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## Hepatitis B screening compliance and non-compliance among Chinese, Koreans, Vietnamese and Cambodians

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### Abstract

**Objective:** The purpose of this community-based study was to determine factors associated with hepatitis B virus (HBV) screening compliance and non-compliance among Chinese, Korean, Vietnamese and Cambodian adults with varying levels of English language proficiency.

**Methods:** A cross-sectional design was used consisting of a sample of 1,603 Asian adult men and women.

**Results:** Overall, 71.4% of the sample reported having never been screened and 28.6% reported being screened for HBV. Demographic, acculturation, and barrier factors were differentially associated with screening rates among the subgroups. Demographic factors associated with never-screened were: lower education, younger age, being male, and no insurance for Chinese; lower education, lower income and no insurance for Cambodians; younger age and unmarried for Koreans; and no health insurance for Vietnamese; Acculturation factors associated with never-screened were: not speaking English for Chinese; not speaking English, not reading newspapers in English, and watching TV in one's native language for Cambodians; not speaking English for Koreans; while no significant factors were found for Vietnamese. All barriers were associated with never-screened for Cambodians and Chinese. Those who lacked knowledge about HBV and had

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Disclosures

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language and transportation barrier were more likely to be never-screened for Koreans. There were no significant relationships between the barriers and the screening status for Vietnamese.

**Conclusions:** High incidence of HBV and liver cancer in Asian Americans mandates a more vigorous and more culturally and linguistically appropriate educational effort to increase screening and vaccination for HBV in these underserved and mostly uninsured populations.

### Keywords

hepatitis B screening; correlates of hepatitis B screening; Vietnamese; Korean; Chinese; Cambodian

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An estimated 1.25 million Americans are chronically infected with the hepatitis B virus (HBV), about 130,000 will become infected each year,<sup>1,2</sup> and of those infected, 5,000 will die from HBV-related liver complications each year.

HBV infection is the third most common cause of cancer death among Asians.<sup>3</sup> One in 10 Asians is infected with HBV, and the earlier an individual is infected, the greater the chances are that he or she will become a chronic carrier.<sup>4-6</sup> Asians tend to be at greater risk for liver cancer death because the prevalence rate of HBV is higher among Asians who are already infected. Individuals can contract HBV through contact with blood, unprotected sex, shared needles, and from an infected mother; most Asians contract HBV as newborns from an infected mother. Infected young children are more likely to develop chronic infections; hence the high incidence and prevalence of HBV and liver cancer in Asian populations.<sup>7</sup> There are differences in both incidence of HBV and prevalence of chronic HBV/liver cancer among Asian Americans. These may be attributed to varying screening rates for HBV and cancer among the ethnic subgroups.<sup>8</sup>

Epidemiologic data show rates for HBV-related liver cancer among male Chinese Americans that are six times higher than rates for Caucasians.<sup>9,10</sup> Chronic HBV infection rates among adult Vietnamese Americans range between 7% and 14%.<sup>11</sup> Lack of knowledge about HBV among large subsets of Asian populations is a major barrier to screening and early intervention. A study of Chinese Americans by Thompson and colleagues found that only 46% of study respondents knew that HBV can cause liver cancer, and 35% reported that they had been screened for HBV.<sup>12</sup> Another study focused on Chinese immigrants found that 48% had been screened for HBV.<sup>13</sup> Studies focused on Southeast Asians also reveal low screening rates even though these populations have one of the highest rates of liver cancer among U.S. ethnic populations. A survey of Cambodian women in Seattle, Washington, showed that only 38% of these women had been screened for HBV.<sup>14</sup> A more recent study of Vietnamese adults in Pennsylvania and New Jersey reported that only 8.8% of study participants had been screened for HBV.<sup>15</sup>

