



## **Mothers' Misconceptions about Hepatitis B Disease and Hepatitis B Vaccine**

**Huynh Giao<sup>1\*</sup>, Pham Le An<sup>2</sup>, Bui Quang Vinh<sup>3</sup>, Tran Thien Thuan<sup>1</sup>,  
Nguyen Quang Vinh<sup>4</sup> and Pauline E. Jolly<sup>5</sup>**

<sup>1</sup>Faculty of Public Health, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam.

<sup>2</sup>Center for Training of Family Medicine, University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam.

<sup>3</sup>Department of Pediatrics, University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam.

<sup>4</sup>Department of Epidemiology, Institute of Public Health, Ho Chi Minh City, Vietnam.

<sup>5</sup>Department of Epidemiology, University of Alabama at Birmingham, USA.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors HG, PLA and BQV designed the study, acquired the data, wrote the protocol and wrote the first draft of the manuscript. Author TTT managed the analyses of the study. Author NQV managed the literature searches. Authors HG and PEJ were the contributors to the analysis and interpretation of the data. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/IJTDH/2018/v34i430102

Editor(s):

(1) Dr. Arthur V. M. Kwena, Professor, Department of Medical Biochemistry, Moi University, Kenya.

Reviewers:

(1) Meer Ahmad A. Mydin Meera, MAHSA University, Malaysia.

(2) Sherief Abd-Elsalam, Tanta University, Egypt.

(3) Robert Obi, Federal University of Technology, Nigeria.

Complete Peer review History: <http://www.sdiarticle3.com/review-history/47153>

**Original Research Article**

**Received 13 December 2018**

**Accepted 25 February 2019**

**Published 13 March 2019**

### **ABSTRACT**

**Introduction:** Hepatitis B vaccination has resulted in dramatic reductions in the prevalence of Hepatitis B Virus (HBV) infection among children since its introduction into infant immunization schedules. However, 45% of Vietnamese mothers did not have their infants immunized at birth in 2013-2014.

**Aim:** To assess mothers' misconceptions about HBV and HBV vaccinations, as well as barriers to mothers getting their children vaccinated.

**Study Design:** A qualitative cross-sectional study was conducted from April to October 2015 in Ho

Chi Minh City, Vietnam among mothers of children under one year of age. This study consisted of one-on-one interviews and focus group discussions (FGDs) designed to collect information on the mothers' perceptions about HBV and decisions to immunize their child.

**Methodology:** Thirty-five mothers of children under one year of age who were completely or incompletely immunized at the Pediatric Number 2 Hospital in Ho Chi Minh City, Vietnam participated in the study. Eligible mothers were identified and recruited by nurses in the Hospital's vaccination clinic for 10 in-depth interviews and 5 FGDs comprised of 5 mothers each.

**Results:** With regards to HBV transmission, 25.7%, 22.9% and 34.3% of mothers believed that HBV could be transmitted genetically, through sharing food, or from an unclean environment, respectively. Over half of the mothers (51.4%) were unaware that HBV could be transmitted during childbirth and 34.3% of mothers believed that vaccines which were purchased were more effective than free vaccines from the Expanded Program on Immunization (EPI).

**Conclusion:** Public educational interventions should be conducted to clear up the misconceptions identified in this study and to reassure parents that the free vaccines offered through the EPI are of the same quality as the vaccines that are purchased in the private clinics at public hospitals.

*Keywords: Qualitative research; health belief model; expanded program on immunization; childhood immunization.*

