

## COMMENTARY

# Eliminating the Threat of Chronic Hepatitis B in the Asian and Pacific Islander Community: A Call to Action

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### Abstract

**Chronic hepatitis B in the Asian and Pacific Islander (API) population is among our nation's greatest ethnic and racial health disparities. Despite comprising 4.3% of the population, API make up a disproportionate half of the 1.2-2 million Americans living with chronic hepatitis B. As many as two-thirds of API are not aware of their infection because they have not been tested. This lack of knowledge prevents them from undergoing life-saving liver cancer screening and potential treatment. Likewise, those not protected are unaware that they should be vaccinated. Instead, there is a pervasive lack of awareness among API and healthcare providers. New concerted public health actions are needed to eliminate this major health disparity.**

**Key Words:** Liver cancer - hepatitis B - Asian and Pacific Islander - health disparity

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### Introduction

Chronic hepatitis B, a serious liver disease caused by lifelong infection with the hepatitis B virus, is one of the most prevalent yet most neglected health problems in the world. It affects nearly 1 in 20 (approximately 350 million) people worldwide and causes 60-80% of the global burden of hepatocellular carcinoma (primary liver cancer) (Hwang et al., 1996; Parkin, 2006), a disease that has only 10% 5-year relative survival in the US (American Cancer Society, 2008). If left untreated, chronic hepatitis B confers a 25% risk of death from liver cancer or liver failure (World Health Organization (WHO), October 2000), resulting in 500,000-700,000 deaths annually. Hepatitis B is among the top three causes of cancer death worldwide, together with tobacco and *Helicobacter pylori* infection (Parkin, 2006; Parkin et al., 2005). However, despite the availability of a safe and effective vaccine against hepatitis B since 1982 (Krugman, 1982), vaccination programs have been poorly implemented in many hepatitis-B-endemic nations, allowing millions of people to become chronically infected, and leaving millions more susceptible to infection.

Although over three-quarters of those with chronic hepatitis B reside in Asia (World Health Organization (WHO), 2007), it is not a problem of only the developing world. Rather, chronic hepatitis B in the Asian and Pacific Islander (API) population is among the greatest racial/ethnic health disparities in the US. While API comprise only 4.3% of the population (United States Census Bureau, 2008), they constitute over half of the nation's 1.2-2

million people with chronic hepatitis B (Office of Minority Health, 2008a). API are also one of our nation's fastest growing populations (United States Census Bureau), due primarily to immigration from countries with high chronic hepatitis B endemicity. The Centers for Disease Control and Prevention (CDC) estimates that over 40,000 persons with chronic hepatitis B legally immigrate to the US each year (United States Department of Homeland Security, 2009). About one-tenth of foreign-born API have chronic hepatitis B, compared with fewer than 1:500 to 1:1000 non-Hispanic whites – greater than a 50 fold difference (Chao et al., 2004; Guane et al., 2004; Centers for Disease Control and Prevention, 2006; Shepard et al., 2006; Lin et al., 2007).

Yet despite the statistics that underscore this profound health disparity, resources and national attention to address chronic hepatitis B are limited. The inextricable image of API as a “model minority” has deterred attention away from API health problems. A superficial assessment of API by median income, education, or employment – common predictors of health – seemingly supports the model minority assumption. However, API are the only racial/ethnic group for which cancer is the leading cause of death, in part because cancer screening rates among API are relatively low (Chen Jr, 2005). In assessments of national health disparities, API disparities are often overlooked. Chronic hepatitis B was not even mentioned in a study of the “ten greatest US health disparities” (Keppel, 2007) despite the fact that the more than 50-fold difference in the prevalence of chronic hepatitis B between API and non-Hispanic whites far exceeds other health

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**Table 1. Top Racial/Ethnic Health Disparities in the US\***

