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# Prospective Cross-sectional Study on Mother's Knowledge and Attitude on Childhood Immunisation in Sibu Hospital

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## ABSTRACT

**Introduction:** The number of vaccine refusal cases is in an increasing trend in Malaysia. Since parents are the main decision-makers for their children to have immunisation, this study was conducted to explore mothers' knowledge and attitude towards childhood immunisation in Sibu, Sarawak.

**Methods:** A prospective cross-sectional study was conducted in Antenatal, Postnatal, and 3 Paediatric wards in Sibu Hospital. Cluster sampling method was used where data collection was done on 7 randomly selected working days from July to October 2020. All mothers (excluding staff) in the wards were approached. A self-administered questionnaire (validated) was given to participants after obtaining written consent. Results are analysed using descriptive statistics.

**Results:** A total of 201 respondents participated in the study, 56% were Iban with a mean age of 28 and a mean number of children of 2. The mean score of knowledge was 6.43 (out of 10). About half of the respondents answered 'yes' to the statement that children get too many vaccines in the first 2 years of life. In terms of attitude, more than 80% of subjects agreed to positive statements. However, only 56% agreed that they were well informed about the possible side effects of vaccination. For vaccines that were not provided under the National Immunisation Programme,

more than 70.0% of the subjects were willing to pay for Influenza and Hepatitis-A vaccine for their children.

**Conclusion:** Young mothers in Sibu generally had moderate knowledge and a positive attitude towards childhood immunisation. Mothers were more concerned about the side effects of vaccination and their decision for vaccination would be affected by their peers. More than 70% of participants were willing to pay for influenza and hepatitis A vaccination. We would like to encourage healthcare providers to give more information about childhood vaccination to mothers during Maternal and Child Health (MCH) follow-up and identify negative attitudes such as peer pressure and other concerns. With this, the negative attitudes of the mothers towards vaccination can be addressed effectively.

**Keywords:** attitude, immunisation, knowledge, mothers, vaccination

## INTRODUCTION

The National Immunisation programme (NIP) in Malaysia was introduced in the early 1950s and many vaccines were available to the public at no cost. Although national immunisation coverage was high (>95.0%), the number of vaccine refusal cases has also increased over the years from 600 cases in 2013 to 1600 cases in 2016 (1). Vaccine refusal in Malaysia initially started with small movements in 2012-2013, which had now progressed into social media (1). The number of vaccine refusal cases reported in Malaysia was higher in Perak, Kedah, and Terengganu (1). If the vaccine refusal cases continue to rise, it could eventually increase vaccine-preventable diseases such as the Diphtheria outbreak in 2016 (13 cases, 5 death) (1).

Studies from overseas showed that the attitude of mothers towards vaccination of children was closely related to their knowledge (2). However, different studies from different countries showed different findings. A study done by Rosso et al in Rome showed only about 30.0% of mothers had good knowledge, resulting in only 22.0% of them having a positive attitude towards the efficacy, safety, and delivery of vaccines (3). In addition, a study done by Verulava et al in Georgia showed that around 30.0% of mothers did not have sufficient information about routine vaccination, which resulted in 36.0% of children having incomplete vaccination (4). On the other hand, two other studies done in Saudi Arabia showed that the majority of the parents had good knowledge and a positive attitude towards childhood immunisation (2,5).

A study done in Seremban, Malaysia showed that only 12.0% of parents had adequate knowledge on childhood immunisation, in which about 50.0% of them had a negative attitude towards childhood immunisation (6). This finding was in line with increasing cases of vaccine refusal. Since parents are the main decision-makers for the immunisation of their children, we conducted this study to assess the knowledge and attitude of mothers regarding childhood immunisation in Sibu Hospital. We also investigated if mothers were willing to pay for vaccines that were not covered by the National Immunisation Programme as there was no previous study done on this issue before in Malaysia. Hence, we had also included several specific objectives: 1) To determine mothers' knowledge and attitude towards childhood immunisation; 2) To compare a mother's socioeconomic characteristics with their knowledge and attitude towards childhood immunisation.