## 1. INTRODUCTION

Hepatitis B Virus (HBV) infection is a major global health problem; it is estimated that 325 million people worldwide are living with chronic HBV [1]. The World Health Organization (WHO) estimates that there were 39 million cases of chronic HBV infection in 2015 in the South East Asia region, and about 115 million cases of chronic HBV in 2016 in the Western Pacific Region [2,3]. Chronic HBV infection is the main cause of liver diseases such as cirrhosis and liver cancer. Vietnam has a high prevalence of HBV infection, with 8.6 million people being HBV-positive [4]. An estimated 8.8% of women and 12.3% of men are chronically infected with HBV in Vietnam [4]. The main mode of transmission for HBV in Vietnam is mother to child transmission (MTCT) during childbirth or early childhood [4]. In 2003, Hipgrave surveyed HBV marker of 536 infants in rural Vietnam, who had not received the HBV vaccine and found that 12.5% of the infants (9-18 months old) were infected with HBV [5]. The HBV infection rate among children 4 - 6 years old in Vietnam was 18.4% [6]. Although HBV prevalence as high as 80.7 per 100,000 people was reported for China in 2012 [7], recent data show that about 95% of all newborns in China receive their timely birth dose of HBV vaccination, and 99.7% of children born in 2012 received the full 3-dose HBV vaccination [7]. Several countries in both Southeast Asia and the Western Pacific began implementing HBV vaccination for all infants in the 1990s and early 2000s to combat the high prevalence of HBV infection [2,3]. Cambodia has had great success with birth-dose administration

of the HBV vaccination since the implementation of a nationwide program in 2005, with an increase of HBV birth-dose coverage from 24% in 2005 to 87% in 2014 [8,9]. HBV vaccination has been utilized in Vietnam through the Expanded Program on Immunization (EPI) since 1997 for children under 1 year of age. A national study in 2010 surveyed HBV marker of children who had received the full dose HBV vaccine ( $\geq 3$  doses) and found that the overall Hepatitis B surface Antigen (HBsAg) prevalence was 2.7%, this result showed dramatic reductions in the prevalence of HBV infection among children born since the HBV vaccine was introduced into infant immunization schedules [10]. Birth-dose coverage increased from 65% in 2006 to 75% in 2012, however it declined dramatically to 55% in 2013 and in 2014 following media reports of alleged adverse events after HBV birth-dose vaccination [11]. Similar to Vietnam, Thailand implemented the HBV immunization into their EPI in 1992; these vaccines are provided at no cost and Thailand experienced significant success in the increase of HBV vaccination coverage rate from 15% in 1992 to as high as 99% in 2013 [12]. Because of these programs and the screening of pregnant women for HBV infection, HBV prevalence among Thai children dropped considerably to roughly 0.3% in all children born before 2015 [12]. Safety concerns have reduced the rate of infants receiving HBV vaccine significantly as parents' decisions to delay or refuse vaccines have been shown to be associated with increased risk of HBV infection [13]. Low knowledge and misconceptions about HBV among parents/caregivers have been shown to affect the rates of immunizations, as is

the case with Malaysia, which has roughly 1 million people chronically infected with HBV; yet, the level of awareness of the disease among the general population is significantly low [14]. Among the participants of a study by Rajamoorthy et al. conducted in Malaysia in 2016, only 36.9% had good knowledge about HBV, and good knowledge was found to be associated with higher educational attainment, ethnicity, and family income [14]. This rather low rate of HBV knowledge among adults contributes to the decisions of parents/caregivers not to have their child immunized against HBV. Maintaining high levels of childhood vaccinations is important for public health and requires a better understanding of parents' perceptions of diseases and consequent decisions about vaccinations.

### 1.1 Theoretical Framework

The Health Belief Model (HBM) is used to interpret differences in compliant and non-compliant parents with regards to childhood vaccinations. The four elements of the HBM are: perceived susceptibility (likelihood of getting the disease), perceived severity (perception of how serious an outcome or consequence is from the disease), perceived benefits (efficacy of preventive action undertaken), and perceived barriers (time, effort, money, inconvenience, pain, side effects of preventive action) [15].

The HBM has been found to be most useful when applied to behaviours for which it was originally developed, particularly traditional preventive health behaviours such as screening and immunization; it provides an essential reference point in the development of messages to improve knowledge and change beliefs. We used the concepts of this model in the design of our in-depth interview questionnaire and focus group discussion (FGD) guide in this study.

