Vaccine knowledge among Generation Y Malays in Pulau Pinang: A pilot study

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Abstract

The increasing spread of infectious diseases in Malaysia has resulted the topic of vaccine acceptance and rejection is gaining traction in academia. the recent outbreak of the COVID-19 pandemic undoubtedly has manifested the never-ending debate of the topic of immunisation both academically and in public discourse. Thus, it is appropriate and timely to delve deeper into the ideas, norms, and values that influence people's health preferences and behaviour, particularly in vaccination. This study concerns on the perceived and actual vaccine knowledge of Generation Y Malays aged 25 to 40 years old in Pulau Pinang. It is critical to understand the public discussion vaccines within the framework of social interaction – how vaccines are portrayed and publicly understood. A pilot study was conducted prior to this to evaluate the procedure for participant recruitment, the data collection processes and the usability of the survey questionnaire. The improvements made to the instrument and methodology before beginning the main research study on vaccine knowledge among Malaysians in Pulau Pinang were made in an attempt to contribute to the body of research in this area.

Keywords: Generation Y, knowledge, Malay, Malaysia, pilot study, vaccine.

Introduction

Over the last few decades, researchers from the medical sciences to the social sciences have recognised how health and bodily concerns such as asthma, cancer, disability, alcoholism, obesity, mental illness, and survival are products of social construct (Poikolainen, 1982; Busfield, 1988; Bauman, 1992; Rich et al., 2000; Liachowitz, 2010; Nolan, 2017; Brawley, 2021). Vaccination is no exception, it is also a socially constructed, acquired, and reinforced phenomenon. According to Attwell et al. (2018), scholars already have a good understanding that society distrusts the expert systems that design and deliver vaccines; some may see vaccines as an unwelcome and unnatural intrusion into a ‘natural body’ that they believe is unnecessary or unbeneficial. Furthermore,

studies show that the vaccination behaviours of an individual's social networks are a predictor of one's behaviours. In other words, it is clear that an individual's milieu matters to the decisions they make. The social construction of reality around vaccines and how it is perceived by an individual ultimately affect one's decision to vaccinate or otherwise. In addition, vaccine acceptance, hesitancy, and rejection also vary between the countries as well as within the societies. The increasing spread of infectious diseases in Malaysia has resulted the topic of vaccine acceptance and rejection is gaining traction in academia. Moreover, vaccine is one of the various contents that is widely discussed and presented across social media platforms due to the recent outbreak of the COVID-19 pandemic. As a prelude to this research on perceived and actual vaccine knowledge, a pilot study was conducted. Simultaneously, this help to determine the feasibility of using a questionnaire as well as the recruitment and data collection processes.

Literature review

As mentioned, the way society perceives vaccines is constructed within the framework of social interaction with others and not inherently, innately, or objectively given. Peretti-Watel et al., (2015) suggested that vaccine practices can be understood using a theoretical framework that incorporates structural features of modern societies, such as social constructionism. Vaccine hesitancy should not be interpreted as merely a behavioural outcome. It is more appropriate to consider it as a constructed decision-making process (MacDonald et al., 2015). Most social constructionists consider the sorts of knowledge that are developed, acquired and brought upon health, illness, and medical care to be regarded as assemblages of beliefs or ideas created via human interaction and pre-existing meanings (Lupton, 2003). According to Giddens (1991), contemporary societies exhibit the decline in tradition and the growing of reflexivity in all domains of society from formal institutions at the macro-level to self-identity and interpersonal intimacy at the micro-level. This represents a new stage of enlightenment that demands new knowledge and autonomy. Besides that, modernity also brought with it a greater awareness of risk, vulnerability, and insecurity. Vaccination-related doubts and reservations, therefore, stem from this process of reconstructing values and knowledge (Siu, Fung & Leung, 2019). This proves that vaccine practices is a highly dynamic and heterogeneous phenomena that varies and evolves over time and space, depending on context, geographic, and demographic variables. (Rosselli et al., 2016).

