

## Assessment of Public Knowledge and Perception towards Childhood Vaccination in Perlis, Malaysia

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### Abstract

**Introduction:** Childhood vaccination protects children from a variety of serious communicable diseases. In Malaysia, however, there are growing numbers of parents questioning the safety and necessity of routine childhood vaccination, hence refusing immunisation. This increases the risk of vaccine-preventable diseases.

**Objective:** This study aimed to assess the knowledge and perception of the public towards childhood vaccination.

**Methods:** A cross-sectional study was conducted from August to December 2017 in Perlis. Through convenience sampling, a validated questionnaire was distributed to Perlis citizens aged above 18 years old. The data was analysed using SPSS v20.0.

**Results:** Of 387 participants included in the study, majority (n=229, 59.2%) of the respondents were female, university graduates (n=168, 43.4%), and Muslims (n=347, 89.7%). The results revealed that 65.1% (n=252) of the public had good knowledge while 65.6% (n=254) of the public had good perception towards childhood vaccination. Most of them obtained vaccination related information from the social network (n=62, 16%), healthcare provider (n=62, 16%) and television (n=58, 15%). There were significant associations between gender, age, educational background, occupation and income level with the knowledge and perception towards vaccination.

**Conclusion:** The study showed that citizen in Perlis has good knowledge and perception on childhood vaccination. Female, as well as those with higher income and higher educational level, have better knowledge and perception towards childhood vaccination. Educational interventions should be focused on lower income group of the society in improving the public's knowledge and perception on the childhood vaccination.

**Keywords:** knowledge, perception, childhood, vaccination

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## Introduction

Vaccination is the process which a person is made immune or resistant to an infectious disease, typically by administering vaccine<sup>1</sup>. Vaccine is a biological preparation that contains an agent that mimics a disease-causing organism, and it is often made up of weakened or killed forms of microbe, its toxins or one of its surface protein<sup>2</sup>. Vaccine has greatly reduced the burden of infectious disease<sup>3</sup>. It can prevent illness, disability, and death from vaccine-preventable diseases such as cervical cancer, diphtheria, hepatitis B, measles, mumps, pertussis (whooping cough), pneumonia, polio, rotavirus diarrhoea, rubella and tetanus<sup>4</sup>. The World Health Organization (WHO) has established the Expanded Programme on Immunization (EPI) to develop and expand immunisation programmes throughout the world<sup>5</sup>.

In Malaysia, the National Immunisation Programme (NIP) was introduced in the early 1950s in accordance to the WHO EPI. Under the NIP initiatives, immunisation against several vaccine-preventable diseases is provided for all Malaysian children at certain ages without any charges<sup>6</sup>. Based on the Ministry of Health Malaysia's vaccination schedule, children aged 12 months are recommended to receive eight basic primary immunisation: BCG, Hepatitis Dose 1 and 3, Diphtheria-Tetanus-Pertussis-Haemophilus Influenza Dose 1, 2 and 3, and Measles-Mumps-Rubella<sup>7</sup>. For past decades, Malaysia has achieved high immunisation coverage among infants and young children<sup>8</sup>. However, there is an increasing trend of vaccine hesitancy. The official statistics showed that the number of parents refusing to immunise their children had gone up from 470 in 2013 to 1,292 in 2015<sup>9</sup>. Parental understanding of the importance of vaccination and their willingness to vaccinate their children plays a vital role in achieving complete immunisation for their children<sup>10</sup>.

It is important to maintain 92% to 95% of vaccination coverage among the population in order to sustain herd immunity and to protect those who are unvaccinated and susceptible<sup>11</sup>. Towards this mission, not only parents' understanding is important to maintain complete immunisation, public awareness also plays a role. Therefore, this study was carried out to assess the knowledge and perception of the public regarding childhood vaccination in Perlis.

## Methods

A cross-sectional study was conducted during a period of seven months (August 2017 to February 2018) in Perlis. The people of Perlis aged 18 years old and above were invited to answer the validated questionnaires developed by the Perlis State Hospital (Tuanku Fauziah Hospital). Sample size was calculated by Raosoft® software using the current Perlis population data of 251,500 acquired from the Department of Statistics Malaysia. The respondents were recruited through convenience sampling from various public places throughout Perlis.

The questionnaire consisted of four sections, namely demographic data, knowledge, perception and knowledge seeking behaviour. Total knowledge and perception scores were computed and the mean value was identified (eight out of 13 and eight out of 14, respectively). Scores below the mean value was considered as having "poor knowledge" and "negative perception" whereas those above the mean value were considered as having "sufficient knowledge" and "good perception" respectively.