## 2. MATERIALS AND METHODS

### 2.1 Method Sampling

A convenience sampling strategy was used to recruit mothers of infants under 1 year of age who were completely immunized for their age, or incompletely immunized at the Pediatric Number 2 Hospital in Ho Chi Minh City. Mothers of reproductive age between 18 and 49 years with infants under 1 year of age were eligible to participate in the study. Ten mothers were recruited for in-depth interviews and 25 mothers

for FGDs. Five FGDs comprised of 5 mothers each were conducted. Mothers could either complete the in-depth interviews or participate in the FGDs but not in both.

### 2.2 Participants

Potential participants were identified by nurses in the Pediatric Number 2 Hospital's vaccination clinic who informed them about the study and introduced those willing to participate to the study investigators.

### 2.3 Ethics

Ethical approval was granted by the Pediatric Number 2 Hospital Ethics Committee. Participation was voluntary, and participants provided written informed consent to be interviewed and for the interview to be recorded. Participants were assured that they were able to stop participating in the study at any time and could choose not to answer any question if they did not want to. They were also assured that their responses would be kept confidential and transcripts were anonymous. The interviewer was neither a clinician nor provider of health services/care to these participants, and therefore did not have a dual relationship with the participants. Interviewing continued until no new information was being obtained from the interviews of mothers of infants who had complete or incomplete immunizations.

### 2.4 Interview Structured Questionnaire

Interviews were structured: one-on-one interviews and FGDs were used to collect information from the mothers. To understand the context of mothers' decisions to immunize, the interviews covered five themes in terms of the concepts in the HBM:

- (1) Perceived susceptibility to HBV infection including two questions: Who can get HBV? and How is HBV spread?
- (2) Perceived severity of HBV infection including two questions: How dangerous is HBV? and Do you think that HBV can be treated successfully?
- (3) Perceived benefits including two questions: Do you know the HBV vaccination program is free? and What do you know about the benefits of getting the HBV vaccination?
- (4) Barriers of vaccination including two questions: Which factors make it difficult for you to get your child the HBV vaccination? and What is the most

- important barrier affecting your decision to get your child the HBV vaccination?
- (5) Cues to action including two questions: Where did you hear information about the HBV vaccination? and What source of information do you trust when deciding to vaccinate your child?

### 2.5 Interview Procedure

All interviews were conducted in the vaccination clinic; interviews lasted between 30 to 45 minutes and FGDs lasted between 60 to 90 minutes. Socio-demographic information including family size and type (two or one parent family), mother's age, occupation, and education level was collected at the end of the interview. All interviews were audio-taped and fully transcribed.

### 2.6 Method of Analysis

Interviews were thematically coded after all data had been collected. This analysis focused on determining mothers' descriptions of their experiences and beliefs to identify misconceptions about perceived susceptibility and severity of HBV infection, benefits and barriers to vaccination, and cues to action based on the HBM.

## 3. RESULTS

### 3.1 Demographic Characteristics of Parent/Guardian Respondents

The age range of the mothers was 18 to 40 years, with 77.1% being 25 to 40 years old. Most

mothers reported secondary school as their highest level of educational completion (60%) and most reported their occupation as housewife (45.7%) or traders (37.1%) (Table 1).

### 3.2 Misconceptions about Susceptibility to and Transmission of HBV Infection

When mothers were asked their opinion of who can get HBV, they gave responses such as: those who do not keep themselves clean (48.6%), those who drink alcohol (25.7%), and those with weak immune systems (20.0%). Several common misconceptions related to HBV transmission were identified (Table 2). Although 48.6% of mothers were aware that HBV infection could be transmitted through MTCT and 25.7% through sexual contact, other mothers thought that HBV could be transmitted by the sharing of food (22.9%), genetically (25.7%), by poor environmental sanitation (34.3%), or by breathing infected air (31.4%) (Table 2).

