RISK PERCEPTION OF CHILDHOOD IMMUNISATION AMONG THE PUBLIC IN KOTA KINABALU, SABAH

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Abstract

Objective: The study was designed to determine the risk perception of the public population in Kota Kinabalu towards childhood immunisation.

Methodology: This was a cross-sectional study where self-administered questionnaires were distributed to the public in Kota Kinabalu. The respondents who consented were 18 years old and older. The illiterate persons and the foreigners were excluded. The calculated sample size was 400. Only 313 samples collected were suitable for analysis using SPSS21.0.

Results: Fever, pain swelling and allergic reaction were correctly identified as risks of immunisation. Autism, mental retardation and even death could also result from vaccination. Of the total respondents, 76.7% agreed with the practice of childhood vaccination, 70.0% thought that childhood vaccinations were safe and effective and 58.1% felt that its benefit outweighed the risk. Other than that, 32.0% refused childhood vaccination from fear of its risks, and this fear was the main reason for the refusal of childhood vaccination. Age, marital status, race and income were the factors which influenced parental willingness to vaccinate their children (p<0.05).

Conclusions: Most participants understood the risks of childhood vaccination, but few agreed to the practice of childhood immunisation for herd immunity. Public health campaigns are needed, to increase the understanding and acceptance of childhood vaccination especially in the rural community.

Keywords: *Childhood Immunisation, Parental Risk, Perception, Public Acceptance*

Introduction

In recent decades, vaccine-preventable diseases have been greatly reduced through routine vaccination programs in high-income countries (1). Vaccinations have become a mainstay of public health programs in disease prevention. These programs have come under worldwide scrutiny, with controversial charges that vaccines cause, rather than prevent, disease. The diseases purportedly caused by vaccines varied across countries: narcolepsy with the H1N1 vaccine in Sweden and Finland; and autism with the measles, mumps, and rubella (MMR) vaccine in the United Kingdom (UK) and the United States (US) (2). Refusal of childhood vaccination might be influenced by concerns about the vaccine components, the low perceived likelihood and severity of the infectious diseases, and a trusting relationship with a natural healer or a respected person doubting the safety and the effectiveness of the vaccination (1). Success in vaccination programmes required a better understanding of the parental perceptions of disease and their consequent decisions about vaccinations. Few studies have considered the risk perception and decision-making associated with uncertainty (3). In a community relatively insulated from direct media influence, word of mouth would become a potent source of rumours about vaccination dangers (4).

The parental choice to decline childhood vaccinations is recognised as an important factor in suboptimal uptake. A study from the UK reported that 5% of all children studied were unimmunised. Three-quarters of the parents whose children were unimmunised with the MMR vaccine,

and almost half of the parents whose children were unimmunised with the primary schedule of the combined Diphtheria-Tetanus-Pertussis–Hepatitis B-Haemophilus influenza Type B vaccine, and oral polio and meningitis vaccines, said they had made a conscious decision to reject the vaccines (5). The Dutch National Immunisation Program (NIP) was assessed by an online-focused group of parents who refused all or part of the NIP (n = 60). Many of the parents refused childhood vaccinations due to multiple factors which included their perception about the physique of their child and the immune system, the perceived risk of the vaccination and the lifestyle of the family (1). In contrast, Singaporean parents were knowledgeable about influenza, and were supportive of vaccination, and had a high perceived benefit of vaccination. However, only 15% and 32% of their children received the influenza vaccine in 2016 and 2017, respectively. The medical professionals needed to be more persuasive in promoting vaccination since parents had the knowledge and the willingness to vaccinate and to pay for the vaccination (6).

The differing parental decisions are influenced by their knowledge and are rooted in complex belief structures. By understanding and modifying these beliefs, it might be possible to influence their decisions, thereby improving uptake. Many studies have examined the parental beliefs about childhood vaccinations. Studies have been conducted in numerous countries, with various vaccines, and differing vaccination policies and vaccine-preventable disease prevalence. These studies spanned several decades, taking in multiple vaccines scares and disease (7).

