# KNOWLEDGE AND ATTITUDE ON CHILDHOOD VACCINATION AMONG HEALTHCARE WORKERS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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## Table of Contents

## LIST OF ABBREVIATIONS

| | |
|---|---|
| HCWs | Healthcare workers |
| HBM | Health Belief Model |
| HUSM | Hospital Universiti Sains Malaysia |
| JEPeM | Jawatankuasa Etika Penyelidikan Manusia |
| KACV | Knowledge and attitude on childhood vaccination |
| MOH | Ministry of Health |
| USM | Universiti Sains Malaysia |

## LIST OF TABLES

## LIST OF FIGURES

## ABSTRAK

**Latar Belakang dan objektif kajian:**

Keraguan terhadap vaksin telah diiktiraf sebagai isu penting di peringkat global. Kakitangan kesihatan mempunyai pengaruh yang kuat kepada orang ramai dalam mendidik masyarakat dengan pengetahuan yang sebenar mengenai isu keraguan terhadap vaksin. Kajian terbaru telah melaporkan bahawa terdapat peningkatan dalam keraguan terhadap vaksin di kalangan kakitangan kesihatan. Kajian ini dijalankan untuk menilai pengetahuan dan sikap terhadap vaksinasi kanak-kanak dalam kalangan kakitangan kesihatan di Hospital Universiti Sains Malaysia (HUSM).

**Kaedah:**

Ini adalah kajian keratan rentas yang dijalankan di kalangan 198 kakitangan kesihatan di HUSM, Kubang Kerian, Kelantan yang dipilih melalui persampelan mudah. Data tentang butiran sosio-demografi, pengalaman bekerja, dan sumber maklumat utama mengenai vaksinasi kanak-kanak telah dikumpulkan. Soal selidik Pengetahuan dan Sikap Mengenai Vaksinasi Kanak-Kanak (KACV) versi Bahasa Melayu yang disahkan telah digunakan semasa kajian. Multiple logistic regression digunakan untuk menentukan faktor yang mempengaruhi pengetahuan yang baik dan sikap yang positif. Nilai $p < 0.05$ dianggap signifikan secara statistik.

**Keputusan:**

Purata skor bagi pengetahuan ialah 27.3 (91%) dan julat skor adalah dari 12 hingga 30. Manakala purata skor bagi sikap ialah 60.8 (81%) dan julat skor adalah dari 39 hingga 75. Jantina wanita [OR (95% CI):3.15, (1.39, 7.12), $p < 0.05$] dan tahap pengetahuan tinggi (ijazah dan ke atas) [OR (95% CI): 2.36 (1.14, 4.89), $p < 0.05$] dikaitkan secara signifikan

dengan pengetahuan yang baik tehadap vaksinasi kanak-kanak. Responden yang mempunyai sejarah kesan sampingan vaksin dalam kalangan saudara mereka adalah kira-kira 66 % kurang berkemungkinan mempunyai pengetahuan yang baik [OR (95% CI): 0.342 (0.16, 0.73), $p < 0.05$]. Sikap positif terhadap vaksinasi kanak-kanak secara signifikan dikaitkan dengan tahap pengetahuan yang lebih tinggi di kalangan peserta serta mempunyai pengetahuan yang jauh lebih baik jika dibandingkan dengan peserta yang mempunyai tahap pengetahuan yang lebih rendah [OR (95% CI): 3.81, (1.92, 7.57), $p < 0.001$]. Sebaliknya, peserta yang mempunyai hubungan langsung dengan pesakit, mempunyai kurang kemungkinan mempunyai sikap yang baik [OR (95% CI): 0.207(0.043, 0.10), $p<0.05$] dalam vaksinasi kanak-kanak. Sejarah kesan negatif vaksin dalam kalangan saudara-mara juga mempunyai hubungan yang signifikan dengan sikap yang negatif [OR (95% CI: 0.342 (0.16, 0.76), $p<0.05$].

