Differences in Knowledge of Hepatitis B Among Korean Immigrants in Two Cities in the Rocky Mountain Region

Hae-Ok Lee1*, RN, DNSc, Ok-Ja Lee2, RN, DNSc, Susie Kim3, RN, DNSc, FAAN, Ivy Hontz4, MA, Amy Warner5, MPH

1Associate Professor, University of Colorado at Denver and Health Sciences Center, School of Nursing, Denver, Colorado, USA
2Associate Professor, Director of Nursing, Department of Nursing Science, Konyang University Medical School, Seoul, Korea
3Professor/President, Seoul Cyber University, Seoul, Korea
4Program Manager, Asian Pacific Development Center, Aurora, Colorado, USA
5Manager of Infection Department, Colorado Department of Public Health and Environment, Denver, Colorado, USA

Purpose To assess knowledge and attitude toward hepatitis B virus (HBV) infection among Korean immigrants in two cities in the Rocky Mountain region and to determine whether sociodemographic and cultural factors are related to the level of HBV knowledge.

Methods Community-based participatory study was conducted in five Korean churches in the Rocky Mountain region to develop baseline data on HBV infection and vaccination behavior. All documents, including announcements, brochures, consent forms, and questionnaires were in Korean and English, and trained Korean interviewers collected the surveys by reviewing the questionnaires with participants at the churches.

Results Knowledge of HBV infection was low and city of residence did not have a statistically significant impact on HBV infection knowledge. In the total sample, 62% identified transmission by sharing utensils and 21% believed that HBV was hereditary, while only 21% thought that HBV was spread through sexual contact. The majority of participants (61%) rated their English level as “minimum”. Knowledge of HBV infection was found to be associated with both demographic and acculturation factors (\(p < .05\)).

Conclusion This study found not only a low level of knowledge of HBV infection but also misunderstanding of the risks of HBV infection. Knowledge of HBV infection was significantly associated with education and acculturation; therefore, culturally sensitive and group-tailored public health education for Korean and other Asian American Pacific Islanders should be developed to clarify misconceptions and misunderstandings about HBV infection. [Asian Nursing Research 2007;1(3):165–175]

Key Words Asian Americans, hepatitis B infection, knowledge, vaccination

*Correspondence to: Hae-Ok Lee, RN, DNSc, Associate Professor, University of Colorado at Denver and Health Sciences Center, School of Nursing, 4200 East Ninth Avenue Box-C288, Denver, CO 80262, USA. E-mail: haeok.lee@UCHSC.edu
INTRODUCTION

The greatest health disparity between Asian Americans and Pacific Islanders (AAPIs) and Caucasian Americans is in the incidence of liver cancer. Liver cancer rates among males are 13 times higher in Vietnamese Americans, 8 times higher in Korean Americans (KA), and 6 times higher in Chinese Americans than in Caucasian Americans (American Cancer Society, 2005; Rosenblatt, Weiss, & Schwartz, 1996; The White House Initiative, 2007). Approximately 80% of cases of liver cancer are etiologically linked with hepatitis B virus (HBV) infection, and HBV is 100 times more contagious than the human immunodeficiency virus. In the general U.S. population, the HBV infection rate is 0.1–0.2%; however, in the AAPI population, 12% of children and 3–19% of adults are infected (Alter & Mast, 1994; Centers for Disease Control and Prevention, 1997, 2006; Coleman, McQuillan, Moyer, Lambert, & Margolis, 1998; Tong & Hwang, 1994). Several surveys have reported a clustering of hepatitis B infection among immediate AAPI family members; thus, if a family member becomes infected, the rest of the family, including children, is at high risk of infection (Greenblatt & Khoo, 1985; Hurie, Mast, & Davis, 1992; Kim, Ahn, & Kim, 1994; Tong & Co, 1985).