In Malaysia, a nationwide community-based survey was conducted among mothers of children between the twelve to twenty-three months of age, to determine the number of children at risk for incomplete immunisation and its associated factors. It was found that the prevalence of incomplete immunisation was 4.5%, and the non-immunised was 0.1%. Incomplete immunisations were associated with factors of living in urban areas and with mothers who received pregnancy care at private healthcare facilities (8). A study on the refusal of immunisation by Malaysian parents found that 18.2% (n = 8) of parents refused immunisation while 70.5% (n = 31) defaulted immunisation or missed appointments for immunisation. The main reason for their refusal was a preference for the alternative treatment of homoeopathy (75.0%, n = 6) (9). A study in Kota Kinabalu in Sabah, determined the prevalence of immunisation defaulters at 16.8% out of a total of 315 respondents. The associated risk factors were the employment status of the mother and the size of the family, where working mothers with bigger families would tend to have higher chances of defaulting immunisations (10).

The existence of both immunisation defaulters and refusers might be one of the reasons for the less than 100% national vaccination coverage in Malaysia for each vaccine-preventable disease (11). Of concern to health care professionals, there was an increase in 2018 of cases of measles with 724 reported cases of the vaccine-preventable infection by 31st May in 2018, compared to the same period in 2017 with 592 (12). It would, therefore, be worthwhile to study the public risk perception towards childhood immunisation. Thus, this study to determine the risk perception of the general public in Kota Kinabalu, Sabah, towards childhood immunisation would provide further insight into these concerns.

Methods

This was a cross-sectional study which utilised a self-administered, Malay and English dual-language questionnaire. The questionnaires were distributed at shopping malls in Kota Kinabalu, Sabah, to capture participants from various backgrounds in the community. Participants were approached by enumerators at various times of the day during data collection. Only those who were 18 years old or older, and who were literate and consented were enrolled in the study. The illiterate persons and the foreigners were excluded, following the exclusion criteria.

The study instrument was constructed after a thorough literature review and using the findings of earlier studies. The questionnaire was developed to focus on the risk perception towards childhood vaccination of the respondents, which included their general ideas and their knowledge of the side effects and risks of childhood vaccinations. The respondents were asked to state their reasons for refusing childhood vaccinations. The final version of the questionnaire was pilot tested in a community sharing similarities to the study population.

Kota Kinabalu was selected because of the increase in vaccination hesitancy. Selection of the study areas and the participants in the study were based on convenience sampling. Possession of a valid Malaysian identification card was a requirement for recruitment into the study. The duration of the study was eight weeks which included; one week of study and questionnaire design, two weeks of questionnaire validation, three weeks of data collection, and finally, two weeks of data analysis and write up.

The estimation of the sample size was calculated using the Open EpiSoftware, with an estimated adult population of 300,000 in Kota Kinabalu. Assuming that 50% of the total population had a general knowledge of childhood vaccination, a total of 384 participants was required at a 95% confidence interval. The collected data were analysed using SPSS 21.0. The descriptive statistical parameters of frequency, percentage, mean and standard deviation were calculated, and associations between variables and outcomes were assessed using the Chi-squared test. A *p*-value of less than 0.05 was considered statistically significant.

Ethical approval was not obtained because the survey was conducted as part of a community project by medical students. Nevertheless, the aim of the study was clearly

described to the respondents and consent was obtained as a prerequisite to joining the study.

Results

Socio-demographic characteristics

A total of 400 questionnaires was distributed and collected back during data collection. However, only responses from 313 participants (78.25%) were included in the final analysis due to the exclusion of the uncompleted questionnaires.

The respondents consisted mainly of Sabahan Bumiputera (65.5%) of 18-29 years old (46.3%) and 30-49 years old (40.6%). Of the total, 60.1% were female while 39.9% were male. Majority of the respondents were married or used to be married (59.7%) and were single (40.3%). More than half of the respondents had children (54.3%) with the mode of 1-2 children (23.0%). Islam and Christianity were the two main religions of the respondents, with a percentage of 63.3% and 28.2% respectively. The educational background was mostly secondary schooling (40.6%) followed by tertiary undergraduate studies (31.0%). Their level of income ranged from RM1000 to RM3500 (35.1%). Further details were described in Table 1.