### 3.3 Misconceptions about Severity of HBV Infection

When asked about the severity of HBV infection 65.7% of mothers said that HBV was not life-threatening, 42.9% said that HBV can be cured, and 31.4% said that it is transmitted genetically from mother to child (Table 3). There were variations on the understanding of the different types of Hepatitis, for example, some mothers felt that Hepatitis A was the first stage of illness, leading to Hepatitis B, then to Hepatitis C, causing Cirrhosis).

**Table 1. Demographic characteristics of parent/guardian respondents**

	Focus group discussion No. (%)	In depth interview No. (%)	Total
Amount	25	10	35
Education			
< Primary school	4 (16.0)	2 (20.0)	6 (17.1)
Secondary school	15 (60.0)	6 (60.0)	21 (60.0)
> High school	6 (24.0)	2 (20.0)	8 (22.9)
Occupation			
Government officer/Staff	4 (16.0)	2 (20.0)	6 (17.1)
Housewife	12 (48.0)	4 (40.0)	16 (45.7)
Trader	9 (36.0)	4 (40.0)	13 (37.1)
Age (years)			
<25	5 (20.0)	3 (30.0)	8 (22.9)
25-<40	20 (80.0)	7 (70.0)	27 (77.1)

**Table 2. Perceived susceptibility to HBV infection (n=35)**

Perceived susceptibility to HBV infection	Mother's opinion	N (%)
Who can get HBV?	Not Keep Themselves Clean	17(48.6)
	No Idea	14(40.0)
	Drink Alcohol	9(25.7)
	Weak Immune System	7(20.0)
	Children	4(11.4)
How is HBV spread?	Blood	18(51.4)
	MTCT	17(48.6)
	Environmental Sanitation	12(34.3)
	Breathing Infected Air	11(31.4)
	Use Syringe of HBV People	10(28.6)
	Sexual Contact	9(25.7)
	Gene	9(25.7)
	Sharing of Food	8(22.9)

**Table 3. Perceived severity of HBV infection (n=35)**

Perceived severity of HBV infection	Mother's opinion	N (%)
How dangerous is HBV disease?	Not Dangerous	23(65.7)
	Cancer	12(34.3)
	Death	12(34.3)
	Gene from Mother to Child	11(31.4)
	Cirrhosis	11(31.4)
	Chronic HBV	10(28.6)
	Leading To C	6(17.1)
	Do you think that HBV can be treated successfully?	Can Be Cured
Not Know		13(37.1)
Not Cured		7(20.0)

### 3.4 Misconceptions about Benefits of HBV Vaccination

Although HBV is best prevented by being vaccinated, only 70.0% of mothers knew that the Hepatitis B vaccination program is free. Participants showed they were confused concerning the efficacy of the vaccine. The majority believed that HBV vaccination would only reduce the risk of disease (71.4%) and not guarantee prevention, and many still believed that the free vaccines in the EPI program are of lesser quality when compared to those which were purchased (Table 4).

### 3.5 Barriers of HBV Vaccination

Many barriers to adhering to the vaccination schedule were children being sick (74.3%), the child being a premature infant (20.0%), or vaccination days coinciding with holidays (48.6%) Table 4. Majority of the mothers said that costs and travel distance were not important barriers to having their child immunized; only

17.1% and 14.3%, respectively, reporting these factors as difficulty. There were several reasons that influenced a mother's decision regarding HBV vaccination of her infant. These include: fear of side effects (94.3%) (fever, shock or death after vaccination), unprofessional healthcare workers (HCWs) in local clinics (48.6%), wrong vaccine administered (42.9%), no physician at clinic (28.6%), and lack of belief in the EPI program because their children were not examined before and after vaccination (34.3%).

### 3.6 Cues to Action

Mothers' reasons for attending the private vaccination service at the public hospitals were: (1) belief that HCWs at these hospitals are well-trained; (2) their neighbors had good experiences at these hospitals and suggested they go there; and (3) they believed that the paid vaccine was of better quality (Table 4). Participants believed most in the information that they obtained from the medical staff.