Though the primary transmission routes of HBV in Europe and North America are through blood, unprotected sex and exposure to contaminated needles, including tattoo and body-piercing tools (Kane, 1995), transmission during birth and close daily contact with family members are the primary routes in most of Asia and Africa in which the incidence is higher than 8% (Custer et al., 2004; Sung, 1990; Tong & Co, 1985). In many Asian countries, including Korea, approximately 4–15% of the population are chronically infected with HBV (Custer et al.), and the majority of KAs (73%) were born in Korea (U.S. Department of Justice Immigration and Naturalization Service [USDJ], 2000). In the U.S., more than half of the 1.25 million chronic carriers of HBV are of Asian descent (Centers for Disease Control and Prevention, 2006) even though Asian Americans comprise only 4% of the U.S. population; this is a serious health disparity.

However, we have little information about KAs’ and other AAPIs’ knowledge and attitude toward hepatitis B infection and vaccination (Choe et al., 2005; Hsu et al., 2007) and as a result, it is difficult to develop an effective hepatitis B prevention program for AAPIs. Moreover, it is commonly thought among KAs that sharing spoons or bowls or that hereditary factors are a major cause, but there are no data to confirm this misunderstanding. Therefore, AAPI-tailored education on prevention of HBV infection and vaccination is imperative to prevent liver cancer; however, this education should be developed based on an understanding of AAPIs’ knowledge and attitudes toward HBV infection and vaccination.

Sociodemographics and acculturation are two factors believed to be related to knowledge of HBV infection and vaccination (Hsu et al., 2007; Taylor, Jackson, Chan, Kuniyuki, & Yasui, 2002; Wiecha, 1999). A number of studies of immigrants have looked at the role of acculturation in health knowledge and health behaviors (Gomez, Kelsey, Glaser, Lee, & Sidney, 2004; Juon, Kim, Shankar, & Han, 2004; Landrine & Klanoff, 2004; Ma et al., 2004). However, the findings have not been consistent. Some studies have reported a positive relationship between acculturation and health behaviors (Juon et al.), while other studies have not found a relationship between the level of acculturation and health behaviors among Asian immigrants and their offspring (Landrine & Klanoff; Ma et al.). There is currently no published information on the relationship between acculturation and HBV infection among KAs. In addition, AAPI issues and research continue to be centered on the coasts, primarily in California and New York. Therefore, this study explored the knowledge and attitude toward HBV and vaccination among KAs in two cities in the Rocky Mountain region and whether sociodemographic and cultural factors are related to the level of HBV knowledge. Consequently, this study hopes to add unique information regarding knowledge and attitude about HBV infection among AAPIs in less dense AAPI regions in the U.S.
METHODS

This study used a church-based, culturally tailored survey administered in collaboration with the KA community of two cities (City A and City B) in the Rocky Mountain region, where there is a small but growing population of AAPIs. The community-based participatory study for KAs was developed in partnership with five Korean American churches. A convenience sampling method was used and a total of 298 KA households participated in the survey, which was administered before and after worship on Saturday and Sunday.

Sociodemographics and acculturation
The participant(s) representing each household reported each family member’s age, sex, marital status, education, occupation, health insurance, and household income. The level of acculturation was measured with six items including self-report of birth place, length of stay in the U.S., language used at home and work, proficiency in speaking English, types of food eaten the previous night, ethnicity of the spouse, and city where the respondents resided. The items used to measure acculturation were selected from a literature review as being shown to be related to health-related variables in AAPIs and other immigrants (Gomez et al., 2004; Kim, Ashing-Giwa, Singer, & Tejero, 2006; Salant & Lauderdale, 2003) as well as those recommended by the advisory council. Hence, the measurement of acculturation provides face and content validity based on a review of the literature and experts in Korean American culture.

