

# **EXAMINING PARENTS' INTENTION TO VACCINATE THEIR CHILDREN IN PAHANG: THE ROLE OF PERCEIVED SEVERITY, PERCEIVED SUSCEPTIBILITY, AND PERCEIVED BARRIERS**

Noor Amira Syazwani Abd Rahman,<sup>1</sup> Jamal Rizal Razali,<sup>2</sup> Mohd Rozaimy Ridzuan,<sup>3</sup> Ju Soon Yew<sup>4</sup> & Nur Hazirah Hamdan<sup>5</sup>

<sup>1</sup> Centre for Human Sciences, Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, Malaysia & Faculty of Administrative Science and Social Studies, UiTM Raub Campus, Pahang, Malaysia.  
Email: amirarahman@uitm.edu.my (corresponding author).

<sup>2</sup> Centre for Human Sciences, Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, Malaysia.  
Email: jamalrizal@umpisa.edu.my.

<sup>3</sup> Faculty of Administrative Science and Social Studies, UiTM Raub Campus, Pahang, Malaysia.  
Email: rozaimy@uitm.edu.my

<sup>4</sup> Faculty of Administrative Science and Social Studies, UiTM Raub Campus, Pahang, Malaysia.  
Email: syju337@uitm.edu.my.

<sup>5</sup> Faculty of Administrative Science and Social Studies, UiTM Raub Campus, Pahang, Malaysia.  
Email: hazirahamdan@uitm.edu.my.

## **ABSTRACT**

This study explores the impact of perceived severity, perceived susceptibility and perceived barriers on parents' intention to vaccinate their children in Pahang, Malaysia, using the Health Belief Model (HBM). Vaccine hesitancy among parents presents unique challenges influenced by concerns about vaccine safety, misinformation and a lack of trust in healthcare systems. Implementing preventive measures to reduce infections and minimise severe consequences is crucial, especially among

children. The study focuses on parents in Pahang and employs a quantitative research approach, collecting data through an online questionnaire. Analysis using descriptive statistics and partial least squares-structural equation modelling (PLS-SEM) is conducted based on responses from 372 participants. The findings demonstrate that parents' perception of disease severity and susceptibility positively influences their intention to vaccinate their children. However, perceived barriers do not significantly affect vaccination intention, which is aligned with previous research. These results provide compelling evidence of the relationship between parents' perception of disease severity, susceptibility and decision to vaccinate. The study highlights the role of parents' perceptions in shaping their decision-making process. It reveals a significant correlation between parents' perception of susceptibility and their intention to vaccinate, consistent with prior studies. Despite potential barrier such as concerns about vaccine safety, this research suggests that these perceived barriers minimally impact parents' vaccination intention. These findings underscore the importance of addressing parents' perceptions of disease severity and susceptibility to promote higher vaccination rates.

**Keywords:** Perceived susceptibility, perceived severity, perceived barriers, vaccination intention

## **BACKGROUND**

The Health Belief Model (HBM) is a significant theoretical framework to predict an individual's engagement in preventive health behaviours, including receiving vaccines (Li et al., 2022). It encompasses various beliefs such as perceived susceptibility, perceived severity, perceived benefits, perceived barriers and cues to action. According to the HBM, individuals are likelier to adopt a specific health behaviour when they perceive a high susceptibility to the health risk, consider severe consequences and perceive low barriers associated with the behaviour's cost. Thus, this study will investigate the role of perceived severity, perceived susceptibility and perceived barriers in vaccination intention.

The rising vaccine hesitancy among parents presents considerable and novel challenges (Manganello et al., 2022). Vaccine hesitancy refers to the reluctance or hesitation to vaccinate oneself or one's children, despite the accessibility and proven effectiveness of vaccines in preventing diseases. This hesitation can be attributed to various factors, such as concerns about vaccine safety, the influence of misinformation, lack of trust in healthcare systems, and cultural or religious beliefs. These multifaceted factors contribute to the complex landscape of vaccine hesitancy, necessitating targeted efforts to address and overcome them.