**Table 4. Perceived benefits, Barriers of HBV vaccination, and cues to action (n=35)**

<b>Perceived benefits</b>	<b>Mother's opinion</b>	<b>N (%)</b>
Do you know the HBV vaccination program is free?		
	Yes	20(70.0)
	No	15(30.0)
What do you know about the benefits of getting the HBV vaccination?		
	Reduce the risk of disease	25(71.4)
	Guarantee prevention HBV	10(28.6)
<b>Barriers of HBV vaccination</b>		
Which factors make it difficult for you to get your child the HBV vaccination?		
	Children being sick	26(74.3)
	Vaccination days coinciding with holidays	17(48.6)
	Premature infant	7(20.0)
	Costs	6(17.1)
	Travel distance	5(14.3)
What is the most important barrier affecting your decision to get your child the HBV vaccination?		
	Fear of side effects (fever, shock or death after vaccination)	33(94.3)
	Unprofessional healthcare workers in local clinics	17(48.6)
	Wrong vaccine administered	15(42.9)
	Lack of belief in the EPI program	12(34.3)
	No physician at clinic	10(28.6)
<b>Cues to action</b>		
Where did you hear information about the HBV vaccination?		
	Medical staff.	31(88.6)
	Internet, children's hospital website	25(71.4)
	Television	21(60.0)
	Vaccination record	19(54.3)
	Brochure	7(20.0)
What source of information do you trust when deciding to vaccinate your child?		
	Medical staff.	32(91.4)
	News at hospital	21(60.0)
	Neighbors had good experiences	8(22.9)

Regarding sources of information about HBV vaccination mothers reported, television (60.0%), internet and children's hospital website (71.4%), vaccination record (54.3%), and brochure (20.0%); 91.4% of participants stated that the best source of information was the medical staff (Table 4).

#### 4. DISCUSSION

This qualitative study examined the perceptions and levels of awareness of HBV and vaccination among mothers in Vietnam. Despite previous media campaigns focused on vaccination for children, levels of reported awareness and knowledge about HBV vaccination within the community were consistently low. Numerous barriers and misconceptions were identified among the respondents, most of which were

similar to the misconceptions found in our literature review of similar studies. For example, the misconception that HBV infection is transmittable by sharing food, through genetic inheritance, by poor environmental sanitation, or by breathing infected air has been found in other studies [16-18]. Our finding of misconceptions related to HBV transmission is congruent with other studies among Asian populations. For example, studies conducted among Vietnamese Americans, Chinese and Vietnamese Australians, and Singaporeans showed that more than half of the respondents believed that HBV could be transmitted by sharing of food or intake of seafood; only 52% of Singaporeans were aware that HBV is transmittable through childbirth, and 38.7% of Vietnamese-Americans believed that people avoided HBV-positive individuals [17-19]. A qualitative study by

Wallace et al. [20] conducted among people living with chronic HBV in Australia showed that many participants associated HBV with poor sanitation, reflecting an inadequate understanding of transmission risks.

In Vietnam, a survey on knowledge of HBV transmission conducted among pregnant women at Hung Vuong hospital found that 11.9% to 44.6% of respondents had incorrect knowledge about the transmission of HBV [21]. In another study conducted by Giao et al. [22] among medical students in Ho Chi Minh city, Vietnam showed that over 50% of students had misconceptions about HBV susceptibility, severity, and transmission. Inadequate knowledge of HBV by infected individuals can lead to self-isolation and if left unchecked could lead to the stigmatization of HBV-positive individuals and hinder efforts in controlling the spread of HBV in the community. For instance, while HCWs advocate for screening for the presence of HBsAg, if someone in a family is diagnosed with chronic HBV, others in the community may be less likely to be screened if they have incorrect knowledge of transmission and are unaware of the potential transmission through childbirth. The prevention of HBV transmission remains a priority within this population, with a need for comprehensive safe-sex education and better vaccination coverage to prevent MTCT. However, information on HBV prevention such as brochures, pamphlets, posters, is not widely available to the public.

