americans in Maryland (N = 877)

	All		Chinese		Korean		Vietnamese		² P-value	
	N (%)	Total	N (%)	Total	N (%)	Total	N (%)	Total		
Screening	409 (46.6)	877	165 (54.5)	303	134 (45.6)	294	110 (39.3)	280	14.72	0.005
Screening result										
Infected	50 (12.2)	409	9 (5.5)	165	24 (17.9)	134	17 (15.5)	110	29.33	<0.001
Not Infected	317 (77.5)		150 (90.9)		89 (66.4)		78 (70.9)			
Don't know	42 (10.3)		6 (3.6)		21 (15.7)		15 (13.6)			
Vaccination										
Vaccinated ^a	313 (37.9)	827	134 (45.6)	294	99 (36.7)	270	80 (30.4)	263	21.24	<0.001
Completed 3 shots ^b	155 (49.5)	313	65 (48.5)	134	43 (43.4)	99	47 (58.8)	80	7.94	0.242

^aPercentage was based on those who were not infected

^bPercentage was based on those received vaccination

Table 2
Characteristics of study participants and bivariate analysis for self-reported HBV screening and vaccination behaviors by sample characteristics (N = 877)

	Total N (%)	Screening (N = 875)		2/1 test N (%)	Vaccination (N = 819)		2/1 test N (%)
		Screened N (%)	Not screened N (%)		Vaccinated N (%)	Not vaccinated N (%)	
N	877	409	466	506	313		
Sociodemographics							
Female	513 (58.5%)	226 (55.3%)	287 (61.6%)	6.42*	183 (58.5%)	301 (59.5%)	0.12
Age >=35	681 (77.8%)	321 (78.5%)	360 (77.3%)	0.19	210 (67.1%)	421 (83.2%)	28.37**
College educated or higher	558 (63.6%)	298 (72.9%)	259 (55.6%)	28.27**	250 (79.9%)	273 (54.0%)	58.5**
>25% lifetime in US	534 (61.1%)	217 (53.1%)	317 (68.2%)	20.92**	173 (55.3%)	324 (64.2%)	6.40*
Patient-related barriers							
Knowledge of HBV (0-10)	4.55 (2.5)	5.21 (2.3)	3.98 (2.5)	-7.54**	5.40 (2.2)	3.99 (2.5)	-8.24**
Provider-related barriers							
Doctor recommendation	174 (19.8%)	139 (34.0%)	34 (7.3%)	99.00**	86 (27.5%)	61 (12.1%)	31.64**
Resource-related barriers							
Have health insurance	581 (66.3%)	291 (71.2%)	288 (61.8%)	9.53**	236 (75.4%)	305 (60.3%)	20.03**
Have a regular physician	514 (58.6%)	262 (64.1%)	250 (53.7%)	12.58*	196 (62.6%)	274 (54.2%)	9.11†
Familial factors							
Family history of HBV	126 (14.4%)	82 (20.1%)	43 (9.2%)	25.11**	54 (17.3%)	51 (10.1%)	10.63*
Family/friend recommendation	215 (24.5%)	159 (38.9%)	55 (11.8%)	88.72**	102 (32.6%)	81 (16.0%)	32.63**

† $p < 0.1$,

* $p < 0.05$,

** $p < 0.01$

Table 3
Multivariate-odds ratios for self-reported HBV screening and vaccination behaviors using the total sample