Knowledge of HBV infection and attitude towards vaccination
The instrument to measure knowledge of HBV and attitude toward HBV vaccination was developed by modifying several existing survey tools testing knowledge of HBV and vaccination. The Knowledge About Hepatitis B Infection questionnaire consisted of 7 items that can be answered with yes, no, or do not know. Sample questions are listed in Table 1. As shown in the table, items 4 and 7 were added in the study of City B after reviewing the data from City A with advisory council members because “HBV transmission during birth” is a primary route of HBV infection in most AAPIs who were not born in the U.S. The item about HBV causing liver cancer was added because the ultimate purpose of this study of prevention of HBV infection is to prevent liver cancer.

The Attitude Toward Vaccination questionnaire was designed to assess attitude toward the HBV vaccine, including knowledge and acceptance of vaccination, and perceived barriers to vaccination. It consisted of 6 items that can be answered with yes, no, or do not know. Sample items are also listed in Table 1. The instrument was content validated by reference to health literature on HBV infection and vaccination in the Asian-specific population (Taylor et al., 2002; Wiecha, 1999). In addition, the survey instrument was reviewed and modified by Korean American health care professionals to improve its clarity, and address common misunderstandings about the sources of HBV infection such as genetics or shared utensils.

Procedure and measures
Support from the pastors of the churches in which the study was conducted and institutional review board approval were obtained. We invited both men and woman who felt comfortable with answering the health survey questions to participate. If both members of a couple participated in the survey, the couples collaboratively responded to the study instruments after signing the informed consent form. All documents, including announcements, informed consent, Health Insurance Portability and Accountability Form B, and survey instruments were available in Korean and English. However, all participants except two preferred Korean to English. At the churches, trained bilingual and bicultural interviewers collected the survey questionnaires, reviewing the questionnaires with the participants. Also, as a standardized procedure, verbal offers to read the survey were provided to all subjects.

Data analysis
All statistical analyses were performed using SPSS version 15 (SPSS Inc., Chicago, IL, USA). The alpha level was set at .05 to determine statistical significance.
Descriptive statistics were computed for all variables for the full sample, as well as for City A and City B, and their distributions were checked via histogram and tests for symmetry and normality. Chi-square was calculated to test for significant differences between the two cities. To examine the relationship between demographic and acculturation characteristics and knowledge of HBV infection, binary logistic regression analysis was performed using forced method entry. Odds ratios (ORs) and 95% confidence intervals (CIs) were generated for all variables in the model, including age, education, length of stay in the U.S., English level, food, and city of residence, which were entered as predictors of knowledge of HBV infection. Among the six items of HBV infection knowledge, three (heredity, STD, sharing utensils), which are considered important issues in HBV knowledge among KAs, were taken as dependent variables.

**RESULTS**

**Sociodemographics and acculturation**

Eighteen household reports were not included in the final data analysis because of a high rate of missing
data; therefore, the report of this study is based on a total of 280 household surveys. Of these, 109 were from City A and 171 were from City B. Characteristics of the subjects are presented in Table 2. The mean age of respondents was 49 years, and the majority were women (66%). In the total sample and in both groups, the majority were married (80%) and employed (72%). There were significantly more women and more people not married to a Korean in City A ($p < .01$). In both groups, 43% had no health insurance.

Table 3 presents Pearson’s $\chi^2$ test results for the acculturation variables and the two cities. All but 5 of the 280 participants were born in Korea. Only 28% from City A and 32% from City B described their English as fluent. Although the majority from both cities reported that the primary language at work was English (City A: 63%; City B: 62%), their primary language at home was Korean (City A: 45%; City B: 74%), while about a quarter used both languages at home. Surprisingly, the majority of both groups reported that they had had a Korean dinner the previous night.

The results of the Knowledge About Hepatitis B Infection and Attitude Toward Vaccination questionnaires are presented in Table 1. City of residence did not have a significant impact on knowledge of HBV infection; however, people in City B were more informed about the need and access to vaccinations.
Only 21% correctly said that HBV is a STD. The majority (62%) believed that HBV is transmitted by sharing spoons and bowls for food. The most worrisome finding of this study was that 21% wrongly believed that HBV is hereditary. The findings indicated not only a paucity of knowledge concerning risk factors for HBV infection, but also a misunderstanding of the sources of HBV infection. Surprisingly, only 6% of participants reported that a physician had recommended HBV vaccination for themselves and their children.