Disease state	Racial/ethnic groups compared	Fold difference in prevalence
1. Chronic HBV	Foreign-born Asians & Whites§	68
2. Gonorrhea	Blacks & Whites	28
3. Congenital syphilis	Blacks & Whites	22
4. Tuberculosis	Asians & Whites	20
5. Fetal alcohol syndrome	AI/AN & Whites	15
6. AIDS	Blacks & Whites	15
7. Smoking during pregnancy	AI/AN & Whites	12
8. Congenital syphilis	Hispanics & Whites	12
9. Chronic HBV	US-born Asians & Whites	11
10. HIV-related deaths	Blacks & Whites	10
11. Smoking during pregnancy	Blacks & Whites	9
12. Non-fatal firearm injuries	Blacks & Whites	9

\*Based on data from Keppel et al. (2007) and Euler et al., 2003b) § Whites=Non-Hispanic Whites; Blacks=Non-Hispanic Blacks; AI= American Indian; AN=Alaskan Native

disparities listed among the top ten (Chang and So, 2007) (Table 1).

This disparity persists because there is a widespread lack of awareness and misconception about chronic hepatitis B not only in the general API population, but also among health care providers, lawmakers, and health-policy makers. Systemic gaps exist and require new concerted public health efforts to eliminate this health disparity.

### **GAP: Perinatal Transmission has not been Eliminated**

The persistently high rates of chronic hepatitis B among API reflect, in part, a failure to recognize the racial/ethnic differences in primary modes of transmission. Among API, vertical transmission from mother to newborn accounts for up to 40% of cases among API (World Health Organization (WHO) Regional Office for the Western Pacific, January 2003), whereas, horizontal adulthood transmission is most common route in non-Hispanic whites (Custer et al., 2004). Each year, there are close to 24,000 births to mothers with chronic hepatitis B and over two-thirds of these are API (Centers for Disease Control and Prevention (CDC), January 28, 2005). Despite the progress of US immunization programs in reducing new hepatitis B infection, approximately 1,000 to 1,500 infants annually – most of whom are API – still develop chronic hepatitis B through vertical transmission (California Perinatal Hepatitis B Prevention Program).

Part of the gap in preventing vertical transmission is the persistent failure in prenatal case identification of infected pregnant women to ensure appropriate immunoprophylaxis for susceptible newborns. Although more than 95% of pregnant women in the US are tested for hepatitis B surface antigen (HBsAg), the marker that indicates chronic hepatitis B (Centers for Disease Control and Prevention (CDC), 2005), there is limited adherence

to other CDC recommendations aimed at reducing vertical transmission. Fewer than half of pregnant women with chronic hepatitis B are identified for timely prenatal case management by county perinatal hepatitis B prevention programs (Din, , Euler et al., 2003a), despite regulations for mandatory case reporting in many states. Even after eligible women are enrolled in case management programs, fewer than three-quarters of their infants complete the three-dose hepatitis B vaccination series and undergo post-vaccination confirmatory testing (Euler, et al., 2003a) - measures that are necessary to ensure protection from perinatal hepatitis B infection.

These failures to comply with CDC recommendations may be due, in part, to a pervasive lack of awareness and knowledge among first-line health care providers. In a survey of obstetricians and nurses serving Santa Clara County, California, which has the nation's highest proportion of births to HBsAg-positive women (California Department of Finance, December 2008, Yue, June 2008), there was poor knowledge about chronic hepatitis B. Only 10-37% of providers were able to correctly identify the disproportionately high prevalence of chronic hepatitis B among API, the lack of symptoms of chronic hepatitis B, and the risk for liver disease (Chao et al., ???).

Public health departments play important and necessary roles in accurate surveillance and education. However, they often lack the funding and staff support necessary to provide culturally and linguistically appropriate management of all cases identified, or education for cases and their health care providers. Increased resources are greatly needed to improve antenatal identification and education about the medical management and prevention of chronic hepatitis B. These measures confer the potential to save lives and reduce future health care costs.

