Beliefs and Attitudes: Hepatitis B among Sub-Saharan African migrants living in Queensland

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Statement of Originality

This report contains no material offered for the award of any other degree or diploma, or material previously published, except where due reference is made in the text.

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Date

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Abstract

Hepatitis B (HBV) is a blood born virus that is becoming an increasing health burden worldwide. It is estimated that up to 50% of people who have HBV are unaware they are infected. This is concerning, as this lack of awareness prevents people from receiving medical treatment for HBV as well as taking the appropriate action to prevent transmission of the disease to others. A particular target group whom have higher rates of HBV are people from Culturally and Linguistically Diverse (CALD) backgrounds. In particular, migrants from Sub-Saharan African countries are most vulnerable, due to high rates of infection. This study aimed to identify beliefs and attitudes regarding HBV, gaps in health literacy, as well as HBV vaccination and testing rates among migrants from Sub-Saharan Africa in Queensland. This was conducted through quantitative cross-sectional surveys. The study replicated the methodology and compare the findings to studies conducted in QLD about self-reported knowledge of HBV in CALD communities. Findings show a link between health literacy and health-protective behaviours. Future research is needed to further explore these findings.

Key words: Hepatitis B, Sub-Saharan Africa, Health Promotion, Self-Reported Knowledge, Health Literacy

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Chapter 1: Introduction

Background

Hepatitis B (HBV) is a debilitating virus that causes damage to the liver, which is categorised as either a chronic (infected more than six months) or acute disease (infected up to six months; Lavanchy, 2004). If HBV is left untreated, the virus becomes life-threatening as it can lead to cirrhosis, hepatocellular carcinoma, liver cancer and liver failure (Lavanchy, 2004; Te & Jensen, 2010). HBV is transferred through contact with blood (e.g., needle sharing, transfusions), unprotected sexual intercourse, and childbirth (Papastergiou, Lombardi, MacDonald, & Tsochatzis, 2015). Research indicates that some people are unaware of how HBV is transmitted, particularly people from migrant and other culturally and lingusitcally diverse (CALD) backgrounds (Vu, et al., 2012). Lack of understanding regarding HBV transmission may result in becoming vulnerable to the risk of HBV infection (Lavanchy, 2004; Vu, et al., 2012). Previous research suggests that there are numerous misconceptions regarding how HBV is transmitted believed among the community (Vu, et al., 2012). Examples of such misconceptions are that HBV can be transmitted through touch (e.g., handshakes, cuddles), or sharing food. This misinformation can increase stigma regarding HBV and lead to social isolation among those living with HBV (Cotler, Cotleer, Luc, Layden, & Wong, 2012; Ma, Shive, Toubbeh, Tan, & Wu, 2008; Wang, Wang, & Tseng, 2009). Social-isolation due to stigma can become a further barrier to accessing preventative care, treatment, and active HBV management. Some studies indicate that increased awareness of ways HBV can be transmitted and prevented may contribute to decreasing stigmatisation and improving prevention and self-management (Cotler, et al., 2012; Wang, et al., 2009). Stigma was also found to be less prevalent for people who have a family member diagnosed with HBV (Cotler, et al., 2012).

Within Australia, it has been estimated that up to 50% of people living with chronic HBV are not aware they are infected (WHO, 2014). This is concerning, as lack of awareness can prevent people from accessing medical treatment for HBV, as well as taking appropriate actions to prevent onward transmission (WHO, 2014; Vu, et al., 2012). These ramifications highlight the importance of ensuring people within the Australian community (including cultural sub-groups with high prevalence) access early HBV screening and treatment in order to prevent infection and transmission of HBV (Australian Government Department of Health, 2014). Screening for HBV involves a blood test which can be administered at medical services (ATAGI, 2015). Although HBV is rarely 'cured', treatments are available to manage the symptoms of HBV, and repair the liver (Keeffe, et al., 2008; Martin, et al., 2015). Early treatment of HBV can also prevent further damage to the liver, and increase longevity. There are also vaccinations available to prevent HBV.

Although medical procedures are available for the identification, prevention and treatment of HBV, many people are often not aware of these interventions, and, are potentially at greater risk of infection and onward transmission. Members of CALD communities are more susceptible to HBV (ATAGI, 2015; Vu, et al., 2012); including migrants from Sub-Saharan Africa (SSA) and Asia (Apata, & Averhoff, 2014; ATAGI, 2015). Greater than 10% of the population in SSA are diagnosed chronic HBV, in contrast to the Australian population (approximately 0.5%; ATAGI, 2015). There are many barriers to treatment and preventative care for people living in SSA, such as lack of HBV education, and access to health services (Apata, & Averhoff, 2014). Due to a shortage of healthy blood available for medical transfusions, there is also a greater risk of HBV infection through blood transfusion in SSA (Aparta, & Averhoff, 2014).

Public Health and Health Promotion

'Public health' plays a crucial role in developing and managing national health policies and programs to improve health (Dawson & Grill, 2012). Public health is defined as an organised community initiative (using evidence based approaches) to prevent disease and promote health (Dawson, & Verwij, 2015; Freedman, Bess, Tucker, Boyd, Tuchman, & Wallston, 2009). Public health emphasises the importance of working towards a health system that provides equality and justice. One key strategy to attain this objective is 'health promotion'. According to the World Health Organisation (WHO), health promotion is defined as "a process of enabling people to increase control over their health and its determinants, and thereby improve their health." (WHO, 2009, pg. 17; see Caperchione, Kolt, & Mummery, 2013; Dawson, & Grill, 2012). Health promotion encompasses a range of strategies to provide health information to people to enhance awareness of how to improve their own health and prevent disease. In order for health promotion to be effective, strategies created must take into consideration health inequalities and ensure cultural relevancy and appropriateness within targeted communities (Henderson, & Kendall, 2011; Solar & Irwin, 2012; Vu, et al., 2012). Factors which may influence access to health resources include education, occupation, income, gender and ethnicity.

Social determinants of health (SDH) are a component of the Ottawa Charter and is a framework used to address inequalities which impact health (Grant & Baker, 2006; WHO, 1986). SDH include factors such as: housing, education, socio-economic status, personal (e.g., biological development) and social factors (e.g., occupation, social support) which determine the level of access individuals/communities have to quality healthcare. (Grant & Barker, 2006; WHO, 1986). In response to these determinants, there are three key action areas, aimed to provide an alternative approach to disease-focused models by enhancing health and ensuring equal access to health resources among the community (Apata, &

Averhoff, 2015; Marmot, Friel, Bell, Houweling, & Taylor, 2008). The model aims to address SDH through three steps: 1) addressing inequality in population groups, 2) increase equality by decreasing gaps, and 3) addressing the health gradient (relationship between social and health status inequality; Kosteniuk, & Dickinson, 2003). WHO and the Australian Government Department of Health have incorporated this framework within global and national health promotion projects (Apata, & Averhoff, 2014; ATAGI, 2015; Marmot, et al., 2008).

Health Behaviour

To create effective health promotion strategies, it is important to understand factors which influence people to engage in health-protective behaviours (Carpenter, 2010; Vu, et al., 2012). There are a number of theories which provide greater understanding regarding health behaviours. Although several theories are useful when exploring health behaviour, the Health Beliefs Model (HBM) will be discussed in-depth due to relevancy of the current study. Further understanding of this theory, along with the application of the SDH for the target group (SSA Migrants living in Australia) would assist in forming an effective HBV health promotion strategy.

The objective of the HBM is to explain contributing factors which influence a person's health behaviour (Asare, & Sharma, 2014). When the model was initially developed, four factors were identified as contributors towards health behaviours (Carpenter, 2010; Davis, Buchanan, & Green, 2013). The factors included; 1) an individual's perception regarding susceptibility to the health condition and; 2) the individual's perception of severity of the health condition. Thus, it was considered that the more susceptible a person believes they are to a health condition and the more severe they believe the condition to be, the more likely they will access preventative-care. Two other factors include the individual's perception of benefits and barriers regarding accessing preventative-care. Thus, if people

believe that there were benefits in accessing preventative-care and few barriers, people were more likely to access preventative-care. In addition, 'cues to action' included factors which may motivate an individual to engage in health-protective behaviours. Examples of such influences are people, media and events (Davis, et al., 2013). Another component later added to the HBM is self-efficacy. Self-efficacy is considered to be the person's level of confidence to engage in particular health behaviours (Bishop, et al., 2014).

There is research to support the link between health literacy and the accuracy and estimation of one's perceived severity of health condition (component of HBM). This was supported by Federman and colleagues (2013), whilst investigating the impact of health literacy on participants living with asthma. The study found a significant association between low health literacy and lack of understanding of health conditions (e.g., misconceptions). A particular misconception related to the likelihood of the health condition ("if no asthma symptoms are experienced, there is no asthma") was found to be associated with low health literacy. These misconceptions would lead to lower self-efficacy regarding management of asthma symptoms and poorer health outcomes (Federman et al., 2013). Conversely, adequate health literacy was associated with obtaining more accurate information regarding severity and likelihood of asthma, and would lead to higher self-efficacy and increased chances of engaging in health-protective behaviour. Thus, engaging in health-protective behaviours would increase ability to manage asthma and improve their general health. A study conducted by Kale and colleagues (2015) investigated chronic obstructive pulmonary disease and health literacy. The results supported a consistent pattern with the study by Federman and colleagues (2013). Further, a study conducted by Lee and colleagues (2013) found a positive association between health literacy and self-efficacy. It was also found that high self-efficacy increased engagement with self-care behaviours. Overall, these studies support that an individual's level of health literacy can influence how they perceive their illness through the

HBM perspective and, thus, contributes to whether or not they engage in health-protective behaviours.

Previous studies have reported, particularly in CALD communities, that language and culture can be a major barrier to accessing accurate health information and medical-care (Henderson, & Kendall, 2011; Caperchione, et al., 2013; Komaric, Bedford, & Driel, 2012). The HBM and SDH may be helpful for creating strategies to increase engagement in health-protective behaviours such as, HBV vaccinations, testings and treatments among SSA migrant communities.

Health Literacy

Health literacy can influence one's ability to manage their health (Nutbeam, 2008; Squiers, Peinado, berkman, Boudewyns, & McCormack, 2012). Health literacy is defined as a 'skill set' which assists people in optimising their functioning in healthcare environments (Mottus, et al., 2014; Sayah, Majumdar, Egede, & Johnson, 2014; Squirers, et al., 2012). To gain further understanding of skills acquired in health literacy, Nutbeam (2000) conceptualised health literacy, which comprised of three components, including: functional, interactive and critical health literacy. Functional health literacy involves basic reading and writing abilities acquired to function in medical settings. Interactive health literacy consists of social and cognitive skills, which enables people to actively participate within healthcare environments. Lastly, critical health literacy involves critical analysis, which is the ability to discern credible from non-credible health resources. Nutbeam's explanation of health literacy continues to be used widely in research literature, as it emphasises the key *skills* constituting health literacy (Bostock, & Steptoe, 2012, Jordan, et al., 2010; Smith, et al., 2009).