The results of the model assessing the odds of knowledge of HBV infection in relation to demographic and acculturation factors are presented in Table 4. Participants with a middle school education were 85% more likely to have the belief that heredity was a route of HBV infection (OR, 0.15; 95% CI, 0.04 to 0.53). Participants who reported having an ethnic dinner were 77% more likely to have this misunderstanding (OR, 0.23; 95% CI, 0.08 to 0.65). For each year lived in the U.S., the odds of a participant thinking that sharing utensils was a source of HBV increased 5% (OR, 0.105; 95% CI, 1.02 to 1.09). Participants in City A, however, were 49% less likely to report that sharing utensils was a transmission route of HBV.

### Table 3

**Comparison Between Two Cities: Acculturation Characteristics of the 280 Households**

<table>
<thead>
<tr>
<th></th>
<th>City A (n = 109)</th>
<th>City B (n = 171)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country of origin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.</td>
<td>0 (0%)</td>
<td>2 (1%)</td>
<td>1.3</td>
<td>.52</td>
</tr>
<tr>
<td>Korea</td>
<td>108 (99%)</td>
<td>167 (98%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (1%)</td>
<td>2 (1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years in the U.S.</td>
<td>18.7 (11.2)</td>
<td>18.4 (10.2)</td>
<td>*</td>
<td>.71</td>
</tr>
<tr>
<td>English fluency</td>
<td></td>
<td></td>
<td>2.9</td>
<td>.58</td>
</tr>
<tr>
<td>Fluent</td>
<td>28 (28%)</td>
<td>53 (32%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A little</td>
<td>67 (66%)</td>
<td>101 (61%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None at all</td>
<td>3 (3%)</td>
<td>8 (5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary language used at home</td>
<td></td>
<td></td>
<td>39.6</td>
<td>.00</td>
</tr>
<tr>
<td>Korean</td>
<td>47 (45%)</td>
<td>124 (74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>28 (27%)</td>
<td>5 (3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A combination</td>
<td>30 (29%)</td>
<td>38 (23%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary language used at work</td>
<td></td>
<td></td>
<td>5.8</td>
<td>.22</td>
</tr>
<tr>
<td>Korean</td>
<td>6 (7%)</td>
<td>17 (12%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>56 (63%)</td>
<td>90 (62%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A combination</td>
<td>23 (26%)</td>
<td>36 (25%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of dinner the previous night</td>
<td></td>
<td></td>
<td>5.9</td>
<td>.32</td>
</tr>
<tr>
<td>Korean</td>
<td>72 (69%)</td>
<td>122 (74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American</td>
<td>12 (12%)</td>
<td>12 (7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A combination</td>
<td>19 (18%)</td>
<td>23 (14%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td></td>
<td></td>
<td>61.9</td>
<td>.00</td>
</tr>
<tr>
<td>Korean</td>
<td>57 (56%)</td>
<td>153 (94%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Korean</td>
<td>44 (44%)</td>
<td>7 (4%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = 0.38.
DISCUSSION

Of the 280 respondents to the survey, 66% were women, which suggests that Korean mothers are more likely than fathers to participate in research and to remember family health information, not unlike Hispanic mothers. In the total sample, 210 were married to Koreans, 56% of those in City A and 94% of those in City B. However, this difference was in line with the 2000 census and was expected (U.S. Census Bureau, 2000).