### **GAP: Misconceptions Undermine Early detection**

Despite their increased risk for chronic hepatitis B and liver cancer, many API remain uninformed, untested, and unprotected (Taylor et al., 2000; 2002; 2005a; 2005b; 2006; Thompson et al., 2002; Choe et al., 2005; 2006; Chen et al., 2006; Ma et al., 2007a; 2007b; 2008; Wu et al., 2007; Hwang et al., 2008; Juon et al., 2008). Among API in the San Francisco Bay Area, over half falsely believed that hepatitis B could be transmitted through contaminated or improperly cooked food, and fewer than one-third were able to correctly identify the actual modes of transmission (Wu, et al., 2007). Consequently, many API are afraid to share meals with chronically infected individuals.

While labor laws generally protect persons with chronic diseases against workplace discrimination in the US, pre-employment blood tests are common in some countries and often serve as the basis for discrimination abroad. Approximately 30% of the global burden of chronic hepatitis B lies in China alone, yet a 2006 survey of 113 multinational companies in China revealed that 77% would not hire persons with chronic hepatitis B (March 5, 2009). In fact, hepatitis B was among the top

three most common perceived causes of discrimination in China, along with physical disability and HIV infection (June 14, 2007). Even companies that hire infected individuals often perpetuate misconceptions about hepatitis B transmission by forbidding infected individuals from sharing tableware or eating with other employees (Ho, February 25, 2009). Since over two-thirds of API are foreign-born (United States Census Bureau, 2008), many carry these widespread misconceptions and concerns about discrimination to the US, thus hindering their willingness to undergo testing for HBsAg. Because chronic hepatitis B is usually asymptomatic, the HBsAg test is the only way to identify those who are chronically infected. Prompt identification is necessary for chronically infected persons to receive long-term medical management to reduce the risk of dying from liver cancer (Zhang et al., 2004).

### **GAP: Public awareness and knowledge are lacking**

The widespread misconceptions reflect systemically poor knowledge about hepatitis B (Taylor et al., 2000; 2002; 2005a; 2005b; 2006; Thompson et al., 2002; Choe et al., 2005; 2006; Chen et al., 2006; Ma et al., 2007a; 2007b; 2008; Wu et al., 2007; Hwang et al., 2008; Juon et al., 2008). In a survey of API in the San Francisco Bay Area, most were unaware that chronic hepatitis B is usually asymptomatic (Wu, et al., 2007). One-quarter were unaware that hepatitis B is preventable through immunization and below one-third of this high-prevalence population reported having been vaccinated. More alarmingly, only 44% reported having their children vaccinated. Those with better hepatitis B-related knowledge were more likely to have been tested or vaccinated (Wu et al., 2007). In a separate study, one year after testing and educating nearly 500 API adults, over two-thirds of those found to be infected had visited a physician for follow-up and liver cancer screening (Chao et al., 2007). More than three-quarters of all those tested had advised their family members to be tested as well. Thus, promoting hepatitis B awareness and improving knowledge can improve preventative action.

### **GAP: Liver cancer disproportionately affects API**

Because API have the highest rates of chronic hepatitis B, they bear a disproportionately high burden of liver cancer. Incidence rates are up to three times higher among API than among White non-Hispanics, and up to eight times higher among Vietnamese men (Chang et al., 2007). Liver cancer is the second leading cause of death in API men in the US, whereas it is not among the top ten causes of cancer death in White men (April 2008, based on the November 2007 submission).

Individuals with chronic hepatitis B should undergo regular liver cancer screening through liver ultrasound and a serologic test for alpha-fetoprotein, since early detection can significantly reduce liver cancer mortality (Zhang et al., 2004). Antiviral therapy may also be indicated in some

cases to reduce the risk of liver disease progression (Belongia et al., 2009). However, there is no consensus for national guidelines for liver cancer screening, and many physicians do not routinely perform liver cancer screening in patients with chronic hepatitis B (Nguyen and Keefe, 2002). Some physicians simply do not know how to screen for liver cancer (Ferrante et al., 2008). Consequently, liver cancer mortality rates remain dismal, as the overall five-year relative survival rate hovers around 10%, and that with distant-stage disease is below 3% (American Cancer Society, 2008). Among API, the incidence rate of liver cancer rises rapidly around age 35 (April 2008, based on the November 2007 submission), striking many young adults in the prime of life.