Health literacy is associated with a wide range of health outcomes, such as people with low health literacy are less likely to access preventative care and adhere to medication, more likely to become hospitalised and make medication errors (Baker, Gazmararian, &

Williams 2002; Kalichman, Ramachandran, & Catz, 1999; Seo, Goodman, Politi, Blanchard, & Kaphingston, 2016). Research has found that adequate health literacy leads to better ability to cope in healthcare environments and, therefore, obtain relevant information regarding maintaining and enhancing their health (Dennison, et al., 2011; Nutbeam, 2008; Seo, et al., 2016). This is supported by previous research which found individuals with adequate health literacy scored well in self-care and heart failure knowledge (Dennison, et al., 2011). In order to improve health literacy, the use of a client centred approach (e.g., adapting approach to clients' ability/needs) by health professionals may be beneficial (Henderson, & Kendall, 2011; Michael, Aylen, & Ogrin, 2013; Seo, et al., 2016). Health literacy screening tools may be useful in providing a 'snapshot' of clients' health literacy level, which could assist health professionals in optimising their individual approach to health promotion and patient-care (Chew, Bradley, & Boyko, 2004; Wallace, Rogers, Roskos, Holiday, & Weiss, 2005). Thus, research has indicated that by health professionals tailoring their approach to the client can improve health outcomes (Dray & Papen, 2004; Jordan, et al., 2010).

The influence of health literacy on health behaviours highlights the importance of considering health literacy as a social determinant when forming health promotions strategies. Jordan and colleagues (2010) emphasised that even if individuals are health literate, other barriers can exist which may prevent individuals from making informed choices for their health. Therefore, analysing health literacy as a factor which influence health outcomes is essential. In addition, the SDH also play a key role in the development of health literacy skills (Nutbeam, 2008; World Health Organisation, 2013). Thus, it is important to address key determinants which influence the ability to access and use health resources when developing initiatives to improve health literacy among communities (Henderson, & Kendall, 2011).

In addition to how the SDH influences health literacy, Nutbeam (2008) has also developed a framework regarding health promotion strategies for improving health literacy (see Figure 1). This model provides predictive pathways to increasing health outcomes by enhancing health literacy through health education. The model states that it is firstly important to assess the individual's current ability in relation to health literacy, it would then be important to assist individuals in developing and enhancing their current level of knowledge (e.g., skills in negotiation, self- management, social organisation, advocacy). The model suggests that by achieving this, health literacy would be improved and, thus, individual's health behaviours would be altered due to increased ability to make informed decisions. The model indicates improvements in health literacy is suggested to also address/change social norms in their community and, thus, 'social action' (e.g., more people vaccinated and blood tested) for health would be likely to occur.

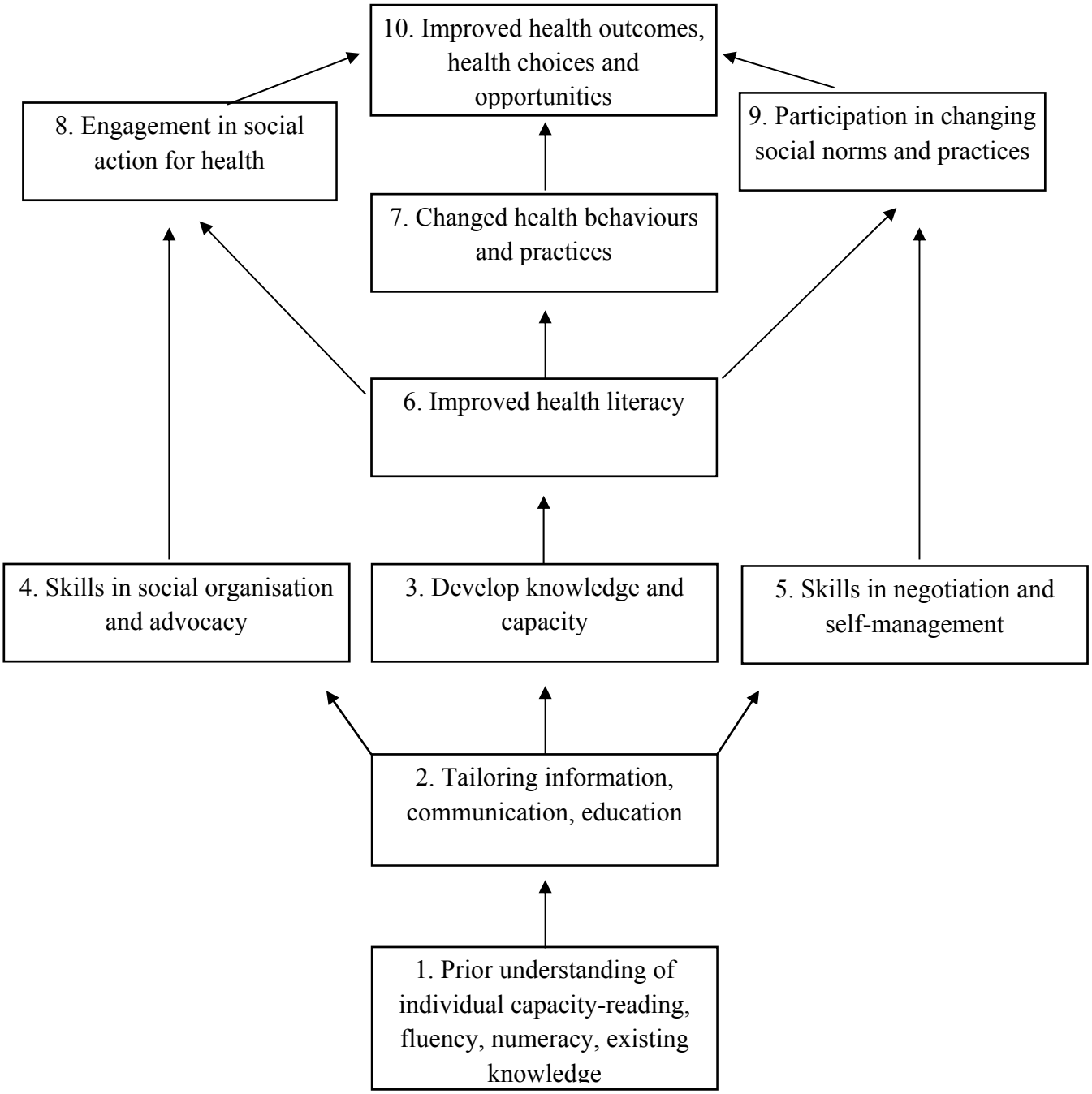

Figure 1. Conceptual Model of Health Literacy as an Asset (MHLA; Nutbeam, 2008)

As stated in the MHLA framework, the first step in improving health literacy is to identify the current state of health literacy. A strategy to consider when trying to identify health literacy level, is the use of screening tools to identify people who are likely to have low health literacy (Chew, et al., 2004).

A number of screening tools are currently used in research to identify health literacy levels. The Short Test of Functional Health Literacy for Adults (STOFHLA) is a screening tool frequently used to identify areas of health literacy (Chew, et al., 2004; Wallace, et al., 2005). The STOFHLA contains 36 items and each item has a 5-point Likert scale for responding. The STOFHLA categorises the results into three different categories which are 'inadequate' (score = 0 – 16), 'marginal' (score = 0 – 22) and 'adequate' health literacy (score = 22 – 36). The questions assess the respondent's reading ability through comprehending passages and questions regarding their ability to complete reading tasks in their daily life and in a medical environment (Chew, et al., 2004). There have been a number of recent studies describing the STOFHLA as measuring reading proficiency, rather than health literacy per sae, as it does not assess other skill sets required to understand healthcare information (Pleasant, 2009). The lack of skills assessed in the STOFHLA is due to the tool assessing functional health literacy and not interactive nor critical health literacy. Despite the limiting nature (only assessing functional health literacy) of the STOFHLA, three specific items within this screening tool have been identified to have good specificity and sensitivity when screening for people with limited/inadequate health literacy (Chew, et al., 2004; Saya, et al., 2014; Wallace, et al., 2006;). As many of the current health literacy screening tools (including the STOHFLA) are time consuming and require someone else to administer the tests, these three questions may be a more time and resource efficient way for screening health literacy. In addition, another limitation identified for tools such as STOHFLA is that it may lead people to feel ashamed of their ability if they feel that they should already have acquired these skills (Ohl, Harris, Nurudtinova, Cai, Drohobyczer, & Overton, 2010; Seo, et al., 2016). These three items may be helpful in reducing this effect among people (Chew, et al., 2004). Fear of judgement regarding level of health literacy can be prevalent for those from CALD community members, as they may know little English resulting in frequent

language barriers (Henderson & Kendall, 2011; Komaric, et al., 2012). Utilising these three health literacy items in practice may reduce chances of misinterpretation or further stigmatisation, as the items are brief, have good reliability and validity and are articulated in basic English level (Chew, et al., 2004).

A study conducted by Chew and colleagues (2004) identified three questions that were able to differentiate participants with inadequate health literacy from marginal, and adequate health literacy. The three items were “How often do you have someone help you read hospital material?” (“Read hospital material”; AUROC = 0.87, [95%CI = 0.78 – 0.96]), “How confident are you filling out medical forms by yourself?” (“filling medical forms”; AUROC = 0.80, [95%CI = 0.67 – 0.93]) and “How often do you have problems learning about your medical condition because of difficulty understanding written information?” (“learning medical condition”; AUROC = 0.80 [95%CI = 0.62 – 0.90]). A study conducted by Wallace and colleagues (2006) investigated the previously mentioned three STOHFLA items, among a sample of University Students. The study found different results to Chew and others (2004). The item, “filling medical forms” had a significantly higher AUROC score than the other two screening questions ($p < .01$) which were “read medical material?" and “learning medical condition?”. Therefore, the “filling medical forms” item was found to have sensitive and specific validity for identifying inadequate health literacy (AUROC = 0.82, [95%CI = 0.77 - 0.83]). This item was found to also be more accurate in predicting health literacy than demographic information.

Research by Sayah, and colleagues (2014) investigated these three items compared with STOFHLA (16 items) for participants living with Type-2 diabetes. The findings indicated that “learning medical condition”, and “read hospital material” were significant in identifying participants with inadequate health literacy, from marginal and adequate health literacy. The item, “filling medical forms”, however, did not significantly discern inadequate

health literacy from marginal and adequate health literacy. The limitations for the research included limited generalisability (only university students and white male veteran participants) The study was not able to decipher whether the items were more accurate in identifying health literacy than self-reported education level. Also, due to the explorative nature of the study, there was a risk of type 1 error in the data analysis (Sayah, et al, 2014).

Research by Bishop and colleagues (2016) investigated differences in responses of three questions from the STOFHLA between English and Spanish speaking participants. Among Spanish speakers, the item regarding "ability to read" most accurately identified those with low health literacy (AUROC = .76, p = .019). Among English speaking participants, there were no significant differences in accuracy between the three health literacy items. There were limitations within the study, such as few participants reporting low responses, and social desirability was not measured.

In summary, among these studies it appears that these three health literacy items from the STOFHLA are reliable and valid in screening for people with low functional health literacy. Identifying those with low health literacy will help to ensure these people are provided adequate level of support and to guide informed decision making regarding their health. Although health literacy can be a major influencing factor for people within CALD communities, it is also important to consider other factors which may influence ability to understand and access appropriate medical support.

