

ORIGINAL ARTICLE

Knowledge of the Malaysian National Immunisation Programme and its associated factors among parents in Dungun, Terengganu: A cross-sectional study

Tengku Muhammad Fakhruddin Tengku Md Fauzi, Aminnuddin Ma'pol, Mohd Nazri Shafei

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Authors:

Mohd Nazri Shafei

(Corresponding author)
MD (USM), MComMed
(Occupational Health)(USM)
Department of Community Medicine,
School of Medical Sciences,
Health Campus, Universiti Sains
Malaysia, Kubang Kerian, Kelantan,
Malaysia.
Email: drnazri@usm.my

Tengku Muhammad Fakhruddin Tengku Md Fauzi

MBBCh (Alexandria University),
MPH (USM)
Department of Community Medicine,
School of Medical Sciences,
Health Campus, Universiti Sains
Malaysia, Kubang Kerian,
Kelantan, Malaysia.

Aminnuddin Ma'pol

MD (UKM), MPH (UKM), DrPH(UKM)
Level 3, District Health Office,
Wisma Persekutuan, Maran, Pahang,
Malaysia.

Abstract

Introduction: The number of unvaccinated children and the rate of vaccination refusal among parents have recently increased despite the robust vaccination programme in Malaysia. The purpose of this study was to determine the level of knowledge of the Malaysian National Immunisation Programme among Malaysian parents as well as the variables that contribute to poor knowledge.

Methods: This study used systematic random sampling to recruit 375 parents from seven health clinics in the Dungun District of Malaysia. The participants were asked to complete a self-administered validated questionnaire that included sociodemographic and knowledge questions. A multiple logistic regression analysis was applied to determine the associated factors of poor knowledge of immunisation. P-values of <0.05 were considered statistically significant.

Results: A total of 189 (50.4%) respondents had poor knowledge of immunisation. The multiple logistic regression analyses revealed that a low educational level (adjusted odds ratio (OR): 1.92; 95% CI 1.25–2.95) was associated with poor knowledge while the age-group of 30–40 years old (adjusted OR: 0.56; 95% CI 0.34–0.93) was protected against it as compared to the age-group of <30 years old.

Conclusion: The prevalence of poor knowledge of immunisation among parents in Dungun, Terengganu, is relatively high. The focus of health promotion and education must be switched to increasing immunisation knowledge among the public, particularly among high-risk groups.

Introduction

Vaccination programmes can help prevent the spread of diseases through efficient herd immunity. This strategy necessitates the vaccination of 75–95% of the population. It is a proven, cost-effective public health practice that has prevented communicable illnesses, such as smallpox (which was eradicated in 1980) and polio (which was eradicated in 2015), from endangering children's lives worldwide.^{1–3} Immunisation is also essential for meeting the 2030 Sustainable Development Goals. According to these goals, universal healthcare is made possible through financial risk protection. All populations should have access to quality essential healthcare as well as safe, effective and inexpensive drug therapies and immunisations.⁴

The immunisation programme in Malaysia began in the 1950s under the Maternal and Child Health Programmes. The government covers the entire cost of immunisation for Malaysian children under the age of 15 years.

Each year, vaccination coverage is claimed to be between 94% and 98%, somewhat higher than the herd immunity level.⁵ Despite its demonstrated effectiveness in protecting children's health, immunisation is still regarded as risky and unfounded. Most parents are unaware of immunisation programmes and schedules, and many assume that homoeopathic replacement and natural immunity are sufficient to protect their children.⁶

As a result, the number of unvaccinated children and vaccine-preventable disease (VPD) outbreaks has recently increased despite the robust vaccination programme in Malaysia.⁷ In the local setting, negative opinions of vaccines are typically driven by misleading information and a lack of awareness of immunisation programmes among important decision-makers, namely parents.⁸

The global burden of VPDs has risen. Despite

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having comprehensive access to immunisation, several high-income countries have inadequate vaccine coverage owing to vaccine safety concerns.⁹ The polio eradication campaign in Pakistan was a success up until 2013 when it began to fail owing to widespread erroneous religious claims about immunisation.¹⁰ VPD outbreaks have also been reported in the Philippines, Vietnam and Malaysia, all of which are ASEAN countries.¹¹ Furthermore, vaccine coverage has dropped in many countries, with a lack of understanding of immunisation risks and benefits being one of the main causes.¹² Malaysia and Vietnam, both ASEAN members, encountered the same problem.¹³

According to the health belief model, the knowledge of children's susceptibility to VPD, severity of the condition and efficiency and mild side effects of immunisation may increase parental acceptance of childhood vaccination. People avoid vaccinations because they do not comprehend the purpose of immunisations – to protect against infectious diseases.¹⁴ In contrast, studies conducted in Malaysia and other countries worldwide revealed an increase in vaccine knowledge, which indicated that vaccination awareness, educational level and excellent practice all affected the prevalence of VPDs.^{15–17} Because parents are the ones who decide on their children's immunisation, parents with limited immunisation knowledge should be given special attention.

