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**Article:**

Vedio, A., Liu, E.Z.H., Lee, A.C.K. [orcid.org/0000-0002-9795-3793](https://orcid.org/0000-0002-9795-3793) et al. (1 more author) (2017) Improving access to health care for chronic hepatitis B among migrant Chinese populations: a systematic mixed methods review of barriers and enablers. *Journal of Viral Hepatitis*. ISSN 1352-0504

<https://doi.org/10.1111/jvh.12673>

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This is the peer reviewed version of the following article: Vedio, A. et al (2017), Improving access to health care for chronic hepatitis B among migrant Chinese populations: a systematic mixed methods review of barriers and enablers. *J Viral Hepat.*, which has been published in final form at <https://doi.org/10.1111/jvh.12673>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Self-Archiving.

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# **Improving access to health care for chronic hepatitis B among migrant Chinese populations: a systematic mixed methods review of barriers and enablers**

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This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:

10.1111/jvh.12673

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## ABSTRACT

Migrant Chinese populations in Western countries have a high prevalence of chronic hepatitis B but often experience poor access to healthcare and late diagnosis. This systematic review aimed to identify obstacles and supports to timely and appropriate health service use among these populations. Systematic searches resulted in 48 relevant studies published between 1996 and 2015. Data extraction and synthesis were informed by models of healthcare access that highlight the interplay of patient, provider and health system factors. There was strong consistent evidence of low levels of knowledge among patients and community members; but interventions that were primarily focused on increasing knowledge had only modest positive effects on testing and/or vaccination. There was strong consistent evidence that Chinese migrants tend to misunderstand the need for healthcare for hepatitis B and have low satisfaction with services. Stigma was consistently associated with hepatitis B and there was weak but consistent evidence of stigma acting as a barrier to care. However, available evidence on the effects of providing culturally appropriate services for hepatitis B on increasing uptake is limited. There was strong consistent evidence that health professionals miss opportunities for testing and vaccination. Practitioner education interventions may be important but evidence of effectiveness is limited. A simple prompt in patient records for primary care physicians improved the uptake of testing; and a dedicated service increased targeted vaccination coverage for new-borns. Further development and more rigorous evaluation of more holistic approaches that address patient, provider and system obstacles are needed.

Keywords: access to healthcare, hepatitis B, Chinese population, barriers

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## Introduction

Hepatitis B is a highly transmissible viral infection with global distribution. Epidemiological studies show that a third of the world's population currently has, or has had, hepatitis B infection. The infection is particularly prevalent in areas of East Asia such as China, Taiwan, Singapore, Malaysia and South East Asia such as Korea, Vietnam, Cambodia and Laos(1). In recent decades, there has been a considerable increase in global migration including movement of persons of Chinese ethnicity from East Asia to countries with low prevalence for the disease, such as North America, Europe and Australia. Groups of migrants from these countries where hepatitis B is endemic have similar prevalence to their country of origin(2–4). There is evidence that Chinese persons in the UK experience greater mortality rate than the background population from liver cancer(5); and that they endure reduced access to health care services for chronic hepatitis B(6–8). This is a growing public health issue for receiving countries and there is need for better disease surveillance and testing of high risk migrant groups as well as effective follow-up in order to ensure infected persons access appropriate health care and their close contacts are appropriately protected, an issue recognised in national policies(9,10).

Poor access to healthcare services among migrant and other marginalised groups is increasingly recognised as a complex, multifaceted issue. Recent frameworks usefully emphasise the interactive and recursive nature of healthcare access, highlighting the need to understand the interplay between patients, providers and the services on offer (11,12). To-date these perspectives have not been used to synthesise the growing body of research that examines hepatitis B among migrant Chinese populations. Several past reviews have addressed particular populations or interventions, but none have employed systematic methods nor provided a comprehensive synthesis that can be applicable in different contexts (13–15). The current study

adds to our understanding of the barriers and enablers of access to hepatitis B testing and healthcare access for Chinese migrants in Western societies through a systematic and theory-informed evidence synthesis.

## **Materials and methods**

### **A systematic mixed method review**

This review adopted a systematic mixed methods approach in order to identify and integrate relevant evidence from the widest range of primary studies(16).

### **Search strategy**

We used a search strategy that aimed to be inclusive by using expanded search terms and by searching both in biomedical databases (Medline, Embase, Cinhal, PsycInfo) and in social sciences databases (ASSIA, Web of Science). We adopted this broad approach in order to ensure we captured all relevant publications. The search terms were grouped in three areas: the population of interest, health care access and experiences, and hepatitis B and are delineated in Table 1.

### **Inclusion/exclusion criteria**

An initial screen undertaken by three of the authors (AL, AV, SS) involved a review of the title and/or the abstract and studies were retained if they focused on (i) individuals identified as

Chinese and/or Far East Asian ethnicity living in a Europe, North America or Australia/New Zealand, and on (ii) healthcare (including testing and vaccination) for hepatitis B. Publications that took a purely epidemiological or pathological approach, without investigating factors affecting healthcare access, were excluded and inclusion and exclusion conflicts were discussed and consensus reached. A second sifting stage involved full text review for 'richness' and retained only those studies judged to provide sufficient data on influences on healthcare access. Following an initial recommendation for inclusion/exclusion by a senior reviewer, a team of three reviewers agreed the final set of included studies. A methodological quality checklist that combined both generic indicators(16) and indicators of quality for research on ethnicity and health(17) was used. However, since the volume of studies was low, we chose not to exclude on the basis of quality, but rather to moderate the contribution of papers that were of low methodological quality to the final conclusions drawn from the synthesis. Reference lists of included papers identified were then scanned and potentially relevant papers subjected to the same sifting process as described above.

### **Data extraction and synthesis**

An extraction template was developed and refined iteratively by three members of the research team drawing on access to care frameworks(11,12) and initial reading of a sub-set of included papers. Papers were categorised by methodology for analysis: qualitative papers were examined by an anthropologist (EL); quantitative studies by a physician researcher (AV); and interventional studies by a social scientist (SS). NVivo® was used to code and retrieve material from the qualitative papers, while a template was prepared in a MS Excel® spread sheet to support the retrieval of relevant information from the quantitative and interventional studies.

Extraction codes related to areas influencing individuals' choice and identification of need for health care (i.e. community and family support, health beliefs), health services accessibility and adjudication of perceived need for care (i.e. practitioners attitudes, knowledge and practice) and wider determinants (i.e. socio economic barriers, policy, institutional factors). Synthesised memos were prepared initially for each set of studies to correctly classify the studies, their context and the clarity and strength of the evidence of each study. Next, evidence was integrated across the methodologies through discussion and consensus in research meetings. Finally, a series of statements was developed to summarise the available evidence in terms of its strength and consistency (approach adapted from McLean et al(18) as described in Table 2).