Implementing preventive measures, including vaccination, is crucial to reduce infections among children (Shmueli, 2021). By doing so, it can effectively mitigate the severe consequences and long-term effects experienced by children while also enhancing community protection. Thus, prioritising and promoting vaccination as a preventive measure holds significant importance. Therefore, it is important for parents to bring their children to get the vaccination.

Pahang recorded 178 cases of parents rejecting immunisation for their children in 2016, representing a 52-case increase from 2015. This situation has led to the emergence of preventable diseases like Hepatitis B, measles and whooping cough in Pahang. Additionally, Hidir (2017) reported that as of 3 April 2017, there were 10 confirmed cases of measles in Pahang, indicating a decrease compared to 30 cases during the same period in 2016. He also mentioned that there had been three measles outbreaks in the current year, while there was only one outbreak in the entirety of 2016. Furthermore, amidst the COVID-19 pandemic, Amin Naharul (2021) reported that approximately 10,000 individuals in Pahang failed to attend their scheduled vaccination appointments. Therefore, it can be stated that the vaccination rate in Pahang is still low.

Therefore, this study aims to investigate the vaccination intention of parents in Pahang, specifically in the context of their children's vaccination, utilising the HBM as a framework. The

study explores the associations between the HBM constructs including perceived susceptibility, severity, benefits and barriers, and parents' intention to vaccinate their children.

## LITERATURE REVIEW

### *Perceived Barriers and Vaccination Intention*

According to Salali et al. (2022), perceived barriers refer to an individual's perception of the obstacles or challenges that may hinder their ability to act and reduce the threat of illness. Perceived barriers encompass the subjective evaluation of factors impeding an individual from engaging in health-protective behaviours. These barriers can be diverse, and include practical, psychological, financial or logistical considerations that individuals perceive as obstacles to adopt preventive measures or accessing healthcare services.

In the context of parents' intention to vaccinate their children, perceived barriers pertain to the individual's assessment of the obstacles or difficulties that may hinder their ability to take preventive actions. These barriers encompass a subjective evaluation of various factors, including practical, psychological, financial or logistical considerations that individuals perceive as hindrances to adopt health-protective behaviours or access healthcare services (Salali et al., 2022).

Limbu and Gautam (2023) highlighted the importance of identifying and addressing barriers to vaccination, including factors like mistrust in the government or healthcare system, limited knowledge about vaccine benefits, misinformation about the coronavirus and vaccines, and challenges related to vaccine affordability or availability. They emphasised the need to implement strategies that can overcome these barriers. Additionally, they suggested that improving vaccine accessibility through initiatives such as walk-in clinics and mobile vaccination units can help to reduce barriers and enhance vaccine uptake. Furthermore, offering incentives such as free or discounted products or services can motivate individuals to accept vaccination.

Similarly, Wong et al. (2020) found a significant correlation between low perceived barriers to receive the COVID-19 vaccine and a strong intention to get vaccinated. This implies that individuals who perceive fewer obstacles or challenges in accessing the vaccine are more likely to have a definite intention to receive the COVID-19 vaccination. Taking into consideration the evidence presented, the study formulates the following hypothesis:

H1: Perceived barriers significantly influence the children's vaccination intention.

### ***Perceived Susceptibility and Vaccination Intention***

Salali et al. (2022) stated that perceived susceptibility refers to an individual's subjective assessment of the risk or threat posed by a specific disease or illness. It is a cognitive perception that varies from person to person, and is influenced by various factors such as personal experiences, knowledge and information received. In the context of parents' intention to vaccinate their children, it refers to parents' subjective evaluation of the risk or threat posed by a particular disease or illness to their children. This cognitive perception varies among individuals, and is influenced by various factors including personal experiences, knowledge and information received. The perceived susceptibility of parents plays a significant role in shaping their decision making regarding children's vaccination, as it directly impacts their willingness to protect their children from the perceived risks or threats associated with the disease or illness.

The relationship between perceived susceptibility and vaccination intention can vary depending on the specific context and disease. Limbu and Gautam (2023) found weaker associations between perceived susceptibility of disease infection and the intention to receive the vaccination. This suggests that perceived susceptibility may have a limited impact on vaccination intention for some diseases or populations.