Table 1: The socio-demographic distributions of the respondents (n = 313)

Socio-demographic factors	Frequency (N)	Percentage (%)
Gender		
Male	125	39.9
Female	188	60.1
Age group		
18-29	145	46.3
30-49	127	40.6
50-69	40	12.8
70-89	1	0.3
Marital status		
Single	126	40.3
Married	170	54.3
Divorced	10	3.2
Widowed	7	2.2
Number of children		
None	143	45.7
1 - 2 kids	72	23.0
3 - 4 kids	61	19.5
5 - 6 kids	31	9.9
7 - 8 kids	4	1.3
9 - 10 kids	2	0.6
Race		
Bumiputera	205	65.5
Malay	62	19.8
Chinese	30	9.6
Indian	5	1.6
Others	11	3.5
Religion		
Islam	198	63.3
Christian	90	28.8
Buddha	16	5.1
Hindu	5	1.6
Others	4	1.3
Education level		
Primary school	23	7.3
Secondary school	127	40.6
Pre-university	23	7.3
Undergraduate	97	31.0
Post-graduate	27	8.6
No formal education	16	5.1
Income		
<RM1000	109	34.8
RM1000-3500	110	35.1
RM3501-5000	54	17.3
RM5001-10000	30	9.6
>RM10000	9	2.9
Not available	1	0.3

Public perception towards the risks of childhood vaccination

The perceptions towards the risks of childhood vaccinations were assessed by questions which focused on their opinion on the possible risks, and their viewpoint on the benefit, safety and effectiveness of childhood vaccination. The respondents were classed according to their willingness to vaccinate; those who vaccinated or would vaccinate their present and their future children as Group A, and those who did not vaccinate and would not vaccinate their present and their future children as Group B.

The risks perception of childhood vaccination

Regarding the risk perception of childhood, the respondents were asked about the possible risks that could occur following a childhood vaccination based on their perception

and knowledge. About 9.6% (n = 30) of them claimed ignorance with the answer 'Don't Know'. The majority of the respondents, 90.4% (n = 283)in their answers, gave at least one of the risks of vaccination.

The most well-known risk of childhood vaccination was fever (78.8%). Other risks and side effects known by the respondents included pain (38.2%), swelling (37.8%), allergic reaction (37.8%), and redness (31.4%). Some of them noted the worst risks of childhood vaccination were autism (2.5%), mental retardation (4.6%) or even death (7.8%). Further details were shown in Table 2. Most of the respondents (69.9%) agreed that vaccines were safe and effective. However, only 58.1% agreed that the benefit of vaccination outweighed the risk.

Table 2: Perception on risks/side effects, safety, effectiveness and benefit of vaccination

Risks of Vaccination	Total N (%)	Among those agreed to vaccinate N (%)	Among those disagree to vaccinate N (%)	p-value
Fever	223 (78.8)	176 (81.1)	47 (71.2)	0.085
Pain	108 (38.2)	89 (41.0)	19 (28.8)	0.073
Swelling	107 (37.8)	94 (43.3)	13 (19.7)	0.001
Allergic reaction	107 (37.8)	83 (38.2)	24 (36.4)	0.782
Redness of the skin	89 (31.4)	71 (32.7)	18 (27.3)	0.404
Death	22 (7.8)	17 (7.8)	5 (7.6)	0.945
Mental retardation	13 (4.6)	9 (4.1)	4 (6.1)	0.516
Autism	7 (2.5)	5 (2.3)	2 (3.0)	0.739
Are vaccinations safe and effective?				
Yes	218 (69.9)	184 (76.7)	34 (47.2)	<0.001
Do benefits outweigh the risks?				
Yes	182 (58.1)	146 (60.8)	36 (49.3)	0.203

The reasons for rejection of childhood vaccination

A majority of the respondents were willing to vaccinate their children (Group A) (76.7%, n = 240), while the rest of them were not willing to vaccinate (Group B) (23.4%, n = 73).