3) To investigate the willingness of mothers' to pay for vaccination which was not covered by the National Immunisation Programme.

## METHODS

This was a prospective cross-sectional survey which was conducted in the Postnatal ward (PNW), Antenatal ward (ANW), Paediatric 26 ward (P26), Paediatric 27 ward (P27), and Paediatric 30 ward (P30) in Sibu Hospital. The target population was all mothers who had children between the age of 0 to 15 years old. In this study, we had only recruited mothers as they were more easily encountered in the ward and were usually the main caregiver in the local settings.

Cluster sampling method was used where data collection was carried out in 7 randomly selected dates from July 2020 till October 2020. A random number generator was used to determine the data collection date, which was on 23rd July 2020, 5th August 2020, 24th August 2020, 9th September 2020, 28th September 2020, 7th October 2020, and 14th October 2020 (7).

During the data collection day, all mothers (excluding working staff) in the wards were approached and invited to participate. A total of 473 mothers were approached, of which 210 refused to participate in this study (response rate was 55.6%). Another 62 mothers met the exclusion criteria and were excluded. The resulting sample size was 201 respondents, which had met our estimated sample size of 200 (calculated via Raosoft sample size calculator with 95.0% of confidence level and 5.0% margin of error) (8).

A self-administrated questionnaire was used to collect data in the survey. The questionnaire consisted of 4 parts as shown below:

Part 1: Demographic data of the respondents, including age, race, religion, education level, employment status, profession, and the number of children. (developed by investigators)

Part 2: Questions related to knowledge about childhood vaccination (validated questionnaire adapted from Awadh et al (9), Cronbach's alpha 0.757)

Part 3: Questions about the attitude towards childhood vaccination (validated questionnaire adapted from Abdullah et al (6), Cronbach's alpha 0.7)

Part 4: Questions on the willingness to pay for 5 vaccines that were commonly given in private settings and were not included in the National Immunisation Programme (developed by investigators)

Parts 1 and 4 were developed by investigators. Forward and backward translations were done by 2 pharmacists to translate Parts 1 and 4 into the Malay language. Part 2 and 3 were validated questionnaires adapted from previous studies with both Malay and English versions readily available.

Mothers from Postnatal, Antenatal ward, Paediatric 26 ward, Paediatric 27 ward, and Paediatric 30 ward had been approached and screened for inclusion and exclusion criteria. Mothers with children aged 0 to 15 years were included but mothers who had language barriers, encountered perinatal/postnatal complications, or with cognitive impairment were excluded from the study. An information sheet was provided and explained before informed consent was obtained. The questionnaires were given once they had signed the informed consent form. Participants were given 15 to 20 minutes to answer the questionnaire and they were not allowed to refer to any information sources while responding to the questionnaires.