The purpose of this study was to determine the level of knowledge about the Malaysian National Immunisation Programme and its associated factors among parents in Dungun, Terengganu. Evaluation of the sociodemographic characteristics of parents and knowledge of immunisation programmes will enable the development of an effective public health intervention. To date, this kind of information is still limited in Dungun. Determining knowledge of immunisation programmes and its associated factors is critical in alleviating vaccination reluctance.

Methods

Study design and sample selection

The current study had a cross-sectional study design and used a validated questionnaire. The sample size was determined using a single proportion formula based on a prior study that revealed that 62% of parents have a low immunisation knowledge level,¹⁸ applying

a 10% non-response rate. Ultimately, the required sample size was 404. The number of samples for each clinic was proportionately estimated on the basis of the average daily patient attendance at the clinics; this study included all seven health clinics in the Dungun District of Terengganu. Data were collected from the third week of January 2020 to the second week of February 2020. The study was conducted from 8 am to 12 pm and then continued from 2 pm to 5 pm to simulate an almost similar situation and condition of the clinics. Respondents were selected from the clinics' registration book using systematic random sampling. The first respondent was selected randomly by pin pointing to the list of attendees (with both eyes closed) in the registration book. Until the required sample size was achieved, every third parent or patient from the first selected respondent who fulfilled the study criteria was selected. The mother was selected as the respondent when both parents were available

Research tools

The study data were obtained from a set of questionnaires developed and validated by Zakria et al.¹⁹ The authors' permission to use the questionnaire was secured. The Cronbach's alpha of the validated questionnaire was 0.85, indicating strong internal consistency. The questionnaire was designed to take an average of 15 min to complete. The self-administered questionnaire is divided into two sections: section A, which includes 11 questions about sociodemographic information, and section B, which focuses on vaccination knowledge. The responses for vaccination knowledge are as follows: 'correct', 'incorrect' or 'do not know'. For scoring, one mark is given to the 'correct' response and no mark to the 'do not know' and 'incorrect' responses. There are 25 questions for the knowledge of vaccination that cover the type and mode of action, immunisation schedule and dose, vaccine risk and vaccine safety. Herein, the knowledge score was transformed into a percentage by dividing the respondents' scores by the maximum possible scores and multiplying them by 100. The respondents who scored 70% or more on the knowledge scale were regarded to have good knowledge, while those who scored less than 70% were considered to have poor knowledge, as previously described.¹⁸

Statistical analyses

Data entry and analyses were performed using IBM SPSS version 26. The data were examined, verified and cleaned. The participants who had no formal education or received up to secondary school education were considered to have low educational levels. Meanwhile, those who received tertiary education were regarded to have high educational levels and considered the reference group in the analysis. To discover any missing values, we employed a preliminary data description. Any mistakes in the dataset were identified. The data normality of numerical variables was confirmed. The frequency (n) and percentage (%) of all categorical variables were calculated. For normally distributed data, the numerical variables were presented as means and standard deviations (SDs). Meanwhile, for skewed data, medians and interquartile ranges were used.

To determine the factors significantly associated with poor knowledge of immunisation, we used simple and multiple logistic regression analyses. Variables with P-values of <0.25 in the simple logistic regression analyses, clinical importance and biological plausibility were selected and included in the multiple logistic regression analysis. Thereafter, forward and backward approaches were used to analyse the manually selected variables. After comparing the outcomes of these two procedures, we created the preliminary final model. Multiple logistic regression assumptions were tested. The

variance inflation factor was used to assess multicollinearity. All two-way interactions were also investigated. The Hosmer–Lemeshow goodness-of-fit test, a classification table and areas under the receiver operating characteristic curve were used to assess the model's fitness. The level of significance was set at P-values of <0.05.