However, Natan et al. (2016) conducted a study among Arab parents and found that perceived susceptibility was a significant predictor of parents' intention to vaccinate their children. This indicates that in certain populations, the perception of susceptibility plays a crucial role in motivating parents to seek vaccination for their children. Wong et al. (2020) also observed a positive correlation between high perceived susceptibility of contracting COVID-19 infection and increased vaccination intention. In other words, individuals who perceive themselves as more susceptible to COVID-19 are more likely to have a stronger intention to get vaccinated. Hence, empirical evidence from the previous study suggests that perceiving a high probability of contracting a disease significantly influences individuals' intentions to take preventive measures. Regarding children's vaccination, parents' perception of their susceptibility to the disease is anticipated to positively affect their readiness to accept the vaccine, given the elevated incidence of disease infections. Building on this, the present study proposes the following hypothesis:

H2. Perceived susceptibility significantly impacts the intention to accept children's vaccination.

### ***Perceived Severity and Vaccination Intention***

Salali et al. (2022) postulated that perceived severity refers to how an individual evaluates seriousness or gravity of a specific disease. It involves their perception of the potential impact and consequences that the disease can have on their health or the health of others.

Similarly, the perceived severity of a disease refers to an individual's perception of the disease's seriousness and the potential consequences it may bring. This reflects their beliefs about the possible problems associated with the disease, such as experiencing pain, discomfort or financial burdens (Grinberg & Sela, 2021).

Regarding parents' intention to vaccinate their children, the perceived severity of the disease plays a crucial role. It represents the parents' perception of the disease's seriousness and the

potential negative outcomes it can have. This perception encompasses their beliefs regarding the potential problems that may arise from the disease, such as the physical discomfort it may cause to their children, the pain they may endure or the financial burdens they may face (Grinberg & Sela, 2021). Hence, the perceived severity of the disease influences parents' decision-making process and readiness to vaccinate their children as a preventive measure.

Several studies have examined the relationship between the perceived severity of a disease and the intention to receive vaccination. Limbu and Gautam (2023) found weaker associations between the perceived severity of COVID-19 infection and vaccination intention. In contrast, Natan et al. (2016) conducted a study among Arab parents and identified that perceived severity and benefits significantly predicted parents' intention to vaccinate their children. Furthermore, Grinberg and Sela (2021) conducted a study involving mothers in Israel and revealed that the perceived severity of the disease plays a crucial role in influencing their intention to vaccinate their children against measles. These findings collectively indicate that the perception of disease severity is an important factor influencing parents' decision making regarding childhood vaccination. Based on the evidence presented, the study put forward the following hypothesis:

H3: Perceived severity significantly impacts the intention to accept children's vaccination.

## **RESEARCH METHODOLOGY**

This study employed a quantitative research approach and data were collected through an online questionnaire to fulfil the research objective. The survey participants consisted of parents residing in Pahang, Malaysia, with children ranging from 1 day old to 15 years old.

The collected data underwent initial analysis using IBM SPSS software, which allowed for examining descriptive statistics and initial relationships between the variables. Additionally, the SmartPLS 4.0 software was utilised for a more comprehensive analysis using partial least squares-structural equation modelling (PLS-SEM) to test the hypothesised relationships between the variables.

By employing these quantitative methods and statistical techniques, the study aimed to comprehensively analyse the relationships between the variables of interest. This approach allowed for a systematic examination of the factors influencing parents' intention to vaccinate their children, contributing to a better understanding of this important public health issue.

## DATA ANALYSIS AND FINDINGS OF THE STUDY

### *Demographic Profile of Respondents*

Table 5.1 displays the demographic characteristics of the survey participants in this study. Three hundred seventy-two individuals participated in the survey after being informed about the study's purpose and potential contributions to the community. According to the frequency distribution, most respondents (75.3%) were female, while the remaining 24.7% were male. In terms of ethnicity, most of the respondents were Malay (90.6%), followed by Chinese (6.2%), Indian (2.2%) and others (1.1%).