Taylor and colleagues and Thompson and colleagues found an association between education level, gender, English fluency, and household income and HBV knowledge and previous HBV testing.<sup>16,17</sup> Other studies found that cultural factors, such as respect for authority and elders, karma, males as decision-makers, saving face (i.e. maintaining a good self image), “yin/yang” (an Asian philosophy that describes how seemingly disjunct or

opposing forces are interconnected and interdependent in the natural world, giving rise to each other in turn), and “qi” (frequently translated as “energy flow”) affect HBV screening behavior.<sup>18–23</sup> These studies have shown that individuals infected with HBV may not inform family members of their illness. Another finding among these populations is a belief in the inappropriateness of talking about the illness because it might happen to those who talk about it (karma). Further, these studies revealed that decisions about HBV screening and vaccination are relegated to and decided upon by adult male family members (husband or eldest son). While Asians may not outwardly disagree with physicians’ recommendations, they show their disagreement by ignoring physicians’ recommendations or prescriptions. Adherence to yin/yang, or balance and harmony in life, is a common practice among Asians experiencing a health crisis; it is achieved through proper diet, acupuncture or exercise, or herbal medications. Acculturated Asians often use a combination of traditional and Western medicine.<sup>24–26</sup> These practices color response patterns to HBV screening, and therefore affect HBV rates.

The purpose of this community-based study was to determine demographic and acculturation risk factors associated with Asian American HBV screening compliance and non-compliance among a sample of Chinese, Korean, Vietnamese, and Cambodian men and women, 18 years and older, populations which are often not included in national surveys.

## Methods

### Sample

A sample of Chinese, Korean, Vietnamese, and Cambodian people was randomly selected from current members of 111 Asian American community organizations in the greater Philadelphia area, New Jersey, and New York City. These community-based organizations included Asian social, religious, and human service organizations such as churches, immigrant service organizations and Asian associations. Most of these organizations are partners of the Center for Asian Health at Temple University and the Asian Community Cancer Coalition network, located in geographic areas which maximized the coverage of Asian Americans across ethnicity, age, and socioeconomic status. Asian community organizations (N = 52) were randomly selected as clusters from the list of 111 organizations. The selected organizations were stratified based on the four racial/ethnic and language groups. An allocation procedure of assigning the sample size proportionally to the subgroups’ size was used.<sup>27</sup> Of the 2,098 participants who were eligible and agreed to participate in the study, 2,011 completed the study for a response rate of 95.9%. The ethnic distribution of the sample included: Chinese, 45.9% (N = 925); Korean, 19.1% (N = 384), Vietnamese, 18.1 (N = 362), and Cambodian, 16.9% (N = 340). The Cambodian group was over-sampled to ensure that data from this group were adequately represented. The data collection protocol was approved by the Temple University Institutional Review Board (IRB).

For the purpose of this study, only men and women aged 18 or older (N = 1,603) who completed the HBV measurements were included in the analysis for this article. The sample size was determined by a statistical power analysis. The study used a chi-square statistical test and the sample size was calculated by using GPOWER, an a priori power analysis

software program.<sup>28</sup> By convention, a power of .85 was chosen, which resulted in a minimum sample size of 160 per ethnic group for statistical tests. The subgroup breakdown showed that each ethnic group met this criterion, thus achieving a minimum power of 85%.

## Design and Data Collection Procedures

A cross-sectional research design was used in the study because of the common advantages provided by this method, such as collecting information from many and diverse participants.<sup>27,29–31</sup> A stratified-cluster proportional sampling technique was adapted for the investigation.<sup>31</sup> Leaders of the randomly selected organization were engaged in the process of recruitment and data collection in addition to the development of and finalization of the study content and instrument. Data collection occurred between June 2005 and October 2006 at the facility sites of sampled organizations. Data collection administration training was provided to all survey administrators and accompanying bilingual translators.

Participants were informed of the voluntary nature, purpose and procedures of the study. Those eligible participants who provided written consent participated in the study. The survey was administrated using a one-on-one instruction method. The research team, assisted by organization leaders, administered the survey. Instructions were provided verbally and in writing, and language assistance was available at all times during the assessment. Participants had the option of responding to the questionnaire in English or in their native languages.