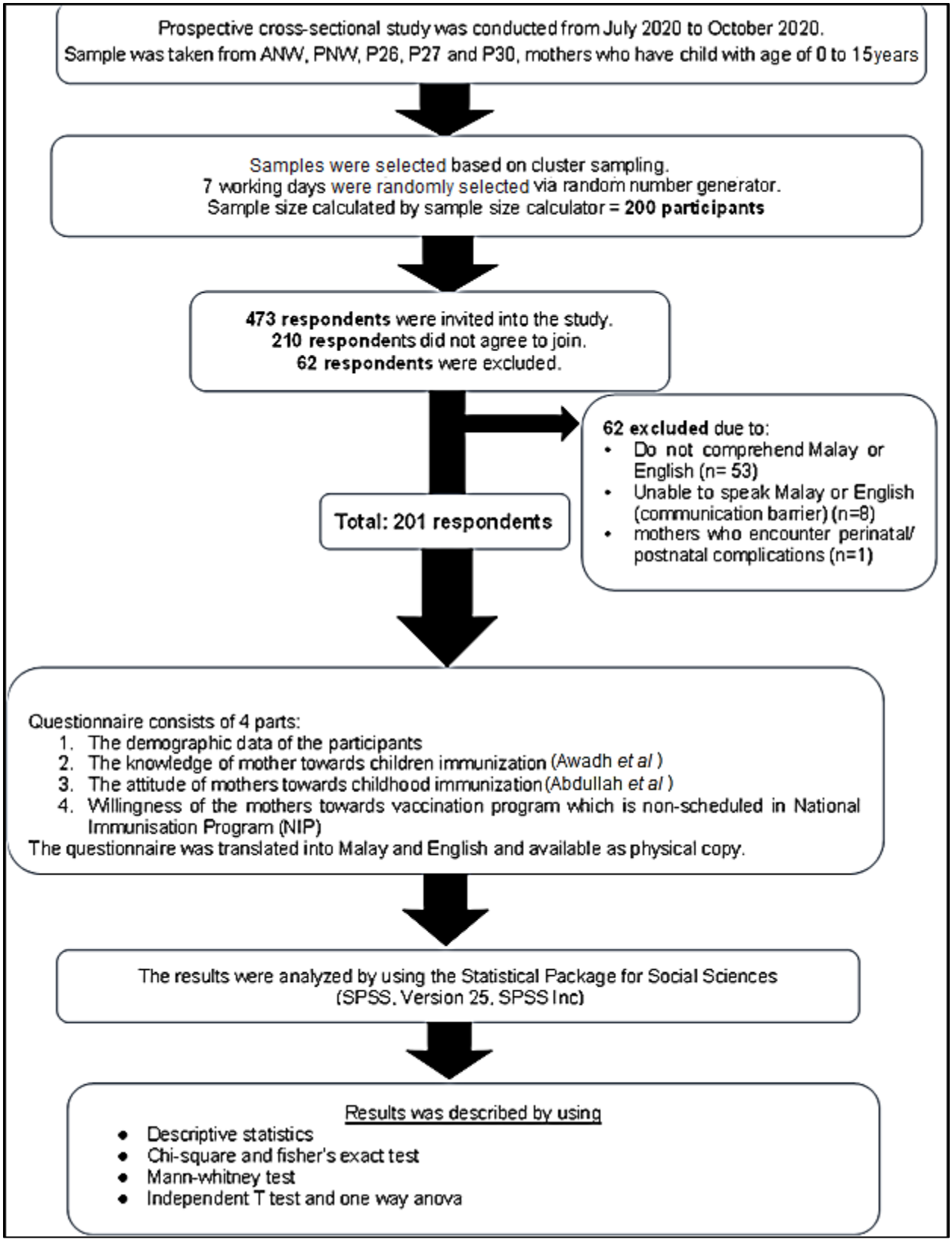


**Figure 1:** Summary of Research Method

The knowledge of mothers on childhood immunisation was determined by 10 questions which consisted of 2 incorrect statements and 8 correct statements. The options given in the questionnaire on the knowledge of mothers towards childhood immunisation were 'yes', 'no', and 'not sure'. For correct statements, option 'yes' indicated 1 mark while for incorrect statements, "no" indicated 1 mark. Other options indicated the 0 mark. The scores were summed up for data analysis. The total score ≥ 7 marks indicated a high level of knowledge, the score in the range of 4-6 indicated moderate knowledge, and the score ≤3 indicated a low level of knowledge.

The attitude of mothers towards childhood immunisation was assessed from the responses in Part 3 of the questionnaire. The scoring system was divided into 5 Likert points which were: strongly agree, agree, not sure, disagree, and strongly disagree. For the positive attitude, the scoring was coded as strongly agree=5, agree=4, not sure=3, disagree=2, and strongly disagree=1. For negative attitude questions, the scoring was counted conversely.