**Table 5. 1:** Demographic profile of respondents (n=372)

Variables		Frequency (N=372)	Percentage (%)
Gender	Male	92	24.7
	Female	280	75.3
Age Group	18-29 Years old	18	4.8
	30-39 Years old	132	35.5
	40-49 Years old	158	42.5
	50 and above	64	17.2
Ethnicity	Malay	337	90.6
	Chinese	23	6.2



Examining Parents' Intention to Vaccinate Their Children in Pahang: The Role of Perceived Severity, Perceived Susceptibility, and Perceived Barriers

Variables	Frequency (N=372)	Percentage (%)	
Working Sector	Indian	8	2.2
	Others	4	1.1
	Businessman/ women	11	3.0
	Housewives/ Househusband	18	4.8
	Private sectors	51	13.7
	Public sectors: Teachers	131	35.2
	Public Sectors	153	41.1
	Others	8	2.2

**Measurement Model**

This study implemented a two-step model validation process following the approach established by Anderson and Gerbing (1988), and Henseler et al. (2015). The process involves validating both the measurement model and the structural model, ensuring the robustness and reliability of the study's findings.

The measurement model was assessed using SmartPLS 4.0.9.3, and the researchers employed the PLS-SEM algorithm procedure to obtain reliability and validity data, as presented in Tables 2. The factor loading metric was used to evaluate the outer loading, where values above 0.5 are considered acceptable and the general threshold value is 0.708, as recommended by Hair et al. (2017). Table 5.2 demonstrates that all indicator loadings met the required criteria. As depicted in Table 2, all the loadings of the indicators are higher than the recommended threshold. The loading values of the indicators ranged from 0.513 to 0.993. Thus, the findings suggest that all indicators are significantly loaded on their respective constructs and less on other constructs (Henseler, 2017). Therefore, no indicators were removed.

To assess the internal consistency of the measurement, the researchers examined the composite reliability (CR), which refers to the extent to which a set of indicators demonstrates internal consistency with the construct (Hair et al., 2017). Table 2 displays

the reliability values of CR for all constructs, ranging from 0.873 to 0.995. These values surpass the minimum suggested threshold of 0.7, indicating strong internal consistency.

This study evaluated the convergent validity by examining the average variance extracted (AVE), which measures the extent to which indicators from similar constructs cluster together. In Structural Equation Models, it is generally recommended that AVE values should exceed 0.50 (Fornell & Larcker, 1981). Table 2 presents the AVE values for all constructs, ranging from .544 to .984, indicating a satisfactory level of convergent validity.

**Table 5. 2:** Construct reliability and convergent validity assessment

Construct	Indicator	Outer Loading	CR	AVE
INT	INT2	0.993	0.995	0.984
	INT1	0.991		
	INT3	0.992		
PB	PB1	0.838	0.873	0.544
	PB2	0.754		
	PB3	0.840		
	PB4	0.867		
	PB5	0.513		
	PB6	0.524		
PS	PS1	0.897	0.911	0.773
	PS2	0.905		
	PS3	0.834		
PSV	PSV1	0.857	0.895	0.741
	PSV2	0.870		
	PSV3	0.855		

Note1: CR = composite reliability; AVE = average variance extracted.

Note 2:  $AVE = \frac{\text{summation of the square of the factor loadings}}{[(\text{summation of the square of the factor loadings}) + (\text{summation of the error variances})]}$ .

Note 3:  $CR = \frac{\text{square of the summation of the factor loadings}}{[(\text{square of the summation of the factor loadings}) + (\text{square of the summation of the error variances})]}$ .

Note 4: INT (Intention); PB (Perceived Barriers); PS (Perceived Susceptibility); PSV (Perceived Severity)

After establishing the measurement model, the next step involves assessing the discriminant validity using the heterotrait-monotrait (HTMT) ratio recommended by Hair et al. (2017). This analysis aimed to determine whether the constructs within the model demonstrate distinguishable characteristics.

The results in Table 5.3 provide evidence of satisfactory discriminant validity achieved in this study. The HTMT values, ranging from 0.143 to 0.512, remained below the threshold value of 0.85, as Henseler et al. (2015) recommended. These findings support the presence of discriminant validity based on the obtained results.

The previously mentioned criteria support establishing discriminant and convergent validity for the constructs. Wilson et al. (2012) defined construct validity as the degree to which a measure accurately evaluates a construct according to its intended purpose. The confirmatory factor analysis results confirm that the study variable has demonstrated distinctiveness, providing a strong basis for further analysis. This is due to the satisfactory convergent and discriminant validity displayed by the measurement model.