The majority of participants (61%) rated their English level as "minimum", and fewer than 10% spoke only English at home, which is concordant with reports from other KA studies (Maxwell & Song, 2003; Sohn & Harada, 2005). Recent data from California indicated that 87% of Koreans aged 18 years and older were foreign born, 28% of Koreans over the age of 25 reported that they spoke English "not well", and 78% did not speak English at home (Korean American Coalition-Census Information Center in partnership with the Center for Korean American and Korean Studies, 2007). This limited English proficiency among KAs adversely affects their ability to communicate with health care providers.

Forty-two percent of the sample reported that they did not have any type of health insurance, which is significantly higher than the general uninsured rate of 21% in the U.S. (U.S. Census Bureau, 2007). According to the National Health Insurance Survey in 1994, approximately 30% of AAPIs were uninsured; however, the uninsured rate was 51% for KAs (Ryu, Young, & Park, 2001). Another population-based study from Los Angeles, the county with the largest number of Koreans outside of Korea, also found that over 40% of KAs were uninsured (UCLA Center for Health Policy Research, 2007). This low rate of health insurance may be related to the difference between health insurance systems in the home and host countries. Korea has a national health insurance system, while access to insurance in the U.S. is highly dependent on the nature of employment as well as

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**Table 4**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Category</th>
<th>Genetic</th>
<th></th>
<th>STD</th>
<th></th>
<th>Sharing utensils</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Per year</td>
<td>1.04</td>
<td>0.99 to 1.08</td>
<td>1</td>
<td>0.96 to 1.04</td>
<td>0.98</td>
</tr>
<tr>
<td>Marital status</td>
<td>Not married</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>0.57</td>
<td>0.24 to 1.36</td>
<td>0.83</td>
<td>0.33 to 2.11</td>
<td>0.77</td>
</tr>
<tr>
<td>Education</td>
<td>≥College</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td></td>
<td>≤Middle school</td>
<td>0.15**</td>
<td>0.04 to 0.53</td>
<td>1.24</td>
<td>0.36 to 4.29</td>
<td>1.21</td>
</tr>
<tr>
<td></td>
<td>≤Some college</td>
<td>0.77</td>
<td>0.34 to 1.76</td>
<td>0.48</td>
<td>0.22 to 1.10</td>
<td>0.88</td>
</tr>
<tr>
<td>Stay in U.S.</td>
<td>Per year</td>
<td>1.01</td>
<td>0.97 to 1.05</td>
<td>1.03</td>
<td>0.99 to 1.07</td>
<td>1.05**</td>
</tr>
<tr>
<td>English level</td>
<td>Not fluent</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td></td>
<td>Fluent</td>
<td>1.37</td>
<td>0.56 to 4.35</td>
<td>0.86</td>
<td>0.38 to 1.95</td>
<td>1.37</td>
</tr>
<tr>
<td>Food</td>
<td>No Korean dinner</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td></td>
<td>Korean dinner</td>
<td>0.23**</td>
<td>0.08 to 0.65</td>
<td>1.04</td>
<td>0.50 to 2.18</td>
<td>1.83</td>
</tr>
<tr>
<td>Site</td>
<td>City A</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td></td>
<td>City B</td>
<td>0.99</td>
<td>0.48 to 2.08</td>
<td>1.49</td>
<td>0.72 to 3.07</td>
<td>0.51*</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.

Note. STD = sexually transmitted disease; OR = odds ratio; CI = confidence interval; Ref = reference.
other socioeconomic factors. Only 28% of our participants were employed. The majority were self-employed (39%) or housewives (17%), so they were less likely to have access to employer-based insurance. Instead, they paid directly for health services or purchased health insurance on their own. Nonetheless, these findings raise concerns because many KAs without health insurance and with language barriers will delay care or have difficulty in getting health care.

Other studies have found that most KAs did not understand the risk of HBV transmission and responded with do not know to most questions. In this study, we were able to confirm the common misconceptions about HBV risk factors among KAs. We found that the majority of participants were not able to distinguish HBV from other types of hepatitis such as hepatitis A and they mistakenly thought that HBV is a genetic problem or is due to sharing utensils. These findings are similar to those of an earlier qualitative study of KAs in Western Washington (Choe et al., 2005). Only 21% of our participants knew that HBV is a sexually transmitted type of viral hepatitis.