The Social Determinants of Health

In order for health promotion to effectively target key populations, the social determinant of health (SDH) framework must be applied. SDH are part of Ottawa Charter, and is defined as factors which influence one's ability to access healthcare and maintain health (Grant & Barker, 2006; Marmot, et al., 2008; WHO, 1986). In relation to health literacy, this 'skillset' could be seen as a determinant to health, as it can influence health

behaviour and health outcomes (Davis, et al., 2013; Henderson, & Kendall, 2011; Nutbeam, 2008). Research suggests that adequate health literacy can increase the ability to access health resources and cope in a healthcare environment (Jordan, et al., 2010; Nutbeam, 2008; World Health Organisation, 2013). In order to enhance health literacy ability among members of specific communities, it is essential to identify factors which prevent the development of health literacy (Jordan, et al., 2010; Nutbeam, 2008; World Health Organisation, 2013). The HBM indicates that it is important to create a holistic approach with health promotion to ensure the relevant influencing factors are appropriately addressed (Henderson, & Kendall, 2011).

There have been studies investigating migrant and CALD populations to gain a better understanding of enablers and barriers to accessing HBV prevention and management care, such as vaccinations and treatment (Le, Debattista, & Gu, 2014; Vu, et al., 2012). A potential barrier identified for accessing sufficient access to these services is low health literacy (Le, et al., 2014; Vu, et al., 2012). In relation to CALD communities, studies have been conducted regarding health promotion and more specifically the SDH. A study conducted by Henderson and Kendall (2011) investigated the role of a 'community navigator' for promoting health among CALD communities. A community navigator provides support to community members with accessing the health system. The study trained nine bilingual community navigators whom were from Sudanese, Burmese, Afghan and Pacific Islander communities. The study then used a phenomenological approach to explore the community navigators' experience working in these roles with their community. The research found that, in order for the community navigators to be able to support their clients, they would often need to address the SDH (e.g., housing, employment, education) before their clients were able to access health resources.

Another study conducted in Germany investigated the knowledge, attitudes and behaviours regarding blood-borne virus prevention (e.g., HIV, Hepatitis, STI) among SSA migrants (Santos-Hovener, et al., 2015). Participants were required to complete a survey regarding their current knowledge of blood-borne viruses and their current health behaviours for prevention or management of these conditions. Determinants found to prevent people from accessing healthcare was knowing little German, recently migrating to Germany, low education and blood-borne virus knowledge, fear of stigmatisation from the African community/healthcare professionals and fear of deportation. In addition, those who were able to sufficiently understand the German language reported a higher level of knowledge regarding the health conditions and were more likely to access healthcare for prevention/management of blood-borne viruses. Therefore, the study suggests that having a sound ability to understand the country's main language may be considered a protective factor from such viruses.

These studies identified determinants which need to be addressed in order to support SSA migrants in Australia accessing health support regarding HBV prevention/management HBV. As the above mentioned, people who recently migrated into a new country with minimal ability to speak the local language are more vulnerable to contracting HBV. Therefore, the use of cultural workers to provide support in meeting their basic living needs (e.g., housing, education) before changing or addressing health behaviours and conditions is extremely important. It is also important when developing health promotion strategies for the target groups, that it aims to reduce stigmatisation of the health conditions which can reduce fear of seeking medical-support.

Previous Research

In relation to the current study, a collaborative applied health research project has been conducted with community partner not for profit organisation Ethnic Community

Council Queensland (ECCQ) and Queensland Health (Public Health Unit). The present study will be largely replicating the methodology of the study ECCQ had conducted (Vu, et al., 2012). The previous study investigated levels of knowledge regarding HBV and rates of HBV vaccinations and testing among Chinese and Vietnamese migrants. In 2014, a further research project investigated HBV rates regarding vaccinations, testing and treatments among Burmese migrants, and made comparative analysis of other key CALD target groups (see Le, et al., 2014; Vu, et al., 2012).

Research by Vu and colleagues (2012) developed the survey used in the current study (see Appendix A) without items regarding health literacy and education level. Vietnamese and Chinese migrants living in Australia (N=931) completed the surveys. High rates of being tested for HBV was found, however rates of vaccinations were 52% for Chinese and 60% for Vietnamese participants. Also, 11% of participants had been diagnosed with HBV. In regard to HBV knowledge, one in two people (50%) did not know that HBV can be transmitted through sexual activity. Unpublished research by Le and colleagues (2014) replicated the same survey developed Vu and others (2012) with Burmese migrants living in Australia as participants (N=156; Le, et al., 2014). The study found that 42% of participants had been vaccinated and 59% had been tested. Also, 8% of participants reported having positive HBV test results. The mean score for correct responses to the HBV knowledge items was six out of 11 questions. Both studies had the limitation of convenience sampling, and suggested the inclusion of items measuring health literacy, education, marital status and income (Le, et al, 2014; Vu, et al., 2012).

The current study is replicating this by utilising the cross-sectional survey, and with three additional questions regarding health literacy (extracted from STOFHLA, see Appendix A) and an item regarding education level. This inclusion regarding health literacy was due to previous research suggesting that there may be a possible link between health literacy and

health outcomes. SSA migrants were chosen as the target group as research has indicated that this group often face various deterrents for accessing health resources and support for HBV (Aparta & Averhoff, 2014; ATAGI, 2015). The purpose of the current study is to identify gaps in health and HBV literacy to assist in informing a culturally sensitive health promotion strategy for prevention/management of HBV.

Aims and Hypotheses

The purpose of this study was to investigate the current state of HBV Knowledge, health literacy and health behaviours of SSA Migrants living in Queensland, Australia. The findings of this study would be used by ECCQ to create more informed and targeted health promotion strategies regarding HBV prevention and management for SSA migrant communities. The study aims to investigate whether demographic, HBV knowledge and health literacy factors influence health-protective behaviours (e.g., HBV vaccinations, blood-tests). The study will also investigate demographic and health literacy factors which influence the development of HBV knowledge. In addition, the study aims to investigate the current state of HBV knowledge and current rates of vaccinations and blood tests of HBV in general and in relation to key demographic factors. Replication of previous methodology among Chinese and Vietnamese migrants living in Queensland also allows for comparisons with other migrant groups within same geographical region, to help inform future health promotion efforts (Vu, et al., 2012). A number of further research questions were identified for the current study to address these aims and extend the research scope to include; to what extent do health literacy factors predict HBV knowledge and health-protective behaviours (HBV testing, vaccinations)?; And lastly, to what extent do HBV knowledge mediate health literacy and behaviour?; Which demographic factors are associated with high and low health literacy, health-protective behaviour and HBV knowledge?

The study hypothesises the following:

1. As previous research indicates, health literacy leads to the ability to affectively access and understand health resources (Nutbeam, 2008; Squiers, et al., 2012), it is hypothesised that reading ability (STOFHLA item 14 “How often do you have someone help you read information related to your health or medical condition?” and item 15 “How often do you have problems learning about your health or a medical condition because of difficulty understanding written information (in English or Home language)?”) and self-efficacy (STOFHLA item 16, “How confident are you filling out medical forms yourself?”) will significantly predict levels of HBV knowledge and health behaviours (e.g., testing, vaccinations) In addition, it is also hypothesised that a positive relationship between health literacy and health behaviours (HBV vaccinations and blood testing) will be mediated by HBV knowledge.
2. As indicated by the Health Belief Model that in order to be able to engage in health-protective behaviours, one must have the self-efficacy to engage in the behaviour (Bishop, et al., 2014). Therefore, it is hypothesised that the positive relationship between health literacy and health-protective behaviours (HBV blood tests, vaccinations) will be mediated by HBV knowledge.
3. As research conducted by Vu and colleagues (2012) identified significant differences between demographic information (gender, years in Australia, age, spoken language) in health behaviours and HBV knowledge, it is hypothesised that significant differences will be found between demographic groups in health behaviour and HBV knowledge. In addition, it is hypothesised that significant differences will also be identified among keys demographic factors for health literacy.

Chapter 2: Method

Participants

Cultural workers (employed by ECCQ) recruited 182 participants who were born in Sub-Saharan Africa (SSA) and now living in Queensland. Recruitment occurred through various African community events/settings (e.g., Cultural days/festivals). Five participants were removed from the dataset due to not responding to most of the items regarding health literacy and HBV knowledge. This reduced the final sample size to 177; 50.8% of participants were male (n = 90) and 49.2% female (n = 87). The age range was between 18 to 65 years old and the range of years lived in Australia fell between less than one year to 34 years. Thirty percent of participants had completed a university degree and 12.5% had completed a postgraduate degree. Twenty-nine percent of participants had completed TAFE/'Polytech'/some university. Of the participants, 22.1% had completed up through high school level education and six percent of participants completed up through primary school education.

Measures

The survey used in the current study included items regarding demography (6 items), HBV knowledge (11 items), health service preferences (3 items) health literacy (3 items), and health-protective behaviours (7 items; see Appendix A). The survey was used to investigate how key demographic factors, health literacy and HBV knowledge might influence health behaviours and outcomes; and utilise this information to inform future health promotion efforts.

Demographic Information

The survey included in this study was consistent with the methodology of previous research (Le, et al., 2014; Vu, et al., 2012). The survey included items regarding demographic information about the participants (gender, level of education, age, country of birth, language

spoken at home, and years lived in Australia). The survey included open response items regarding country of birth, years lived in Australia, and language spoken at home (see Appendix A). Gender was asked as a dichotomous question with response options of either female or male. In relation to education level completed, there were eight response options including primary school, Grade 10, Grade 11, Grade 12 or equivalent, TAFE ('Polytech'), some university, university degree, and postgraduate university degree.

HBV Self-Reported Knowledge scale

The survey included 11 dichotomous response items (e.g., 'yes', 'no', 'not sure') for self-reported HBV knowledge. These items were replicated from a prior study conducted by Vu, and colleagues (2012). The 11 items developed based on past research regarding self-reported knowledge for HBV (Hislop, et al., 2007; Hwang, Huang, & Yi, 2008; Ma, et al., 2007; Taylor, et al., 2006; Thompson, et al., 2003). All of the items assessed for understanding of factual information regarding the transmission of HBV, [for example; "Can new born baby get HBV from their mothers?" (see Appendix A)]. There were also two items within the survey regarding ways in which participants preferred receiving health information. The first multiple choice item asked "In what language would you prefer to access information?" responses included 'English only', 'home language only' (Language spoken at home), 'English and home language', and 'other'. Next to 'other', participants were able to write their preferred language. The second open-response question asked, "If you want to access health information, where would you go to?" The set of items included nine items with the correct response as "Yes" and two items with the correct response as "No". The two items with the correct statement as "No" included item four which was "Can people get HBV by sharing food and drinks?" and item six which was "Can people get HBV by shaking hands?". A total score of correct responses was calculated for all 11 HBV knowledge items for each case (total scores ranged between zero to eleven; $M = 7.29$ (66.27%).