Past studies have also reported that parents also use online internet resources, namely search engines, websites, blogs, and social media as the main reference to obtain information on immunization that has affected their perceptions and decision-making about their children's vaccinations. As social media has a reputation to offer anyone a platform to create and curate unfiltered content and reach a massive audience, consequently, it may fuel the phenomenon of vaccine hesitancy. Medical knowledge that was previously restricted and exclusive to medical professionals is now accessible to anyone (Keelan et al., 2010). For a country like Malaysia that has one of the highest rates of internet connectivity in the region and is ranked top five globally for mobile social media penetration, it is definitely a powerful and prevailing tool (Kemp, 2020). This justified the significance to understand public narratives about vaccines – how vaccines knowledge, the way they are represented and publicly understood plays a significant role in understanding health or vaccine practices, particularly its acceptance and hesitancy in society.

Method and study area

Sampling

Pilot study involved 31 Malays from generation Y living in Penang as the study sample. Researchers select a sample from the same group for the actual study will be conducted. This aims to identify any inappropriate or confusing questions as well as problems faced by this focus group when answering the questions. As a result, this study will help researchers in identifying design flaws, refining data collection and analysis plans. Besides that, it can also reveal ethical and practical issues that may jeopardise the main research.

Research instruments

The instrument for this study was adapted based on literature review which included previous studies on vaccination knowledge, documents, and reports from the Malaysian Ministry of Health. The primary goal of this instrument is to assess two variables: respondents' perceptions of vaccine knowledge and respondents' knowledge of vaccine. These were all classified as constructs or dimensions in the questionnaire form. Each construct has its own items to measure the variables. The total number of items by constructs are as follows

Table 1. Total items by constructs.

Construct	Items	Total
Perceptions of vaccine knowledge	Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20	20
Knowledge of vaccine	Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32, Q33, Q34, Q35, Q36, Q37, Q38, Q39, Q40	20

Research procedures

a. Pre-research

Domain contruction and items

As noted at the beginning of this section, the domains and items of the questionnaire were formed based on the literature review. There is also a reference to documents and reports from the Malaysian Ministry of Health. Researchers conducted a review to clarity the items, instructions and layout of the questionnaire. This is done to determine the reliability and validity of the questionnaire items based on their level of appropriateness and the format of the responses.

Content validity

Following that, the questionnaire was reviewed to determine the validity of its content and to ensure that each item corresponded to the study’s objectives. According to Yusoff (2019), there are 6 systematic steps to perform content validation. There are preparing content validation forms, selecting panels from among experts, handling content validity, reviewing domains and items,

scoring each item and calculating the CVI. The content validity is usually ensured by referring to experts in the field and to validate the items or questions contained in a research instrument. In this study, the content validity of the instrument was evaluated by three experts, in accordance with the recommendation given by Lynn (1986) that is between three to ten people. These experts are lecturers with medical and health backgrounds. This panel of experts is tasked with evaluating and examining the items in terms of factual accuracy and appropriateness. All suggestions, opinions, and feedback from these experts are considered and used to improve the meaning, language, and content of the questionnaire.

b. Post-research

After obtaining all of the findings, researchers analysed and discussed the pilot study's findings using the SPSS statistical software.

Results

This section summarizes in detail the findings of a pilot study on the vaccine knowledge among the Malays Generation Y in Penang. This study uses data sources from a questionnaire involving a total of 31 respondents as the study sample. The data obtained were analyzed according to IBM SPSS Statistics program procedures. The discussion on the findings of the study in this chapter is done through several sections consisting of a) respondent demographics, b) respondent feedback and c) exploratory factor analysis (EFA) results.

The first part will discuss the demographic categories of respondents Involved in this questionnaire such as age, gender, monthly income, educational background, and district of residence in Penang. The respondents 'feedback section covers the frequency distribution and percentage of respondents' responses which are displayed in tabular form along with descriptive statistics. Researchers used exploratory factor analysis (EFA) to test the instrument's validity. The EFA seeks to assess the dimensional distribution of items in order to quantify a given construct. While testing the instrument's reliability, the researcher assessed the level of reliability using the cronbach's alpha statistical test.