The willingness of the respondents to pay for vaccination not scheduled in the National Immunisation Programme was measured by giving choices of 'yes' and 'no' to respondents for each of the vaccines. The information about the vaccine, including the indication, price per dose, route of administration, and the total number of doses required was also provided in this section. If the respondents answered 'no' to any of these questions, they were required to answer an additional question about the reason(s) for not being willing to pay for the vaccination. Available options for the reasons were: expensive, feeling that it is not necessary, and others.

## RESULTS

### *Sociodemographic Characteristics*

A total of 201 respondents participated in this study. The majority of the respondents were Iban (56.7%) with a mean age of 28.18 years old. The majority of the respondents received secondary or higher education (89.6%) and most were not healthcare workers (88.1%). Table 1 shows the sociodemographic characteristics of the sample.

**Table 1:** Sociodemographic Characteristics of the Sample (n=201)

| Variable | n (%) | Mean (SD) |
|---|---|---|
| **Age** | - | 28.18 (6.05) |
| **Ethnic** | | |
| Malay | 40 (19.9) | - |
| Chinese | 25 (12.4) | - |
| Iban | 114 (56.7) | - |
| Other | 22 (10.9) | - |
| **Religion** | | |
| Islam | 58 (28.9) | - |
| Christian | 114 (56.7) | - |
| Buddism | 11 (5.5) | - |
| Hindu | 18 (9.0) | - |
| **Healthcare worker** | | |
| Yes | 24 (11.9) | - |
| No | 117 (88.1) | - |
| **Education** | | |
| Primary education | 21 (10.4) | - |
| Secondary education | 137 (68.2) | - |
| College or University | 43 (21.4) | - |
| **Working status** | | |
| Working | 141 (70.1) | - |
| Not working | 60 (29.9) | - |
| **Number of children** | - | 2 (2)[a] |

[a]Number of children reported as median (IQR) as data skewed to left.

*Knowledge of Mothers towards Childhood Immunisation*

Out of a total score of 10, the mean knowledge score of the study sample was 6.43 (SD 1.88), which was of moderate level. Table 2 showcases a detailed percentage distribution of the mothers' responses to each statement. More than 80.0% of them answered correctly that there were many types of vaccines and childhood immunisation should be started at birth. About half of the participants did not know that "*vaccines can be given in combination*" and half of the participants answered "yes" to the statement that "*Children get too many vaccines in the first two years of life"*.

**Table 2:** Frequency and Percentage Distribution of Knowledge of Mothers Towards Childhood Immunisation

| Question | Correct Answer n (%) | Wrong Answer n (%) | Don't Know n (%) |
|---|---|---|---|
| Correct *Statement* | | | |
| *There are different types of vaccines.* | 163 (81.1) | 13 (6.5) | 25 (12.4) |
| *Active immunisation is a killed or weakened form of a disease-causing agent.* | 126 (62.7) | 21 (10.4) | 54 (26.9) |
| *Vaccination is for all ages.* | 158 (78.6) | 24 (11.9) | 19 (9.5) |
| *The immunisation of the children should be started at birth.* | 171 (85.1) | 10 (5.0) | 20 (10.0) |
| *In some health situations, vaccines should not be given.* | 112 (55.7) | 38 (18.9) | 51 (25.4) |
| *Vaccines can be given in combination.* | 102 (50.7) | 26 (12.9) | 73 (36.3) |
| *If the child receives extra immunisation, it is more effective and safer.* | 144 (71.6) | 11 (5.5) | 46 (22.9) |
| *More than one dose of vaccine may be required for complete protection.* | 132 (65.7) | 17 (8.5) | 52 (25.9) |
| *Incorrect* Statement | | | |
| *Healthy children do not need immunisation.* | 134 (66.7) | 46 (22.9) | 21 (10.4) |
| *Children get too many vaccines in the first two years of life.* | 49 (24.4) | 101 (50.2) | 51 (25.4) |

The association between sociodemographic data and the knowledge was also investigated by comparing the mean knowledge score in different sociodemographic data. However, there was no significant association (*P* values > 0.05) between any of the sociodemographic data and knowledge.