**Kesimpulan:**

Tahap pendidikan dikaitkan dengan skor pengetahuan yang baik. Kakitangan kesihatan dengan saudara mara yang mempunyai kesan sampingan vaksinasi dikaitkan dengan skor pengetahuan yang lebih rendah dan lebih berkemungkinan mempunyai sikap negatif. Kajian ini mengesyorkan lebih banyak program pendidikan mengenai vaksinasi di kalangan kakitangan kesihatan di HUSM supaya pengetahuan dan sikap yang lebih baik tentang vaksinasi kanak-kanak dapat diterapkan. Untuk meningkatkan pengetahuan dan mempunyai sikap positif mengenai vaksinasi kanak-kanak dalam kalangan kakitangan kesihatan, kami mengesyorkan pembangunan dan pelaksanaan strategi komunikasi vaksinasi yang berkesan melalui program pendidikan berterusan yang sistematik terutamanya kepada kakitangan yang mendapat skor pengetahuan dan sikap yang rendah.

## ABSTRACT

### KNOWLEDGE AND ATTITUDE ON CHILDHOOD VACCINATION AMONG HEALTHCARE WORKERS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

**Introduction and research objectives:**

Vaccine hesitancy has been recognized as an important issue globally. Healthcare workers (HCWs) had a powerful influence on the public on educating them the right understanding on childhood vaccination. Recent studies have reported that there is increasing numbers of vaccine hesitancy among HCWs. This study was conducted to assess the knowledge and attitudes on childhood vaccinations among HCWs in Hospital Universiti Sains Malaysia (HUSM).

**Methodology:**

This was a cross-sectional study conducted among 198 HCWs in HUSM, Kubang Kerian, Kelantan who were selected via convenient sampling. Data on their socio-demographic details, working experience, and main source of information regarding childhood vaccination were collected. A validated, Malay version of the Knowledge and Attitude on Childhood Vaccination (KACV) questionnaire was used during the study. Hosmer Lemeshow for fitness model was used. Multiple logistic regression was conducted to determine associated factors for good knowledge and positive attitude. A p value $< 0.05$ was considered statistically significant.

**Results:**

The mean score for knowledge is 27.3 (91%) and the score range is from 12 to 30. While the mean score for attitude is 60.8 (81%) and the score range is from 39 to 75. Female sex [OR (95% CI):3.15, (1.39, 7.12), $p < 0.05$] and higher education level (degree and above) [OR

(95% CI): 2.36 (1.14, 4.89), p < 0.05] are significantly associated with good knowledge. Respondents with a history of side effects of the vaccines among their relatives were about 66 % less likely to have good knowledge [OR (95% CI): 0.342 (0.16, 0.73), p < 0.05]. Positive attitudes toward childhood vaccination were significantly associated with higher levels of knowledge among participants as well as having significantly better knowledge when compared to participants with lower levels of knowledge [OR (95% CI): 3.81, (1.92, 7.57), p <0.001]. On the contrary, participants having direct contact with patients were less likely to have a good attitude [OR (95% CI): 0.207(0.043, 0.10), p<0.05], and those with a history of severe side effects of the vaccines among their relatives were also significantly associated with poor attitude [OR (95% CI: 0.342 (0.16, 0.76), p<0.05].

**Conclusion:**

The education level is associated with good knowledge score. HCWs with relatives having side effects of vaccination is associated with lower knowledge score and more likely to have negative attitude. This study recommends more enhanced education programs on childhood vaccinations for HCWs in HUSM and demand an improved knowledge and attitude on childhood vaccinations. These findings highlight the need for increased efforts by policymakers to educate HCWs to enhance their knowledge and attitude on childhood vaccination. To improve the knowledge and to have positive attitude of childhood vaccination among HCWs, we recommend the development and implementation of vaccination communication strategies that address the determinants of vaccine hesitancy through systematic continuous education programs to targeted HCWs with low score of knowledge and attitude.

**Keywords**: knowledge; attitude; healthcare workers; childhood vaccination.

# CHAPTER 1: INTRODUCTION

## 1.1 Study background

Vaccine is found to be the single most effective intervention to prevent infectious diseases worldwide. Beyond that, vaccines have also been said to prevent antibiotic resistance and extend life expectancy (Andre et al., 2008). As the number of vaccinated individuals dominant in the community, the possibility of contact of unvaccinated individuals and the prevalence of the disease in that community will decrease (herd immunity) (Gür, 2019). Vaccination programme has been recognised as one of the most successful preventive measures in public health. Smallpox vaccine was the first vaccine to be administered widely in human, and smallpox was the first human infectious disease to be eradicated by vaccination in 1979 (Greenwood, 2014). The World Health Organisation declared human beings smallpox free on 8 May 1980 and poliomyelitis-free in Europe in June 2002. Polio in Malaysia was eradicated since 1992. Thanks to the National Immunisation Program (NIP) as it includes polio in the vaccination coverage, Malaysia is free from polio for 27 years (WHO, 2019b) before it re-emerged in December 2019.