## **Results**

### **Study characteristics**

The initial search found 347 publications of which 111 were deemed relevant after abstract screening, and 48 were selected after richness and methodological appraisal. Table 2 provides an overview of the 48 studies included, together with descriptions of their geographical setting, study design, objectives, populations and sample sizes. Nineteen cross-sectional surveys described knowledge levels and other factors hypothesised to influence healthcare usage and health behaviours related to HBV, as well as reasons for (non-) testing or (non-) vaccination. The different studies employed diverse measurement approaches, reflecting a lack of validated instruments, which made findings difficult to compare. Two recent cross sectional studies recruited patients with hepatitis B and enquired about rates of contact tracing of relatives(19) and potential factors affecting treatment uptake(20). Seven qualitative studies explored

reasons for (non-) testing, (non-) vaccination or treatment adherence, as well as underlying meanings, processes or values related to the disease. Twenty-two interventional studies sought to either describe, or evaluate the effectiveness of, interventions. Although the evaluations were likely to provide the most robust evidence, their study designs were frequently weak which compromised the strength of the evidence generated.

A few studies took a holistic approach, aiming to examine the interplay between populations and healthcare system actors, but the majority focused solely on patients or members of the public of Chinese or East Asian ethnicity. Among the interventional studies, seven papers referred to multi-component interventions addressing purported obstacles at both the community and healthcare level(21–27), four referred to lay health worker interventions(28–31), six reported on narrower health education interventions(32–35), and two reported on interventions that involved modifications to the healthcare delivery alone(36,37).

The uptake of HBV testing was the most frequently studied outcome (14 quantitative papers(19,38–49) and six interventional papers(21–23,26,27)). Few papers looked at vaccination uptake (one survey(39) and two interventions(25,36)), or the receipt of care/treatment by HBV-infected individuals (three surveys(20,50,51)) and one qualitative paper(52)). Several papers examined more than one healthcare outcome, particularly those focused on multi-component interventions(21–23,26,27) and the qualitative papers(52–57).

Theoretical frameworks were infrequently used to inform collection or analysis of data in the quantitative studies. The frameworks used in studies included the “Health Belief Model”(58), “Behavioural Model of Health Service Use”(46), and the “Health Behaviour Framework”(40).

The “Sociocultural Health Behaviour Model” derived by the G. Ma was applied to elucidate factors associated with never having been screened for HBV(45,49).



## Evidence statements

### **- There is strong consistent evidence of low knowledge and awareness of CHB among Chinese populations**

Examination of knowledge levels, awareness and misconceptions held by individuals within the target populations found common misconceptions regarding transmission routes, participants erroneously identifying sharing food and utensils as a route of infection(38,41,46–48,59). Transmission by sexual intercourse was correctly identified by 50 to 66% of survey respondents and 80% of patients with CHB(51). Knowledge of hepatitis B mother-to-child transmission at birth was recognised correctly by 70 to 91% of respondents(40,41,46–48), and 85% of patients with hepatitis(51). One to two thirds were unaware that HBV is more common in China or among Chinese immigrants than among other populations(40,42,60). And while 89% of Chinese American respondents thought HBV would be harmful if they contracted it, only 33% believed that they were at risk(39). Respondents were unlikely to perceive themselves as being at risk of infection if they had been resident in the UK for a long period(59). Misconceptions about causal factors were reported including: harmful food (fried foods or contaminated foods), alcohol, contact with infected individuals, stress and inadequate rest.(53,55,56,61) Among patients with CHB, a third of treated and 40% of untreated patients believed life style changes and diet can be sufficient to manage the infection(20).

**- There is weak equivocal evidence that levels of knowledge are associated with receipt of HBV testing and vaccination.**

Studies that examined the association between knowledge levels and HBV testing(38,40,42,44–46,58), or with both testing and vaccination(39,47), reported a positive association with previous testing for HBV and knowledge scores(38,46,58). The strength of association observed was between OR 1.15 and 4.8 as measured with different instruments. Correct responses - to “the Chinese are more likely than Whites to have HBV” (OR=1.9), “individuals with HBV can be infected for life” (OR=1.7), and “HBV causes liver cancer” (OR=2.0)(40) -; and the answers to two knowledge questions - reporting that the disease was serious (OR=1.3) and that it caused harm (OR=3.9)(39) - were all positively associated with having been tested. In the latter, there was no significant association with having been vaccinated in the logistic regression analysis(39). A knowledge score (based on 11 statements with possible answers yes/no/unsure) was not significantly higher among China-born respondents who had been tested for HBV, but was significantly higher among those that had been vaccinated; although there was no significant association between current knowledge and prior testing or vaccination among their Vietnam-born respondents(47).

**- There is weak, consistent evidence that interventions focused on improving knowledge about HBV (without action on other barriers) result in only modest increases in uptake of screening and vaccination.**

Poor knowledge levels about the disease among the target populations have previously been addressed by designing and delivering educational material in linguistically and culturally tailored ways such as lay health workers, using community venues, and through mass media

and English language classes. Most studies reported an increase in knowledge levels post intervention, but this was not necessarily sustained over time and some misconceptions appeared difficult to shift(30–32,62). Importantly, several interventions that achieved an increase in knowledge did not achieve similar increases in uptake of testing or vaccination(25,35). A study from Texas, USA reported significant increases in knowledge among two intervention arms for raising knowledge and awareness among parents (coupled with improved access to low cost services). However, despite a significant increase in child vaccination rates, these remained below 40% in both intervention groups(25). A few studies evaluated a Lay Health Worker model involving educational and motivational dimensions in different contexts(29–31,62). They found significant increases in mean knowledge scores and self-reported testing, but concluded that effect sizes on testing were small for the resources needed and that poor knowledge may not be the key factor restricting testing. Taylor delivered an educational intervention in ESL classes<sup>1</sup> and similarly found that increased knowledge was accompanied by a weak effect on testing uptake (with just 6% of intervention participants reporting testing at follow up)(35).

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<sup>1</sup> ESL – English as a Second Language

- **There is consistent evidence that stigma around hepatitis B exists, but interventions to address stigma, also addressed other factors thus confounding the evidence on its relevance as a barrier to care**

The importance of stigma as an obstacle to HBV healthcare access show variable results. In a UK study HBV-related stigma did not show a consistent picture across their ethnically diverse sample of UK respondents and there were no findings specific to Chinese participants(59). Nevertheless, some participants did report a fear of infection among community members and felt that this could lead to anxiety around eating together and the sharing of utensils.