*The Attitude f Mothers Towards Childhood Immunisation*

Among all the 13 questions on attitude towards childhood immunisation, 7 were positive attitude questions and 6 were negative attitude questions. Figure 2 shows the percentage distribution of positive attitudes of mothers towards childhood immunisation. The green bars reflected most of the participants (>80.0%) had positive attitudes towards most of the positive attitude questions (5

out of 7). About half of the participants (56.7%) agreed that they are well informed about the side effects of the vaccine (Question 5).

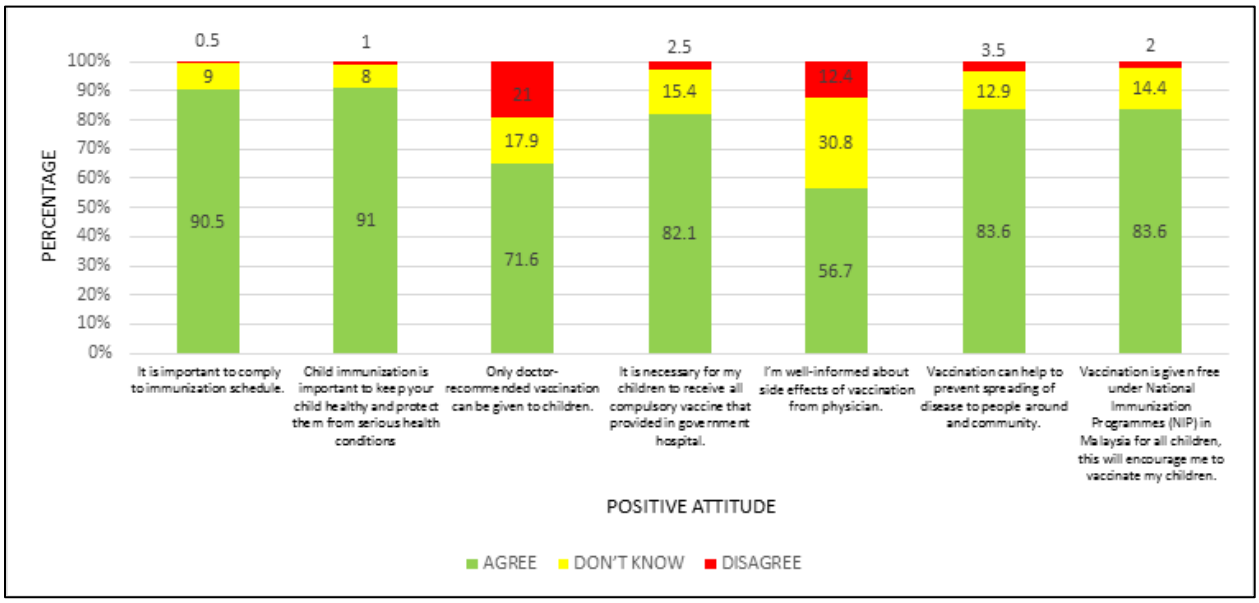


**Figure 2:** Percentage Distribution of Positive Attitude of Mothers Towards Childhood Immunisation

There was a high percentage of participants who agreed to the statement that "childhood immunisation is important to keep your child healthy and to protect them from serious health conditions" (91.0%) and "it is important to comply to immunisation schedule" (90.5%).

For negative attitude questions, Figure 3 shows the percentage distribution of negative attitudes of mothers towards childhood immunisation. The percentage distribution of mothers who disagreed with negative attitude questions (green bar) ranged from 23.4% to 58.7%. 43.4% of participants agreed to the negative statement that they would be discouraged to get the vaccine for their children if their friends did not do so. A total of 37.8% of the respondents were worried that their children may have serious side effects after vaccination (question 11). 37.8% of participants were worried that their children may have serious side effects after vaccination.