### **Moving forward: An assessment of current efforts and future directions**

Elimination of the health disparity due to chronic hepatitis B requires collaborations among healthcare providers, public health professionals, community leaders, legislators, and the general public. One such model of a successful public-private partnership is the Jade Ribbon Campaign, the first large-scale, culturally and linguistically targeted, community outreach campaign to promote hepatitis B and liver cancer screening, prevention, and education among API. Launched in 2001, this effort includes widespread media-based public awareness campaigns, local community screenings and education, healthcare provider education, and broad-based community partnerships to disseminate educational resources. A library of culturally and linguistically appropriate multimedia informational resources has been developed to specifically address chronic hepatitis B and liver cancer in the API community, and has been widely distributed throughout numerous organizations, including state health departments and the CDC.

As a part of the Jade Ribbon Campaign, a partnership was developed with the San Francisco Public Health Department to create "3 For Life," a program designed to provide free serological testing for HBsAg along with low-cost hepatitis B vaccination targeting the high-risk API community. Over the course of 12 months, 1,206 participants were tested and 85% of those who were unprotected against hepatitis B were vaccinated (Chang et al., 2009). 3 For Life was successfully adapted and replicated in Hawaii (Tsai et al., 2008) and served as a model program for expansion into the larger "SF Hep B Free Campaign," a collaboration of more than 100 San Francisco community groups, including health care, media, private industry, local politicians, and community based organizations, with the common goal of making San Francisco the first city to screen all API for hepatitis B, vaccinated the unprotected, and provide care for those who are infected. The SF Hep B Free Campaign has garnered state and national attention as a model public-private partnership to reduce the burden of hepatitis B in the community. Such examples of culturally targeted, community-based collaborations are integral in improving awareness about chronic hepatitis B and reducing the health disparity.

The US Office of Minority Health recently released new strategies to reduce the incidence of chronic hepatitis B and its long-term complications among API (Office of Minority Health, 2008b). These strategies include 1) improving hepatitis B-related public health prevention infrastructure, 2) increasing hepatitis B-related health education and awareness, 3) increasing screening for chronic hepatitis B, 4) improving access to care and treatment for chronic hepatitis B, and 5) increasing research for chronic hepatitis B and liver cancer. The formulation of these strategies is an important step in raising national awareness, but they must be supported with increased government funding and resources.

Attempts at legislative change have met with limited success. In 2005 and 2006, the National Hepatitis B Act with bipartisan support was introduced in the US Congress calling for a national plan to support chronic hepatitis B prevention, screening, education, research and treatment (H.R. 4550, S. 3558) (Dec. 15, 2005, June 22, 2006). In 2007, a bill was introduced in the California State Assembly (A.B. 158) to make chronic hepatitis B infection a qualifying disease for state public health insurance (January 18, 2007). Yet, in each case, the proposals have stalled.

Routine hepatitis B screening of all API and timely post-exposure prophylaxis of newborns born to infected mothers are important issues for adoption as national healthcare quality measures.

We cannot allow this health disparity to persist when we possess all the tools for prevention: a safe and effective vaccine, an available post-exposure prophylaxis treatment, a variety of effective antiviral treatments, and life-saving liver cancer screening tools. API are among the fastest growing sectors of the US population and the toll of chronic hepatitis B on API health, well-being, and productivity is mounting. The gaps in chronic hepatitis B prevention and management are many, but so, too, are the opportunities for improvement. New, concerted public health efforts to unite community, private, and public organizations must continue to be developed to address these gaps. Only in such united efforts can we raise the awareness to institute fundamental infrastructure change to finally close these gaps and eliminate this profound health disparity.