## Measurements

A 95-item, multi-lingual questionnaire was developed. The instrument was back-translated and pilot-tested for reliability and validity. The instrument was also field-tested for the cultural appropriateness of its format, content validity, the level of difficulty, and length of administration time. Face and content validity of the questionnaire were tested with 37 Asian American adults who did not participate in the study. The test-retest method was used to establish reliability. The reliability coefficients were high, indicating that, overall, participants responded consistently to questionnaire items. The following test-retest correlation coefficients were obtained: HBV screening (0.85); reasons for getting liver cancer screening (0.54); barriers to getting liver cancer screening (lack of knowledge (0.46), feel well (0.81), language (0.69), no regular doctor (0.46), no time (0.66), no place to get it (1.0), no transportation (0.60), no insurance (1.0), insurance does not cover (0.79), fear of bad test (0.69), and embarrassment or shame (0.69)); items related to family history, getting free screenings and discussing with the family (0.87), and demographics (year born (0.98), gender (1.0), born in the U.S. (1.0), years lived in the U.S. (1.0), degree of education (0.97), employment (0.81), covered by insurance (1.0), level of English (0.87), watch TV in English (1.0), and income level (0.85)).

## Data Analysis

The variables associated with HBV screening fell under three broad headings: demographics, acculturation, and barriers. The association between demographic and

acculturation variables and screening was examined through contingency tables and the chi-square test. The measure of the association between barrier variables and screening status were odds ratios (OR) and associated 95% confidence intervals (CI), which were calculated using logistic regression modeling. All statistical analyses were performed using the Statistical Analysis System (SAS v 9.2). We tested the significance with a p value of less than 0.05.

## Results

The final sample consisted of 1,603 men and women aged 18 or older who completed the HBV screening status survey. Of these, 71.43% (N = 1,145) reported never-screened and 28.57% (N = 458) reported screened. The sample involved four ethnic groups, with the largest proportion being Chinese (44.79%), followed by Vietnamese (19.03%), Cambodians (18.15%), and Koreans (18.03%). These proportions reflected ethnicity proportions in the sampling area with the exception of Cambodians, who were over-sampled. The following section describes demographic, acculturation, and barrier category results.

### Demographic factors associated with HBV screening status

Table 1 presents HBV screening status and demographic factors for each of the four Asian-American groups. The significant chi-square results are indicated in the table.

**Cambodian**—Education was significantly related to screening status,  $\chi^2(1) = 21.41, p < 0.01$ . For Cambodians with less than a high school education, 92.73% reported never-screened compared to 64.29% with high school or higher education who reported never-screened. Screening status was also associated with annual household income,  $\chi^2(2) = 70.79, p < 0.01$ . Of participants who had annual household incomes of less than \$10,000 and \$10,000–\$30,000, 94.56% and 94.55% respectively reported never-screened, compared to 29.41% of respondents with annual household incomes of more than \$30,000 reporting never-screened. Screening status was significantly related to health insurance,  $\chi^2(1) = 27.05, p < 0.01$ . Of those without current health insurance, 93.26% reported never-screened compared with 83.19% of those with health insurance reporting never-screened. Age, gender, marital status, and employment status were not significantly related to HBV/liver cancer screening status,  $p > 0.05$ .

**Vietnamese**—Current health insurance status was significantly related to screening status,  $\chi^2(1) = 4.54, p < 0.05$ . Of those without health insurance, 90.38% reported never-screened compared to 77.29% of those with health insurance reporting never-screened. Age, gender, marital status, education, employment status, and annual household income were not significantly related to screening status.