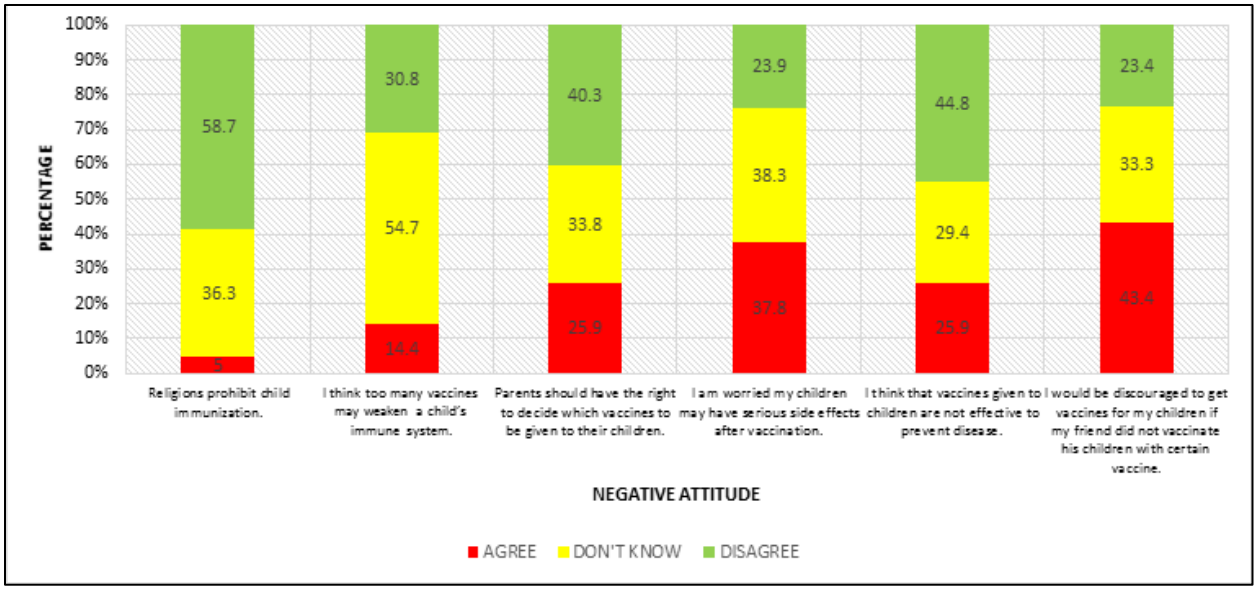


**Figure 3:** Percentage Distribution of Negative Attitude of Mothers Towards Childhood Immunisation

The association between sociodemographic data and attitude was also investigated. However, there was no significant association (P-values > 0.05) between any of the sociodemographic data and attitude.

*Willingness to pay for vaccination which was not scheduled in National Immunisation Programme*