Health Literacy Items

To measure level of health literacy among participants, three items were extracted from the Short Test of Functional Health Literacy (STOFHLA). A number of studies have found these items to have good psychometric properties, as there were significant AUROC scores in identifying individuals with inadequate health literacy (Bishop, et al., 2016; Chew, et al., 2004; Wallace, et al., 2006). These three items were also chosen as they are easy to understand and have been found to be most predictive in identifying low health literacy (Chew, et al., 2004). These items included "How often do you have someone help you read information related to your health or medical condition?", and "How often do you have problems learning about your health or a medical condition because of difficulty understanding written information (in English or Home language)?" (self-efficacy). Both of these involved the same 5-point Likert scale which were 1 = 'Always', 2 = 'often', 3 = 'Sometimes', 4 = 'Occasionally', and 5 = 'Always'. The last question included from the STOFHLA was "How confident are you filling out medical forms yourself?" and this would be responded through another 5-point Likert scale involving 1 = 'Not at all', 2 = 'A little bit', 3 = 'Somewhat', 4 = 'Quite a bit', 5 = 'Extremely'. A total score of the health literacy items was calculated for each case (score ranged between three to fifteen).

HBV Prevention Behaviours

Another five items were asked to assess participants HBV prevention/management strategies. Four items asked whether participants have been vaccinated and tested for HBV in Australia and overseas (if yes, participants were asked write down *when* and *where* this was completed). If participants had been tested for HBV, participants were also asked whether their test results were *positive* or *negative* for HBV. There was also an option "unsure" if participants did not know their results. If participants had answered positive to the previous question, they were then asked whether they are frequently consulting with a doctor regarding

their HBV and whether they were receiving treatment. If they were receiving treatment, the survey included an item asking whether they were receiving western or traditional medicine (or both) for treatment. If they were not receiving any treatment, there was an open response item asking why.

Procedure

Prior to commencement of the study, the research met requirements (HREC H16REA005) of the National Statement on Ethical Conduction Human Research (2007), therefore the University of Southern Queensland provided ethical approval.

Cultural workers and volunteers from ECCQ invited participants to complete these surveys during HBV health promotion stalls (near local shopping centres in Brisbane), cultural days/festivals and other events (approximately 143 participants). Cultural workers also recruited participants while working independently in the community (approximately 31 participants). Participants were often approached by providing incentive to participants to engage with workers/volunteers during health promotion barbeque events. This was typically attempted by offering a free sausage on bread or/and engaging a casual conversation which naturally lead to the survey. Cultural workers and volunteers responded sensitively to the needs and wants of the potential participants and did not pressure participation. Cultural workers and volunteers provided information regarding HBV regardless of participation as the purpose of these events were also to increase awareness regarding HBV. Research information flyers were available to participants and consent was given verbally. Cultural workers explained to participants that all information would remain anonymous and the purpose of the survey was to gain information regarding their current level of knowledge. Cultural workers also provided assistance with understanding the questions upon request of the participants. Cultural workers reassured participants that their assistance would not compromise their confidentiality or current/future relationship with partner organisation.

Cultural workers also provided participants with information regarding HBV to promote awareness within the community once the survey had been completed. This information was shared with participants through conversation and flyers. A small gift (e.g., stationary items, toothbrush) was provided to participants for taking the time to complete the survey.

Chapter 3: Results

Data analysis was conducted using Statistical Package for Social Sciences (SPSS, Version 23.0, 2015). Three standard multiple regression tests were conducted to investigate whether the health literacy items predicted HBV knowledge and health-protective behaviours. The Hayes Process tool (Hayes, 2013) was also used to investigate whether HBV knowledge mediated the relationship between health literacy and health-protective behaviour (vaccinations/testing) and whether self-efficacy (health literacy item 16) mediated the relationship between reading ability (health literacy items 14 and 15) and health behaviours. Independent samples t-test was conducted to investigate differences in health literacy, HBV knowledge and health behaviours related to demographic factors. A multiple imputation was conducted on the dataset to reduce the amount of missing data. Item regarding 'Years lived in Australia' had 20% of missing data, while 16 other variables had less than six percent of missing data. All missing data from these variables were imputed.

Before conducting these analyses, the power of the sample size was assessed. G*power 3.1.9.2. (2014) was used to estimate the minimum sample size required for a significant regression model (Tabachnick & Fidell, 2007). It was found that a minimum sample size of 550 would be required for a small effect size and power of .80. As such, the current sample size of 177 is under the minimal sample size. In addition, an alpha of .05 was used to determine significance of these tests.

To measure internal consistency of variables included, reliability analysis was calculated for health literacy, HBV knowledge and health-protective behaviours. The Cronbach's alphas indicated that all variables obtained an alpha above .70 which is considered acceptable internal consistency (see Table 1).

Table 1.

Variable Means, Standard Deviations, Cronbach's Alpha

Variable	Point Scale	No. Items	M	SD	α
Health Literacy	5	3	11.28	3.71	.81
HBV Knowledge	3	11	16.70	4.60	.75
Health Behaviour	3	2	4.24	1.46	.78

Health Literacy Predicting HBV Knowledge and Health Behaviours

Three standard multiple regression analyses were conducted to identify whether the three health literacy items significantly predicted HBV vaccinations, blood tests and HBV knowledge. Mahalanobis distance was used to identify multivariate outliers ($\chi^2(3) = .16.27$, $p < .001$). No multivariate outliers were identified, as no cases exceeded the mahalanobis distance of 16.27 (Tabachnick & Fidell, 2007). No residual outliers were identified when conducting the case-wise diagnostic screening for standardised outliers (SD above 3.3). Residual scatterplots were also analysed to confirm that there were no residual outliers. There were minor violations of linearity and homoscedasticity, however due to multiple regression analyses being robust, this was not considered to affect the results. The variance inflation and tolerance remained within acceptable cut off range (Variance inflation below 1 and tolerance below 2 but above 1), except for item 15 with a variance inflation of 2.19. As the variance inflation for item 15 was slightly above 2, this was retained.

Bivariate correlations were conducted to determine whether there were any significant relationships between variables used for multiple regression analyses. All variables appeared to significantly and positively correlate with each other. As shown in Table 2, all variables investigated within the three multiple regression analyses significantly correlated with each other in the bivariate correlation analysis.

Table 2.

Inter-Correlations among Health Literacy, HBV Knowledge and Health Behaviour

Variable	1	2	3	4	5	6
1. HL Item 14 (help reading)	-	.616**	.513**	.328**	.249**	.267**
2. HL Item 15 (problems learning)		-	.642**	.343**	.200**	.255**
3. HL Item 16 (self -efficacy)			-	.288**	.320**	.330**
4. HBV Knowledge				-	.238**	.295**
5. Vaccinations					-	.648**
6. Testing						-

Note. $^{**}p < .01$.

The results indicated that the overall model was significant for the standard multiple regression regarding three health literacy items predicting HBV knowledge, R = .379, (3, 173) = 9.653, $p < .001$. The health literacy items accounted for 14.3% variance towards HBV knowledge. HBV knowledge was not significantly predicted by item 14 ($\beta = .172$, $t = 1.886$, $p = .061$), items 15 ($\beta = .185$, $t = 1.817$, $p = .071$) and item 16 ($\beta = .081$, $t = 0.870$, $p = .385$). Therefore, the hypothesis was not supported.

The results indicated that the overall model was significant for the standard multiple regression regarding three health literacy items predicting HBV vaccinations, R = .339, F (3, 172) = 7.509, $p < .001$. The health literacy items accounted for 11.5% variance towards the health behaviour, vaccinations. The health literacy item 16 was significantly predicted vaccinations against HBV ($\beta = .297$, $t = 3.124$, $p < .01$) contributing 22.3% variance. Health literacy item 14 and 15 did not significantly predict vaccinations. The hypothesis of health literacy items significantly predicting HBV vaccinations was partially supported.

The results indicated for the third part of the first hypothesis (three health literacy items predicting HBV blood tests) that the overall model was significant, R = .349, F (3, 172) = 8.015, $p < .001$. The health literacy items accounted for 12.2% variance towards health

behaviour, blood tests. Item 16 (self-efficacy) significantly predicted HBV blood tests (β = .258, $t = 2.724$, $p < .01$) contributing 19.4% variance (Partial = .185). HBV blood tests was not significantly predicted by items 14 (β = .128, $t = 1.392$, $p = .166$) and 15 (β = .010, $t = .099$, $p = .921$). Overall, one of the variables regarding self-efficacy (item 16) significantly predicted HBV blood tests. The hypothesis of health literacy items significantly predicting HBV blood tests was partially supported.

Table 3.

Summary of Standard Multiple Regression Analysis for Predicting HBV Knowledge and Health Behaviours (N = 177)

				Part?		95% CI	
Variable	B	SE B	β	sr^2	*p*-value	Lower	Upper
HBV Knowledge							
Health Literacy Item 14	.30	.16	.17	.13	.061	-.01	.61
Health Literacy Item 15	.33	.18	.19	.13	.071	-.03	.70
Health Literacy Item 16	.13	.15	.08	.06	.385	-.17	.43
Proportion of Variance Explained							
ΔR^2=.14 (*Adj.* R^2 = .13) $\Delta F(3, 173) = 9.65^{***}$, $p < .001$							
HBV Vaccinations							
Health Literacy Item 14	.09	.06	.15	.11	.116	-.02	.20
Health Literacy Item 15	-.05	.06	-.08	-.06	.436	-.17	.08
Health Literacy Item 16	.17	.05	.30**	.22	.002	.06	.27
Proportion of Variance Explained							
ΔR^2=.12 (*Adj.* R^2 = .10) $\Delta F(3, 173) = 7.51^{***}$, $p < .001$							
HBV Blood Test							
Health Literacy Item 14	.07	.05	.13	.10	.166	-.03	.16
Health Literacy Item 15	.01	.06	.01	.01	.921	-.10	.12
Health Literacy Item 16	.13	.05	.26*	.19	.007	.04	.22
Proportion of Variance Explained							
ΔR^2=.12 (*Adj.* R^2 = .11) $\Delta F(3, 173) = 8.01^{***}$, $p < .001$							

Note. $^*p < .05$, $^{**}p < .01$, $^{***}p < .001$

Mediation Model for HBV Knowledge and Health Behaviours

The Hayes Process Tool (Hayes, 2013) was conducted to investigate whether self-efficacy (item 16) mediates the relationship between reading ability (item 14) and HBV knowledge. There was a significant total effect, *b* = .5637, BCa CI [0.3212, 0.8062]. There was a significant direct effect of reading ability with HBV Knowledge, *b* = .4196, BCa CI [0.1396, 0.6997]. There was no significant indirect effect of self-efficacy on HBV knowledge, *b* = 0.1441, BCa CI [-0.0252, 0.3330]. These findings indicate that self-efficacy does not mediate how reading ability (item 14) effects HBV knowledge and therefore does not supports the hypothesis.