**Koreans**—Age was significantly related to screening status,  $\chi^2(2) = 7.71, p < 0.05$ . Younger respondents (18–39 years old) were more likely to be never-screened (77.27%) than those in the 40–64 group (61.15%) and 65 + group (68.18%). Marital status was significantly related to screening status,  $\chi^2(1) = 10.77, p < 0.01$ . More unmarried than married participants reported never-screened (81.71% vs. 61.58%). Gender, education,

employment status, annual household income, and current health insurance status were not significantly related to screening status.

**Chinese**—Age was significantly related to screening status,  $\chi^2(1) = 6.10, p < 0.05$ . Younger participants (18–39 years old) were more likely to be never-screened (69.78%) than those in the 40–64 group (59.41%) and 65+ group (60.00%). Gender was significantly related to screening status,  $\chi^2(1) = 10.48, p < 0.01$ . Among males, 69.20% reported never-screened compared with 57.24% of females. Education was significantly related to screening status,  $\chi^2(1) = 18.78, p < 0.01$ . Of those with less than a high school education, 76.44% reported never-screened compared to 58.06% with high school or higher education who reported never-screened. Screening status was significantly related to health insurance,  $\chi^2(1) = 44.13, p < 0.01$ . Of those without current health insurance, 79.17% reported never-screened compared with 53.62% of those with health insurance reporting never-screened. Marital status, employment status and annual household income were not significantly related to screening status.

### Acculturation factors associated with hBV screening status

Table 2 presents hepatitis B screening status and acculturation factors for each of the four Asian-American groups.

**Cambodian**—How well English is spoken was significantly related to screening status,  $\chi^2(2) = 57.95, p < 0.01$ . Of those who did not speak English at all, 97.66% reported never-screened, and 62.8% of those who did not speak English well reported never-screened, while 74.19% of those who spoke English well or very well reported never-screened. Those who watched TV in their native language were significantly more likely to be never-screened than those watching TV in English (92.09% vs. 27.27%),  $\chi^2(1) = 47.78, p < 0.01$ . Those who did not read a newspaper were more likely to report never-screened (97.25%) than those who read a newspaper in English (66.67%) or read a newspaper in their native language (76.77%),  $\chi^2(2) = 32.17, p < 0.01$ . Years of living in the U.S. was not significantly related to screening status.

**Vietnamese**—No acculturation variables were significantly related to screening status. Those who did not read a newspaper were more likely to report never-screened (91.18%) than those who read a newspaper in English (74.19%) or read a newspaper in their native language (78.30%).

**Koreans**—How well English is spoken was significantly related to screening status,  $\chi^2(2) = 9.15, p < 0.01$ . Of those who did not speak English at all, 82.35% reported never-screened, and 60.84% of those who did not speak English well reported never-screened, while 75.29% of those who spoke English well or very well reported never-screened. Those who did not read a newspaper were more likely to report never-screened (89.36%) than those who read a newspaper in their native language (74.19%) or read a newspaper in English (61.54%),  $\chi^2(2) = 14.24, p < 0.01$ .



**Chinese**—How well English is spoken was significantly related to screening status,  $\chi^2(2) = 14.65, p < 0.01$ . Of those who did not speak English at all, 73.96% reported never-screened, followed by 61.32% of those who did not speak English well, compared with 55.31% of those who spoke English well or very well who reported never-screened. No other acculturation variables were significant.

### Barrier factors associated with HBV screening status

Table 3 presents the associations between barrier variables and HBV screening status, indicating unadjusted odds ratios (OR) and 95% CIs for each ethnicity.

**Cambodian**—All barrier variables were significantly related to screening status. As the reported knowledge, psychosocial factors, language, and transportation barriers increased, the odds were significantly higher for Cambodians to be never-screened. The OR for psychosocial factors was unusually large (34.56) and the 95% CIs were wide (3.44–346.84). This was likely due to the large variations in psychosocial variables for the Cambodian sample. Thus, the reader should use caution when interpreting this result. The insurance barrier and time barriers were related to screening in an unexpected direction. As these two barriers increased, the odds were smaller for reporting never-screened.