Two non-UK qualitative studies identified stigma and the fear of disclosure as potentially adversely impacting on access to care as it made it more difficult for patients to keep their disease status secret(52,57). Fear of rejection or stigma at a personal and community level also restricted CHB patients from disclosing their status to family and friends as it could lead to exclusion from family and social life in some communities. The stigma seems to arise from a belief that ‘the way to avoid disease is exclusion’(52).

One study addressing stigma found that the ‘fear of contagion’ stigma was most prevalent; 62% of respondents believed that ‘infected individuals should avoid close contact with others such as kissing and hugging’(48). Stigma associated with the “fear of contagion”, “negative perception” and “workplace/school stigma” were lower and knowledge levels were higher in people who reported having a relative with hepatitis B(48).

In one Canadian study, a third of participants with hepatitis B, the majority of whom had secondary education and had resided in Canada for over 10 years, were not ashamed and were willing to inform others of their condition. Persons who had resided in Canada for less than 10 years were less likely to inform others(51). Markers of stigma were also less common among people with poor knowledge of hepatitis B; for example, “fear of getting a bad test result, embarrassment/ shame” was not associated with never having been tested(45). In contrast, a previous study, Ma et al. (2010) reported that the ‘fear of a bad test’ and ‘embarrassment or shame’ was negatively associated with testing status (44).

Exploration of the role of social support, and particularly family-level support, found that testing was more common among those who had discussed it with their spouse (39), and among those who reported that a family member had suggested it, but less common among those that had not discussed hepatitis B with a partner or family member (40). However, the direction of the association could not be ascertained and reverse causality could not be excluded from these cross-sectional studies.

Several of the studies of multi-component interventions aimed to address stigma both via individual communication and community-wide efforts; e.g. mass media, using celebrities, community awareness events held at churches, and engagement of community leaders. For example, an intervention for Korean Americans included activity in churches aimed at challenging community level stigma including messages that emphasized the benefits of being tested for HBV, that such action is the responsible thing to do, and these aimed to challenge the embarrassment or shame associated with HBV infection(24).

However, detailed description of how these were implemented was not provided in the publications and none explicitly reported on any shifts in attitudes or behaviours to suggest reductions in levels of stigma. None of these studies attempted to isolate the effect of reducing stigma on uptake of testing, vaccination or treatment for HBV.

**- There is consistent evidence that migrant Chinese populations have low engagement and satisfaction with local health systems**

Financial barriers to hepatitis care were reported in several of the US-based qualitative studies (54–57). The financial barriers included lack of health insurance(61) and difficulty in getting such insurance (57). Chinese and Korean participants could not afford screening tests(56) and the practitioners reported being somewhat reluctant to test for and diagnose HBV because of anticipated problems with the affordability of care(55). However, in a survey study of patients with CHB not receiving treatment, affordability of treatment was seen as possible below certain monthly expenditure and this exceeded the actual out of pocket expenditure of treated patients(20). In the survey studies, there were mixed findings in relation to the association between general socioeconomic factors (such as employment, income and education) and screening status. Individuals without health insurance were less likely than those with insurance to have been tested, but household income was not associated with testing status(44,49).

Not having a regular family physician was also found to be negatively associated with prior screening(40,46). Similarly, a positive correlation (OR:10.5) was found between prior HBV vaccination and having a primary care physician(39). A UK study reported that some immigrants do not register with primary healthcare(59). In addition, other structural issues identified

included limited consultation availability, long working hours, restrictions on the use of some healthcare services by immigrants, potentially affecting their engagement with HBV screening(59). Chinese participants who reported not having less time or transportation were less likely to have been tested for HBV(44).

Language and communication difficulties were also identified as barriers to engagement with primary care-based screening and treatment for Chinese patients in the UK(59). This mirrors similar findings from non-UK qualitative studies elsewhere(55–57). Some of the survey studies found that those who needed an interpreter during doctor visits were less likely to have been tested(40), while not speaking the physician’s language was negatively associated with prior HBV vaccination(39). Some immigrants have low levels of trust and confidence in UK general practice-based care that has been attributed to rushed appointments and delays in receiving treatment(59). Key informants felt that a screening invitation letter might be ignored by some expecting to be contacted again if the screening was important and others fearing the knock-on implications in terms of further tests or treatment(59). A lack of preventive healthcare seeking was highlighted, as well as the acceptance of poor health and a lack of familiarity with the healthcare system that contributed to low levels of health service engagement (57).

The use of complementary and alternative medicine (CAM) by Chinese immigrants was another factor that was identified as undermining positive patient-provider interactions and potentially affecting appropriate HBV care. There was evidence that patients turn to CAM when told that hepatitis B is not curable with biomedicine(53,56). In addition, practitioners have mixed attitudes towards CAM and some practitioners suspect their non-acceptance of CAM could turn patients away(55).

Misunderstandings about HBV-related healthcare were further potential barriers to uptake. In the UK, healthcare providers identified adherence to treatment among some chronic hepatitis B immigrant patients to be poor and that this was because patients may not fully appreciate the value of monitoring or taking medication if they felt well(59). Studies from the US also found misunderstandings regarding testing: Korean groups did not understand the significance of screening prior to vaccination(56) and participants did not understand test results(52,56); others were unclear about vaccination including fears of side effects(53,54) and failed to recognise vaccination as a primary means of prevention(53,54,56,57). Reasons given by participants for not having been tested in some of the survey studies also suggested a lack of understanding regarding HBV infection and testing. The “lack of knowledge” and “feeling well” were commonly reported reasons for not being screened(39). Among patients with CHB, many were concerned about the potential side effects of treatment such as kidney damage and bone thinning(20).

**- There is confounded evidence that the provision of free or low cost services that are culturally appropriate and geographically and temporally accessible are effective in increasing uptake of HBV screening, vaccination and treatment**

Some interventional studies recognised structural obstacles and included modifications to the cost, availability and/or cultural appropriateness of HBV healthcare services. The multi-component interventions tended to address several factors at once including: free or low cost testing and vaccination(21–26), provision of additional community-based sites for testing and vaccination(21,22,26), or flexible opening times(24), and the involvement of bilingual or



multilingual healthcare practitioners or support staff(21,22,24,26). It was not possible from these studies to ascertain the individual contribution of each intervention component.

Studies that evaluated these multi-component interventions concluded that the provision of free services was important. For instance, 48% of those tested for HBV through the *Jade Ribbon Campaign* in San Francisco said that they would not have been tested if it had not been free(23,63), and 88% of those newly identified with HBV infection were uninsured in *BeFreeNYC*(26,27). There were also several studies that evaluated simpler interventions involving training and deployment of Lay Health Workers to help community members navigate the health services, and provide support and education to them in their homes . These studies reported significant increases in self-reported testing, though levels remained low [6% of the intervention group for Chinese in 2009(30); 22% of the intervention group for Cambodians in 2013(31); 24% of the intervention group for Hmong in 2013(29)] and the authors concluded that increases were small for the resources expended.