Table 3 summarised the reasons for their refusal and the respondent could list more than one reason for not supporting childhood vaccination among those in Group B. The main reason for vaccination rejection among the respondents was their fear of the risks of vaccination: 'afraid of the risk' (45.8%). This was followed by the cultural practice (25.0%). The least common factors were the inconvenience of follow-ups (11.1%) and the religious belief (9.7%).

Table 3: List of reasons for the refusal of childhood vaccination (among vaccine refusals)

Reasons for vaccination refusal	N = 72 (*one missing value)	
	N	%
Afraid of the risks	33	45.8
Cultural practice	18	25.0
Low accessibility to vaccine centres	15	20.8
Financial burden	12	16.7
Afraid of needles/doctors	10	13.9
Inconvenience of follow ups	8	11.1
Religious belief	7	9.7

The factor associated with the refusal to vaccinate

Table 4 summarised the factors associated with the refusal to vaccinate. Age over 50 years old, marital status, income, a perception that vaccine would not prevent disease and the belief that vaccination would not provide immunity were found to be significant in affecting their decision to vaccinate. However, only an education of a pre-university and above was found to be significant after an adjusted analysis.

Table 4: Factors associated with the refusal to vaccinate

Socio-demographic factors	N (%)	Odds Ratio (95%CI)	p-value	Adjusted Odds Ratio (95%CI)	p-value
Gender Male Female	32 (25.6) 41 (21.8)	1.23 (0.73-2.10) Reference	0.437	1.06 (0.33-3.34)	0.925
Age ≤50 years old >50 years old	72 (25.4) 1 (3.4)	9.51 (1.27-71.15) Reference	0.008	-	0.998
Marital status Not married Married	55 (38.5) 18 (10.6)	5.28 (2.92-9.55) Reference	<0.001	2.32 (0.53-10.15)	0.264

Socio-demographic factors	N (%)	Odds Ratio (95%CI)	p-value	Adjusted Odds Ratio (95%CI)	p-value
Race Non-Bumiputera Bumiputera	26 (24.1) 47 (22.9)	1.07 (0.62-1.84) Reference	0.820	1.37 (0.48-3.91)	0.560
Religion Non-Islam Islam	22 (19.1) 51 (25.8)	0.68 (0.39-1.20) Reference	0.181	0.80 (0.24-2.66)	0.718
Educational level <Pre-university ≥Pre-university	34 (20.6) 39 (26.5)	0.72 (0.43-1.22) Reference	0.217	0.232 (0.06-0.90)	0.034
Income ≤RM3500 >RM3500	60 (26.2) 13 (15.5)	1.94 (1.00-3.75) Reference	0.047	3.36 (0.77-14.67)	0.108
Believe vaccine will prevent disease No Yes	19 (38.0) 48 (19.7)	2.50 (1.30-4.81) Reference	0.005	2.42 (0.72-8.18)	0.264
Believe vaccine will provide herd immunity No Yes	48 (27.3) 19 (16.1)	1.95 (1.08-3.53) Reference	0.025	2.11 (0.60-7.41)	0.243

Discussion

The study aimed to explore the perceptions of the public in Kota Kinabalu, Sabah on childhood vaccinations. The common side effects known to the respondents included fever, pain, swelling and allergic reaction. Some of the respondents believed that more severe side effects like autism, mental retardation or death could occur. This was similar to what had been reported in Malaysia (9). Perceived parental beliefs such as a yearly vaccination overloading the immune system, the vaccine was unsafe, the vaccine was causing long-term health problems, as well as a short-term side effect, contributed to the reduced rate of vaccination in England. Those who believed in the short-term side effects were less likely to vaccinate their children in the next vaccine uptake schedule (13).

Our finding also showed that a majority of the public in Kota Kinabalu, Sabah had a correct understanding and a good perception of the risks of childhood vaccination. However, some still believed in the more severe side effects of vaccination such as autism. The fear of autism was initially heightened following a reported finding in 1998 (14), which had been retracted in 2010 due to claims of data falsification (15). Many subsequent studies have failed to report any significance in the association between autism and vaccination (16,17).