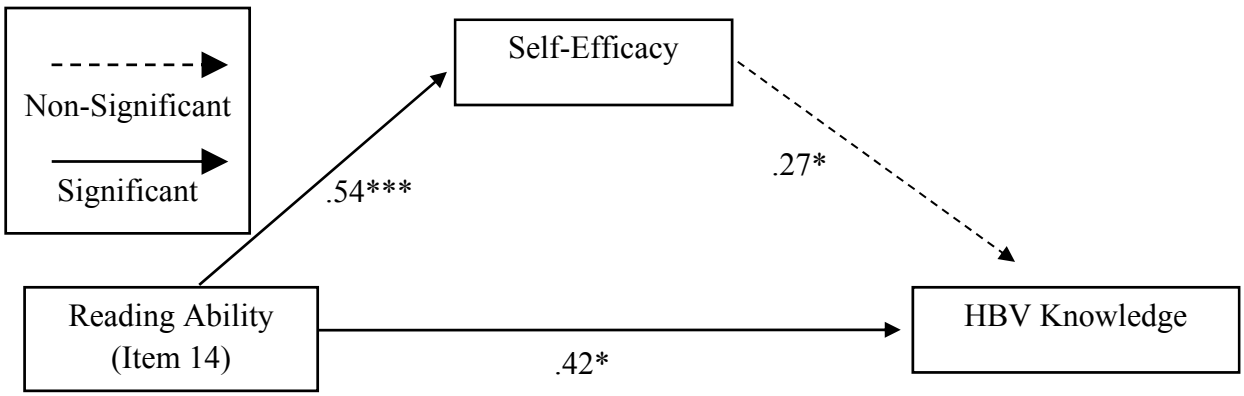

Figure 2. Reading ability (item 14) and HBV Knowledge Mediated by Self-Efficacy

The Hayes Process Tool (Hayes, 2013) was conducted to investigate whether self-efficacy (item 16) mediates the relationship between reading ability (item 15) and HBV Knowledge. There was a significant total effect, *b* = .6014, BCa CI [0.3560, 0.8468]. There was a significant direct effect of reading ability with HBV Knowledge, *b* = .4715, BCa CI [0.1519, 0.7910]. There was no significant indirect effect of self-efficacy on HBV knowledge, *b* = 0.1299, BCa CI [-0.0839, 0.3973]. These findings indicate that self-efficacy does not significantly mediate reading ability (item 15) and HBV knowledge.

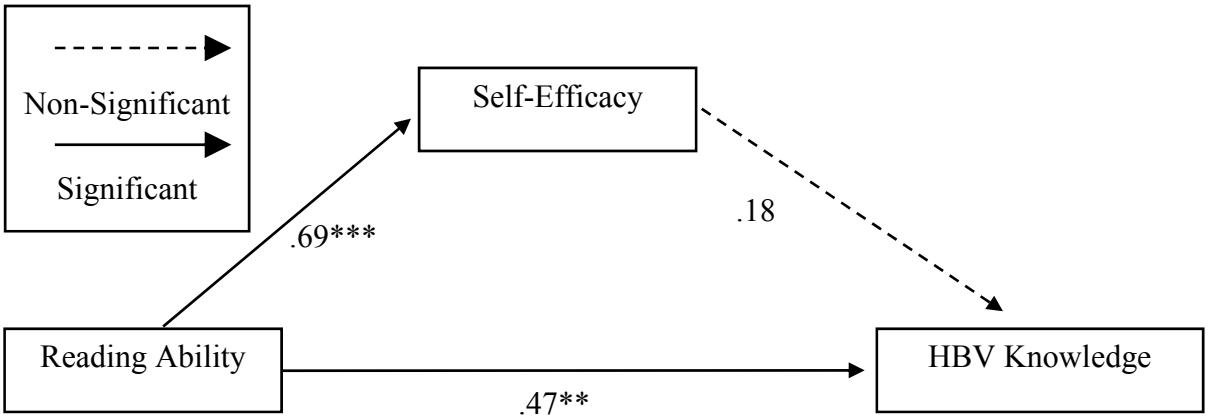

Figure 3. Reading ability (item 15) and HBV Knowledge Mediated by Self-Efficacy

The Hayes Process Tool (Hayes, 2013) was conducted to investigate whether HBV knowledge mediates the relationship between health literacy and vaccinations. There was a significant total effect found, $b = 0.0693$, BCa CI [0.0367, 0.1018] for this model. There was also a significant direct effect of health literacy on vaccinations, $b = .0568$, BCa CI [0.0219, 0.0916]. However, there was no significant indirect effect of health literacy on vaccinations through HBV knowledge, $b = 0.0125$, BCa CI [-0.0007, 0.0288]. These findings indicate that health literacy does not significantly mediate the relationship between health literacy and vaccinations.

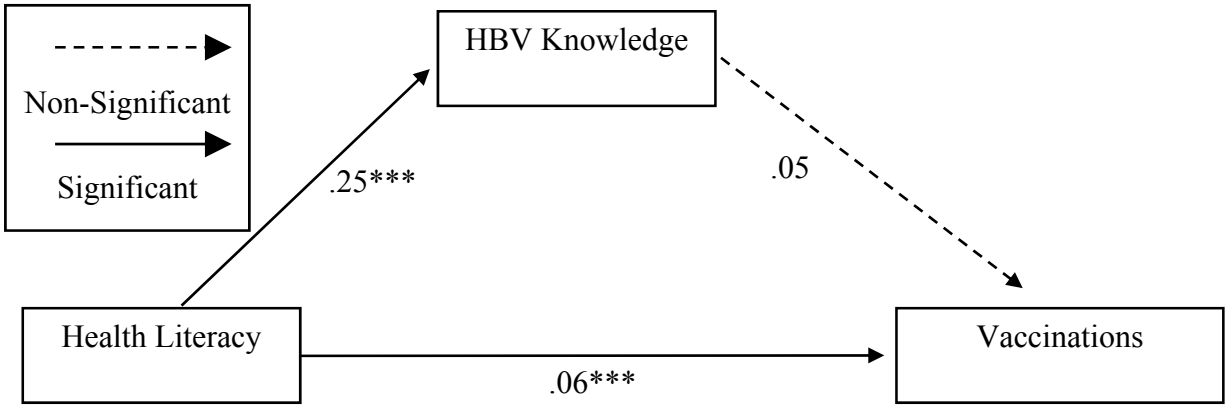

Figure 4. Health Literacy and HBV Vaccinations Mediated by HBV Knowledge

The Hayes Process Tool (Hayes, 2013) was conducted to investigate whether HBV knowledge mediates how health literacy affects HBV testing. There was a significant total effect found, $b = .0679$, BCa CI [0.0394, 0.0965] for this model. There was a significant direct effect of health literacy on HBV testing, $b = .0529$, BCa CI [0.0226, 0.0832]. There

was also a significant indirect effect of health literacy on HBV testing through HBV knowledge, b = 0.0150, BCa CI [0.0035, 0.0283]. This demonstrates that HBV knowledge does mediate how health literacy affects HBV testing. The mediation represents a small effect size, K^2 = .0728, 95% BCa CI [0.0167, 0.1342].

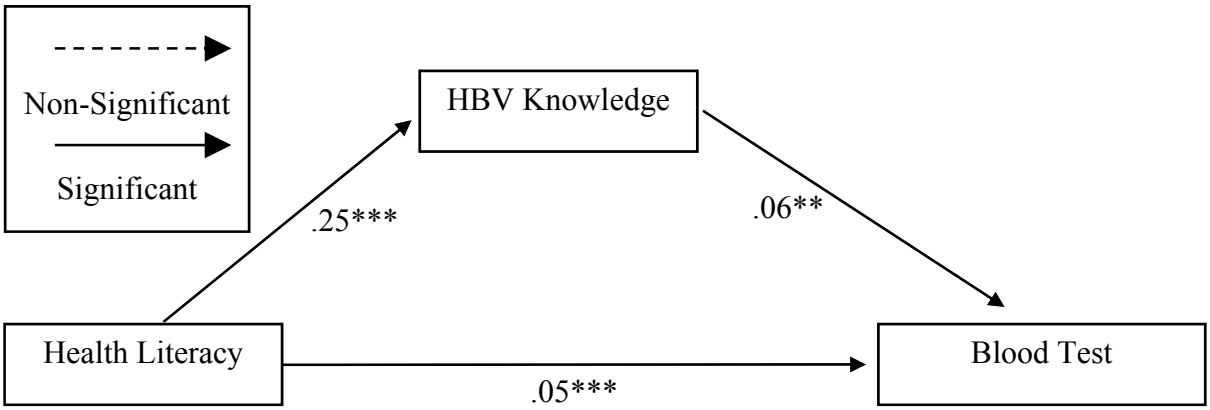

Figure 5. Health Literacy and HBV Blood Tests Mediated by HBV Knowledge

Demographic Differences regarding Health Behaviour and Education Factors

Independent Samples t-tests was conducted to investigated differences in HBV knowledge, health literacy and health behaviour means between various demographic factors (gender, years lived in Australia, Age, Level of education and home language). In relation to demographic factors, significant differences were found between males and females. On average, males (M = 6.84, SD = 2.50) responded correctly to less HBV knowledge items than females (M = 7.75, SD = 2.36). This was difference, -0.97, BCa 95% CI [-1.635, -0.193] was significant t (175) = -2.50, p < .05 and represented a small-sized effect, d = 0.36. No significant differences were found between males and females (See Figure 7) in health literacy scores, .211, BCa 95% CI [-0.895, 1.316], vaccinations, .0207, BCa 95% CI [-0.233, 0.274], and blood tests, .0391, BCa 95% CI [-0.185, 0.264].

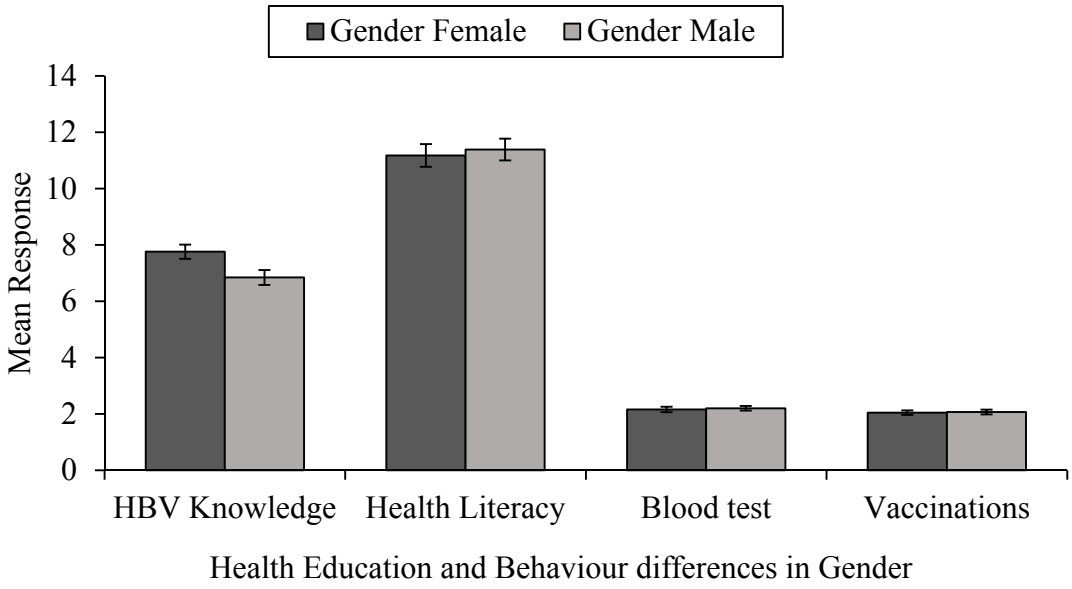

Figure 6. Histogram of differences between gender in HBV Knowledge, Health Literacy, and Health Behaviours

In relation to age, significant differences were found in health literacy scores. On average, participants under the age of 40 (M = 11.93, SD = 2.52) reported to have higher health literacy than those aged between 40 to 50 (M = 10.68, SD = 3.93) and aged 50 years or older (M = 9.40, SD = 4.33). The difference, 1.246, BCa 95% CI [0.056, 2.437], between participants aged under 40 and those aged between 40 to 50 was considered significant $t(155) = 2.068$, $p < .05$. This represented a small-sized effect d = 0.38. The difference 2.526, BCa 95% CI [0.425, 4.638] in health literacy scores between participants aged under 40 and aged over 50 was significant $t(23.5) = 2.473$, $p < .05$. This difference was considered a medium-

sized effect $d = 0.58$. There were no significant differences in HBV knowledge, vaccinations and blood tests between age groups (See figure 8).