Demographic data

Gender, age, district of residence in Penang, level of education, employment, monthly income, marital status, and number of children comprise the demographic distribution of respondents for this study. The demographic information of the respondents was described using nominal scales such as percentage and frequency. The following is a breakdown of the results for each category:

a. Gender

The majority of study respondents are female which is 23 people (74.2%) while male respondents are 8 people (25.8%).

b. Age

The study's respondents ranged from 23 to 39 years old. A total of 7 (22.6%) respondents were under the age of 25 years, 15 (48.4%) respondents were between the ages of 26 to 30 years, 6 (19.4%) respondents from the age group of 31 to 35 years followed by 3 (9.7%) respondents from age 36 years and above.

c. District of residence in Penang

The distribution of respondents by district of residence in Penang is as follows: Southwest (Penang island) has 4 (12.9%) respondents, Northeast (Penang island) has 17 (54.8%) respondents, Seberang Perai Utara has 5 (16.1%) respondents, Seberang Perai Tengah has 4 (12.9%) respondents and Seberang Perai Selatan has only one (3.2%) respondent.

d. Occupation

The results of the study found that 15 (48.4%) respondents work in the private sector and a total of 4 (12.9%) respondents in the government sector. In addition, there are 3 (9.7%) respondents are self-employed or in business. The remainder were students consisting of 9 (29.0%) respondents.

e. Monthly income

The data obtained showed that 31 respondents can be divided into 5 income categories. First, a total of 3 (9.7%) respondents have an income of less than RM1000 per month. Furthermore, 19 (61.3%) respondents have an income of less than RM3000 per month. Another 3 (9.7%) respondents earn less than RM5000 per month and there are 2 (6.5%) respondents who earn less than RM10,000. Meanwhile, 4 (12.9%) respondents said that they have no monthly income.

f. Marital status

The majority of the respondents are single with a figure of 22 (71.0%) people while the remaining 9 (29.0%) are married.

g. Number of children

As for the number of children, 26 people, which is 83.9% of the respondents did not have children. Only 5 respondents, 15.1% have at least one child. The demographic data is detailed in table 2.

Table 2. Demographic characteristic.

Characteristic	Frequency	Percent
Gender		
Male	8	25.8
Female	23	74.2
Age		
23-25	7	22.6
26-30	15	48.4
31-35	6	19.4
36-39	3	9.7
District of residence in Penang		
Southwest (Penang island)	4	12.9
Northeast (Penang island)	17	54.8
Seberang Perai Utara	5	16.1
Seberang Perai Tengah	4	12.9
Seberang Perai Selatan	1	3.2
Occupation		
Self-emplyoed/business	3	9.7
Government sector	4	12.9
Private sector	15	48.4
Student	9	29.0
Monthly income		
> RM1000	3	9.7
> RM3000	19	61.3
> RM5000	3	9.7
> RM10000	2	6.5
None	4	12.9
Marital status		
Single	22	71.0
Married	9	29.0
Number of children		
1	2	6.5
2	1	3.2
>3	2	6.5
None	26	83.9
Total	31	100

Findings

Table 3 to table displays the distribution of respondents' responses for each section of the questionnaire (A and B). The table covers the question items along with the scale of respondents' answers according to frequency and percentage. This section will also discuss descriptive statistics that use indicators such as mean and standard deviation to measure data dispersion. The interpretation of the mean range was made according to the scale used by Nunnaly and Bernstein (1994) as shown in the Table 3.

Table 3. Mean score and level.

Mean Scale	Level
1.00 – 2.00	Low
2.01 – 3.00	Medium low
3.01 – 4.00	Medium high
4.01 – 5.00	High

a. Perceived knowledge about vaccine

Table 4 shows the frequency distribution and percentage of respondents' perceptions of their own vaccine knowledge.

Table 4. The frequency distribution and percentage of respondents' perceptions of vaccine knowledge.