**- There is strong, consistent evidence that healthcare providers miss opportunities during routine healthcare encounters to refer Chinese immigrant individuals for screening and follow up for HBV.**

The role of healthcare practitioners, particularly family physicians, was explored in several studies as a potential barrier or support to testing, vaccination and treatment access. Several of the US papers noted that physicians in the US commonly fail to adhere to CDC<sup>2</sup>

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<sup>2</sup> CDC – US Centres for Disease Control and Prevention

recommendations that individuals of Chinese/Far East Asian origin should be routinely tested for HBV.

Opportunities for testing and vaccination of Chinese immigrants within routine healthcare encounters are frequently missed in receiving country settings. In one study, only a third of 393 practitioners surveyed reported that they screen all new Asian patients for HBV, regardless of risk factors or symptoms, whilst two thirds reported that they would screen some of their new Asian patients for CHB, but that this was dependent on the presence of risk factors in these patients(43). The reasons given for not testing were primarily the cost of tests, physician considerations and patient resistance. In an Australian study 70% of the Chinese respondents who had been vaccinated had received it in their country of origin(47). Similarly, those who had lived a shorter proportion of their life in North America were significantly more likely to have had HBV testing which may reflect greater HBV prevention efforts in Asia than in North America(42).

A common theme in focus group discussions was adherence to the doctors' recommendations, both in relation to other medical matters, and in relation to HBV testing(64) and vaccination(54). Despite the fact that the majority of participants had healthcare providers who were conversant in Chinese, most reported no discussion of hepatitis B with their providers(39). There was a positive association between reported prior HBV screening and reports that the doctor had suggested being tested (OR=2.4). Similarly, studies in Canada and US found that those who reporting having had a test previously were more likely to have received a physician recommendation to do so (OR 9.04) (40–42). In a study of sources of information and its influence on testing uptake, 39% reported gaining information about HBV from physicians. The study concluded that *'learning about HBV from physicians had the strongest direct effect'*

(p779) on screening behaviour(58). Further evidence show that when participants were asked directly the reasons why they had not been tested, a common response was that the “doctor did not suggest it”(39), and the top reported reasons for being tested were when the tests were “mandatory” (43%) and “following physician advice” (16%). Survey respondents also suggested that they would consider testing if they felt sick/discomfort (35%) or if instructed to by a doctor (21%)(43).

**- There is one strong study that shows that simple prompts to primary healthcare physicians can increase referral for, and receipt of, HBV testing.**

Two interventional studies focused entirely on modifications to the health-service model. A US study used a controlled trial design to assess the effect of an electronic health record prompt sent to primary care physicians 24 hours before a scheduled appointment with a patient with a Chinese surname(37). The prompt included CDC recommendations for HBV testing in at-risk Asian populations, information about HBV prevalence and laboratory tests for HBV screening and also a link to facilitate the ordering of tests. The study found that among patients in the intervention arm, 41% received an order for, and 34% completed, an HBV test, compared to 1.1% and 0% in the control (care as usual) arm ( $p<0.001$ ).

**- One dedicated service for immunisation of new-born babies to hepatitis B infected mothers show improvement of vaccination coverage in the UK**

One intervention implemented in London, UK, provided a dedicated centralised immunisation service aimed at increasing immunisation coverage among babies born between 1992 and 1996

to hepatitis B positive mothers (a small proportion of whom were identified as 'Oriental'). The setting is an inner city area, with high proportion of immigrants from high prevalence countries and high mobility. In the UK only targeted immunisation of babies is available through primary care. The study found that greater proactivity on the part of the health service, to contact mothers whose babies remain unimmunised and to provide flexible opportunities for completion of hepatitis B immunisation course, were effective at improving coverage in comparison with a similar neighbouring area(36).

**- There is confounded evidence that education of healthcare practitioners is effective in increasing uptake of HBV screening, vaccination and treatment.**

Two survey papers examined practitioner knowledge. In one US study most primary care physicians (83%) knew that CHB was a serious condition were aware that the disease was prevalent in the Asian American population. However, more than half (62%) were unfamiliar with the major treatment guidelines(43). Another US study, in an area with a high Chinese population density, showed that as much as 30% of providers could not identify the correct test for HBV screening despite the fact that all of the respondents knew that Chinese immigrants had a higher prevalence of chronic HBV than non-Hispanic Whites or US-born Chinese people(65). The study also found that providers who spoke an Asian language and had greater knowledge of HBV were more likely to report that they would screen their patients for HBV(65).

Care may also be suboptimal for patients with the hepatitis B virus. A qualitative study found that little information about hepatitis B and its impact was given to participants at the point of diagnosis, and people with CHB had a poor understanding of their infection and had

reservations regarding the capability of health professionals to respond effectively to their CHB queries(52).

Multi-component initiatives also recognized the influential role of physicians and targeted them in an attempt to reduce missed opportunities within the healthcare system for testing and to support HBV service uptake. Bailey et al. (2011) introduced a range of measures aimed at practitioners' role including educational events, a quick reference HBV diagnostic flowchart and practitioner pledge signing to confirm intended adherence to CDC recommendations (87). The *Jade Ribbon Campaign* in San Francisco included education for healthcare practitioners, including Chinese medicine providers(23,63). McPhee et al. (2003) report on another multi-component intervention that included engagement and registration of physicians as providers of low cost hepatitis B services(25). The *BeFreeNYC* initiative in New York also included training for providers(26,27). However, it was not possible ascertain the effect of these provider-focused interventions as they were part of complex, multi-component interventions.

## **Discussion**

The evidence base is currently skewed towards studies focused primarily on the knowledge and attitudes of Chinese immigrant groups including interventions to modify these, with less attention having been paid to practitioner attitudes and health system factors that could better support access to HBV screening, vaccination and care. However, findings from this review suggest that interventions focused on the target population alone are unlikely to be efficacious. Indeed, there is evidence of the significant influential role of health providers.

Dixon-Woods(11) describes access as a complex and interactive process whereby individuals within their social and economic context identify their own need for health care (termed 'candidacy' in this model) and negotiate and navigate services that are more or less 'permeable'. This review confirms that navigation and negotiation can be compromised by misunderstandings and poor knowledge of services and of the condition, but addressing these obstacles without addressing service accessibility does not effectively improve access. Health workers intervene in this negotiation by adjudicating candidacy and offering the right services, aligned with institutional, commissioning and policy guidance as well as skills and knowledge. Causes for reduced access to services are complex and multifactorial, but understanding the interaction between individuals and services is essential to define and modify determinants of access(12). Contacts with primary healthcare providers present an important, but often unrealised, opportunity to promote HBV testing and follow-up. Individuals who are not registered with, or do not visit their physician, or who have not had positive interactions with their primary healthcare provider, are less likely to access HBV-related healthcare even if they themselves recognise a need for it(57,59). There may also be some reticence within migrant Chinese populations to access care or testing, due to various barriers such as stigma(46,48) or poor understanding of the disease and its risks(38,40).