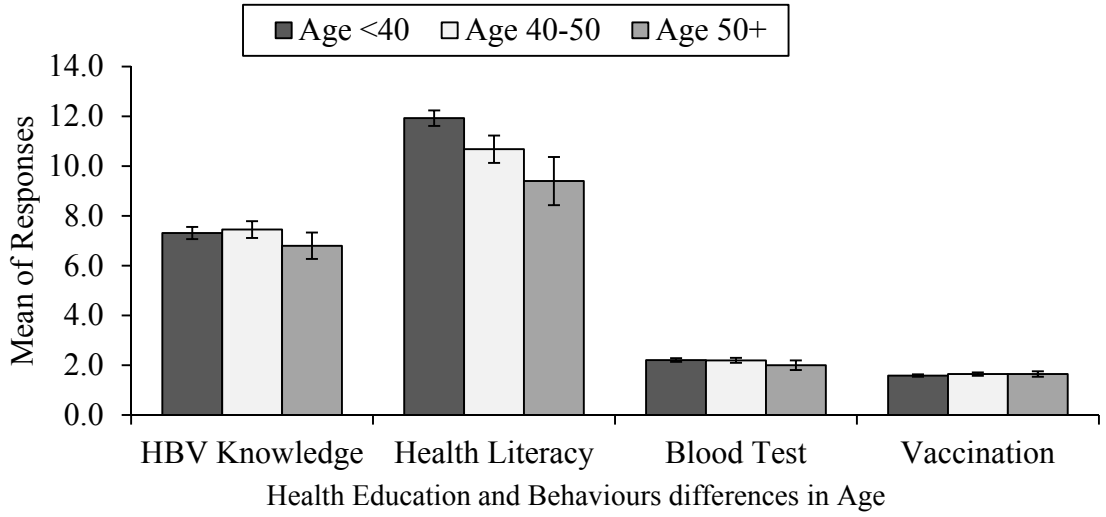

Figure 7. Histogram of Differences between Age Groups in HBV Knowledge, Health Literacy and Health Behaviours

In relation to education, there were significant differences in health literacy, HBV knowledge and health behaviours. On average, participants who had completed up to primary school (M = 5.83, SD = 2.21) and high school (M = 6.56, SH = 2.55) responded to less items correctly than those who had completed up to University (M = 5.833, SD = 2.21). This was a significant difference, -1.83, BCa 95% CI [-3.238, -0.313], t (136) = -2.556, $p < .05$ and represented a large-sized effect, $d = 0.83$. The difference between completion of up to high school and University -1.09, BCa 95% CI [-1.970, -0.219], was significant, t (163) = -2.469, $p < .05$, representing a medium-sized effect, $d = 0.43$.

In addition, on average participants who had completed up to primary school (M = 5.67, SD = 4.16) reported lower health literacy than those who had completed up to high school (M = 9.23, SD = 3.67) and university (M = 12.45, SD = 2.84). Those who had completed up to high school also reported lower health literacy than participants who had completed up the university. The difference -3.564, BCa 95% CI [-6.078, -1.050] in health

literacy scores between participants who had completed up to primary school and high school was significant $t(49) = -2.849$, $p < .01$. This difference was considered a large-sized effect, $d = 0.86$. The difference -6.785, BCa 95% CI [-9.461, -3.109] in health literacy scores between participants who had completed up to primary school and university was significant, $t(12) = -5.524$, $p < .001$. This was considered a large-sized effect, $d = 1.63$. The difference -3.563, BCa 95% CI [-6.078, -1.050] in health literacy scores between those who completed up to high school and university was significant $t(49) = -2.849$, $p < .01$. This was considered a large-sized effect, $d = 0.86$.

On average participants who had completed up to primary school (M = 1.50, SD = 0.80) and high school (M = 1.82, SD = 0.76) reported having a blood test for HBV less than those who had completed up to University (M = 2.36, SD = 0.67). The difference -0.857, BCa 95% CI [-1.267, -0.448] in blood tests for HBV between primary school and University was significant $t(136) = -4.138$, $p < .001$ and considered a large-sized effect, $d = 1.07$. The difference -4.215, BCa 95% CI [-0.788, -0.285] in having a blood test for HBV between high school and University was significant $t(163) = -4215$, $p < .001$ and was a medium-sized effect $d = 0.71$. It was also found that on average, participants who had completed up to primary school (M = 1.83, SD = 0.39) and high school (M = 1.74, SD = 0.44) reported having a vaccination against HBV more than those who had completed up to University (M = 1.55, SD = 0.50). The difference 0.386, BCa 95% CI [0.028, 0.544] between primary school and University in having a vaccination against HBV was significant $t(14.7) = 2.364$, $p < .05$. This was considered medium-sized effect $d = 0.56$. The difference 0.196, BCa 95% CI [0.291, 0.363] between high school and university was found to be significant $t(70.6) = 2.342$, $p < .05$

and was considered to be a small-sized effect, $d = 0.38$.

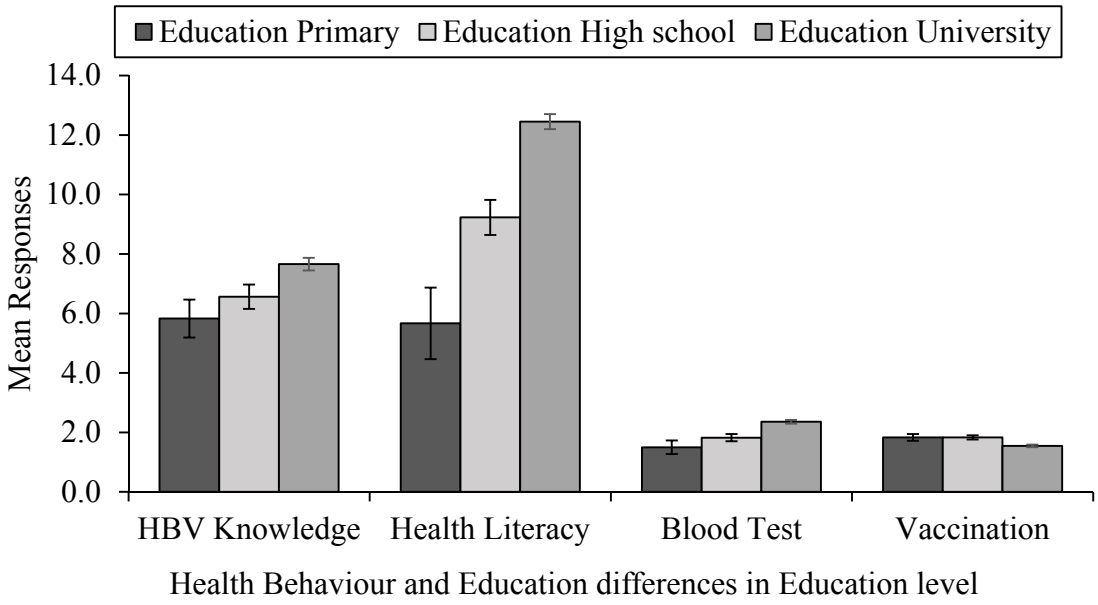

Figure 8. Histogram of Differences Between Education Groups in HBV Knowledge, Health Literacy and Health Behaviours

In relation to years lived in Australia, there were significant differences in health literacy scores and vaccinations against HBV. On average participants who had spent less than 10 years living in Australia (M = 10.65, SD = 3.99) reported lower health literacy scores than those who had been living in Australia for more than 10 years (M = 11.80, SD = 3.40). This difference -1.153, BCa 95% CI [-2.250, -0.056] was significant $t(175) = -2.074$, $p < .05$ with a small-sized effect, $d = 0.29$. In addition, on average participants who had lived less than 10 years in Australia (M = 1.88, SD = 0.89) reported being vaccinated against HBV less than those who had been living in Australia for more than 10 years (M = 2.21, SD = 0.79). This difference -0.331, BCa 95% CI [-0.584, -0.079] was significant $t(159.4) = -2.589$, $p < .05$ and represented a small-sized effect, $d = 0.37$. There were no significant differences

found between years lived in Australia in HBV knowledge and blood tests for HBV (refer to Figure 9).

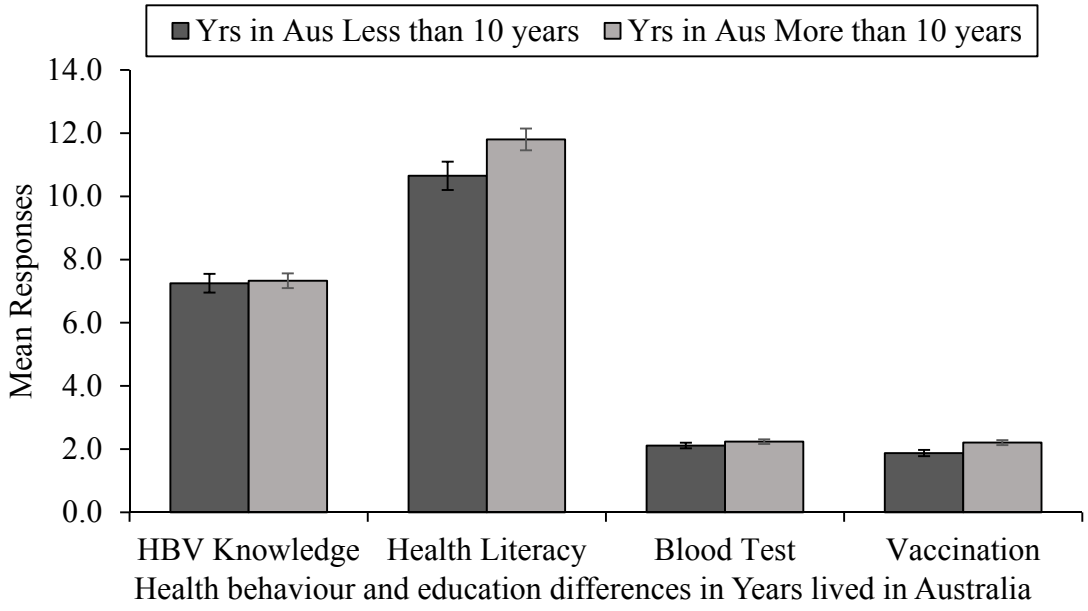

Figure 9. Histogram in Differences Between Years Lived in Australia Groups in HBV Knowledge, Health Literacy and Health Behaviours

In relation to language spoken at home, on average those who spoke a language other than English (M = 2.00, SD = 0.85) at home reported being vaccinated against HBV less than those who spoke English at home (M = 2.50, SD = 0.80). This difference -0.455, BCa 95% CI [-0.832, -0.077] was significant $t(175) = -2.375$, $p < .05$ and represented a medium-sized effect, d = 0.59. There were no significant differences found between between the two language spoken at home groups on HBV knowledge, health literacy and vaccinations against HBV (See Figure 10).