Data were analysed using Statistical Package for Social Sciences (SPSS) version 20. Chi-square test was used to investigate the association between knowledge and perception towards childhood vaccination. A *p*-value less than 0.05 was considered statistically significant. Multivariable logistic regression model was applied to determine the factors associated with knowledge and perception towards childhood vaccination. The independent variables included age, gender, race, religion, location of residence, educational background, occupation, income, marital status and number of children.

## Results

### *Demographic data*

A total of 450 questionnaires were successfully distributed during the study period, and 387 respondents participated in the study. Their baseline characteristics were in Table 1. Majority of them were female (59.2%), Muslim (89.7%), Malay (88.6%) and aged greater than 25 years old (55.8%). The percentage of respondents living in rural and urban area was almost equal which were 50.4% and 49.6% respectively. Most of them had degree / Master / Ph.D. educational background (43.4%) followed by Diploma / STPM (26.6%).

### *Knowledge of public on childhood vaccination*

Overall, 65.1% (n=252) of the public had good knowledge on childhood vaccination and the knowledge was good across majority of the demographic characteristics (Table 2). Based on the univariate analyses, knowledge on childhood vaccination was associated with gender, educational level, occupational sector and monthly income. The knowledge was not influenced by respondents' age, religion, race, location of residence, marital status and number of children. After adjusting for gender, educational level, occupational sector and monthly income in the multivariate model, only monthly income remained significantly associated with the level of childhood vaccination knowledge. Individuals with monthly income of RM3,000 – RM3,999 was 4 times more likely to have good knowledge compared to other monthly income groups (adjusted odds ratio (OR) 4.12, 95% confidence interval (CI) 1.7 – 10.0).

### *Perception of public towards childhood vaccination*

The results showed that 65.6% (n=254) of the public had good perception towards childhood vaccination. Female respondents expressed a better perception towards childhood vaccination compared to male (p=0.001) as demonstrated in Table 3. In terms of age, the highest rate of good perception was reported among respondents aged greater than 25 years old (74%) compared to those below 25 years old (56%, p<0.005). Civil servants were more likely to have good perception towards childhood vaccination compared to private employees (p<0.001). Respondents with monthly income of RM4,000 – RM5,000 had the highest rate of good perception towards childhood vaccination (86%), followed by those earning more than RM5,000 (80%) and RM3,000 – RM3,999 (71%). Further logistic regression analysis found that only two factors, i.e. gender and monthly income, were significantly associated with good perception towards childhood vaccination.

### *Knowledge Seeking Behaviour*

There were three sections in the questionnaire about knowledge seeking behaviour, namely the source of vaccine information, information the respondents want to know and their opinion regarding the best way for public to get the information (Table 4). From the results, most of the respondents thought social network (16%) and healthcare providers (16%) as the main source to obtain vaccine information, followed by television (15%), family and friends (13%) and medical websites (13%). In Section 2, 18.1% of them wanted to know more about the advantages and disadvantages of childhood vaccination, 13.7% on halal status and contents of vaccine, and another 5.7% of respondents want to know type of vaccine and availability of vaccine in MOH facilities. Most of the respondents also believed that social media, mass media and digital media is the best way for public to get vaccine information (60%) followed by awareness programmes conducted by government and non-government association such as campaign, health talk and exhibition (30%).

Table 1: Demographic data (N=387)

Demographic data	n	(%)
Age		
≤25 years old	171	(44.2)
≥26 years old	216	(55.8)
Gender		
Male	158	(40.8)
Female	229	(59.2)
Religion		
Muslim	347	(89.7)
Non-Muslim*	40	(10.3)
Race		
Malay	343	(88.6)
Non-Malay**	44	(11.4)
Location of residence		
Rural	195	(50.4)
Urban	192	(49.6)
Educational background		
UPSR / PMR <sup>#</sup>	26	(6.7)
SPM / Matriculation	90	(23.3)
Diploma / STPM	103	(26.6)
Degree / Master / PhD	168	(43.4)
Occupation		
Public sector	165	(42.6)
Private sector	222	(57.4)
Income		
None	116	(30)
< RM2,000	89	(23)
RM2,000 – RM2,999	45	(11.6)
RM3,000 – RM3,999	48	(12.4)
RM4,000 – RM5,000	50	(12.9)
> RM5,000	39	(10.1)
Marital Status		
Non-married <sup>##</sup>	180	(46.5)
Married	207	(53.5)
Children		
Yes	178	(46)
No	209	(54)