**Table 5. 3:** Discriminant validity assessment (HTMT)

	INT	PB	PS	PSV
INT				
PB	0.512			
PS	0.261	0.143		
PSV	0.528	0.239	0.55	

INT (Intention); PB (Perceived Barriers); PS (Perceived Susceptibility); PSV (Perceived Severity)

***Structural Model***

Before evaluating the structural model, examining and addressing any potential issues related to collinearity within the model are essential. To ensure that collinearity is not a concern in this study, Table 5.4 was analysed, and the Variance Inflation Factor (VIF) values were found to be below the recommended threshold of 5.0,

as suggested by Kim (2019). These results indicate the absence of collinearity issues in the study. Therefore, this study does not encounter any problems associated with collinearity.

The bootstrapping procedure was conducted using Smart PLS 4.0.9.3 to evaluate the structural model in this study. The significance level was set at 0.05, and a one-tailed test was utilised. The results revealed that perceived susceptibility had a positive and significant impact on intention ( $\beta = 0.115$ ,  $t = 2.852$ ,  $p\text{-value} = 0.002$ ), while perceived severity also had a positive and significant effect on intention ( $\beta = 0.319$ ,  $t = 5.445$ ,  $p\text{-value} = 0.010$ ). Hence, hypotheses H2 and H3 received support based on these findings.

Contrarily, the findings indicated that perceived barriers did not positively and significantly influence intention ( $\beta = -0.461$ ,  $t = 9.346$ ,  $p\text{-value} = 0.000$ ). As a result, hypothesis H1 was not supported.

**Table 5. 4:** Path coefficient assessment

Hypothesis	Relationship	Beta	SE	t-value	p-value	f <sup>2</sup>	VIF	LL	UL
H1	PB -> INT	-0.461	0.049	9.346	0.000	0.34	1.086	-0.536	-0.373
H2	PS -> INT	0.115	0.04	2.852	0.002	0.018	1.297	0.047	0.178
H3	PSV -> INT	0.319	0.059	5.445	0.000	0.129	1.368	0.223	0.416

Note 1: LL, lower limit; UL, the upper limit at 95 and 99% confidence interval

Note 2: INT (Intention); PB (Perceived Barriers); PS (Perceived Susceptibility); PSV (Perceived Severity)

Examining Parents' Intention to Vaccinate Their Children in Pahang: The Role of Perceived Severity, Perceived Susceptibility, and Perceived Barriers

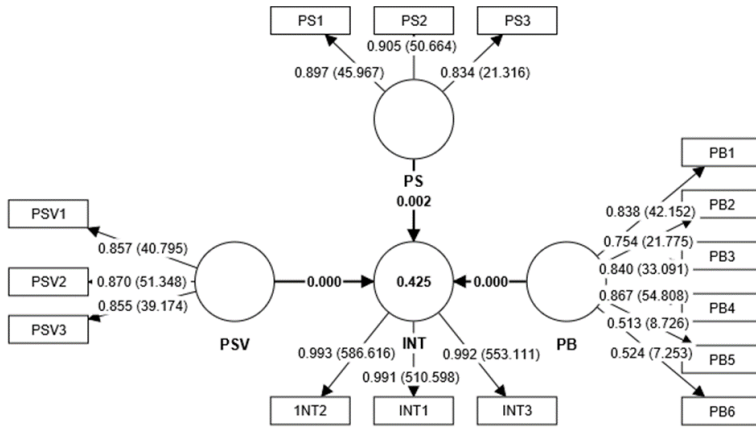


Figure 5.1: Structural model

**PLS predict**

The PLS prediction procedures were conducted following the methodology proposed by Shmueli et al. (2016) to evaluate the model's predictive performance on unseen data. The root means squared error (RMSE) was a crucial criterion for assessing predictive capabilities. The RMSE generated by the PLS analysis was compared to the RMSE values obtained from a linear model (LM) as a benchmark (Danks & Ray, 2018). The PLS analysis was anticipated to exhibit lower prediction errors than the naïve benchmark (PLS-LM), indicating superior predictive power. The results presented in Table 5.5 validate this expectation, showing that the PLS analysis indeed achieved lower prediction errors compared to the naïve LM benchmark, thereby demonstrating strong predictive power (Hair et al., 2019; Shmueli et al., 2019). Additionally, Table 5.5 reveals that all Q2 values exceed 0, indicating sufficient predictive relevance.