Primary care physicians are often the gate-keepers to HBV testing, vaccination and treatment, and therefore hold an influential role in enabling access to services(11). Economic barriers may exist, the thought that treatments might be unaffordable was found to be an influential factor in practitioners' decision to offer tests(55), but it is not clear if this is a shared decision: a process whereby the patient and the physician are involved in a discussion of informed options, and reach an agreement in the decision making process(66). If health workers make non-

shared decisions that are in dissonance with the needs or choice of individuals, may exert a disempowering effect in patients. A more comprehensive and holistic approach including health provider adaptations is required to improve the accessibility and acceptability of services. Enabling and empowering patients to successfully request tests and care for their individual needs also warrant attention.

A number of limitations of the reviewed evidence base, and our review methods, should be highlighted. Caution is warranted in extrapolating findings across often very divergent social and healthcare contexts. The majority of studies were published over the last 10 years and originate in USA, and there are very few studies from other countries, particularly those where public health services are provided free. However, low uptake is reported in healthcare settings where the services should be free as well as those where they might be dependent on particular insurance status.

An important limitation is that most of the studies reviewed were not informed by any explicit theory, and those that referenced theoretical models did not explicate them clearly. Indeed, a lack of detailed theory-driven process evaluations meant that it is not possible to ascertain and validate the efficacy of the various interventions employed or their mechanisms of action. There was also a dearth of robust evaluations of interventions. Most of the interventional studies were of low or medium quality and there was a reliance on self-reported measures of healthcare uptake. A lack of controlled designs further compromised the strength of conclusions that could be drawn from many of these studies. There was also very little information on the costs of these interventions and there were no detailed assessments of the cost effectiveness of the interventions studied. Consequently, the findings from the various studies have been mixed. Further studies using more robust methodology to elucidate the

effectiveness of interventions to boost HBV testing and care are required. In addition, practical strategies to improve the accessibility of health care services deserve further exploration.

Another limitation of the existing evidence base is that the diversity within and between Chinese sub-groups was not explored in much detail in most studies. While some gender, age, socioeconomic and migration status differences were examined, the results were inconsistent and it was not easy to identify the relevance to diverse settings, other than the general need to recognise diversity and to exercise caution in generalisations.

Finally the review sought to examine papers in the English published literature only, therefore potential useful findings in other languages were not studied. This study addressed only Chinese and related populations, but did not examine studies looking at other communities that may have information on common barriers in relation with chronic hepatitis B. This also applies to examination of studies addressing other conditions in Chinese populations that could have provided further understanding of barriers in this population.

## **Conclusion**

Migrant Chinese populations across the world are not a homogeneous group but extremely diverse in terms of their countries of origin, language and dialect groups, education levels, socioeconomic wealth, and degree of acculturation, all of which are likely to have some bearing on their health seeking behaviours. Cognizance of this diversity is vital to ensure that interventions developed are tailored to the cultural and contextual specificities of each Chinese migrant community.



The current evidence base shows that low awareness, knowledge and access to testing and treatment for hepatitis B are a consistent pattern for migrant Chinese populations across diverse health service contexts. However, the evidence for interventions to address these healthcare gaps is patchy. Multipronged approaches to researching determinants of access, and to informing policy interventions, are necessary. It is likely that effective programmes to boost access to care and testing for hepatitis B will need to be carefully designed, multi-faceted and target health care providers as well as the population groups, ensuring integration of programmes within the broader health systems.

### **Acknowledgments**

*We acknowledge the members of the research team: Dr Jason Horsley, Dr Amrita Jesurasa, Dr Benjamin Stone, Professor Elizabeth Goyder and Professor Steve Green.*

*We thank the research advisory group Mr Eddie Chan (London Chinese Healthy Living Centre), Mrs Carrie Ho (Scottish Huntington Lothian and Edinburgh Chinese Elderly Support Association), Dr Mike Tomson (Sheffield GP), Dr Christian Schnier (Health Protection Scotland), Wendy Phillips (Health Protection at Public Health England), Ruth Granger (Health Protection Manager, Sheffield City Council)*

### **Disclosures**

*This review was funded by the Policy Research Programme of the Department of Health, UK as part of study 015/0313.*

*The paper authors do not have any commercial disclosures to declare.*

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**Table 1: search strategy terms**