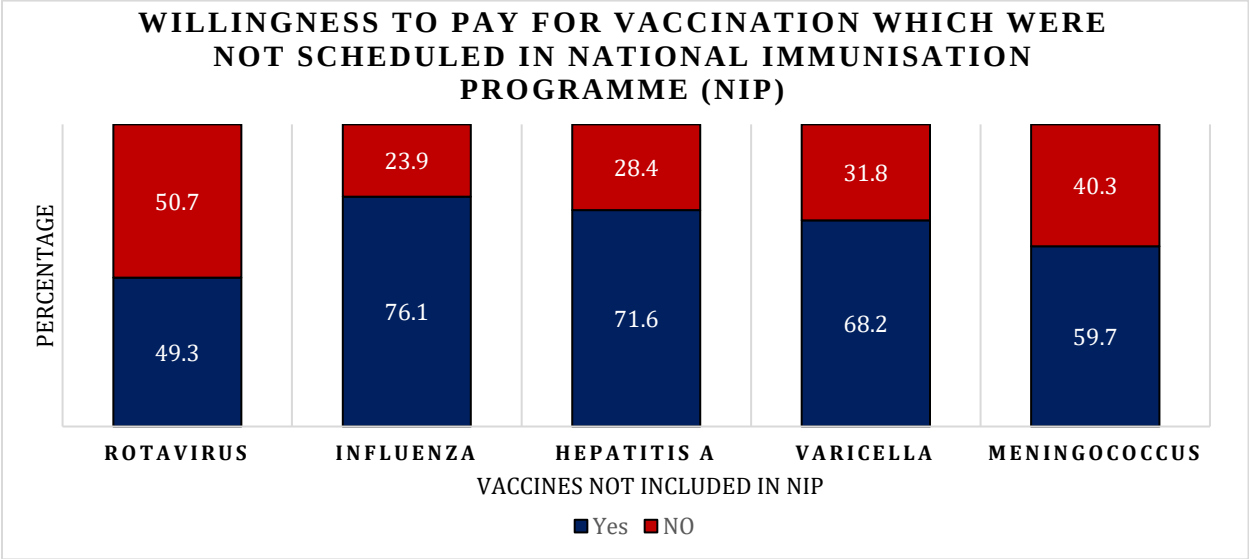


**Figure 4:** Willingness to Pay for Vaccination Which was Not Scheduled in the National Immunisation Programme

Figure 4 shows the percentage distribution of the participant's willingness to pay for vaccination which was not scheduled in the National Immunisation Programme. More than half of the participants were willing to pay for the Influenza vaccine (76.1%), Hepatitis A (71.6%), Varicella (68.2%), and Meningococcal (59.7%). The lowest rate was Rotavirus (49.3%).

The reasons for the participant's unwillingness to pay for these vaccinations were also analysed, as shown in Table 3. Participants were allowed to choose more than 1 reason for their unwillingness to pay for those vaccinations. Among the 5 vaccines that were not scheduled in the National Immunisation Programme, Rotavirus vaccination had the lowest proportion of participants who were willing to pay for it (49.3%). In the group of participants who were not willing to pay for rotavirus vaccination, 75.5% of them refused due to the cost of the vaccine.

**Table 3:** Reasons for Not Willing to Pay for Vaccination Which is Not Scheduled in the National Immunisation Programme

| Vaccine | Number of participants who were not willing to pay, n | Expensive n (%) | Feeling that it is not necessary. n (%) | Others n (%) |
|---|---|---|---|---|
| Rotavirus | 102 | 77 (75.5) | 25 (24.5) | 2 (1.9) |
| Meningococcal | 81 | 50 (61.7) | 28 (34.5) | 4 (4.9) |
| Varicella | 64 | 27 (42.2) | 34 (53.1) | 3 (4.7) |
| Hepatitis A | 57 | 23 (40.4) | 33 (57.9) | 1 (1.8) |
| Influenza | 48 | 32 (66.7) | 17 (35.4) | 1 (2.1) |

## DISCUSSION

Our findings suggested that the overall knowledge level for our participants was moderate, with a mean score of 6.43 (SD 1.881) out of the total score of 10. We found out that about half of the participants (50.2%) answered "yes" to the statement that "Children get too many vaccines in the first two years of life". This could have resulted from multiple visits required in the baby's first 2 years of life as the current National Vaccination Schedule (2021) in Malaysia is comprised of 9 vaccines requiring 10 visits for vaccination (10). Hence, it is important to inform mothers of the

total number of visits and types of vaccines to be administered during the baby's first 2 years of life. If mothers have concerns about having too many vaccines in the first 2 years of life, such concerns should be addressed immediately.