	Scale					
	Yes		Not sure		No	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Q1- Do you know about vaccine?	31	100	0	0	0	0
Q2 – Do you feel the knowledge you have about the vaccine and its safety is adequate?	21	67.7	4	12.9	6	19.4
Q3 – Do you make decisions about the vaccine based on your knowledge of vaccine?	28	90.3	2	6.5	1	3.2
Q4 – Have you ever decided not to take the vaccine for yourself?	7	22.6	1	3.2	23	74.2
Q5 – Have you ever decided not to take the vaccine for an individual in your care or as a guardian?	4	12.9	0	0	27	87.1
Q6 – Do you know anyone who has a negative reaction towards vaccine?	21	67.7	3	9.7	7	22.6
Q7 – Do you know anyone who does not take vaccine due to religious factors?	10	32.3	2	6.5	19	61.3
Q8 – Do you know anyone who does not take vaccine due to culture factors?	8	25.8	2	6.5	21	67.7
Q9 – Do you know about the ingredients in the vaccine?	13	41.9	7	22.6	11	35.5
Q10 – Are you aware of the vaccine manufacturing process?	13	41.9	6	19.4	12	38.7
Q11 – Do you understand how vaccines work?	27	87.1	2	6.5	2	6.5
Q12 – Do you believe that vaccines are able to prevent disease?	26	83.9	3	9.7	2	6.5
Q13 – Do you know about herd immunity?	19	61.3	1	3.2	11	35.5
Q14 – Do you think that vaccines are able to protect yourself and society?	25	80.6	4	12.9	2	6.5
Q15 – Do you know why children need certain vaccines	28	90.3	2	6.5	1	3.2
Q16 – Do you feel vaccine is not needed if your child is healthy?	2	6.5	3	9.7	26	83.9
Q17 – Do you know about the side effects of vaccine?	20	64.5	8	25.8	3	9.7
Q18 – Do you feel that natural immunity is better than immunisation?	8	25.8	11	35.5	12	38.7
Q19 – Do you know about the types of vaccines?	19	61.3	8	25.8	4	12.9
Q20 – Do you know about the functions and benefits of the vaccines?	11	35.5	8	25.8	12	38.7

b. Respondents' knowledge of vaccines

Table 5 shows the frequency distribution and percentage of respondents'knowledge of vaccines.

Table 5. Frequency distribution and percentage of *respondents' knowledge of vaccines*.

	Scale					
	Right		Not sure		Wrong	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Q21. Vaccines contain active substances called antigens.	19	61.3	12	38.7	0	0
Q22. Vaccines contain substances that can be harmful to the body.	0	0	16	51.6	15	48.4
Q23. There are several types of vaccines that use fetus cells.	12	38.7	16	51.6	3	9.7
Q24. Fetus cells are used to breed viruses for vaccine production.	10	32.3	18	58.1	3	9.7
Q25. Vaccines contain formaldehyde.	9	29.0	22	71.0	0	0
Q26. Formaldehyde is used to weaken viruses such as polio and hepatitis viruses or bacterial toxins.	9	29.0	22	71.0	0	0
Q27. Vaccines result from the production of living organisms.	13	41.9	11	35.5	7	22.6
Q28. Vaccine production is carried out under closely monitored conditions, through quality control measures and in a germ-free (aseptic) environment.	26	83.9	5	16.1	0	0
Q29. There are four steps in the vaccine production process namely reproduction, isolation, purification, and formulation.	18	58.1	13	41.9	0	0
Q30. Antigens in vaccines act to stimulate the immune system to produce antibodies specific to certain diseases.	23	74.2	8	25.8	0	0
Q31. Vaccines provide almost 100% protection against vaccine-preventable diseases.	15	48.4	4	12.9	12	38.7
Q32. The duration of protection of a vaccine varies depending on the type of vaccine and the method of production.	26	83.9	5	16.1	0	0
Q33. Some vaccines provide protection for a limited time and require an additional dose (booster).	22	71.0	9	29.0	0	0
Q34. If the extra dose is not taken according to the prescribed schedule, it will not protect effectively.	21	67.7	10	32.3	0	0
Q35. Vaccines can cause disease in healthy children.	8	25.8	9	29.0	14	45.2
Q36. There are many diseases that can infect pregnant women and their contents such as hepatitis B infection, rubella, and tetanus.	24	77.4	7	22.6	0	0
Q37. There are vaccines that can be taken before pregnancy (such as the Hepatitis B vaccine and the rubella vaccine) or during pregnancy (such as the tetanus vaccine) that will prevent various complications to the pregnant mother and her fetus.	24	77.4	7	22.6	0	0
Q38. Some diseases are endemic (common) in some countries of the world. Therefore, there are specific vaccines recommended before visiting a country at risk of infection.	23	74.2	8	25.8	0	0
Q39. Vaccines provide protection against seasonal diseases such as influenza that occur every year.	24	77.4	7	22.6	0	0
Q40. Elderly people (over 65 years old) generally have weakened immune systems and are susceptible to vaccine-preventable disease infections.	28	90.3	3	9.7	0	0