Prior studies conducted in Vietnam focused on assessing frequencies of opinions, their distribution in the community at large, or the relationship between individual factors and HBV preventive behaviors [21,22]. We were unable to find any qualitative studies that explored why people chose the paid vaccine or why children were not vaccinated on-time according to the immunization schedule in Vietnam. This is the first study conducted with the aim of identifying misconceptions about HBV vaccination and prevention of HBV-related liver disease.

This study found misconceptions among participants concerning who were at higher risk for contracting HBV. Participants felt that children with weak immune systems, heavy drinkers, people with unhygienic behaviors, and garbage collectors were the ones at higher risk. Our findings are consistent with prior studies conducted in Cambodia [16,23].

The prevention of HBV transmission remains a priority within this population, with a need for comprehensive safe-sex education and better vaccination coverage to prevent MTCT. However, information on HBV prevention such as brochures, pamphlets, posters, is not widely available to the public.

Several of the misconceptions about HBV vaccines related to the effectiveness of the EPI vaccines compared to the paid vaccines. Other barriers to the vaccination among community members were: fears regarding the side effects of the HBV vaccine, administration of the wrong vaccine, lack of available physicians at the clinic, children not being examined before the vaccination, and unprofessional behavior of HCWs in local clinics. Therefore, most parents/caregivers do not choose the EPI vaccine for their children. The finding of concern about side effects of the vaccine is similar to that of community studies on mothers in the United States [24]. Our study found that mothers' fears about adverse events following immunization made them delay or refuse vaccines. Overall awareness of HBV, its risk factors, and prevention was generally limited among participants.

Interestingly, costs and travel distance were not found to be important factors affecting immunization. This finding is different from previous studies on medical students in Vietnam, Korean-American mothers, Korean immigrants, and Vietnamese and Korean-Americans, all of which found that participants had difficulty in paying for HBV immunizations [22,23,25,26].

While respondents of the Salmon DA et al. (2013) study thought that children's immune systems could be weakened by number of immunization doses, our study found that participants did not consider this an issue because they trusted the recommendations of the doctors [27]. It is essential to raise parents' perceptions regarding HBV vaccination through education, encourage them to follow their children's immunization schedule, reassure them that the vaccines are safe, and let them know that both the EPI vaccine and paid vaccine are of the same quality.

The most commonly cited sources for HBV information in our study were specialists and popular hospitals such as The Pediatric Number 2 Hospital in HCMC. This is similar to a report of the Vietnamese-Australian group where the

preferred source of advice was medical practitioners (57%), with only 14% preferring the Internet. In contrast among the Chinese, the most commonly cited source for gathering information on HBV was the Internet (57%) and physicians (17%) [19]. A study by Salmon DA et al. conducted in Colorado, Massachusetts, Missouri, and Washington, U.S.A. found that most respondents had moderate or a great deal of confidence in state health departments (91.4%) and local health departments (88.8%), while fewer respondents had a moderate amount or great deal of confidence in the media (17.4%) [27]. The differences in these reports could be due to different socio-economic conditions in the different countries. These different findings highlight the importance of conducting local studies when planning public education programs rather than utilizing data from other countries and groups with differing sociodemographic characteristics.

## 5. CONCLUSION

HBV infection is highly prevalent in Vietnam and many misconceptions exist among the public, especially regarding at-risk groups, and mode of transmission. Further public education should be targeted to clear up the misconceptions identified and encourage parents to see that their children receive the HBV vaccination on time and ensure that they are fully vaccinated. Mothers need to be reassured that the EPI vaccines are of the same quality as the vaccines that are purchased in the private clinics at public hospitals. It is necessary to conduct a quantitative study on mothers' misconceptions regarding HBV transmission and HBV immunization, using a structured and validated questionnaire. The findings from this study will be useful in designing the quantitative instrument.

## 6. LIMITATIONS

This study has limitations that should be considered when interpreting the results. Convenience sampling was used, and all participants were recruited from a single hospital; therefore, the findings may not be generalizable to all parents with children under 1 year of age living in the region. There is also the possibility of social desirability bias; however, interviewers encouraged the mothers to express their opinions freely. Future studies could be conducted to compare differences based on gender, age, and education level of parents.