**Vietnamese**—None of the barrier variables was significantly related to screening status.

**Koreans**—As the reported knowledge barrier increased, the odds were significantly higher for Koreans to be never-screened compared with being screened (OR = 2.49, 95% CI 1.08–5.72). As the reported language and transportation barrier increased by 1 point, the odds were 3-fold higher to be never-screened. No other barriers were significantly related to screening status.

**Chinese**—All barrier variables were significantly related to screening status. As the reported knowledge, insurance, language, transportation, and time barriers increased, the odds were significantly higher for Chinese respondents to be never-screened. However, the relationship between psychosocial barriers and screening was in the reverse direction, i.e. as the degree of barrier increased, the chances of being never-screened were smaller (OR = 0.45, 95% CI 0.21–0.95).

## Discussion

The purpose of this community-based study was to determine demographic and acculturation risk factors associated with Asian American HBV screening compliance and non-compliance among Chinese, Korean, Vietnamese, and Cambodian men and women 18 years and older with varying competencies in English. Our results have shown that the populations in this study comprise distinct cultural groups and generalizations beyond the ethnic groups should be guarded.

### Demographics

Education was significantly associated with being never-screened for Cambodians and Chinese. These results corroborate findings from previous studies which found that a higher

level of education was associated with increased knowledge about HBV and higher rates of screening among Cambodians and Chinese;<sup>13,14,32</sup> one study showed no association for Vietnamese, also corroborating our findings.<sup>16</sup> Low income (<\$10,000) was significantly associated with being never-screened among Cambodians only. Not having health insurance was significantly correlated with being never-screened for Cambodians, Vietnamese, and Chinese. Health coverage facilitates entry into the health system. Its absence is a major barrier to screening and follow-up.

Age was significantly correlated with being never-screened for Koreans and Chinese. Younger persons appeared less likely than older persons to never have been screened. Studies to date on the relationship between age and screening have shown inconsistent results. Taylor et al., for example, found an association between age and screening among Vietnamese, whereas our study did not.<sup>16</sup> Another study by the same author and colleagues, however, corroborated our findings that, among Cambodians, age was not significantly ( $p < 0.05$ ) associated with screening for HBV.<sup>14</sup> In two other studies, Taylor and colleagues, found that among Chinese, age was not associated with screening.<sup>13,32</sup>

Marital status was significantly correlated with being never-screened for Koreans; a finding that is at variance with other studies.<sup>13</sup> Our findings revealed that those who were unmarried were more likely to be never-screened for HBV. Because of the association between HBV and sexual activity, a culturally-driven response of never-screened would be more acceptable to some Asians, whereas being married may provide some immunity against this cultural belief. For instance, sexuality is acceptable in marriage; therefore there is an acceptance of screening for HBV. Gender, especially among Chinese, was significantly associated with being never-screened. The finding that males are more likely to be screened than females, however, indicates a slight cultural bias in perceptions of sexuality.

Our findings clearly showed that demographics in the four Asian ethnic groups we studied were differentially associated with screening.

### **Acculturation**

How well a person spoke English was significantly associated with HBV screening for Chinese, Koreans, and Cambodians, but not Vietnamese. Participants who were not fluent in English were significantly more likely to be never-screened than those who are fluent in English, corroborating other studies.<sup>34</sup> Taylor and colleagues confirmed our findings that among Vietnamese men and women, English proficiency was not associated with HBV screening.<sup>16,33</sup> Similarly, though differentially among the groups, not reading a newspaper or watching TV in English was associated with being never-screened among Cambodians and Koreans but not among Chinese and Vietnamese. Generally, the less acculturated the Asians in our study were, the more likely they were to be never-screened and noncompliant with current guidelines. Chen and colleagues have noted that cultural attitudes may influence screening, especially for functions of the liver.<sup>34</sup> The liver preserves “qi” or internal energy, and therefore plays an important role in Yin-Yang and, consequently, nutrition and the preservation of health. Cultural attitudes may influence the belief that screening could interfere with these functions and lead to adverse health consequences.