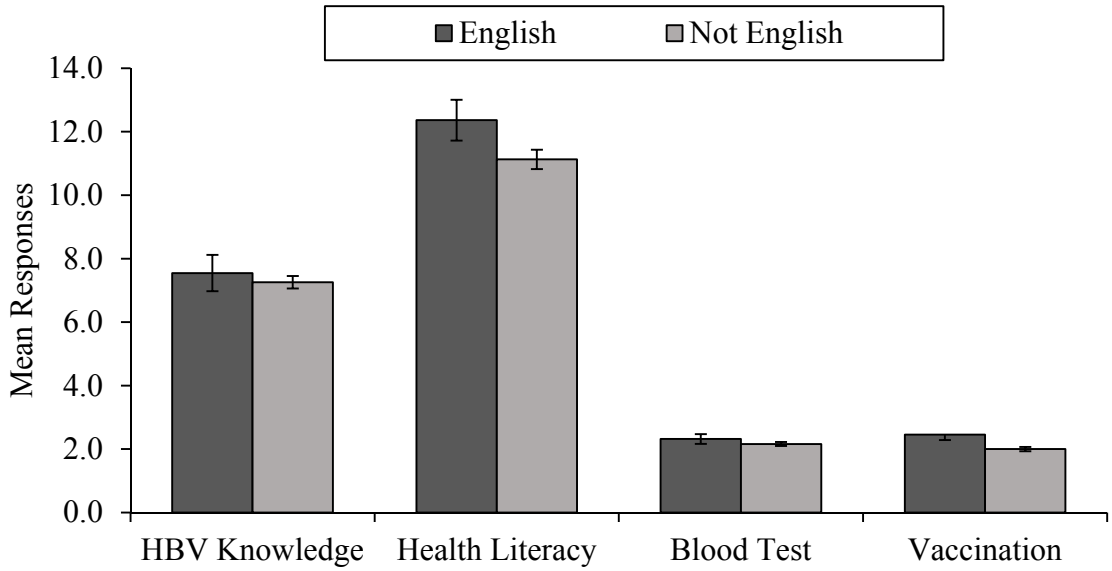

Figure 10. Histogram of Differences Between Language Spoken at Home Groups in HBV Knowledge, Health Literacy and Health Behaviours

Chapter 4: Discussion

The aim of this study was to investigate the current state of HBV knowledge, health literacy, and health-protective behaviours (e.g., HBV knowledge, vaccinations) of Sub-Saharan African (SSA) migrants living in Queensland. The findings were in part intended to be used to help inform future health promotion efforts for SSA migrants in Queensland. Previous research has identified health literacy as a core factor in increasing people's understanding and motivation to engage in health-protective behaviours (Baker, et al., 2002; Nutbeam, 2008; Seo, et al., 2016) Therefore, the current research aimed to identify how HBV knowledge and health literacy relate to each other and predict health-protective behaviours. The results indicate that, as expected, health literacy and HBV knowledge appeared to influence health-protective behaviours. In relation to demographic differences, it was found that participants aged over 40 and participants with lower formal education scored lower in health literacy and HBV knowledge. Those with lower formal education were also less inclined to engage in health-protective behaviours (HBV blood tests), than participants with higher formal education. There were some unexpected outcomes as some health literacy items did not significantly predict health behaviour nor HBV knowledge. One of the health literacy items, "filling medical forms" (self-efficacy) did not significantly mediate the relationship between health literacy items related to reading ability (items 14 and 15) and HBV knowledge. To explain these findings further, relevant hypotheses will be explained and consistent with the literature review. Following this, implications, applications, limitations and recommendations for future research will be discussed.

Influencing Factors of HBV Knowledge and Health-Protective Behaviours

The hypothesis that health behaviours and HBV knowledge would be significantly predicted by three health literacy items was partially supported. The multiple regression model for predicting HBV knowledge was significant, however the health literacy items did

not significantly predict HBV knowledge. This inconsistency could be due to an interaction effect between the predictors. To counteract the interaction, a mediation model was tested. When HBV testing and vaccinations was the predicted outcome, it was found that they were significantly predicted by the health literacy item regarding self-efficacy (item 16 "filling medical forms?") with a small effect. Two other items regarding health literacy did not significantly predict health behaviours (item 14 "read hospital material?" item 15 "learning medical condition?"). There was no significance found by items 14 and 15 predicting health-protective behaviours. This was an unexpected outcome.

Self-efficacy (item 16) significantly predicting health-protective behaviours is consistent with the HBM and the MHLA (Nutbeam, 2008; Bishop, et al., 2014). For example, according to the HBM, in order for people to be willing to engage in health-protective behaviours, they must believe that they are capable (Federman, et al., 2013; Lee, et al., 2013). Previous research identified that participants with high self-efficacy were more inclined to engage in health-protective behaviours. Thus, the current research is consistent with these previous research findings and, highlights the role of self-efficacy with engagement in health-protective behaviours.

An inconsistency found between the current and past research, however, was how two other health literacy items (items 14 and 15) did not significantly predict health behaviours. According to previous research (Federman, et al., 2013; Lee, et al., 2013) higher health literacy leads to an increased understanding of health conditions. Consequently, participants gain higher self-efficacy and are more likely to engage in health-protective behaviours. This research appeared to be inconsistent with the findings of the second hypothesis which was regarding self-efficacy mediating reading ability (Item 14 and 15) and HBV knowledge. The hypothesis was not supported as there was no significant mediation. This inconsistency could, however, be due to lack of robust statistical power in the sample

size of the current study. Therefore, further data collection may influence the outcome and, thus, result in consistency with previous research.

It was hypothesised that the positive relationship between health literacy and health-protective behaviours would be mediated by HBV knowledge. The hypothesis was partially supported as there was a significant mediation for HBV blood tests, however this was no significant mediation for HBV vaccinations. The significant mediation found for blood tests appears to be consistent with the HBM and MHLA (Bishop, et al., 2014; Nutbeam, 2008). Part of the MHLA indicates that after improving health literacy, individuals then change their health behaviours, which leads to improved health outcomes (Nutbeam, 2008). The HBM explains the underlying factors which influence health behaviours (Asare, & Sharma, 2014; Carpenter, 2010; Davis, et al., 2013). The model indicates that knowledge regarding the health condition's severity, susceptibility and of managing/preventing illness (cues to action) can influence health behaviours. Previous research supports these models and current findings, as participants with adequate health literacy scored well in knowledge regarding heart failure and relevant self-care strategies (Dennison, et al., 2011). Consistent with HBM, these findings indicate that when people accurately understood the severity, susceptibility and cues to action, they were more likely to engage in health-protective behaviours. Although health literacy was not assessed in the previous replicated studies (Le, et al., 2014; Vu, et al., 2012), the current research was able to investigate health literacy's potential role in the HBM. Based on the present study, it could be theorised that those with optimal health literacy, become more aware of accurate information regarding the health condition and engage in more health-protective behaviours which is consistent with the MHLA (Lee, et al., 2013; Nutbeam, 2008).

Differences among Demographic Factors

It was hypothesised that there would be significant differences among demographic factors, health literacy, HBV knowledge, and health-protective behaviours. The most significant differences were found in education levels. As expected, participants with tertiary education had more correct responses regarding HBV knowledge and reported higher health literacy scores. The demographic, 'Years lived in Australia', also demonstrated significant differences. As expected, participants who spent less than 10 years in Australia had lower health literacy scores and had lower vaccination rates than those who had spent more than 10 years in Australia. In addition, participants over the age of 40 had significantly lower health literacy scores than those younger than 40. Further, male participants responded with significantly less correct answers regarding HBV knowledge than females. Also, Participants who spoke predominantly English at home had significantly higher rates of HBV vaccinations than those who predominantly spoke a language other than English at home.

The findings regarding demographic differences in health literacy, HBV knowledge and health-protective behaviours provides insight into at risk populations of HBV which could inform future health promotion strategies. When addressing factors contributing to health disparity, it may be useful to consider the Social Determinants of Health (SDH) framework. In relation to demographic factors, the main determinant of health-protective behaviours found in this study was education level. On average, more people with higher education levels reported a higher health literacy score, responded with more correct answers regarding HBV, and were more likely to engage in health-protective behaviour, including, HBV blood tests. When considering the SDH, these results were expected, as education is a determinant to optimal health (Grant, & Barker, 2006; WHO, 1986) In addition, these findings were consistent with the MHLA, as it suggests that education is key to development of health literacy (Nutbeam, 2008).

Implications and Applications

Early prevention and management is crucial, as HBV can be life threatening if left untreated. Previous research has identified that lack of HBV awareness, may lead to less engagement in health-protective behaviours (Lavanchy, 2004; Vu, et al., 2012). Furthermore, misconceptions regarding the transmission of HBV may increase stigmatisation of the disease, leading to avoidance or/and lack of awareness regarding viable HBV prevention strategies (Cotler, et al., 2012; Ma, et al., 2008; Wang, et al., 2009). Previous research regarding HBV knowledge and health-protective behaviours among Vietnamese and Chinese migrant populations in Queensland found a relationship between HBV knowledge and engagement in health-protective behaviours (Vu, et al., 2012). The current study focused on a different migrant population, SSA migrants. The rationale behind this focus, was that the SSA region has high rates of HBV prevalence (Apata, & Averhoff, 2014; ATAGI, 2015). Current research indicates that misconceptions regarding HBV were prevalent among SSA migrants with low formal education and/or low health literacy.

In order to improve HBV prevention and reduce financial strain/demand on the health system, it is important to take advantage of prevention-focused approaches, rather than disease-focused models (Apata, & Averhoff, 2015, & Marmot, et al., 2008). This can be achieved through the SDH three key action areas model, as it is designed to address and prevent determinants from leading to negative health outcomes (Apata, & Averhoff, 2015, & Marmot, et al., 2008). In relation to the first action area, (addressing inequality in population groups), this has been achieved through the current research, as it is investigating factors which influence engagement and non-engagement in health-protective behaviours among SSA migrant community. The second action area (increase equality by decreasing gaps) will be applied by ECCQ future health promotion strategies that are based on the findings of this research. Lastly, addressing health gradient will occur once strategies are in place. Therefore,

by addressing these action areas through providing further HBV education as a prevention strategy may help reduce stigmatisation and increase engagement of health-protective behaviours such as vaccinations and blood tests.