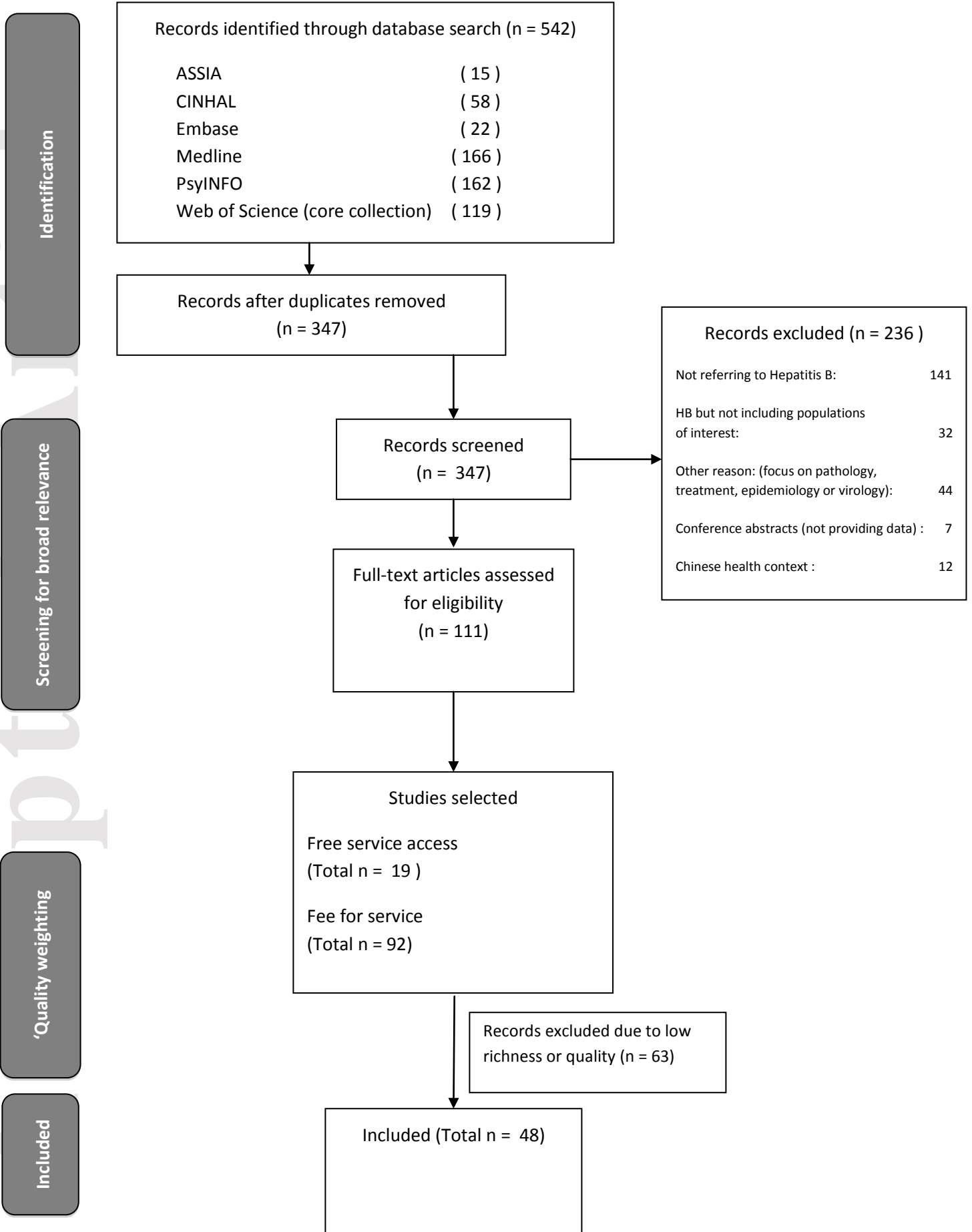
Criteria	Terms included
<b>Population</b>	“Chinese”, “Asian continental ancestry group”, “Asian Ancestry”, “Far East Asian”, “Korean”, “Taiwan or Taiwanese”, “Malaysia or Malaysian”, “Asian”, “East Asian”, “Singapore”
<b>Health care access</b>	“Barriers”, “Access to Health Care” (or healthcare), “Health services accessibility”, “Healthcare disparities”, “Patient acceptance of healthcare”, “Health Knowledge, Attitudes, Practice” or “barrier\$ to health”, “Health behaviour” or “Attitude to health”
<b>Hepatitis B</b>	“Hepatitis B, Chronic”, “Hepatitis B”, “HBV” or “Hepatitis B Virus”

**Table 2 – Definitions edited for the evidence statements (Table 4)**

<b>Category</b>	<b>Definition</b>
<b>Strong consistent evidence</b>	Studies pointing in the same direction (for or against) with a pattern of statistical significance
<b>Strong equivocal evidence</b>	Studies with statistical significance shared between for and against positive and negative effects
<b>Weak consistent evidence</b>	Studies pointing towards a general trend without statistical significance
<b>Weak equivocal evidence</b>	Studies divided between for and against without statistical significance
<b>Indicative evidence</b>	Studies suggesting that a factor may be important (i.e. result from single study)
<b>Confounded evidence</b>	Studies include factor but have not been designed to isolate its importance



**Figure 1 - Systematic Literature Search Flow Diagram**



**Table 3: Systematic literature review: included studies**

Authors	Location	Aim/focus	Research method	Setting	Participants
<b>Quantitative</b>					
<b>Free at point of access</b>					
<b>Cheung et al. 2005</b>	Vancouver, Canada	To determine level of concern, awareness and knowledge of HBV and associated factors	Cross-sectional survey	Community, via Asian commercial centres	Chinese and South East Asians (993); born in China (310), Hong Kong (431), Taiwan (97), Vietnam (22), Other Asia (67), N America (57)
<b>Hislop et al. 2007 (see Tu et al 2009)</b>	Vancouver, Canada	Exploration of factors associated with testing for HBV	Cross-sectional survey	Community, via telephone records	Chinese Canadians (504)
<b>Li et al. 2012</b>	Toronto, Canada	Exploration of factors associated with testing for HBV; to determine whether stigma acts as a barrier	Cross-sectional survey	Community (ESL classes) and health clinic	Self-identified Chinese (343)
<b>Thompson et al. 2003</b>	Vancouver, Canada	Exploration of factors associated with knowledge about HBV and with testing for HBV	Cross-sectional survey	Community via Chinese surnames in telephone book in areas with high concentration of Chinese residents	Chinese Canadian women (n: 147)
<b>Tu et al. 2009 (findings also published for USA and Canada separately: Coronado et al., 2007; Hislop et al., 2007)</b>	Vancouver in Canada, Seattle in USA	Exploration of factors associated with testing for HBV; comparison between US and Canada	Cross-sectional survey	Community, via telephone records	Chinese American (430) and Chinese Canadians (533)
<b>Vu et al. 2012</b>	Brisbane, Australia	Exploration of factors associated with testing and vaccination for HBV	Cross-sectional survey	Community via community organisations and events	Chinese (442) and Vietnamese (433)
<b>Wu et al. 2009</b>	Toronto, Canada	Investigation of barriers to care for CHB	Cross-sectional survey	Health service, via primary care physician visits	Chinese Canadians with CHB (204)

**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	Participants
<b>Quantitative</b>					
<b>Service for fee health system</b>					
<b>Chao et al 2015</b>	California, USA	<i>To investigate physicians' knowledge of chronic hepatitis B diagnosis, screening, and management in various stages of their training.</i>	Cross sectional survey	Health service	Interns (63), 2 <sup>nd</sup> year residents (60), chief residents (26), attending physicians (70)
<b>Coronado et al. 2007</b>	Seattle, USA	Exploration of factors associated with testing for HBV	Cross-sectional survey	Community, via telephone records	Asian Americans (with Chinese surnames) men & women (442)
<b>Cotler et al. 2012</b>	Chicago, USA	Assessment of stigma and validation of stigma measurement instrument	Cross-sectional survey	Community	Chinese immigrants (201)
<b>Lai et al. 2007</b>	San Francisco, USA	Exploration of knowledge and practice among practitioners	Cross-sectional survey	Health service serving high number of Chinese patients	Providers: residents, fellows, nurses (91)
<b>Ma et al. 2006</b>	New York City, USA	Exploration of factors associated with testing and vaccination for HBV	Cross-sectional survey	Community, via community organisations in disadvantaged area	Chinese Americans ( 429)
<b>Ma et al. 2010</b>	Philadelphia, New Jersey, New York City, USA	Exploration of factors associated with testing for HBV	Cross-sectional survey	Community, via community organisations	Asian Americans (1,603): Chinese (718), Korean (289), Vietnamese (305) and Cambodians (291)
<b>Ma et al. 2011 (same study as Ma, 2010)</b>	Philadelphia, New Jersey, New York City, USA	Exploration of factors associated with testing for HBV	Cross-sectional survey	Community, via community organisations	Asian Americans, adults (1,312): Chinese (718), Korean (289), Vietnamese (305) [Cambodians not included]
<b>Ma et al. 2015 (same study as Ma 2010, and Ma 2011)</b>	Philadelphia, New Jersey, New York City, USA	<i>Prediction of non testing using socio-cultural health behaviour model</i>	Cross sectional survey	Community	Chinese (718)
<b>Nishimura et al. 2012</b>	San Francisco, USA	Exploration of risk factors, knowledge and preventive behaviours	Cross-sectional survey	Persons reported by laboratories as HBV+ to health department	People with hepatitis B (829, Chinese 609)