\* Non-Muslims comprised of Buddhism, Hindu, Christian and others

\*\* Non-Malay comprised of Chinese, Indian and others

<sup>#</sup> UPSR / PMR comprised of no formal education; UPSR and PMR

<sup>##</sup> Non-married comprised of single, divorced, widow and widower

Table 2: Knowledge of public on childhood vaccination

Demographic data	Knowledge				Simple logistic regression			Multiple logistic regression		
	Good		Poor		Crude OR	95% CI	p-value	Adjusted OR	95% CI	p-value*
	n	%	n	%						
Age										
≤ 25 years old	102	59.6	69	40.4	1		0.450			
≥ 26 years old	150	69.4	66	30.6	1.54	1.01, 2.34	<b>0.003</b>			
Gender										
Male	89	56.3	69	43.7	1		0.288			
Female	163	71.2	66	28.8	1.92	1.25, 2.93				
Religion										
Muslim	229	66.0	118	34.0	1.43	0.74, 2.79				
Non-Muslim	23	57.5	17	42.5	1		0.222			
Race										
Malay	227	66.2	116	33.8	1.49	0.78, 2.81				
Non-Malay	25	56.8	19	43.2	1		0.526			
Location of residence										
Rural area	124	63.6	71	36.4	0.87	0.58, 1.33				
Urban area	128	66.7	64	33.3	1		<b>0.001</b>			
Educational level										
Primary education	13	50	13	50	1					
Secondary education	49	54.4	41	45.6	1.20	0.50, 2.86				
Tertiary education	63	61.2	40	38.8	1.58	0.66, 3.74				
Higher education	127	75.6	41	24.4	3.1	1.33, 7.22	<b>&lt;0.001</b>			
Occupation										
Government sector	127	77.0	38	23.0	2.59	1.66, 4.06				
Private sector	125	56.3	97	43.7	1		<b>&lt;0.001</b>			<b>&lt;0.001</b>
Income										
None	66	56.9	50	43.1	1			1		
<RM2,000	43	48.3	46	51.7	0.71	0.41, 1.23		0.72	0.41, 1.25	
RM2,000- RM2,999	30	66.7	15	33.3	1.52	0.74, 3.11		1.53	0.74, 3.16	
RM3,000- RM3,999	41	85.4	7	14.6	4.44	1.84, 10.72		4.12	1.70, 10.00	
RM4,000- RM5,000	42	84.0	8	16.0	3.98	1.72, 9.22		3.79	1.63, 8.84	
>RM5,000	30	76.9	9	23.1	2.53	1.10, 5.80		2.52	1.09, 5.82	
Marital status										
Married	143	69.1	64	30.9	1					
Non-Married	109	60.6	71	39.4	0.687	0.45, 1.05				
Do you have children?										
Yes	109	60.6	71	39.4	1.32	0.87, 2.02				0.193
No	143	69.1	64	30.9	1					

\* Multiple logistic regression analysis using the Enter method

Table 3: Perception of public on childhood vaccination

Demographic data	Perception				Simple logistic regression			Multiple logistic regression		
	Good		Poor		Crude OR	95% CI)	p-value	Adjusted OR	(95% CI)	p-value*
	n	%	n	%						
Age										
≤ 25 years old	95	55.6	76	44.4	1		<0.005			
≥ 26 years old	159	73.6	57	26.4	2.23	1.46, 3.42				
Gender										
Male	89	56.3	69	43.7	1		0.001			
Female	165	72.1	64	27.9	2.00	1.30, 3.06		1.95	(1.25,3.05)	<0.005
Religion										
Muslim	225	64.5	122	35.2	0.70	0.34, 1.45	0.336			
Non-Muslim	29	72.5	11	27.5	1					
Race										
Malay	222	64.7	121	35.3	1		0.295			
Non-Malay	32	72.7	12	27.3	1.45	0.72, 2.93				
Location of residence										
Rural area	131	67.2	64	32.8	1.15	0.76, 1.75	0.519			
Urban area	123	64.1	69	35.9	1					
Educational level										
Primary education	17	65.4	9	34.6	1		0.027			
Secondary education	53	35.9	37	41.1	0.76	0.31, 1.89				
Tertiary education	60	58.3	43	41.7	0.74	0.30, 1.81				
Higher education	124	73.8	44	26.2	1.49	0.62, 3.59				
Occupation										
Government sector	125	75.8	40	24.2	2.25	1.44, 3.51	<0.005			
Private sector	129	58.1	93	41.9	1					
Income										
None	56	48.3	60	51.7	1		<0.005			
<RM2,000	59	66.3	30	33.7	2.11	1.19, 3.73		2.20	1.23, 3.92	
RM2,000- RM2,999	31	68.9	14	31.1	2.37	1.15, 4.92		2.44	1.16, 5.10	
RM3,000- RM3,999	34	70.8	14	29.2	2.6	1.27, 5.35		2.37	1.14, 4.92	
RM4,000- RM5,000	43	86.0	7	14.0	6.58	2.74, 15.84		6.31	2.61, 15.30	
>RM5,000	31	79.5	8	20.5	4.15	1.76, 9.80		4.21	1.77, 10.03	
Marital status										
Married	106	58.9	74	41.1	1.75	1.14, 2.67	0.009			
Non-Married	148	71.3	59	28.5	1					
Do you have children?										
Yes	129	72.5	49	27.5	1.77	1.15, 2.72	0.009			
No	125	59.8	84	40.2	1					