## Barriers

Barriers that were associated with being never-screened were lack of knowledge, psychosocial factors, no insurance, language, transportation, and time. Our findings showed that those who lacked knowledge of HBV were four times more likely to be never-screened; those with psychosocial factors, three times more likely to be never-screened; those with language and transportation difficulties about 3.5 times more likely to be never-screened; those who did not have health insurance were more likely to be never-screened; and those who lacked time, nearly six times more likely to be never-screened than those who were screened but noncompliant with current guidelines.

Although our findings reveal similarities among groups in response to barriers, there are also substantial differences in the manner in which these barriers affect screening and compliance behaviors in each group as shown in Table 3. Among Cambodians, for example, knowledge about HBV/liver cancer and language has a greater impact on screening and compliance. Time, on the other hand, appears to have less impact on screening and compliance behavior among Cambodians than among Koreans and Chinese, even though there are still differences in impact among the latter. Employment/unemployment and the type of employment can either impede or facilitate the screening process and compliance status among Koreans and Chinese. The impact of psychosocial factors on screening and compliance is even more exaggerated in the Cambodian group than in the Korean or Chinese groups, even though there are substantial, but not exaggerated, differences in impact on screening in the latter two groups. Psychosocial factors such as depression have been associated with HBV and those who experience more psychosocial stressors were more likely to be depressed.<sup>35,36</sup> Screening and compliance were associated with health insurance, but among Cambodians insurance had a lesser impact on screening and compliance than among Koreans and Chinese. This, too, may be related to employment, lack of knowledge about insurance and health benefits. Unexpectedly, however, not having insurance among Cambodians made it more likely for them to be screened.

Some of the findings in this study corroborated findings in other studies, but this study revealed the differential and significant impact of demographics and acculturation variables on screening and compliance among the various ethnic groups studied. It was a surprise to us to find that these same variables did not have a significant impact on Vietnamese, although other studies of Vietnamese have shown significant impact on screening and compliance behavior. What makes that difference is a subject for further inquiry. Our study is innovative because it was conducted in community settings, involving a wide range of lay personnel, organizations and professionals from these communities. The study had inherent limitations. Because of the nature of self-reporting, it does not allow verification of HBV screening. We assumed that there was an overestimate of the frequency of screening, meaning rates were even lower than reported. Additionally, because most community organizations do not allow access to their membership lists for confidentiality reasons, simple random sampling was difficult. The methods we employed were designed specifically to facilitate greater access to these organizations and the communities they represent and serve.

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**Table 1.**

Hepatitis B screening status by ethnicity.

	Ethnicity											
	Cambodian N = 291			Vietnamese N = 305			Korean N = 289			Chinese N = 718		
	Never screened (260)	Screened (31)	%	Never screened (243)	Screened (62)	%	Never screened (196)	Screened (93)	%	Never screened (446)	Screened (272)	%
Overall	89.4	10.7		79.7	20.3		67.8	32.2		62.1	37.9	
Age category												
18–39	80.8	19.2		85.2	14.8		*77.3	22.7		*69.8	30.2	
40–64	89.7	10.3		81.1	18.9		61.1	38.9		59.4	40.6	
65+	91.8	8.2		70.5	29.5		68.2	31.8		60.0	40.0	
Gender												
Male	87.0	13.0		78.6	21.4		71.0	29.0		**69.2	30.8	
Female	91.4	8.6		80.8	19.2		64.6	35.4		57.2	42.8	
Current marital status												
Unmarried	93.2	6.8		82.5	17.5		**81.7	18.3		65.7	34.3	
Married	87.9	12.1		78.9	21.1		61.6	38.4		61.2	38.8	
Highest degree												
<High school	**92.7	7.3		84.3	15.7		83.3	16.7		**76.4	23.6	
>High school	64.3	35.7		77.3	22.7		67.8	32.2		58.1	41.9	
Employment status												
Employed	91.7	8.3		82.3	17.7		64.9	35.1		62.5	37.5	
Unemployed	88.0	12.0		74.8	25.2		71.6	28.4		60.4	39.6	
Annual income												
<\$10,000	**94.6	5.4		73.0	27.0		71.7	28.3		64.3	35.7	
\$10,000–\$30,000	94.5	5.5		79.9	20.1		69.1	30.9		62.9	37.1	
>\$30,000	29.4	70.6		90.5	9.5		61.6	38.4		58.7	41.3	
Current health insurance												
No	**93.3	6.7		*90.4	9.6		71.8	28.2		**79.2	20.8	
Yes	83.2	16.8		77.3	22.7		62.8	37.2		53.6	46.4	