## References

American Cancer Society (2008). Cancer Facts & Figures 2008. Belongia EA, Costa J, Gareen IF, et al (2009). National Institutes of Health Consensus Development Conference Statement: management of hepatitis B. *Ann Intern Med*, **150**, 104-10. California Department of Finance (December 2008). California County Population Estimates and Components of Change by Year — July 1, 2000–2008. Available at: <http://www.dof.ca.gov/research/demographic/reports/estimates/e-2/2000-08/>. Last accessed: 03/30/2008. California Perinatal Hepatitis B Prevention Program California Department of Public Health. Centers for Disease Control and Prevention (CDC) (2005). A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) part 1: immunization of

infants, children, and adolescents. *MMWR Recomm Rep*, **54**, 1-31. Centers for Disease Control and Prevention (CDC) (2006). Screening for chronic hepatitis B among Asian/Pacific Islander populations--New York City, 2005. *MMWR Morb Mortal Wkly Rep*, **55**, 505-9. Chang ET, Keegan THM, Gomez SL, et al. (2007). The burden of liver cancer in Asians and Pacific Islanders in the Greater San Francisco Bay Area, 1990 through 2004. *Cancer*, **109**, 2100-8. Chang ET, Nguyen BH, So SK (2008). Attitudes toward Hepatitis B and Liver Cancer Prevention among Chinese Americans in the San Francisco Bay Area, California. *Asian Pac J Cancer Prev*, **9**, 605-13. Chang ET, So SK (2007). Re: "Ten largest racial and ethnic health disparities in the United States based on Healthy People 2010 objectives". *Am J Epidemiol*, **166**, 1105-6; author reply 1106-7. Chang ET, Sue E, Zola J, So SK (2009). 3 For Life: a model pilot program to prevent hepatitis B virus infection and liver cancer in Asian and Pacific Islander Americans. *Am J Health Promot*, **23**, 176-81. Chao S, Lee PV, Prapong W, Su J, So S (2004). High prevalence of chronic hepatitis B (HBV) infection in adult Chinese Americans living in California. *Hepatology*, **40** (Suppl 1), 717A. Chao SD, Chang ET, Le PV, et al (2007). The Jade Ribbon Campaign: A Model Program for Community Outreach and Education to Prevent Liver Cancer in Asian Americans. *J Immigr Minor Health*, ????. Chao SD, Cheung CC, Yue A, So SK (2009). Low hepatitis B knowledge among perinatal healthcare providers serving county with nation's highest rate of births to mothers chronically infected with hepatitis B. Poster presentation at the 13th International Symposium on Viral Hepatitis and Liver Disease. Washington, DC. March 20-24, 2009. Chen H, Tu SP, Teh CZ, et al. (2006). Lay beliefs about hepatitis among North American Chinese: implications for hepatitis prevention. *J Community Health*, **31**, 94-112. Chen MS, Jr. (2005). Cancer health disparities among Asian Americans: what we do and what we need to do. *Cancer*, **104**, 2895-902. China Daily (2007). Discrimination in Job Market Common: Survey. Choe JH, Chan N, Do HH, et al (2005). Hepatitis B and liver cancer beliefs among Korean immigrants in Western Washington. *Cancer*, **104**, 2955-8. Choe JH, Taylor VM, Yasui Y, et al (2006). Health care access and sociodemographic factors associated with hepatitis B testing in Vietnamese American men. *J Immigr Minor Health*, **8**, 193-201. Chu D (2009). Hepatitis B screening practices of Asian-American primary care physicians who treat Asian adults living in the United States. Oral presentation at the 13th International Symposium of Viral Hepatitis and Liver Disease. Washington, DC. March 20-24, 2009. . Custer B, Sullivan SD, Hazlet TK, et al. (2004). Global epidemiology of hepatitis B virus. *J Clin Gastroenterol*, **38**, S158-68. Din E (2009). Estimating the number of births to hepatitis B surface antigen-positive women in select US states, 2004. Oral presentation at the 13th International Symposium of Viral Hepatitis and Liver Disease. Washington, DC. March 20-24, 2009. Dulay M, Zola J, Hwang J, Baron R, Lai C Are Primary Care Clinicians Knowledgeable About Screening for Chronic Hepatitis B Infection? Poster presentation: Society of