Ethical considerations

The study protocol was explained to the respondents before written consent was obtained. Ethical approval to conduct the current study was granted by the Human Research Ethics Committee of Universiti Sains Malaysia (reference no. USM/JEPeM/1910059) and the Medical Research and Ethics Committee of the National Medical Research Registry [reference no. NMRR-19-2998-5126 (IIR)]. No names of respondents were mentioned in the reporting and publication of the findings.

Results

The questionnaire was completed and submitted by 375 respondents. The remaining 29 respondents did not complete the survey, resulting in a 92.8% response rate. **Table 1** shows the sociodemographic characteristics of the respondents. All respondents were Malays, with ages ranging from 19 to 57 years. The respondents' mean (SD) income was RM 3127.22 (2237.00). The majority of the respondents (86.7%) were women, and 193 (52.4%) had high educational levels.

Table 1. Sociodemographic characteristics of parents of children who attended health clinics in Dungun (n=375).

Characteristic	n	%
<i>Age (year)</i>		
<30	88	23.5
30–40	185	49.3
>40	102	27.2
<i>Sex</i>		
Male	50	13.3
Female	325	86.7
<i>Educational level</i>		
Low	175	47.6
High	193	52.4
<i>Occupational status</i>		
Not working	193	51.5
Working	182	48.5
<i>Marital status</i>		
Single/divorced/widow	35	9.4
Married	339	90.6
<i>Number of children</i>		
1–2	174	46.5
>2	200	53.5

A total of 189 (50.4%) respondents had poor knowledge of immunisation based on their total mark score. The results of the simple logistic regression analyses of the factors associated with poor knowledge of immunisation are summarised in **Table 2**. The factors found to have a significant association with poor knowledge were a low educational level (crude OR: 2.06; 95% CI: 1.36–3.12; $P < 0.001$) and an age of 30–40 years (crude OR: 0.38; 95% CI: 0.23–0.66; $P < 0.001$).

Table 2. Simple logistic regression analysis of the factors associated with poor knowledge of immunisation among parents of children attending health clinics in Dungun (n=375).

Variable	β	Crude OR ^a (95% CI ^b)	Wald statistic	P-value
<i>Age (year)</i>				
<30		1		
30–40	–0.95	0.38 (0.23–0.74)	12.45	<0.001
>40	–0.45	0.64 (0.35–1.14)	3.98	0.460
<i>Income</i>				
	0.001	1.00 (0.99–1.04)	1.07	0.299
<i>Sex</i>				
Male		1		
Female	–0.35	0.70 (0.39–1.29)	1.32	0.250
<i>Educational level</i>				
High		1		
Low	–0.72	2.06 (1.36–3.12)	11.60	<0.001
<i>Occupational status</i>				
Not working		1		
Working	–0.33	0.72 (0.48–1.09)	2.47	0.116
<i>Marital status</i>				
Single/divorced/widow		1		
Married	0.08	1.10 (0.54–2.19)	0.06	0.917
<i>Number of children</i>				
1–2		1		
>2	–0.20	0.82 (0.55–1.23)	0.89	0.347

^a Odds Ratio

^b Confidence Interval

The factors with a P-value of <0.25 in the univariable analysis (i.e. age, sex, educational level and occupational status) were included in the multiple logistic regression analysis. **Table 3** shows that the educational level and age were significantly associated with poor knowledge of immunisation. The parents with a low educational level had a 1.92-fold higher odds of having poor knowledge of immunisation (95% CI: 1.25–2.95) than those with a high educational level when age was adjusted. Meanwhile, parents aged 30–40 years old had 0.56 odds to have poor knowledge (95% CI: 0.34–0.93) as compared to parents aged less than 30 years old when educational status was adjusted.

Table 3. Multiple logistic regression analysis of the factors associated with poor knowledge of the Malaysian National Immunisation Programme among parents of children who attended health clinics in Dungun (n=375).

Variable	β	adjusted OR (95% CI)	Wald statistic	P-value
<i>Educational level</i>				
High		1		
Low	0.69	1.92 (1.25–2.95)	8.91	0.003
<i>Age</i>				
<30		1		
30–40	0.31	0.56 (0.34–0.93)	3.82	0.027
>40	–0.50	0.98 (0.53–1.83)	9.69	0.900

No multicollinearity and interaction

Hosmer–Lemeshow test, $P = 0.126$

The classification table was 59.7% correctly classified.

The area under the receiver operating characteristic curve was 58.6%.

The variance inflation factor was <10.