\*  
\*\*  
p < 0.05 from chi square test.  
p < 0.01 from chi square test.

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**Table 2.**

Acculturation and hepatitis B screening status by ethnicity.

	Ethnicity											
	Cambodian n = 291		Vietnamese N = 305		Korean N = 289		Chinese N = 718					
	Never screened (260)	Screened (31)	Never screened (243)	Screened (62)	Never screened (196)	Screened (93)	Never screened (446)	Screened (272)				
	%	%	%	%	%	%	%	%	%	%	%	%
Years live in the U.S.												
<15 yrs	89.6	10.4	80.9	19.1	68.5	31.5	65.0	35.0				
>15 yrs	88.9	11.1	77.5	22.5	66.3	33.7	58.6	41.4				
How well speak English												
Not at all	**97.7	2.3	81.2	18.8	**82.4	17.6	**74.0	26.0				
Not well	62.8	37.2	77.9	22.1	60.8	39.2	61.3	38.7				
Well/Very well	74.2	25.8	79.2	20.8	75.3	24.7	55.3	44.7				
Usually Watch TV in												
Native language	**92.1	7.9	79.5	20.5	67.8	32.2	61.7	38.3				
English	27.3	72.7	77.8	22.2	66.7	33.3	65.5	34.5				
Usually Read News in												
English	**66.7	33.3	74.2	25.8	**74.2	25.8	68.7	31.3				
Don't read it	97.3	2.7	91.2	8.8	89.4	10.6	66.7	33.3				
Native language	76.8	23.2	78.3	21.7	61.5	38.5	61.6	38.4				

\* p < 0.05 from chi square test.

\*\* p < 0.01 from chi square test.



**Table 3.**

Unadjusted odds ratios and 95% confidence intervals (in parenthesis) of hepatitis B screening status and barrier factors by ethnicity.

Risk factors	Cambodian N = 291		Vietnamese N = 305		Korean N = 289		Chinese N = 718	
	Never-screened (260) vs. screened (31)	Never-screened (243) vs. screened (62)	Never-screened (196) vs. screened (93)	Never-screened (446) vs. screened (272)				
Knowledge	4.69 (1.41–15.57) *	1.49 (0.71–3.14)	2.49 (1.08–5.72) *	3.29 (1.97–5.51) *				
Psychosocial	34.56 (3.44–346.82) *	0.33 (0.06–1.85)	2.67 (0.62–11.53)	0.45 (0.21–0.95) *				
Insurance	0.2 (0.04–0.94) *	1.77 (0.51–6.1)	0.99 (0.39–2.5)	3.69 (1.9–7.18) *				
Language/trans	8.27 (2.17–31.51) *	0.58 (0.24–1.37)	3.01 (1.21–7.53) *	2.59 (1.41–4.75) *				
Time	0.11 (0.02–0.51) *	1.14 (0.37–3.48)	1.25 (0.57–2.75)	5.75 (2.6–12.71) *				

\* Indicates significance at  $p < 0.05$ .