Table 5. 5: PLS predict

	PLS RMSE	LM RMSE	PLS-LM	Q <sup>2</sup> predict	Result
1NT2	1.329	1.332	-0.003	0.398	
INT1	1.321	1.325	-0.004	0.410	High Predictive
INT3	1.336	1.341	-0.005	0.392	Power

## DISCUSSION

The study's results provide strong evidence to support the link between parents' perception of the severity of diseases and their intention to vaccinate their children. This finding is consistent with previous research conducted by Natan et al. (2016), Grinberg and Sela (2021), and Limbu and Gautam (2023), which add to the body of knowledge and reinforce the consistency of this relationship across different studies. The study emphasises the crucial role that parents' perception of disease severity plays in shaping their decision-making process regarding vaccination for their children.

When parents perceive diseases as severe or potentially harmful, they demonstrate a higher inclination to prioritise vaccinating their children as a preventive measure. The perception of disease severity motivates parents to take proactive steps to protect their children's health and wellbeing. This finding highlights the importance of effectively communicating the severity of vaccine-preventable diseases to parents, as it can positively influence their intention to vaccinate.

Furthermore, the research findings reveal a significant correlation between parents' perception of their children's susceptibility to diseases and their intention to vaccinate. Parents who perceive their children as more susceptible to diseases are more likely to have the intention to vaccinate them. This finding is aligned with previous studies conducted by Natan et al. (2016) and Wong et al. (2021), which also reported similar associations between perceived susceptibility and vaccination intention. This suggests that parents' perception of their children's vulnerability to diseases is another influential factor in their decision-making process regarding vaccination.

On the other hand, despite the potential barriers parents may perceive regarding vaccinating their children, the study's findings indicate that these barriers do not significantly influence parents' intention to vaccinate. This lack of association between perceived barriers and vaccination intention is consistent with a similar study

conducted by Chen et al. (2015) among Taiwanese parents, which found no predictive relationship between perceived barriers and vaccination intention. These findings suggest that addressing parents' perceived barriers alone may not be sufficient to increase vaccination rates effectively, and other factors should be considered when developing interventions to promote vaccination.

Therefore, this study highlights the significant impact of parents' perception of disease severity and susceptibility on their intention to vaccinate their children. Understanding and addressing these perceptions can be crucial in promoting vaccination and mitigating vaccine hesitancy among parents. However, it is important to recognise that perceived barriers may not be the primary driver of vaccination intention, indicating the need for a comprehensive approach to address vaccine hesitancy.

## **CONCLUSION AND RECOMMENDATION**

In a nutshell, the findings of this study contribute significantly to our understanding of the factors that influence parents' intention to vaccinate their children. Utilising the HBM as a framework, the study shed light on the role of perceived severity, perceived susceptibility and perceived barriers in vaccination intention. The results highlighted the substantial impact of perceived severity and susceptibility on parents' intention to vaccinate, indicating that when parents perceive diseases as severe and their children as susceptible, they are more inclined to prioritise vaccination as a preventive measure.

However, the study also revealed that perceived barriers did not significantly influence vaccination intention. This suggests that while addressing perceived barriers is important, it may not be the primary driver in influencing parents' vaccination decisions. These findings are aligned with previous research and underscore the importance of considering parents' perceptions when promoting children's vaccination.

Building upon these findings, several recommendations can be made to improve vaccination rates among children. Firstly, policymakers should develop and implement targeted health education campaigns that emphasise the severity of vaccine-preventable diseases and highlight children's susceptibility to these diseases. These campaigns should address common misconceptions, and provide accurate information about the benefits and safety of vaccines, aiming to enhance parents' understanding and address their concerns.

Additionally, it is crucial to improve communication strategies between healthcare providers and parents. Healthcare providers should take the time to address parents' specific concerns, provide clear and accessible information about vaccines, and engage in open and honest conversations. By building trust and enhancing parents' understanding of the importance of vaccination for their children's health, healthcare providers can play a pivotal role in increasing vaccination rates.