## CONSENT AND ETHICAL APPROVAL

Ethical approval was granted by the Pediatric Number 2 Hospital Ethics Committee. Participation was voluntary, and participants provided written informed consent to be interviewed and for the interview to be recorded. Participants were assured that they were able to stop participating in the study at any time and could choose not to answer any question if they did not want to. They were also assured that their responses would be kept confidential and transcripts were anonymous. The interviewer was neither a clinician nor provider of health services/care to these participants, and therefore did not have a dual relationship with the participants. Interviewing continued until no new information was being obtained from the interviews of mothers of infants who had complete or incomplete immunizations.

## ACKNOWLEDGEMENTS

We wish to acknowledge the cooperation and support of Dr. Pham Le Thanh Binh and nurses at the Pediatric Number 2 Hospital in Ho Chi Minh City, who facilitated the study. We thank all the families for the time and effort they devoted to the study.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. World Health Organization. Global Hepatitis Report; 2017. (Accessed 13 April 2018) Available:<http://apps.who.int/iris/bitstream/handle/10665/255016/9789241565455-eng.pdf;jsessionid=DCDBF3CE82E38D86A186AA3DE123DDEA?sequence=1>
2. World Health Organization. Burden of viral hepatitis in the South-East Asia Region. (Accessed 15 April 2018) Available:[http://www.searo.who.int/entity/hepatitis/data/hepatitis\\_data\\_statistics/en/](http://www.searo.who.int/entity/hepatitis/data/hepatitis_data_statistics/en/)
3. World Health Organization. Hepatitis in the Western Pacific. (Accessed 20 April 2018) Available:<https://www.who.int/westernpacific/health-topics/hepatitis>