Most of the respondents thought that childhood vaccinations were beneficial, safe and effective for their children and future children. Those who vaccinated, or would vaccinate their children and their future children (Group A) made up 76.7% of the total respondents. This was still considered inadequate, as at least 90.0% of the population needed to be vaccinated to achieve herd immunity for most vaccine-preventable diseases. The Malaysian national childhood immunisation coverage in 2016 was at least 94.0% for each vaccine-preventable disease (11). The percentage of vaccine acceptance found in this study was much lower than the national coverage.

A review found that a community-based and a facility-based education had almost the same effect in determining or influencing the improvements of childhood vaccination coverage. Future vaccination programs should incorporate education among health facilities and the community on the importance of childhood vaccinations, followed by the monitoring of the impact of the promotional activities as well as the use of those data for action (18).

Among the respondents who were not willing to vaccinate (Group B), it was noted that the main reason for their refusal of childhood vaccinations was due to their fear of the risks of vaccination. This could be due to their lack of knowledge which caused them to have a wrong perception of the risk of childhood vaccination, triggering them to be afraid of the risks and leading them to reject vaccinations. The public in Kota Kinabalu needed to be educated on the importance of childhood vaccination to improve their understanding and their acceptance of childhood vaccination. This problem could be solved by organising more health campaigns or media involvement to promote the importance and the benefit of childhood vaccination. A study in Korea found that parents were motivated to vaccinate against influenza by the campaigns of the government and the mass media (19). A similar finding was reported in Pakistan where the mass media was the determining factor in vaccination compliance (20). A study had reported different communication methods of conducting childhood vaccination campaigns, as guides to conduct more efficient programs to reach the desirable vaccination coverage which included methods like 'Remind or Recall', 'Facilitate Decision Making', 'Inform or Educate', and 'Teach Skills' (21).

This study found that religious practice played the least role in their refusal for childhood vaccination which was opposite to the other parts of Malaysia. Religious practice did play a role in vaccination preferences in a study conducted in Peninsular Malaysia where the majority were Malays and Muslims (8). A study among healthcare professionals (HCP) in the Netherlands recommended that HCPs should adopt the decision-making process in dealing with parental refusal of vaccines due to religious objections (22). Thailand showed a high overall acceptance of HPV

vaccination even among parents who described religion as being important, compared to those who did not (23).

Parental decisions were significant in non-participation in childhood vaccination. Information and its source, religion, and other socio-economic factors, were found to influence the parental willingness of childhood immunisations. It was found that sending added information highlighting the benefits of an MMR vaccine to the child or both the child and family was significantly associated with increased parental vaccination intentions compared to just sharing information with parents alone (24). Parental immunisation decisions in Ghana were influenced by the sources of vaccine information, the fear of vaccine-preventable diseases, and the awareness of the benefits of immunisations (25). Several reports recommended the proper spreading of information to and among the community, and the address of religion-related issues of vaccination to prevent an outbreak of vaccine-preventable diseases such as measles [reported in Netherlands (26), Croatia (27), California (28)] and pertussis [reported in the US (29,30)] (8,31).

A review of studies among European children found that confusing knowledge, beliefs and perception were associated with a lower MMR vaccine uptake. It was advised that policymakers should focus on upgrading communication strategies to correct perceptions and beliefs regarding vaccines among parents, to improve parental attitudes and behaviours toward vaccinations (32). Religion, as well as education and marital status, significantly influenced parental willingness to bring their children for routine immunisation and parental belief about immunisation in Nigeria (33). In contrast, a study from Nepal found that religion and the gender of the child had little impact in influencing parental decision to bring their children for vaccination (34).

The findings in this study should be interpreted with caution due to the limitations of the study. The selection of the study areas and the participants in this study were based on non-probabilistic sampling. This could cause some bias in the representation of the respondents. A causal relationship could not be established due to the cross-sectional nature of the study. The non-significant results found in the study could be due to the small sample size.

Conclusion

A majority of the public in Kota Kinabalu in Sabah had a fair understanding of the risks of childhood vaccination. However, the percentage of those who agreed to the practice of childhood immunisation was still inadequate to achieve herd immunity (76.7%). Therefore, more promotions would be needed to improve public understanding and their perception towards childhood vaccination, targeting those with lower education status especially.

Competing Interests

The authors declare no conflict of interests.

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