Furthermore, policymakers should ensure easy access to vaccines by implementing strategies such as mobile vaccination clinics or expanding vaccination services in underserved areas. This can remove logistical barriers and improve convenience for parents, making it easier for them to vaccinate their children.

In conclusion, this study highlights the significant influence of parents' perceptions of disease severity and susceptibility on their intention to vaccinate their children. By understanding and addressing these perceptions, policymakers and healthcare professionals can design targeted interventions, develop health education campaigns, improve communication strategies and ensure easy access to vaccines, ultimately contributing to increased vaccination rates among children and the prevention of vaccine-preventable diseases.



## REFERENCES

- Amin Naharul, M. (2021, May 8). Many fail to show up for their vaccination appointment. *The Malaysian Reserve*. Retrieved June 12, 2023, from <https://themalaysianreserve.com/2021/05/28/many-fail-to-show-up-for-their-vaccination-appointment/>.
- Anderson, J. C.; Gerbing, D. W. Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*. 1988, 103(3), 411-423.
- Chen, C. H., Chiu, P. J., Chih, Y. C., & Yeh, G. L. (2015). Determinants of influenza vaccination among young Taiwanese children. *Vaccine*, 33(16), 1993-1998.
- Danks, N. P., & Ray, S. (2018). Predictions from partial least squares models. In *Applying partial least squares in tourism and hospitality research*. Emerald Publishing Limited.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics.
- Grinberg, K., & Sela, Y. (2021). What affects maternal response to measles vaccinations? Examining the health beliefs model (HBM). *Sci*, 3(2), 20.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24.
- Hair, J. F.; Hult, G. T. M.; Ringle, C. M.; Sarstedt, M. A primer on partial least squares structural equation modeling (PLS-SEM). SAGE Publications, Inc.: United States of America, 2017.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science*, 43(1), 115-135.
- Hidir, R. (2017, April 5). Anti-vaxxer cases on the rise in Pahang. *New Straits Times*. Retrieved June 12, 2023, from <https://www.nst.com.my/news/2017/04/227441/anti-vaxxer-cases-rise-pahang>.
- Kim, J. H. (2019). Multicollinearity and misleading statistical results. *Korean Journal of Anesthesiology*, 72(6), 558-569.

- Li, J. B., Lau, E. Y. H., & Chan, D. K. C. (2022). Why do Hong Kong parents have low intention to vaccinate their children against COVID-19? Testing health belief model and theory of planned behavior in a large-scale survey. *Vaccine*, 40(19), 2772-2780.
- Limbu, Y. B., & Gautam, R. K. (2023). How Well the Constructs of Health Belief Model Predict Vaccination Intention: A Systematic Review on COVID-19 Primary Series and Booster Vaccines. *Vaccines*, 11(4), 816.
- Manganello, J. A., Chiang, S. C., Cowlin, H., Kearney, M., & Massey, P. (2022). HPV and COVID-19 vaccines: Social media use, confidence, and intentions among parents living in different community types in the United States. *Journal of Behavioral Medicine*, 46(1–2), 212–228. <https://doi.org/10.1007/s10865-022-00316-3>.
- Natan, M. B., Kabha, S., Yehia, M., & Hamza, O. (2016). Factors that influence israeli muslim Arab parents' intention to vaccinate their children against influenza. *Journal of Pediatric Nursing*, 31(3), 293-298.
- Salali, G. D., & Uysal, M. S. (2022). COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychological medicine*, 52(15), 3750-3752.
- Shmueli, L. (2021). Predicting intention to receive COVID-19 vaccine among the general population using the health belief model and the theory of planned behavior model. *BMC public health*, 21(1), 1-13.
- Wilson, F. R., Pan, W., & Schumsky, D. A. (2012). Recalculation of the critical values for Lawshe's content validity ratio. *Measurement and evaluation in counseling and development*, 45(3), 197-210.
- Wong, L. P., Alias, H., Wong, P. F., Lee, H. Y., & AbuBakar, S. (2020). The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. *Human vaccines & immunotherapeutics*, 16(9), 2204-2214