\* Multiple logistic regression analysis using the Enter method

Table 4: Knowledge seeking behaviour

Criteria	n	(%)
<b>Section 1: Source of vaccine information</b>		
Social network	62	(16)
Healthcare provider	62	(16)
Television	58	(15)
Family and friends	50	(13)
Medical websites	50	(13)
Newspaper	43	(11)
Magazine	31	(8)
Radio	27	(7)
<b>Section 2: Information the respondents want to know</b>		
Advantages & disadvantages of childhood vaccination	70	(18.1)
Halal status & contents of the vaccine	53	(13.7)
Side effects of the vaccines	29	(7.5)
Types and availability of vaccine in the MOH facilities	22	(5.7)
Cost spent on vaccines	12	(3.1)
Vaccination schedule and the use of vaccine	5	(1.3)
Others	28	(7.2)
<b>Section 3: Opinion regarding the best way for public to get information on vaccines</b>		
Social media, mass media and digital media	232	(60)
Campaign, health talk, and exhibition	116	(30)
Healthcare providers	27	(7)
Formal education	4	(1)

## Discussion

Knowledge can be defined as the state of knowing about or being familiar with something<sup>12</sup>. Our study found that more than half (65%) of the respondents have good knowledge regarding childhood vaccination (N= 254). Approximately 92% of the respondents answered correctly that vaccine is important for protection against certain infectious disease and it can help the body fight certain infections, meanwhile 79.1% correctly answered that vaccination reduced incidence of certain infectious disease. In terms of knowledge on childhood vaccination, our study found that female respondents were 1.92 times more likely to have better knowledge compared to men. Women have better knowledge as they are usually the one that has greater decision making in child's health<sup>13,14</sup>. In addition, socioeconomic status can affect vaccination knowledge level. Our study showed that there were significant differences in the level of immunisation knowledge among respondents of different educational backgrounds and monthly income levels. Respondents from the lower educational background or lower monthly income groups had poorer knowledge compared to those with higher education and monthly income level. The same trend had been observed in the previous study<sup>10,15,16</sup>. Educational interventions should be focused on lower income group of the society in improving the public's knowledge and perception on the childhood vaccination.

Perception is a belief or opinion, often held by many people and based on how things seem. According to our study, female respondents were two times more likely to have positive perception towards vaccination compared to male. Gender refers to socially constructed roles, behaviours, activities and attributes that a given society considers appropriate for men and women<sup>13</sup>. The results of a qualitative study that explored teenagers' understandings of and attitudes towards vaccines and



vaccine-preventable diseases showed that female participants were most aware of human papillomavirus (HPV) infection, although it was subject to misunderstandings, while male respondents commonly believed that it only affects female respondents<sup>17</sup>. Another study done by A. Raja'a *et al.* in 2002 on the coverage and perceptions of Medical Sciences students towards hepatitis B virus vaccine in Sana'a City, Yemen also revealed that the attitudes and practices of female students were better than that of males<sup>18</sup>. Women are usually the primary responsible person to deal with health-related issues. Immunisation interventions targeting only women, however, clearly neglect the critical influence that men have over women's decision-making power. In many developing countries, women may have the primary responsibility for children's healthcare but it is the men who have control over women's access to health information and services, finances, transportation and other resources.