**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	
<b>Quantitative</b>					
<b>Service for fee health system</b>					
<b>Tanaka et al. 2013</b> <b>(Baseline survey of trial participants reported in Hsu et al., 2007)</b>	Washington DC, USA	Exploration of factors associated with testing for HBV and sources of knowledge	Cross-sectional survey	Community via various venues	Asian Americans (877): Chinese (303), Korean (294), Vietnamese (280)
<b>Tokes et al 2014</b>	<i>New York City, New Jersey, San Francisco, Los Angeles, USA</i>	<i>To explore perceptions and attitudes of CHB treatment among patients infected with HBV</i>	<i>Cross sectional survey</i>	<i>Health service</i>	<i>Chinese (90), Korean (77), and Vietnamese (85)</i>
<b>Vijayan et al 2015</b>	USA	<i>To assess the extent of screening family members of Asian patients with known HBV infection, and patient knowledge of disease</i>	<i>Cross sectional survey</i>	<i>Health service</i>	<i>58 Asian American including 32 Chinese</i>

**Table 3: Systematic Literature review: included studies (continued)**

<b>Authors</b>	<b>Location</b>	<b>Aim/focus</b>	<b>Research method</b>	<b>Setting</b>	<b>Participants</b>
<b>Qualitative</b>					
<b>Free at point of access</b>					
<b>Chen et al. 2006</b>	Vancouver in Canada, Seattle in USA	To learn about HB prevention behaviour, knowledge, beliefs and perceptions of HBV screening and vaccination	Individual semi-structured interviews (40) and focus group discussions (8)	Community	North American Chinese, 18-64 years, (total of 111 across interviews and groups)
<b>Wallace et al. 2011</b>	Victoria, New South Wales and South Australia	To record how people with CHB respond to their infection and inform better public health response to HBV in Australia	Semi-structured interviews with CHB patients (20) and focus group discussions with community and health workers (4)	Hospital	People with CHB (20) including 5 born in China and 6 born in Vietnam; and community health workers (40)
<b>Sweeney et al. 2015</b>	London, Bradford, UK	Exploration of knowledge, perceptions and folk models of hepatitis B and C among immigrant communities and lay and professional perspectives on a proposed model of targeted screening and treatment.	Semi-structured interviews and focus group discussions	Community and health service	Key informants (17; of which 3 identified as Chinese); community members Chinese (12), Pakistani 35(),Roma (15), Somali (16), African (17); General practitioners (6)

**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	Participants
<i>Qualitative</i>					
<b>Fee for service health system</b>					
<b>Chang et al. 2008b</b>	San Francisco Bay, USA	To identify motivation for and deterrents from taking preventive action against CHB and liver cancer, and spreading awareness of these diseases in the Chinese-American community	Focus group discussions (6)	Community	Chinese Americans (47)
<b>Hwang et al. 2010</b>	Houston, USA	To explore the HBV beliefs, attitudes and practice patterns of medical providers serving Asian American communities	Focus group discussions (3)	Health services	Medical providers serving Chinese, Korean and Vietnamese communities (23)
<b>Hwang et al. 2012</b>	Houston, USA	To explore attitudes about prevention, screening and treatment of HBV infection in American Chinese, Korean and Vietnamese communities	Focus group discussions (12)	Community	Chinese, Korean and Vietnamese (113)
<b>Philbin et al. 2012</b>	Maryland, USA	To explore the knowledge, awareness and perceived barriers towards HBV screening and vaccinations	Focus group discussions (8)	Community	Chinese, Korean and Vietnamese (58)

**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	Participants
<b>Intervention</b>					
<b>Free at point of access</b>					
<b>Larcher et al. 2001</b>	London, UK	Evaluation of intervention to increase HBV vaccination B of babies	Retrospective case note review, comparison with data from similar neighbouring district	Hospital	All babies born to mothers in the hospital (2% labelled as Oriental)
<b>Taylor et al. 2008 (Design described in Hislop et al 2007)</b>	Vancouver, Canada	Description of content of intervention to promote HBV knowledge and HBV testing	Qualitative, narrative description of intervention content	Community (ESL classes)	Chinese
<b>Taylor et al. 2009a (Refers to Taylor et al 2008)</b>	Vancouver, Canada	Evaluation of intervention to promote HBV knowledge (via ESL classes)	Randomised controlled trial (cluster)	Community (ESL classes)	Chinese Canadians
<b>Taylor et al. 2009b</b>	Vancouver in Canada, Seattle in USA	Evaluation of intervention to promote HBV knowledge and HBV testing	Randomised controlled trial with process evaluation	Community (lay educators)	Chinese American and Chinese Canadians
<b>Taylor et al. 2011</b>	British Columbia, Canada	Evaluation of intervention to promote HBV knowledge and HBV testing	Cluster randomised trial	Community (ESL classes)	Asian Canadian students (759) follow-up of untested (180) including Chinese (92)

**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	Participants
<b>Interventional</b>					
<b>Fee for service health system</b>					
<b>Bailey et al. 2011</b>	San Francisco, USA	Evaluation of intervention to promote HBV knowledge, testing, vaccination and treatment	Descriptive process evaluation Before-and-after comparison of numbers of HBV tests	Community and health service; multi-component	Asian and Pacific Islanders including Chinese Americans; area-based intervention
<b>Bastani et al 2015</b>	Los Angeles, USA	<i>Small group intervention to improve HBV testing</i>	<i>Cluster randomised trial</i>	<i>Community church-based</i>	<i>Koreans (1123)</i>
<b>Burke et al. 2004</b>	Seattle, USA	Description of development of intervention to promote HBV knowledge and HBV testing	Qualitative, narrative description of process	Community (lay educators)	Vietnamese Americans
<b>Chang et al. 2009</b>	San Francisco, USA	Evaluation of intervention to increase uptake of HBV testing and vaccination	Descriptive process evaluation with quantitative outcome measures	Health service	Asian and Pacific Islanders including Chinese
<b>Chao et al. 2009</b>	San Francisco Bay, USA	Evaluation of intervention to promote HBV knowledge, testing, vaccination and treatment	Descriptive observational study	Community, mass media and health service; multi-component	Asian Americans including Chinese Americans; area-based intervention
<b>Chao &amp; So 2011 (same intervention as Chao et al. 2009)</b>	San Francisco, USA	Description of development and design of intervention to promote HBV knowledge, testing, vaccination and treatment	Descriptive observational study	Community, mass media and health service; multi-component	Asian and Pacific Islanders including Chinese Americans; area-based intervention
<b>Chen et al. 2013</b>	Sacramento County CA, USA	Evaluation of intervention to promote HBV knowledge, health service navigation and HBV testing	Randomised controlled trial	Community	Hmong Americans
<b>Hsu et al. 2007</b>	Montgomery County, USA	Evaluation of intervention to promote HBV knowledge	Before-and-after comparison of scores on test	Community	Asian Americans including Chinese (202), Taiwanese (40), Korean (103), Indian (66), Vietnamese (75), Cambodian (39), Filipino (24), Thai (28), other (15)