The immunisation practice has revolutionised the history of medicine, reducing mortality and morbidity and profoundly changing the epidemiology of infectious diseases. Despite the good achievement by vaccination program, there seems to be an increasing number of individuals who perceived it as unsafe and unnecessary Overall, 86.4% children were verified as having received complete primary vaccination by the age of 12 months, with an additional 8.9% self-reported as having completed their child's primary vaccination (IPH, 2016) which is less than the target 95% for herd immunity (Gür, 2019). Findings from the

National Health and Morbidity Survey (NHMS) 2016 also indicated that the overall prevalence of children aged from 12 until 23 months, who completed their primary vaccination, was more than 90%. However, statistics indicated that the number of parents in Malaysia who chose not to vaccinate their children increased, especially among parents with children aged below two years, from 637 cases in 2013 to 1,603 cases in 2016 (IPH, 2016). This increasing trend indicates that the public demands for more safety affirmations towards vaccination or immunisation despite a wide array of safe and effective vaccines in use at the global level (Wan Rohani W. T., 2017)

Concomitantly, a low level of information has been observed among professional healthcare workers, giving rise to strong scepticism about the efficacy and safety of certain vaccinations which can lead to widespread under-utilisation. This attitude of mistrust manifested itself clearly after the recent influenza pandemic, during which healthcare workers showed very low support of vaccination campaigns although flu vaccination is recommended for all at-risk groups, including the healthcare workers themselves (Panico et al., 2011; Verger et al., 2012). The issue of vaccination among healthcare workers is undoubtedly important for the protection of the health not only of the workers themselves but also of the whole community. Not all healthcare workers are in favour of vaccinations, and as proof of this, we can mention the countless websites and healthcare workers associations which are actively engaged against vaccines (Joyeux, 2015).

The rate of support for some vaccinations among healthcare workers never reaches 100% (Douville et al., 2010). Among the reasons that induce healthcare workers not to get vaccinated are the strong uncertainties about the actual safety and efficacy of the vaccine itself, fear related to adverse reactions, fear of injection-related pain, fear that multiple

injections at one time could be too much for the immune system. Other than that the belief that it is not necessary to be vaccinated, and finally, the organisational difficulties in obtaining the vaccination (Battistella et al., 2013; Zhang et al., 2012). Many American studies have shown that although the rate remains low, more than 50% of healthcare workers are in favour of vaccinations, especially against flu (Pielak et al., 2010). In support of the importance of vaccinations, several studies report the reasons which include the professional responsibility to protect themselves, their patients and colleagues, but also family members, as well as the ease of access to vaccines and their gratuity (Zhang et al., 2012).

Several studies have evaluated the attitude, knowledge and immunisation practice of healthcare workers (Bean and Catania, 2013); (Gilca et al., 2009; Herzog et al., 2013). In addition to the alarming data about the healthcare workers rates of support of vaccinations, the most worrying data is represented by their alleged inclination not to get vaccinated, which could discourage the choice of the citizens themselves (Mergler et al., 2013). For this reason, it is necessary to promote immunisation practice as well as for healthcare workers to acquire information for raising awareness of the problem.

Parental decisions were predominantly shaped by the perceived benefits of the vaccine; perceived risk of children contracting the vaccine-preventable disease and having recommendations from health care providers. Fear of side effects and uncertainty about vaccine effectiveness, as well as cost and lack of healthcare, were barriers to vaccination. Other factors such as knowledge, family characteristics, parent-child dialogue and egalitarian values appeared to be important when deciding whether to vaccinate boys (Radisic et al., 2016). The importance of mothers aged ≥ 30 years and educational level for vaccination coverage has been shown in various reports as associated factors for knowledge. This may

be due, in part, to older mothers being influenced more by memories of the benefits of vaccination and less by current controversies. Whether the mother worked or not ,did not affect vaccination coverage (Borràs et al., 2009). Lack of parents' trust in childhood vaccination and their unawareness affects their attitude towards childhood vaccination (Aziz et al., 2019) and this source of information by healthcare providers has a significant association parents belief and practice on childhood vaccination (Abdullah et al., 2019). Therefore healthcare workers may enhance their knowledge and strengthen its educational promotion for parents at health clinics and also during outreach activities. These to ensure all parents, especially the anti-vaccine groups, are aware of the importance of childhood vaccination.