In this study, we also found that higher income respondents had a good perception compared to lower income respondents. A study assessing the predictive effects of socioeconomic factors on influenza vaccination coverage rates in eleven European countries found that household income may significantly contribute to the chances of getting immunised against influenza<sup>19</sup>. In another study, low income families were less likely to receive needed health information regarding HPV vaccine, thereby reducing the likelihood of vaccine uptake<sup>20</sup>. Further analyses by the author revealed that lower income families had lower odds of receiving healthcare professionals' recommendations after controlling other healthcare related factors such as insurance status, annual preventive care and usual source of care.

Based on our findings, more respondents tended to obtain information from the social network and healthcare provider, followed by television and family or friends. The same trend was also observed in other studies<sup>1,10</sup>. Public that tended to use social media as the primary source of information could be vulnerable to misinformation. Information of vaccination found on website or social networks were sometimes inaccurate or having negative contents<sup>21</sup>. From the respondents' point of view, mass media was the best channel to provide information to public. A study conducted by Pew Research Centre reported that 61% of American adults search for health information online and these information had impact on the health decisions in 60% of e-patients (internet user that search for health information online)<sup>24</sup>. Public tends to use online social media to obtain information, share stories and discuss health related concerns<sup>25</sup>. Another study conducted by Scandfeld *et al.* found that Twitter can be used as a method of informal sharing of health information<sup>26</sup>. However, the readers should be vigilant in browsing all these social media pages.

Most of the respondents were concerned about the advantages and disadvantages of childhood vaccination, the halal status, and side effects of vaccination. This was also seen in a study conducted in Malaysia by Lim *et al.* and Azizi *et al.*<sup>22</sup>. It was evident that halal issue remained the main concern as the majority of Malaysians are Muslims. Research and development in Malaysia focus on producing bovine based vaccine and halal certified ingredients. However, it should be noted that the Islamic Religious authorities in Malaysia have issued fatwa or Islamic policy clarifying that porcine based medications, including vaccines, can be used in "dharurah" or emergency situations<sup>23</sup>.

In this study, we encountered a number of practical difficulties. One of the challenges was the difficulty to recruit the public. Most of them were in a rush when approached by the investigators to answer our questionnaires and it required approximately 20 minutes to answer all the questions. Some of the respondents also complained that the questions were difficult. This constraint contributed to the fact that a limited number of completed questionnaires were received. The length of the questionnaire presented was also a limitation and a lack of interest was observed in some respondents who participated in the study. As the questionnaire was in printed-version, geographical limitation was another difficulty in the execution of the study as the distribution of questionnaires could not cover all areas in Perlis. A similar study can be conducted with larger sample size, so that one may be able to obtain diverse demographic information when comparing results. Similar studies can



be conducted by exploring the knowledge and perception of public towards vaccination at another location.

### Conclusion

This study showed that citizens in Perlis had good knowledge and perception on childhood vaccination. Female population and those with higher educational and income level had better knowledge towards childhood vaccination. Female and those with higher income level had a better perception towards childhood vaccination. Educational interventions may be targeted at the lower income groups of the society in improving the public's knowledge and perception on the childhood vaccination.

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### Conflict of Interest Statement

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### References

1. Aa; A. Parents' Knowledge, Attitude and Practice towards Childhood Vaccination, AlMadinah, Saudi Arabia 2017. *Neonatal and Pediatric Medicine*. **2017**, 3, 1–8.
2. WHO | Vaccines. <http://www.who.int/topics/vaccines/en/> (accessed May 2, 2018).
3. Andre, F.; Booy, R.; Bock, H.; Clemens, J.; Datta, S.; John, T.; Lee, B.; Lolekha, S.; Peltola, H.; Ruff, T.; et al. Vaccination Greatly Reduces Disease, Disability, Death and Inequity Worldwide. *Bull World Health Organ*. **2008**, 86(2), 140–146.
4. Immunization coverage. <http://www.who.int/news-room/fact-sheets/detail/immunization-coverage> (accessed May 2, 2018).
5. Keja, K.; Chan, C.; Hayden, G.; Henderson, R. H. Expanded Programme on Immunization. *World Health Stat Q*. **1988**, 41(2), 59–63.
6. Kusnin, F. Immunization Programme in Malaysia <https://www.fondation-merieux.org/wp-content/uploads/2017/10/vaccinology-2017-faridah-kusnin.pdf> (accessed May 26, 2018).
7. Ahmad, N.; Jahis, R.; Kuay, L.; Jamaluddin, R.; Aris, T. Primary Immunization among Children in Malaysia: Reasons for Incomplete Vaccination. *Journal of Vaccines & Vaccination*. **2017**, 8(3), 1–8.
8. Official Portal for Ministry of Health Malaysia Childhood Immunisation Coverage <http://www.moh.gov.my/english.php/pages/view/408> (accessed May 2, 2018).
9. Addressing vaccine hesitancy <https://www.nst.com.my/news/2016/01/122556/addressing-vaccine-hesitancy> (accessed May 2, 2018).
10. Awadh, A. I.; Hassali, M. A.; Al-Lela, O. Q.; Bux, S. H.; Elkalmi, R. M.; Hadi, H. Does an Educational Intervention Improve Parents' Knowledge about Immunization? Experience from Malaysia. *BMC paediatrics*. **2014**, 14(1), 254.
11. Tannous, L. K.; Barlow, G.; Metcalfe, N. H. A Short Clinical Review of Vaccination against Measles. *JRSM Open*. **2014**, 5(4), 2054270414523408.
12. Perception Meaning in the Cambridge English Dictionary <https://dictionary.cambridge.org/dictionary/english/perception> (accessed May 16, 2018).
13. Martin Hilber, A.; Bosch-Capblanch, X.; Schindler, C.; Beck, L.; Sécula, F.; McKenzie, O.; Gari, S.; Stuckli, C.; Merten, S. *Gender and Immunisation: Summary Report for SAGE*, November 2010. 2010.