Exploratory Factor Analysis (EFA)

The results of Exploratory Factor Analysis (EFA) were performed on respondents' perceptions of vaccine knowledge.

a. Result of KMO dan Barlett's Test - perceived knowledge about vaccine

Exploratory Factor Analysis using extraction method: principal component analysis and rotation: varimax with Kaiser norminalization was conducted on 20 items aimed at measuring respondents' perceived knowledge on vaccine. The results in Table 6 shows that the value of Bartlett's Test of Sphericity is <0.001. Moreover, the measurement for sample accuracy using Kaiser-Meyer-Olkin (KMO) was 0.491.

Table 6. KMO dan Bartlett's Test for items measuring respondents' perceived knowledge on vaccine.

Kaiser-Meyer-Oklin Measure of Sampling Adequacy		.491
Bartlett's Test of Sphericity	Approx. Chi-Square	347.162
	df	171
	Sig.	<.001

b. Result of dimensions or components and Total Variance Explained

The results as in the Table 7 show that there are six dimensions or components that emerge as a result of the EFA procedure based on Eigenvalue values greater than 1.0. The results of the study found that the value of Eigenvalue was between 1.097 and 5.404. Meanwhile, the variance value for component 1 is 20.634%, component 2 is 15.255%, component 3 is 13.988%, component 4 is 9.875%, component 5 is 8.641%and component 6 is 7.381%. The total variance for the measure was 75.775%. This indicates that the number of components and items for each component is relevant because the total variance is over 60%.

Table 7. Component numbers and total variance explained for items measuring perceived knowledge on vaccine.

Components	**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% Variance**	**Cumulative %**	**Total**	**% Variance**	**Cumulative %**
1	5.404	28.441	28.441	3.921	**20.634**	20.634
2	2.457	12.931	41.372	2.898	**15.255**	35.890
3	2.048	10.778	52.149	2.658	**13.988**	49.877
4	1.978	10.411	62.561	1.876	**9.875**	59.753
5	1.414	7.441	70.001	1.642	**8.641**	68.394
6	1.097	5.774	75.775	1.402	**7.381**	**75.775**

Reliability results

The reliability of the instrument items was determined in this study using the Cronbach's alpha statistical test. Table 8 shows the values for the Cronbach's alpha coefficients that must be observed (Ghafar, 1999).

Table 8. Cronbach's alpha coefficients range and level.

Range	Level
0.0 – 0.2	Very weak
0.2 – 0.4	Weak and low
0.4 – 0.7	Medium
0.7 – 0.9	High and strong
0.9 – 1.0	Very high and strong

The overall reliability value indicates that the instrument has moderate internal consistency. The values of the Cronbach's alpha coefficients as a whole is shown in Table 9.

Table 9. Reliability value.

Coefficient value	Level
0.641	Medium

Reliability values by component are found in the Table 10. The table shows the values of the Cronbach's alpha coefficients by component. Based on the results, the value of internal consistency for each component is between 0.408 and 0.858.

Table 10. Reliability value according to component.