**Table 3: Systematic Literature review: included studies (continued)**

Authors	Location	Aim/focus	Research method	Setting	
<b>Interventional</b>					
<b>Fee for service health system</b>					
<b>Hsu et al. 2010</b> (same intervention as <b>Hsu et al., 2007</b> )	Montgomery County, USA	Evaluation of intervention to promote HBV knowledge (and assessment of sub- group differences)	Before-and-after comparison of scores on test	Community	Asian Americans including migrants from mainland China (241), Taiwan (53), Korea (89), India (89), Vietnam (108), SE Asia (116).
<b>Hsu et al. 2013</b>	USA	Evaluation of intervention to increase HBV testing	Randomised controlled trial	Health service	Asian American patients with Chinese or Vietnamese surnames
<b>Juon &amp; Park 2013</b>	Montgomery County, USA	Evaluation of intervention to promote HBV knowledge	Cluster randomised controlled trial	Community	Asian Americans (Chinese, Korean and Vietnamese); 441 intervention, 436 control
<b>Ma et al. 2012</b>	Pennsylvania and New Jersey, USA	Piloting prior to full trial of intervention to promote HBV knowledge, testing, vaccination and treatment	Pilot feasibility study	Community and health service; multi- component	Korean Americans
<b>McPhee et al. 2003</b>	Houston, USA	Evaluation of intervention to promote HBV knowledge and catch-up vaccination of children	Randomised controlled trial	Community and mass media; multi-component	Vietnamese (children)
<b>Pollack et al. 2011</b>	New York City, USA	Evaluation of intervention to promote HBV knowledge, testing, vaccination and treatment	Before-and-after comparison of numbers of HBV tests and vaccinations	Community and health service; multi- component	Asian Americans
<b>Taylor et al. 2013a</b>	Seattle, USA	Evaluation of intervention to promote HBV knowledge and HBV testing	Randomised controlled trial with process evaluation	Community	Cambodian Americans
<b>Taylor et al. 2013b</b> (same intervention as <b>Taylor et al. 2013a</b> )	Seattle, USA	Evaluation of differential effects by gender of intervention to promote HBV knowledge and HBV testing	Randomised controlled trial with process evaluation (sub-group analysis)	Community	Cambodian health worker – education randomization
<b>Trinh-Shevrin et al. 2011</b>	New York City, USA	Description of development of intervention to promote HBV knowledge, testing, vaccination and treatment	Qualitative, narrative description of process	Community and health service; multi- component	Asian Americans

**Table 4 – Evidence statements**

<p>Poor knowledge of the disease as a barrier to HBV service uptake</p>
<ul style="list-style-type: none"> <li>• There is strong, consistent evidence that knowledge about hepatitis B is low among immigrant Chinese populations and that common misconceptions are held regarding transmission routes, the seriousness of chronic infection and personal risk.</li> </ul>
<ul style="list-style-type: none"> <li>• There is weak, consistent evidence that accurate knowledge can be improved via relatively brief, culturally tailored interventions and that such interventions are well received.</li> </ul>
<ul style="list-style-type: none"> <li>• There is weak, equivocal evidence that levels of knowledge are associated with receipt of HBV testing and vaccination.</li> </ul>
<ul style="list-style-type: none"> <li>• There is weak, consistent evidence that interventions focused on improving knowledge about HBV (without action on other barriers) can effect only modest increases in uptake of screening and vaccination.</li> </ul>
<p>Stigma as a barrier to HBV service uptake</p>
<ul style="list-style-type: none"> <li>• There is strong, consistent evidence that HBV infection carries some stigma among immigrant Chinese populations.</li> </ul>
<ul style="list-style-type: none"> <li>• There is weak, consistent evidence that stigma acts as a barrier to healthcare access among some people with CHB.</li> </ul>
<ul style="list-style-type: none"> <li>• There is equivocal evidence that individually measured stigma is associated with past screening and vaccination for HBV.</li> </ul>
<ul style="list-style-type: none"> <li>• There is confounded evidence on the effectiveness of interventions aimed at reducing HBV stigma on uptake of screening and vaccination.</li> </ul>
<p>Poor engagement with the healthcare system as a barrier to HBV service uptake</p>
<ul style="list-style-type: none"> <li>• There is strong consistent evidence that immigrant Chinese individuals, particularly those who are new to their adoptive country, face a range of obstacles to engaging with routine healthcare services.</li> </ul>
<ul style="list-style-type: none"> <li>• There is strong consistent evidence that immigrant Chinese individuals often have poor health service experiences, commonly undermined by communication problems, cultural distance and mistrust.</li> </ul>
<ul style="list-style-type: none"> <li>• There is strong, consistent evidence that immigrant Chinese individuals often hold misunderstandings regarding the need for, and purpose of, testing for HBV infection.</li> </ul>
<ul style="list-style-type: none"> <li>• There is confounded evidence that the provision of free or low cost services that are culturally appropriate and geographically and temporally accessible are effective in increasing uptake of HBV screening, vaccination and treatment.</li> </ul>
<p>Missed opportunities within the healthcare system as a barrier to HBV service uptake</p>
<ul style="list-style-type: none"> <li>• There is strong, consistent evidence that healthcare providers miss opportunities during routine healthcare encounters to refer Chinese immigrant individuals for screening and follow up for HBV.</li> </ul>
<ul style="list-style-type: none"> <li>• There is confounded evidence that education of healthcare practitioners is effective in increasing uptake of HBV screening, vaccination and treatment.</li> </ul>
<ul style="list-style-type: none"> <li>• There is one strong study that concludes that simple prompts to primary healthcare physicians can increase referral for, and receipt of, HBV testing.</li> </ul>