Discussion

In the present study, the prevalence of poor knowledge of childhood immunisation is relatively high despite efforts by the Ministry of Health Malaysia through the national immunisation promotion campaign from 2016 to 2020.²⁰ This is consistent with the findings of a study conducted in a district in northeastern Malaysia¹⁸ and a qualitative study among healthcare professionals that described that poor knowledge and misinformation remain the main challenges during the vaccination and post-vaccination phases.²¹

The lack of understanding about children's national immunisation programmes raises the risk of non-vaccination, leading to vaccine rejection or hesitancy.²² Further, misinformation about immunisation leads to widespread doubt regarding the efficacy and safety of other vaccines.²³ Therefore, delivering accurate information regarding vaccination programmes will improve the uptake and acceptance of such programmes.

In our analysis of the level of knowledge and sociodemographic characteristics, the level of education had a significant association with the level of knowledge of childhood immunisation. The multivariable analysis revealed that the parents with low educational levels were almost two times more likely to have poor knowledge of immunisation than their counterpart. The findings are consistent with those of studies conducted locally and internationally.^{8,24–26}

Parents with low educational levels usually come from low socioeconomic classes. Several issues negatively impact their understanding of immunisation, such as healthcare inaccessibility, exposure to inaccurate information about the risks and benefits of immunisation and barriers in information delivery owing to a lack of scientific knowledge.^{29–31} All of this demonstrates that parental education has a substantial impact on children's health. Accordingly, enhancing parental education will enhance the health of their children.

We also found that the immunisation knowledge of the parents was also related to their age. The parents between the ages of 30 and 40 years were less likely to have poor knowledge than the younger parents. This discovery is supported by a few more research that found comparable results.^{24,27} According to Al-lela et al., parents between 30 and 40 years of age have more knowledge of immunisation

than younger parents owing to exposure to immunisations of previous children, good relationships with healthcare providers, good cognitive capacity and better source of education.²⁷ Mothers in this age group also experience more antenatal care visits and have frequent access to health education regarding immunisation programmes.

Herein, there was also no significant association found between the knowledge level and income, sex, marital status and number of children. However, this is inconsistent with the findings of studies conducted among mothers in Pakistan²⁵ and parents in Thailand,²⁸ which contend that household income greatly influences the knowledge of parents. Meanwhile, a study among parents in Iraq found that married parents have better knowledge of immunisation.²⁷ Many studies also reported that parents' knowledge of immunisation is also significantly related to the number of their children.^{17,29} All these discrepancies may have been caused by population differences and limited sample sizes.

Among the strengths of the current study is the fact that it used primary data from a culturally sensitive and reliable interview-guided questionnaire; the questionnaire was developed and validated in our local population. Hence, the study findings may represent the actual results of the knowledge of immunisation programmes among parents in Dungun, Terengganu. Nevertheless, the findings should be interpreted with caution owing to the limitation of this study which is related to the study design. Being a cross-sectional study, it only examined the relationship but could not assess the causal direction of the variables.

Conclusion

The prevalence of poor knowledge of immunisation among parents is concerning. It is recommended that a further interventional study be focused on improving knowledge of immunisation among high-risk groups of parents, especially those aged below 30 years and those with low educational levels. Collaboration with stakeholders, such as the Ministry of Women, Family and Community Development; state agencies; and non-governmental organisations, is also recommended to solve such issue.

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Author contributions

Tengku Muhammad Fakhruddin Tengku Md Fauzi was involved in the conceptualisation of the study, data collection, formal analysis, and writing of the original draft.

Aminuddin Ma'pol was involved in the conceptualisation of the study, data collection and reviewing as well as editing the writing of the paper.

Mohd Nazri Shafei was involved in the conceptualisation of the study, data collection, statistical analyses, and reviewing and editing the writing of the paper.

All authors have read and agreed to the manuscript publication.

Ethical approval

Ethical approval to conduct the study was granted by the Human Research Ethics Committee of Universiti Sains Malaysia

(reference no. USM/JEPeM/1910059) and the Medical Research and Ethics Committee of the National Medical Research Registry [reference no. NMRR-19-2998-5126 (IIR)].

Conflicts of interest

The authors have no conflicts of interest to declare.

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Data sharing statement

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

How does this paper make a difference in general practice?

- This paper reveals the prevalence of poor knowledge of immunisation and its associated factors among parents in Dungun, Terengganu, Malaysia.
- This area of family health would be of interest to a broad readership, especially those with a special interest in preventive medicine and family health.

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