Among healthcare workers who did not receive the vaccine, the most frequently mentioned reason was the high cost and unavailability. Similarly, studies from different areas reported the same finding. Another barrier mentioned was vaccine unavailability, which was reported by 36% of participants (Akibu et al., 2018). In another study, inadequate infection prevention knowledge and unsafe practices were frequent among study participants, reflecting a potentially common problem at public healthcare facilities in southeast Ethiopia. Healthcare workers have better knowledge and safer practices if they had received infection prevention training and had infection prevention guidelines in their workplace (Geberemariyam et al., 2018).

## 1.2 Problem statement

Healthcare workers are considered to be the most trusted source of vaccine-related information for patients. They are in the best position to understand issues of hesitancy among patients, to respond to their worries and concerns, and to find ways to explain to them

the benefits of vaccination. However, more and more studies are now showing that healthcare workers themselves, including those who provide vaccination to patients, give wrong information or even advise patient to prevent taking vaccines (Verger et al., 2015). It could be whether considering vaccination for themselves, their children, or their patients. Almost all of these studies in Europe focused on healthcare workers' attitudes and concerns related to seasonal and pandemic influenza vaccines. Many of the studies found that healthcare workers had not been vaccinated against influenza because they had not had time (Ciancio and Rezza, 2014; Qureshi et al., 2004), were not at risk of influenza (Wicker and Marckmann, 2014; Wicker et al., 2008), felt healthy or had not had the vaccine prescribed (Raftopoulos, 2008; Rubin et al., 2011) or concerns about vaccine safety and efficacy (Barrière et al., 2010). A recently published study showed that 16% to 43% of French family doctors admitted not having recommended a specific vaccine for their patients, or only sometimes (Verger et al., 2015).

Vaccines have been used for years. Its safety is always a concern to the public. There are myths and beliefs about vaccines autism and its link to Measles/Mumps/Rubella (MMR) vaccine (Battistella et al., 2013). Public and healthcare workers must update their knowledge to overcome the propaganda towards childhood vaccination. Healthcare workers' knowledge and attitudes have an impact on the public as general acceptability of vaccines (Tomboloni et al., 2019). Unfortunately, studies regarding knowledge and attitude on childhood vaccination among healthcare workers are limited. Most of the studies focus more on knowledge and attitude on childhood vaccination among parents. Studies conducted to assess public knowledge childhood vaccination, and it is found that limited knowledge among participants regardless of their educational, social and ethical background (Abdullah et al.,

2019; Jeyachelvi et al., 2016). This low awareness among the public could negatively impact the success of the vaccination program. This finding indicates a serious need for education childhood vaccination to the healthcare workers and the public.

### 1.3 Rationale of the study

The survey is designed to detect knowledge, attitudes and associated factors on childhood vaccinations of healthcare workers at the HUSM in order to support clinical management in decision-making capable of positively affecting the immunisation practice. The main concern here is poor knowledge and negative attitude towards childhood vaccination which might spread the false belief of childhood vaccination to patients. Thus, further intervention can be done to overcome the issues of poor knowledge or misconception of childhood vaccination among healthcare workers in HUSM. For example, a training program to give appropriate information on childhood vaccination. At the same time, it may help to prevent the spreading of wrong information on childhood vaccination from healthcare workers to society.

Healthcare workers are frontline personnel who provide health education to patients and the general population (Jeyachelvi et al., 2016). Healthcare workers must update their knowledge with a positive attitude towards vaccination. Health nurses, for example, play the main role to vaccinate the target population through the National Immunization Program (NIP). They are going to be the trusted source of information about childhood vaccination to the parents (WHO, 2014). Assessing knowledge and attitudes about childhood vaccination among healthcare workers is important to achieve the aim of NIP and to reduce the case of vaccine-preventable diseases in our population.

Thus, this study is determined to assess the knowledge and attitudes on childhood vaccinations among healthcare workers at the HUSM in order to support clinical management in decision-making capable of positively affecting the immunisation practice. This study is initiated based on minutes of meetings of the HUSM administration that notice there are some complaints on health care workers attitude towards vaccination program. The administration decides to initiate the study to assess this issue further. The result of this study will be shared with the HUSM administration for future planning and policymaking. Thus, a further intervention can be done to overcome the issues of poor knowledge or misconception and negative attitude of childhood vaccination among healthcare workers in HUSM.