14. Antai, D. Gender Inequities, Relationship Power, and Childhood Immunization Uptake in Nigeria: A Population-Based Cross-Sectional Study. *International journal of infectious diseases*. **2012**, 16(2), e136–e145.
15. Tagbo, B.; Uleanya, N.; Nwokoye, I.; Eze, J.; Omotowo, I. Mothers' Knowledge, Perception and Practice of Childhood Immunization in Enugu. *Nigerian Journal of paediatrics*. **2012**, 39(3), 90–96.
16. Wang, B.; Clarke, M.; Afzali, H. H. A.; Marshall, H. Community, Parental and Adolescent Awareness and Knowledge of Meningococcal Disease. *Vaccine*. **2014**, 32(18), 2042–2049.
17. Hilton, S.; Patterson, C.; Smith, E.; Bedford, H.; Hunt, K. Teenagers' Understandings of and Attitudes towards Vaccines and Vaccine-Preventable Diseases: A Qualitative Study. *Vaccine*. **2013**, 31(22), 2543–2550.
18. Raja'a, Y. A.; Saeed, G. G.; Al-Hattami, A. A.; Al-Asadi, M. H.; Mohammad, A. A.; Ahmed, A. A.; Al-Ammari, N. M. Coverage and Perceptions of Medical Sciences Students towards Hepatitis B Virus Vaccine in Sana'a City, Yemen. *Saudi Medical Journal*. **2002**, 23(10), 1222–1226.
19. Endrich, M. M.; Blank, P. R.; Szucs, T. D. Influenza Vaccination Uptake and Socioeconomic Determinants in 11 European Countries. *Vaccine*. 2009, 27 (30), 4018–4024.
20. Blair, S. L.; McCormick, J. H. *Family and Health: Evolving Needs, Responsibilities, and Experiences* Emerald Group Publishing, **2014**.
21. Zimmerman, R. K.; Wolfe, R. M.; Fox, D. E.; Fox, J. R.; Nowalk, M. P.; Troy, J. A.; Sharp, L. K. Vaccine Criticism on the World Wide Web. *Journal of Medical Internet Research*. **2005**, 7 (2).
22. Azizi, F. S. M.; Kew, Y.; Moy, F. M. Vaccine Hesitancy among Parents in a Multi-Ethnic Country, Malaysia. *Vaccine*. **2017**, 35 (22), 2955–2961.
23. Taib, W. R. W.; Yusoff, N. A. M.; Hussin, T. M. A. R.; Ahmad, A. Issues in Vaccine Hesitancy in Malaysia: A Countering Approach. *Journal of Biomedical and Clinical Sciences (JBACS)*. **2017**, 2 (1), 42–46.
24. Fox, S.; Jones, S. *The Social Life of Health Information*. Pew Research Center: Internet, Science & Tech, **2009**.
25. Fox, S. *The Social Life of Health Information*, 2011; Pew Internet & American Life Project Washington, DC, **2011**.
26. Scanfled, D.; Scanfled, V.; Larson, E. L. Dissemination of Health Information through Social Networks: Twitter and Antibiotics. *American Journal of Infection Control*. **2010**, 38 (3), 182–188.