The result from our study showed a similar knowledge score (6.43, SD 1.881) as compared to a previous study done by Awadh et al (7.36, SD 2.29), in which both studies concluded that the knowledge level was moderate (9). However, the result from our study showed a higher knowledge score compared to the study done by Abdullah et al in Seremban, Malaysia, which showed that only 12% of parents had adequate knowledge on childhood immunisation, in which about 50% of them had a negative attitude towards childhood immunisation (6). This could be due to discrepancies in the population pool as well as different questionnaires used by Abdullah et al.

We had also compared the mean knowledge score against the subject's demographic data such as education level using one-way ANOVA. However, there were no significant findings, which were the opposite conclusion found by Yousif et al, in which a significant association between parents' educational level and their knowledge and attitudes on childhood immunization were observed (2). The difference in this finding could be due to the concentrated distribution of education level in our sample, where 68.2% of the participants only received secondary education.

In terms of attitude, the participants were most concerned about the side effects of the vaccines. About half of the participants (56.7%) agreed that they were well informed about the side effects of the vaccine and only 37.8% of them agreed that they were worried that their children may have serious side effects after vaccination. This finding was in line with a previous study done by Salmon et al which showed the most common reason for requesting childhood vaccine exemptions (190 [69%] of 277) was parents' concerns that the vaccines might cause harm (11). Hence, we would like to encourage healthcare providers to give more information about childhood immunisation to mothers during Maternal and Child Health (MCH) follow-up, especially regarding the indication and common side effects of each childhood vaccination.

From the aspect of willingness to pay for vaccines that were not scheduled in the National Immunisation Programme, we had included 5 vaccines that were commonly given in private settings. Interestingly, there was a big portion (76.0%) of participants who were willing to pay for the Influenza vaccine for their children. This could be due to high awareness of seasonal influenza as compared to the other 4 vaccines on the list. Centers for Disease Control and Prevention (CDC) recommended children younger than 2 years old receive the Influenza vaccine (12). A study done by Ferdinands et al showed that influenza vaccination reduced children's risk of flu-related Pediatric Intensive Care Unit (PICU) admission by 74.0% during flu seasons from 2010-2012 (13). A further study done by CDC showed that flu vaccination reduced the risk of flu-associated death by 51.0% among children with comorbidity and by 65.0% among healthy children (14). With these pieces of evidence and given the high proportion of mothers who were willing to pay for influenza vaccination, we would like to suggest healthcare providers offer and encourage parents to bring their children for influenza vaccination.

*Limitations*

There are several limitations to our study. Firstly, the recruitment was only done in local, inpatient settings due to the manpower constraint as the study was initiated in the hospital. Hence, our result may not be applied to the general population. Sampling was also not done using simple random sampling or systematic sampling due to the manpower constraint. However, cluster sampling was employed to minimise selection bias. Our study had only recruited mothers instead of parents/guardians, as mothers were more easily encountered in the ward and they were usually the main caregivers in the ward. Consequently, the result cannot be applied to parents/guardians in general. Next, we have also noticed a relatively low response rate where there were only 263 out of 473 subjects approached who agreed to participate in our study (Response rate 55.6%). The low response rate might lead to a certain degree of bias in our result as potential subjects who refused participation might have more negative attitudes towards vaccination. Last but not least, the questionnaire was not pre-tested in our local population even though it was validated from previous studies done in West Malaysia. This might affect the validity and reliability of the questionnaire as the local population may have a different understanding from the population in West Malaysia.

## CONCLUSION

Young mothers in Sibu generally had moderate knowledge and a positive attitude towards childhood immunisation. Mothers were more concerned about the side effects of vaccination and their peers affected their decision for vaccination. More than 70.0% of participants were willing to pay for influenza and hepatitis A vaccination. We would like to encourage healthcare providers to give more information about childhood vaccination to mothers during Maternal and Child Health (MCH) follow-up and identify negative attitudes such as peer pressure and concerns about side effects. With this, the negative attitudes of the mothers towards vaccination can be addressed effectively.

## CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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