## 1.4 Research questions, objectives and research hypothesis

### *1.4.1 Research questions*

1.4.1(a) What is the level of knowledge on childhood vaccination among healthcare workers in HUSM?

1.4.1(b) What is the level of attitude on childhood vaccination among healthcare workers in HUSM?

1.4.1(c) What are the associated factors for knowledge on childhood vaccination among healthcare workers in HUSM?

1.4.1(d) What are the associated factors for attitude on childhood vaccination among healthcare workers in HUSM?

### *1.4.2 General objective:*

To determine knowledge and attitude on childhood vaccination and its' associated factors among healthcare workers in HUSM.

### *1.4.3 Specific objectives:*

1.4.3(a) To determine the level of knowledge on childhood vaccination among healthcare workers in HUSM.

1.4.3(b) To determine the level of attitude on childhood vaccination among healthcare workers in HUSM.

1.4.3(c) To identify the associated factors for the level of knowledge on childhood vaccination among healthcare workers in HUSM.

1.4.3(d) To identify the associated factors for the level of attitude on childhood vaccination among healthcare workers in HUSM.

### *1.4.4 Research hypothesis*

1.4.4(a) Socio-demographic factors, working factors, attendance to course and past experience are significant associated factors for knowledge on childhood vaccination among healthcare workers in HUSM.

1.4.4(b) Socio-demographic factors, working factors, attendance to course and past experience are significant associated factors for attitude on childhood vaccination among healthcare workers in HUSM.

## 1.4 Dissertation organisation

This dissertation was arranged according to Format B (Manuscript ready format) according to guideline by Postgraduate Office, School of Medical Sciences (2016). The following chapter is the study protocol that had been submitted and had obtained ethical approval from JEPeM, USM. The chapters in the dissertation are arranged in following orders; Chapter 1: Introduction, Chapter 2: Study protocol, Chapter 3: Manuscript, Chapter 4: Discussion, limitations, conclusions and recommendations and Chapter 5: References and appendix. Appendices which include approval letter from Jawatankuasa Penyelidikan Etika Manusia (JEPeM), Universiti Sains Malaysia, patient's information sheet and consent forms in Malay and English version, case report form and certificate of participation in oral presentation of 23rd Family Medicine Scientific Conference 2021 for this thesis and published manuscript in Vaccines journal.

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# CHAPTER 2: STUDY PROTOCOL

## 2.1 Literature review

### *2.1.1 Overview of the vaccination program in Malaysia*

The National Immunisation Program (NIP) was introduced by the Malaysian Government in 1950$^{th}$ to protect children from vaccine-preventable diseases. Since then, there were several changes and modifications in NIP to suit the latest recommendation by the Expanded Immunisation Programme (EPI) of the World Health Organisation (WHO). The latest update was in 2010 when the Human Papilloma Virus (HPV) was introduced for school-age [1]. The vaccines are given free of charge to all babies in the government health centres and cover the 10 vaccine-preventable childhood diseases [2]. More vaccines may be added in future, depending on factors such as the disease burden, cost-effectiveness and the budget allocation. There may be a slight modification of the immunization schedule from time to time, depending on the combination of vaccines available. While in Malaysia, the immunisation schedule, as shown below:

Table 1: Malaysia immunisation schedule

| Age | Birth | 1 m/o | 2 m/o | 3 m/o | 5 m/o | 6 m/o | 9 m/o | 12 m/o | 18 m/o | 21 m/o | 7 y/o |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Types of vaccines | BCG dose 1 | Hep B dose 2 | DTaP dose 1 | DTaP dose 2 | DTaP dose 3 | Hep B dose 3 | MMR dose 1 | MMR dose 2 | DTaP booster | JE dose 2 (Sarawak) | MR dose 2 |
| | Hep B dose 1 | | Hib dose 1 | Hib dose 2 | Hib dose 3 | Measles dose 2 (Sabah) | JE dose 1 (Sarawak) | | Hib booster | | DT Booster |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Polio (IPV) dose 1 | Polio (IPV) dose 2 | Polio (IPV) dose 3 | | | | Polio (IPV) booster | | |

### *2.1.2 Knowledge towards childhood vaccination*

Several socio-demographic factors were statistically related knowledge and confidence in childhood vaccination. Firstly, those aged 50–59 years old showed lower knowledge and confidence level than those aged 20–29 year old. Women were more knowledgeable and more confident than men and, as compared to those without children, parents with children are less confident and less knowledge about childhood vaccination. There was no significant association between lack of confidence and knowledge with employment, level of education and socioeconomic status (Luyten et al., 2019).