4. World Health Organization Western Pacific Region. Hepatitis B Fact Sheet; 2018. (Accessed 13 April 2018)  
Available: <http://www.wpro.who.int/vietnam/topics/hepatitis/factsheet/en/>
5. Hipgrave DB, Nguyen TV, Vu MH, Hoang TL, Do TD, Tran NT, et al. Hepatitis B infection in rural Vietnam and the implications for a national program of infant immunization. *Am J Trop Med Hyg.* 2003;69(3):288-94.
6. Ngo TA, Quach MT, Nguyen DN. Assessment of the status of hepatitis B virus infection in children aged 3-6 years in ThieuHoa district, Thanh Hoa province [in Vietnamese]. *J Prev Med.* 2005;15(1):155-158.
7. Wang S, Smith H, Peng Z, Xu B, Wang W. Increasing coverage of hepatitis B vaccination in China: A systematic review of interventions and implementation experiences. *Medicine (Baltimore).* 2016;95(19):e3693.
8. Mao B, Patel MK, Hennessey K, Duncan RJ, Wannemuehler K, Soeung SC. Prevalence of chronic hepatitis B virus infection after implementation of a hepatitis B vaccination program among children in three provinces in Cambodia. *Vaccine.* 2013;31(40):4459-64.
9. Sreng B, Sophal C, Srun S, Samnang C, Huot E. Viral hepatitis in Cambodia: Past, present, and future. *Euroasian J Hepatogastroenterol.* 2016;6(1):45-48.
10. Nguyen TH, Vu MH, Nguyen VC, Nguyen LH, Toda K, Nguyen TN, et al. A reduction in chronic hepatitis B virus infection prevalence among children in Vietnam demonstrates the importance of vaccination. *Vaccine.* 2013;32(2):217-22.
11. United Nations International Children's Fund (UNICEF). Viet Nam: WHO and UNICEF estimates of immunization coverage: 2016 revision; 2017. (Accessed 13 April 2018)  
Available: [https://data.unicef.org/wp-content/uploads/country\\_profiles/Viet%20Nam/immunization\\_country\\_profiles/immunization\\_vnm.pdf](https://data.unicef.org/wp-content/uploads/country_profiles/Viet%20Nam/immunization_country_profiles/immunization_vnm.pdf)
12. Leroi C, Adam P, Khamduang W, Kawilapat S, Ngo-Giang-Huong N, Ongwandee S, Jiamsiri S, Jourdain G. Prevalence of chronic hepatitis B virus infection in Thailand: A systematic review and meta-analysis. *Int J Infect Dis.* 2016;51:36-43.
13. Smith PJ, Humiston SG, Marcuse EK, Zhao Z, Dorell CG, Howes C, et al. Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the Health Belief Model. *Public Health Rep.* 2011;126(Suppl 2):135-46.
14. Rajamoorthy Y, Taib NM, Munusamy S, et al. Knowledge and awareness of hepatitis B among households in Malaysia: A community-based cross-sectional survey. *BMC Public Health.* 2019;19(1):47. Published 2019 January 10.  
DOI: 10.1186/s12889-018-6375-8
15. Janz NK, Becker MH. The health belief model: A decade later. *Health Education Quarterly.* 1984;11(1):1-47.
16. Burke NJ, Do HH, Talbot J, Sos C, Svy D, Taylor VM. Chumnguh thleum: Understanding liver illness and hepatitis B among Cambodian immigrants. *J Community Health.* 2010;36(1):27-34.
17. Lu W, Mak B, Lim SG, Aung MO, Wong ML, Wai CT. Public misperceptions about transmission of hepatitis B virus in Singapore. *Annals of the Academy of Medicine, Singapore.* 2007;36(10):797-800.
18. Nguyen TT, McPhee SJ, Stewart S, Gildengorin G, Zhang L, Wong C, et al. Factors associated with hepatitis B testing among Vietnamese Americans. *J Gen Intern Med.* 2010;25(7):694-700.
19. Vu LH, Gu Z, Walton J, Peet A, Dean J, Dunne MP, et al. Hepatitis B knowledge, testing, and vaccination among Chinese and Vietnamese adults in Australia. *Asia-Pacific Journal of Public Health.* 2011;24(2):374-84.
20. Wallace J, McNally S, Richmond J, Hajarizadeh B, Pitts M. Managing chronic hepatitis B: A qualitative study exploring the perspectives of people living with chronic hepatitis B in Australia. *BMC Res Notes.* 2011;4:45. Published 2011 March 3.
21. Do Huu Loi. Knowledge and attitude about Hepatitis B among pregnant women aged 18-45 years at the Hung Vuong hospital. University of Medicine and Pharmacy in Ho Chi Minh City; 2008.
22. Giao H, Vinh BQ, Le An P. The proportion of vaccinated students and perceptions of about hepatitis B disease. *Journal of*

- University of Medicine and Pharmacy in Ho Chi Minh City. 2016;33:189-93.
23. Maxwell A, Stewart S, Glenn B, Wong W, Yasui Y, Chang L, et al. Theoretically informed correlates of hepatitis B knowledge among four Asian groups: The health behavior framework. *Asian Pac J Cancer Prev.* 2012;13(4):1687-92.
  24. Thomas M, Kohli V, King D. Barriers to childhood immunization: Findings from a needs assessment study. *Home Health Care Services Quarterly.* 2004;23(2):19-39.
  25. Kim YO, Telleen S. Predictors of hepatitis B immunization status in Korean American children. *Journal of Immigrant Health.* 2001;3(4):181-92.  
DOI: 10.1023/A:1012275527477
  26. Choe JH, Chan N, Do HH, Woodall E, Lim E, Taylor VM. Hepatitis B and liver cancer beliefs among Korean immigrants in Western Washington: Report of a qualitative study. *Cancer.* 2005;104(12 Suppl):2955–2958.
  27. Salmon DA, Moulton LH, Omer SB, Chace LM, Klassen A, Talebian P, et al. Knowledge, attitudes, and beliefs of school nurses and personnel and associations with nonmedical immunization exemptions. *Pediatrics.* 2004;113(6):e552-9.

© 2018 Giao et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<http://www.sdiarticle3.com/review-history/47153>