- General Internal Medicine (SGIM) National Meeting, Toronto, Canada. April 2007.
- Euler GL, Copeland J, Williams WW (2003a). Impact of four urban perinatal hepatitis B prevention programs on screening and vaccination of infants and household members. *Am J Epidemiol*, **157**, 747-53.
- Euler GL, Wooten KG, Baughman AL, Williams WW (2003b). Hepatitis B surface antigen prevalence among pregnant women in urban areas: implications for testing, reporting, and preventing perinatal transmission. *Pediatrics*, **111**, 1192-7.
- Ferrante JM, Winston DG, Chen PH, de la Torre AN (2008). Family physicians' knowledge and screening of chronic hepatitis and liver cancer. *Fam Med*, **40**, 345-51.
- Guane R, Siu P, Lam K, et al. (2004). Prevalence of HBV and risk of HBV acquisition in hepatitis B screening programs in large metropolitan cities in the United States. *Hepatology*, **40** (Suppl 1), 716A.
- Ho B (February 25, 2009). New report accuses multi-national organizations of hepatitis B discrimination in China. Corporate Social Responsibility in Asia Weekly, 5.
- Hutton DW, Tan D, So SK, Brandeau ML (2007). Cost-effectiveness of screening and vaccinating Asian and Pacific Islander adults for hepatitis B. *Ann Intern Med*, **147**, 460-9.
- Hwang JP, Huang CH, Yi JK (2008). Knowledge about hepatitis B and predictors of hepatitis B vaccination among Vietnamese American college students. *J Am Coll Health*, **56**, 377-82.
- Hwang SJ, Tong MJ, Lai PP, et al. (1996). Evaluation of hepatitis B and C viral markers: clinical significance in Asian and Caucasian patients with hepatocellular carcinoma in the United States of America. *J Gastroenterol Hepatol*, **11**, 949-54.
- Juon HS, Strong C, Oh TH, et al. (2008). Public health model for prevention of liver cancer among Asian Americans. *J Community Health*, **33**, 199-205.
- Keppel KG (2007). Ten largest racial and ethnic health disparities in the United States based on Healthy People 2010 Objectives. *Am J Epidemiol*, **166**, 97-103.
- Krugman S (1982). The newly licensed hepatitis B vaccine. Characteristics and indications for use. *JAMA*, **247**, 2012-5.
- Lin SY, Chang ET, So SK (2007). Why we should routinely screen Asian American adults for hepatitis B: A cross-sectional study of Asians in California. *Hepatology*, **46**, 1034-40.
- Ma GX, Fang CY, Shive SE, et al. (2007a). Risk perceptions and barriers to hepatitis B screening and vaccination among Vietnamese immigrants. *J Immigr Minor Health*, **9**, 213-20.
- Ma GX, Shive SE, Fang CY, et al (2007b). Knowledge, attitudes, and behaviors of hepatitis B screening and vaccination and liver cancer risks among Vietnamese Americans. *J Health Care Poor Underserved*, **18**, 62-73.
- Ma GX, Shive SE, Toubbeh JI, Tan Y, Wu D (2008). Knowledge, attitudes, and behaviors of Chinese hepatitis B screening and vaccination. *Am J Health Behav*, **32**, 178-87.
- Nguyen GT, Bellamy SL (2006). Cancer information seeking preferences and experiences: disparities between Asian Americans and Whites in the Health Information National Trends Survey (HINTS). *J Health Commun*, **11** Suppl 1, 173-80.
- Nguyen MH, Keffe EB (2002). Screening for hepatocellular carcinoma. *J Clin Gastroenterol*, **35**, S86-91.
- Office of Minority Health (2008a). Chronic Hepatitis B in Asian Americans, Native Hawaiians and Other Pacific Islanders: Background. Available at: <http://www.omhrc.gov/templates/browse.aspx?lvl=2&lvlid=190>. Last modified: 12/17/2008. Last accessed: 03/30/2009.
- Office of Minority Health (2008b). National Hepatitis B Initiative for Asian Americans and Pacific Islanders. Available at: <http://www.omhrc.gov/templates/browse.aspx?lvl=2&lvlid=190>. Last modified: 12/17/2008.