A study shows that Influenza vaccination coverage among healthcare workers is low in Srinagar, India due to poor knowledge of vaccine availability and misperceptions about vaccine effectiveness and fear of adverse effects (Bali et al., 2013). Another study among healthcare workers in Italy shows that there is a good level of information and knowledge about the injection site of vaccines for healthcare workers in all age groups, except for those over 61. In particular, the professional category of doctors was the most prepared compared to the others (Tomboloni et al., 2019). In Malaysia, a study conducted among health nurses for knowledge on the HPV vaccine in school-age. HPV is one of the vaccines listed in the National Immunisation Program (NIP). The study was conducted in primary care centres in Kelantan, and it shows that nearly 60% of participants wrongly answered that HPV vaccines could not be offered to sexually active women. Likewise, 70.9% of participants were not aware that the HPV vaccine might be appropriate for females aged 9 through 26 years.

Though 90% of participants believed that the vaccine is safe, nearly half of them were unsure about efficacy. From multiple linear regression analysis, among the factors tested only the participant's level of education showed a statistically significant association with the HPV knowledge score. Thus, this conclude that his study the nurses have favourable attitudes towards HPV vaccination; however, they have significant knowledge deficit and major misunderstanding in critical knowledge items (Jeyachelvi et al., 2016).

### *2.1.3 Attitudes towards childhood vaccination*

For many people, vaccination attitudes are not formed just by healthcare professionals but also by other sources of information, including online and social media (Charron et al., 2020). It is found that healthcare professionals report increasing challenges to building a trustful relationship with patients, through which they might otherwise allay concerns and reassure hesitant patients (Betsch and Sachse, 2012). A negative attitude, for example, mothers fear from vaccination, was found to be significantly affected the immunisation status of their children (Siddiqi et al., 2010). In a study conducted in Zagreb, Croatia, parents with positive attitudes were more likely to state their child experienced mild or no adverse reaction after vaccination, report not delaying vaccination. They too provide additional non-mandatory vaccines for their children (Lovric Makaric et al., 2018). It suggests the need for educational interventions, understanding and communication strategies that could foster better knowledge and attitude on immunisation with a focus on misconceptions, perceived constraints and safety issues about childhood vaccination. In another study conducted in Salerno, Italy, the most frequent reasons cited by healthcare workers for noncompliance with vaccination for healthcare workers are confident in their health, the fear of adverse reactions to the vaccine and the doubt they had about vaccine efficacy (Panico et al., 2011).

### *2.1.4 Associated factors for good and poor knowledge and attitude on vaccination*

A gradual increase in the number of vaccine refusal cases caused a reduction in vaccination rates and an increase in the frequency of vaccine-preventable diseases. While the total number of measles cases was 324,277 worldwide in 2018, 74,338 cases of measles occurred in the first two months in 2019 (WHO, 2019a). It is important to understand who refuses vaccines and what is the associated factors that lead towards misconceptions and poor knowledge on childhood vaccination. The associated factors for vaccine refusal are TV shows and magazines as the main sources of information with the main source of information, female gender and low trust in government (Siddiqui et al., 2013). Another study among parents visiting the outpatient department in Riyadh, Saudi Arabia, shows that 15% of them have misconceptions about childhood vaccination. Age group between 30-40, female sex, high education level and social media as the main source of information are the associated factors for refusal childhood vaccination (Al-Saeed et al., 2018).

In a study among parents in Hulu Langat, Selangor to determine predictors for inadequate knowledge and negative attitude towards childhood immunisation. The study indicates that the source of information plays an important role in giving information and subsequently results in acceptance and refusal of childhood vaccination. In this study, 12.8% of parents have inadequate knowledge of childhood immunisation, and 47.6% of parents have a negative attitude towards childhood immunisation. The predictors for inadequate knowledge on childhood immunisations were last child's age of 2 years old or more, parents without tertiary education, parents without educational exposure on childhood immunisation and parents who obtained information on childhood immunisation from the non-healthcare provider. Predictors for negative attitude on childhood immunisations were male, parents

without tertiary education, household income of less than RM 5000 and unsatisfactory religious belief. Therefore, these predictors should be considered in any health intervention on childhood immunisations for parents in Malaysia (Abdullah et al., 2019).