Based on the demographic differences, it was found that education was a determinant for engagement in health behaviours. It was also identified that health-protective behaviours, health literacy and HBV knowledge was lower when education was low. This is consistent with previous research, as it was found by Santos-Hovener and colleagues (2015) that those who were highly educated also were less likely to have HBV. Other research also indicates that HBV education may decrease stigmatisation of HBV and isolation of people with HBV and improve engagement in health prevention/management (Cotler, et al., 2012; Wang, et al., 2009). This therefore, highlights the importance of reducing stigma to enable people to seek medical assistance. Research by Cotler and Colleagues (2012) has found that there was less stigma of HBV for those educated on ways HBV is transmitted, or/and had a family member who was a carrier of HBV. Wang and colleagues (2009) found that there was also less prevalence of stigma for those who were educated on treatment/prevent for HBV. Therefore, it may be of benefit for future health promotion strategies to focus on educating the community on HBV transmission, and treatment/prevention to reduce stigma and increase engagement in health-protective behaviours.

ECCQ have developed programs with the goal of preventing HBV through awareness among the SSA migrant community in Queensland (F. Siggins, personal communication, October 12, 2016). At present, ECCQ have been providing information stalls and presentations regarding HBV awareness (e.g., HBV transmission and treatment/prevention) within the community. As previously stated, education regarding HBV transmission and treatment/prevention have been supported by research to increase engagement of health-protective behaviours whilst simultaneously reduce stigma (Cotler, et al., 2012; Wang, et al.,

2009). Strategies used to achieve this have been through African Bilingual Cultural Workers going into SSA migrant communities and delivering HBV education sessions in African languages. As indicated by previous research, cultural workers engaging with the community in these activities are crucial for building rapport with the community and providing opportunities to engage in health-protective behaviours (Henderson & Kendall, 2011). Awareness campaigns for SSA migrants are also being developed by Hepatitis Queensland (F. Siggins, personal communication, October 12, 2016). Two specific initiatives are developing a film project regard HBV with African youths and working TAFE (Logan Lea) to produce an information booklet regarding HBV awareness. The reason for working with TAFE Logan Lea was due to many SSA people attending the institution.

A client-centred approach can be useful for health professionals engaging with any clients, particularly people from CALD backgrounds (Michael, et al., 2013; Seo, et al., 2016). Tailoring their approach to the client's education and health literacy level may help educate clients and provide the opportunity to make more informed choices regarding their health. This approach is particularly important as the current research indicates that those with low education were most misinformed of HBV and had the lowest rates of engaging in health-protective behaviours. One strategy health professionals can use to work towards a client-centred approach, is the use of brief health literacy screening tools such as the three items used in the current survey. Screening tools would assist health professions in gaining a snapshot of the client's current knowledge and ability which can be used to tailor their approach to improve the client's knowledge base. Past research suggests a strength of the three health literacy items is that the items have good psychometric properties, are easy to understand and is brief which reduces the likelihood of clients experiencing shame or embarrassment (Bishop, et al., 2016; Chew, et al., 2004; Wallace, et al., 2005).

Another strategy to consider when assisting people from CALD backgrounds to make informed choices and engage in health-protective behaviours, particularly individuals with lower formal education are providing translations (translators) into the client's original language (Henderson, & Kendall, 2011; Michael, et al., 2013). As translators are not always an available resource, exploration of the use of technology may be a viable alternative in overcoming language barriers between health professionals engaging with their clients (e.g., application specifically for translating African languages to be used on tablets). This may also be helpful for cultural workers on the field who might not be familiar with the clients' language. This can particularly be the case for African cultural workers, as the African region has vast range languages spoken.

Strengths and Limitations

Within the current study there were a number of strengths and limitations. A strength of the current study was the addition of three items to measure health literacy and an item to measure formal education. In past research, these items were not included. By including these items, the study was able to gain further understanding of other factors which may influence health-protective behaviours. The current study also included more robust statistical models which investigated key constructs within the study (e.g., health literacy, demography, HBV knowledge, health behaviours), including bootstrapping-based mediation and multiple regression. In addition, as the study replicated previous studies by using the same survey with the modification of including education and health literacy, comparison between cultural samples were possible. This was useful in identifying differences and similarities to be taken into consideration when forming health promotion strategies for specific cultures. Lastly, the study was able recruit participants through cultural workers. The cultural workers provided a culturally sensitive approach to cater for potential participant's needs during recruitment and

opportunity for health promotion after. This played a crucial role in connecting and building trust within the SSA migrant community to participate.

There were a number of limitations of this current study. During recruitment, cultural workers found participants attempting to start using their phones to find correct answers regarding the HBV items. When cultural workers observed this, they stopped participants from using their phones by re-explaining the purpose of the study (e.g., to accurately understand current HBV knowledge) and that their information will remain confidential

Secondly, in terms of the survey used, differences in temporal sequencing between self-reported health literacy and health behaviours may have occurred when the health behaviours happened in the past rather than recently (Worgotter, & Porr, 2005). The difference between the two self-report measures is due to the self-reported health literacy measuring current health literacy, which may have differed during the time participants were tested or vaccinated. Secondly, as participants were often unable to check medical records regarding vaccinations and blood tests, participants relied on their own recall of whether/when these medical procedures were administered. Therefore, accuracy of these responses may have been compromised

Another limitation to address, is the over-representation of people who have completed higher former education (29% studied some university/completed TAFE, 30% finished university, 12.5% completed postgraduate-studies). This limits the generalisability of the data. The likely over-representation of higher formal education may be due to potential participants who know little English not feeling comfortable participating, as the surveys was not written in other languages. It is also important to consider that SSA is a very culturally diverse group, and, therefore, the findings may not be generalizable to all people from countries of this region.

Despite the robust nature of the statistical tests run and significance occurring for some results, the sample size provided only small effects. Also, the survey incorporated single items of health literacy which can be less reliable than scales. Lastly, it is also important to note that the results support correlational links, not causation.

Implications for Future Research

For future research, it is recommended that specific sub-populations of SSA migrants should be investigated, as this will provide more accurate information regarding factors contributing to health behaviours which would then inform future health promotion efforts. Also, researching sub-populations will narrow down the languages participants might speak, and, thus, meaning the development of surveys in these languages becomes a more feasible option. Providing surveys in the participants' language preference may breakdown the language barrier and reduce risk of over-representation of people with higher-former education.

It is advised that future research should increase statistical power by increasing sample size (e.g. minimum 550 as suggested by G*Power). Increased statistical power will provide more accurate interpretations of the models being tested, particularly for insignificant models. In addition, increasing the sample size may also increase the amount of participants who were tested as HBV positive and whether they are receiving treatment. This will allow further exploration of factors predicting such health behaviours and outcomes. Also, conducting a longitudinal designed study may be useful in gaining more accurate understanding of how health behaviour might change over time depending on various factors and reduce risk of differences in temporal sequencing. As suggested in previous research, including a control group (Australian-born) into the study may highlight general norms and significant differences across populations (Vu, et al., 2012).

As the HBV items were not psychometrically developed, further assessment of the psychometric properties of these items as well as refinement to improve reliability and validity is recommended. Also, additional items included into the survey may help with exploration of other contributing factors of health-protective behaviours. For example, assessing socio-economic status may help provide further information regarding how financial situations impact the ability to engage in health-protective behaviours (e.g., estimation of yearly income; see Vu, et al., 2010). Also, including an item regarding when/if participants are a permanent Australian resident may help assess when/if participants have access to health resources (e.g., Medicare), which may impact their ability to engage in health-protective behaviours. Previous research by Santos-Hovener, and colleagues (2015) investigated fear of deportation and stigma as factors influencing health-protective behaviours. This may be useful to investigate in future research as well. It is also recommended that future research should investigate other areas of health literacy, in addition to functional health literacy (e.g. critical, interactive). Investigating other areas of health literacy will provide a more holistic understanding of the relationship between health literacy and health behaviours, thus, providing further insight into areas which require development in order to improve health outcomes.

Conclusion

Overall, the present research indicates that there is a link between health literacy/HBV knowledge and health-protective behaviours. Participants within demographic categories such Language spoken other than English, low formal education and spent less than 10 years in Australia, appeared to score low on HBV knowledge and Health literacy. This flowed on to low rates of engagement in health-protective behaviours such as immunisations and blood tests. As stated earlier, there are a number of approaches that can be used to bridge these gaps, such as prevention-focused approaches (increasing awareness among at risk

communities), health professionals using a client-centred approach (e.g., translators, screening tools to understand client's current health literacy/knowledge level). It is suggested that future research investigates these strategies and other potential determinants of health-protective behaviours, such as income and Australian residency status.

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Appendix A

Please answer the question and circle appropriate answer/s

Age : _____

Gender: Male Female

Country of Birth: _____
If you were born outside of Australia, how many years have you lived in Australia? _____
What language/s do you speak at home? _____

What is your highest level of education you have completed? *(please tick one answer only)*
_____Primary school
_____Grade 10
_____Grade 11
_____Grade 12 (or equivalent)
_____ TAFE (Polytech)
_____ Some university
_____University degree
_____Post-graduate university degree

(Please tick one answer only)	**Yes**	**No**	**Not Sure**
1. Can people get Hepatitis B through unsafe sex (not using condoms)?			
2. Can people get Hepatitis B by sharing toothbrushes, tweezers, or razors?			
3. Can new born baby get Hepatitis B from their mothers?			
4. Can people get Hepatitis B by sharing food and drinks?			
5. Can people get Hepatitis B from unsterile medical equipment?			
6. Can people get Hepatitis B by shaking hands?			
7. Can people with Hepatitis B develop liver cancer?			
8. Can people have Hepatitis B for life?			
9. Can people with Hepatitis B for a long time still pass on hep B to others?			
10. Someone can have Hepatitis B but look and feel healthy?			

11. Is there a treatment for Hepatitis B?			

12. In what language would you prefer to access information (please circle only one)?
English only Home language only Home language *and* English

Other language_____

13. If you want to access *health* information where you would go to?_____

14. How often do you have someone help you read information related to your health or medical condition?
    1. Always
    2. Often
    3. Sometimes
    4. Occasionally
    5. Never

15. How often do you have problems learning about your health or a medical condition because of difficulty understanding written information (in English or Home language)?
    1. Always
    2. Often
    3. Sometimes
    4. Occasionally
    5. Never

16. How confident are you filling out medical forms yourself?
    1. Not at all
    2. A little bit
    3. Somewhat
    4. Quite a bit
    5. Extremely

17. Have you ever been vaccinated against hepatitis B?
    a. Yes If Yes, where did you have your vaccination?_____
    b. No If No, why not_____
    c. Not sure

18. Have you ever had a blood test to see if you have had hepatitis B?
    a. Yes ⟶ **Please go to question 19**
    b. No ⟶ **You have completed the survey form. Thank You**
    c. Not sure ⟶ **You have completed the survey form. Thank You**

19. What year did you have the last hepatitis B test in Australia? _____
    a. Where did you have your hep B test? _____

20. What year did you have the last hep B test in another country (not in Australia)? - _____

    a. Which country (outside of Australia) did you have your last hep B test? _____

21. What was the result of that test?
    a. Positive (you are infected by hep B) → **Please go to Question 22**
    b. Negative (you are not infected by hep B) → **You have completed the form. Thank You.**
    c. Not sure → **You have completed the form. Thank You**

22. Are you seeing a doctor regularly because of hepatitis B?
    a. Yes
    b. No If No, why? _____

23. Are you on the hepatitis B treatment?
    a. Yes
    If Yes, please choose:
        a) Western medicine
        b) traditional medicine (herbs, acupuncture etc)
        c) both

    b. No If No, why_____

Thank you!