- Parkin DM (2006). The global health burden of infection-associated cancers in the year 2002. *Int J Cancer*, **118**, 3030-44.
- Parkin DM, Bray F, Ferlay J, Pisani P (2005). Global cancer statistics, 2002. *CA Cancer J Clin*, **55**, 74-108.
- Shepard CW, Simard EP, Finelli L, Fiore AE, Bell BP (2006). Hepatitis B virus infection: epidemiology and vaccination. *Epidemiol Rev*, **28**, 112-25.
- Taylor VM, Choe JH, Yasui Y, et al. (2005a). Hepatitis B awareness, testing, and knowledge among Vietnamese American men and women. *J Community Health*, **30**, 477-90.
- Taylor VM, Jackson JC, Chan N, Kuniyuki A, Yasui Y (2002). Hepatitis B knowledge and practices among Cambodian American women in Seattle, Washington. *J Community Health*, **27**, 151-63.
- Taylor VM, Jackson JC, Pineda M, et al (2000). Hepatitis B knowledge among Vietnamese immigrants: implications for prevention of hepatocellular carcinoma. *J Cancer Educ*, **15**, 51-5.
- Taylor VM, Tu SP, Woodall E, et al (2006). Hepatitis B knowledge and practices among Chinese immigrants to the United States. *Asian Pac J Cancer Prev*, **7**, 313-7.
- Taylor VM, Yasui Y, Burke N, et al (2005b). Hepatitis B knowledge and testing among Vietnamese-American women. *Ethn Dis*, **15**, 761-7.
- Taylor VM, Yasui Y, Burke N, et al. (2004). Hepatitis B testing among Vietnamese American men. *Cancer Detect Prev*, **28**, 170-7.
- Thompson MJ, Taylor VM, Jackson JC, et al. (2002). Hepatitis B knowledge and practices among Chinese American women in Seattle, Washington. *J Cancer Educ*, **17**, 222-6.
- Tsai NCS, Holck PS, Wong LL, Ricalde AA (2008). Seroepidemiology of hepatitis B virus infection: analysis of screening in Hawaii. *Hepatol Int*, **2**, 478-85.
- United States Census Bureau (2004). Press release: Hispanic and Asian Americans increasing faster than overall population. <http://www.census.gov/Press-Release/www/releases/archives/race/001839.html>. June 14, 2004 [accessed March 29, 2009].
- United States Census Bureau (2008). 2007 American Community Survey. Available at: <http://www.census.gov/acs/www/index.html>.
- United States Department of Homeland Security (2009). Yearbook of Immigration Statistics: 2008. Table 3: Persons obtaining legal permanent resident status by region and country of birth: fiscal years 1999 to 2008. Available at: <http://www.dhs.gov/ximigt/statistics/publications/LPR08.shtm>. Last updated: 03/24/2009. Last accessed: 03/30/2009.
- Weinbaum CM, Williams I, Mast EE, et al (2008). Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. *MMWR Recomm Rep*, **57**, 1-20.
- World Health Organization (WHO) (2007). Western Pacific regional plan for hepatitis B control through immunization.
- World Health Organization (WHO) (October 2000). Hepatitis B Fact Sheet No. 204. Available at: <http://www.who.int/mediacentre/factsheets/fs204/en/>.
- World Health Organization (WHO) Regional Office for the Western Pacific (January 2003). Western Pacific regional plan to improve hepatitis B control through immunization.

- Wu CA, Lin SY, So SK, Chang ET (2007). Hepatitis B and liver cancer knowledge and preventive practices among Asian Americans in the San Francisco Bay Area, California. *Asian Pac J Cancer Prev*, **8**, 127-34.
- Xinhua Economic News Service (2009). Survey: Implicit discrimination against Chinese Hepatitis B carriers rising in multinationals.
- Yue A (2008). Presentation at the Santa Clara County Public Health Department, Perinatal Hepatitis B Prevention Program, San Jose, CA.
- Zhang BH, Yang BH, Tang ZY (2004). Randomized controlled trial of screening for hepatocellular carcinoma. *J Cancer Res Clin Oncol*, **130**, 417-22.