A study conducted among healthcare workers in Finnish hospitals shows that the total of 23.4% of them refused vaccine with past personal experience of vaccination, level of education and nurse profession being the associated factors (Karlsson et al., 2019). There are several more studies regarding associated factors for knowledge on vaccination as general and childhood vaccination. A study in Kelantan found that nurses have favourable attitudes towards HPV vaccination; however, they have significant knowledge deficit and major misunderstanding in critical knowledge items. Among the factors tested, nursing qualification is the only factor that is significantly associated with the nurses' knowledge score (Jeyachelvi et al., 2016). Below is the table summarize some other studies about associated factors on knowledge and attitude on vaccination as general and childhood vaccination.

Table 2: Associated factors knowledge and attitudes on childhood vaccination

| Study | Year | Population | Associated factors | Types of vaccination |
|---|---|---|---|---|
| Goins et al. [3] | 2015 | HCW in medical centres | Lack of recommendation for vaccination and inaccurate conceptions about pertussis | Pertussis vaccine: healthcare workers |
| Butsashvili et al. [4] | 2012 | Physicians and nurses employed in seven hospitals in Georgia | Personal experience and practice | HBV vaccination: adults, healthcare workers and newborns |

| | | | | |
|---|---|---|---|---|
| Verger et al. [5] | 2012 | General practitioners in France | Personal experience and practice, good knowledge of vaccine, source of information-CME | MMR, Hep B, Influenza: healthcare workers, adults and child |

### *2.1.5 Conceptual framework*

Various health behaviour models have been used to explain vaccination intention, including the Health Belief Model (HBM) (Rosenstock 1974), WHO Strategic Advisory Group of Experts (SAGE) Vaccine Hesitency Model(Dube et al 2014) and the Theory of Planned Behaviour (Ajzen and Driver 1991). For this study, we use the Health Belief Model (Rosentock 1974).

HBM was chosen as the model for the study to determine the knowledge and attitude of HCWs on childhood vaccinationdue to its design and pervious use in assessing patient's vaccination intention. This theory also has been used in many vaccination studies to identify behaviours relationship (Kocoglu-Tanyer et al 2020) (Larson et al 2014)and fit to assess knowledge and attitude on vaccination. When compared to other models that explain behaiour and resulting action, the HBM was specifically developed to focus on preventive health research (Larson et al 2014). The HBM has been modified since its early use in 1952 to be more inclusive and encourage interventions that improve health behaviours (Orji et al 2012). The most cited concept s involved in the HBM include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and action. The HBM suggests that modifying factors including patient characteristics, demographics and certain knowledge directly impact individual beliefs and attitude. In terms of childhood

vaccination, the good knowledge and positive attitude. The outside influence on individual behaviours as described by the HBM also includes ‘Cues to action’, which could comprise the influence by source of information. Figure 1 shows the conceptual framework of HBM and Figure 2 shows the conceptual framework for this study based on HBM.

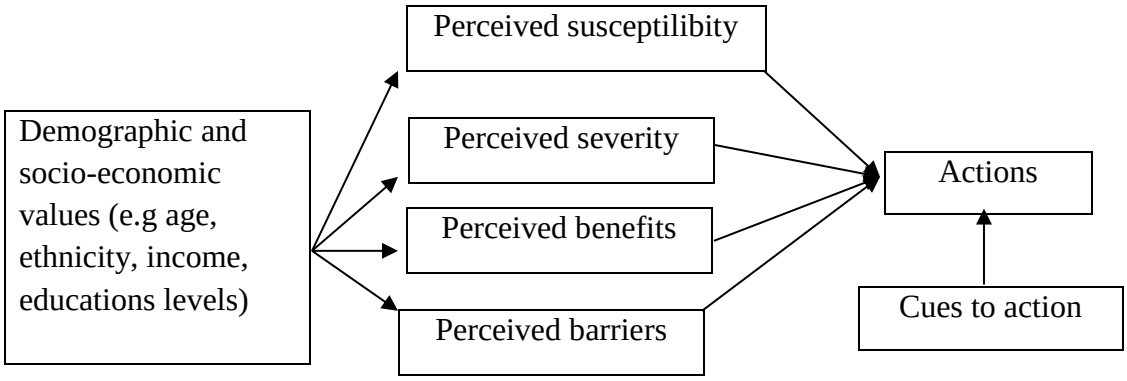


Figure 1: Health belief model conceptual framework