	Screening		Vaccination	
	N = 866		N = 810	
	OR	95% CI	OR	95% CI
Group (Chinese-2 vs. Korean-1)	0.95	0.65–1.40	1.04	0.70–1.55
Group (Vietnamese-3 vs. Korean-1)	0.52	0.34–0.79	0.53	0.34–0.82
Sociodemographics				
Female	0.75	0.54–1.04	1.10	0.79–1.53
Age ≥35	1.35	0.90–2.04	0.44	0.29–0.66
College educated or higher	1.95	1.34–2.84	2.21	1.50–3.27
>25% lifetime in US	0.39	0.28–0.55	0.62	0.44–0.88
Patient-related barriers				
Knowledge of HBV (H:10, L:1)	1.18	1.10–1.26	1.20	1.12–1.29
Provider-related barriers				
Physician recommendation	4.61	2.81–7.54	2.09	1.30–3.37
Resource-related barriers				
Have health insurance	1.13	0.76–1.67	1.43	0.95–2.14
Have a regular physician	1.61	1.10–2.35	1.33	0.90–1.98
Familial factors				
Family history of HBV	0.96	0.59–1.58	0.99	0.60–1.62
Family/friend recommendation	3.03	1.96–4.69	2.01	1.28–3.15

N = 866 for screening,

N = 810 for vaccination

Table 4
Multivariate-adjusted odds ratios for self-reported HBV screening behaviors for ethnic-specific analysis

	Chinese		Korean		Vietnamese	
	OR	95% CI	OR	95% CI	OR	95% CI
Sociodemographics						
Female	0.93	0.54–1.61	0.67	0.38–1.18	0.68	0.37–1.25
Age >=35	1.24	0.54–2.85	1.21	0.61–2.39	1.46	0.72–2.99
College educated or higher	2.87	1.30–6.31	1.23	0.68–2.22	2.40	1.14–5.08
>25% lifetime in US	0.40	0.22–0.71	0.34	0.19–0.62	0.37	0.18–0.76
Patient-related barriers						
Knowledge of HBV (H:10, L:1)	1.24	1.10–1.40	1.17	1.04–1.31	1.10	0.97–1.25
Provider-related barriers						
Physician recommendation	5.07	1.89–13.58	3.81	1.40–10.40	5.28	2.52–11.07
Resource-related barriers						
Have health insurance	1.53	0.66–3.56	0.99	0.54–1.80	0.92	0.46–1.87
Have a regular physician	1.19	0.59–2.41	1.42	0.74–2.71	2.35	1.19–4.63
Familial factors						
Family history of HBV	0.96	0.39–2.32	0.88	0.38–2.06	1.10	0.46–2.63
Family/friend recommendation	2.11	0.84–5.28	5.14	2.29–11.55	2.85	1.46–5.58

N = 301 for Chinese,

N = 293 for Korean,

N = 272 for Vietnamese

Table 5
Multivariate-adjusted odds ratios for HBV vaccination behaviors for ethnic-specific analysis

	Chinese		Korean		Vietnamese	
	N = 287		N = 269		N = 254	
	OR	95% CI	OR	95% CI	OR	95% CI
Sociodemographics						
Female	1.32	0.76–2.31	0.88	0.49–1.60	1.07	0.57–2.01
Age >=35	0.22	0.09–0.57	0.59	0.30–1.16	0.39	0.20–0.78
College educated or higher	2.74	1.18–6.36	2.59	1.35–4.96	1.69	0.81–3.54
>25% lifetime in US	0.80	0.45–1.42	0.48	0.26–0.89	0.64	0.30–1.34
Patient-related barriers						
Knowledge of HBV (H:10, L:1)	1.32	1.16–1.49	1.12	0.99–1.27	1.17	1.03–1.32
Provider-related barriers						
Physician recommendation	1.67	0.70–3.99	4.46	1.62–12.25	1.62	0.73–3.57
Resource-related barriers						
Have health insurance	1.37	0.57–3.29	0.91	0.48–1.73	2.66	1.21–5.83
Have a regular physician	1.31	0.64–2.66	2.11	1.05–4.22	0.92	0.45–1.87
Familial factors						
Family history of HBV	0.41	0.16–1.03	1.03	0.44–2.39	2.32	0.97–5.56
Family/friend recommendation	3.23	1.28–8.12	1.48	0.64–3.39	1.78	0.86–3.69

N = 287 for Chinese,

N = 269 for Korean,

N = 254 for Vietnamese