Our data indicated that knowledge of HBV infection was found to be associated with both demographic and acculturation factors. As expected, education seemed to play an important role in mistakenly identifying heredity as a cause of HBV. The lower the educational status, the more misunderstanding of heredity as a cause of HBV. This finding is in line with that of a positive correlation between education and health knowledge in other ethnic groups including AAPIs (Anzai, Ohkubo, Nishino, Tsuji, & Hisamichi, 2000; Consoli & Bruckert, 2004; Jasti, Siega-Riz, & Bentley, 2003; Powell, Hill, & Clancy, 2007).

The clustering of HBV infection within close family members might be a cause of this mistaken view of HBV as being genetic (Kim et al., 1994; Tong & Hwang, 1994), and that is why a family feels stigmatized by having an HBV family member. There are different stigmas attached to HBV infection in different geographic and ethnic communities; for instance, stigma related to sex and/or drug use in North America and to a combination of sex and family stigma in Asia (Mazoff, 2007; Wang, 2007). Much education is clearly needed to dispel the misunderstanding and eliminate the stigma surrounding HBV.

English fluency did not emerge as a significant correlate of knowledge among our study participants. Although in univariate analysis, English-speaking participants were more likely to have better knowledge, this association lost statistical significance when adjustments were made for other acculturation factors in multivariate analysis. This finding is surprising since the common assumption is that immigrants who are fluent in English have greater health knowledge. However, if no education about HBV infection has been provided in English, the lack of a significant relationship between English fluency and knowledge is logical.

There was a 5% increase in the odds of misunderstanding of shared utensils as a source of HBV for each year lived in the U.S. (OR, 0.105; 95% CI, 1.02 to 1.09). As with English fluency, it was surprising that a longer stay in the U.S. was not positively related to HBV knowledge. However, longer stay would not guarantee better acculturation or greater attainment of health knowledge. Rather, the process of acculturation reflects how individuals change by being influenced by contact with another culture (Berry, 1980). The process of acculturation of KAs is unique. The majority of KAs adopt American culture by contact with other KAs rather than by direct contact with local Americans. The Immigration and Naturalization Service reported that 65% of Korean immigration is based on family invitation (USDJ, 2000). Moreover, most KA immigrants continue to be exposed to Korean culture through attending Korean-language churches, subscribing to local Korean newspapers and cable TV, and shopping at Korean grocery stores, and through networks of family and friends. So it is possible that the majority of Korean immigrants would receive information related to health via their Korean language.

There are specific concerns for AAPIs because of the high incidence of chronic HBV carriers (8–15%) among AAPIs and their low HBV knowledge. Education is imperative since HBV is 100 times more
infectious than HIV and the majority of HBV-infected AAPIs are not aware of the routes of transmission. Therefore, it is a matter of urgency to develop and implement educational programs that will not only benefit HBV carriers but also the community and nation, because wise health behavior will prevent the infection from being passed silently from HBV carriers to others.

CONCLUSION

This study suggests that KAs not only have low levels of knowledge about HBV infection but also significant misunderstandings, and points to the need for targeted educational interventions. Our findings of the relationship between only select acculturation measures and knowledge imply the limitation of using a unidimensional scale to measure acculturation. Therefore, culturally sensitive and group-tailored public health education for AAPIs based on data from the targeted group should be implemented to clarify misunderstandings about HBV infection.

The success of this community-based participatory study was primarily due to the research team, the advisory council members, and more than 100 volunteers, who were all committed to making a difference by reducing health disparities. As Paulo Freire, the Brazilian educator, suggested, “To be a good educator, means above all to have faith in people; to believe in the possibility that they can create and change things” (Freire, 1971, p.62).

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