Component	Total item	Coefficient value	Level
1	6	0.858	High, strong
2	5	0.408	Medium
3	4	0.748	High, strong
4	3	0.523	Medium

Discussion

Content Validity

Panel of experts were tasked with evaluating and examining the items in terms of factual accuracy and appropriateness. All suggestions, opinions, and feedback from these experts are taken into account and used to improve the meaning, language, and content of the questionnaire. One of the panel from medical science background provide a disclaimer that he does not quite understand the nature of questionnaires in social science. As a result, there are a few questions that appear to be repetitive and similar. He suggested adjusting a few questions that appeared to be interchangeable or indistinguishable. Another panel suggested conducting a fact check because questions like Q23 – There are several types of vaccines that use foetus cells can leave some knowledgeable participants perplexed as only a few vaccines use foetus cells. The use of a yes or no likert scale for this type of question may be unfitting.

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SPSS analysis - Exploratory Factor Analysis (EFA)

Findings in this study were also obtained by conducting an exploratory factor analysis (EFA) to determine the validity of the instrument and a Cronbach's alpha statistical test to determine the instrument's level of reliability. Result of dimensions or components and Total Variance Explained shows that there are six dimensions or components. Table 11 depicts all dimensions or components derived from 20 items of perceived knowledge on vaccine. The loading factor for almost every item is greater than 0.6. However, some items will need to be discarded because the loading factor value does not meet the 0.6 condition (Awang, 2015). Components 5 and 6 are also ineligible for use because they only contain 1-2 items each. Thus, only four of the six components are appropriate and meet the prescribed requirements and can be used to assess respondents' vaccine knowledge perceptions.

Table 11. Respondents' perceived knowledge of the vaccine.

	Component			
	1	2	3	4
Basic knowledge such as content, function and process				
Do you know about the ingredients in the vaccine?	.773			
Are you aware of the vaccine manufacturing process?	.804			
Do you know about herd immunity?	.864			
Do you know about the side effects of vaccine?	.699			
Do you feel that natural immunity is better than immunisation?	-.648			
Do you know about the functions and benefits of the vaccines?	.656			
Decision to take a vaccine				
Have you ever decided not to take the vaccine for yourself?		.406	.765	
Have you ever decided not to take the vaccine for an individual in your care or as a guardian?		-.767		
Do you think that vaccines are able to protect yourself and society?	.		.497	
Do you know why children need certain vaccines?				
Do you feel vaccine is not needed if your child is healthy?			.819	
			-.731	
Understanding of vaccines				
Do you feel the knowledge you have about the vaccine and its safety is adequate?	.	.722		
Do you make decisions about the vaccine based on your knowledge of vaccine?		-.816		
Do you understand how vaccines work?		.554		.475
Do you know about the types of vaccines?	.408			.715
Knowledge of the experiences of others				
Do you know anyone who has a negative reaction towards vaccine?				.891
Do you know anyone who does not take vaccine due to religious factors?				.722
Do you know anyone who does not take vaccine due to culture factors?				.498

Based on the components grouped through the EFA, four dimensions were identified as in Table 11. These dimensions account for the respondents' perceptions of their own vaccine knowledge. For example, perceptions in terms of basic knowledge such as content, function and

process, decision to take a vaccine, understanding of vaccines and knowledge of the experiences of others.

Reliability results

The overall value indicates that the instrument has moderate internal consistency in terms of reliability (0.641). According to Abu and Tasir (2003), the study item is accepted if the Cronbach's alpha coefficient is between 0.6 and 1.0, and the instrument and item do not need to be changed.

Conclusion

Based on the findings and discussion, researchers were able to review and identify the proposed method's weaknesses and limitations. Particularly, researchers found that some items must be changed, while others must be eliminated. This is due to the items being somewhat confusing, not being understood by the respondents, and being insignificant. Following procedures such as content validity and Exploratory Factor Analysis (EFA) on SPSS, a few amendments were made to improve the quality of the vaccine knowledge instrument. Moreover, this paper that emphasises the value of pilot study in improving research study design, contributes to the body of knowledge on pilot studies and helps to develop best practises in sociological qualitative method. A questionnaire that has been tested and improved as a result of this pilot study has also been created and is ready to be used for the main study.

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