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“To Do, or Not to Do?”: Determinants of Stakeholders’ Acceptance on Dengue Vaccine Using PLS-SEM Analysis between Scientists and Public in Malaysia.

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Abstract

Background: Dengue vaccine is the best potential alternative for protecting communities and cities from dengue. Nevertheless, the dengue vaccine's acceptance must be considered a guide for authorities to continue intensified research and, eventually, execute dengue vaccine injections to improve public health. Therefore, this study aimed to determine the relationship between the predictor factors that influence stakeholders' attitude and intention towards the dengue vaccine.

Methods: Survey data collected from 399 respondents which represent two primary stakeholder groups: scientist (*n* = 202) and public (*n* = 197) were analysed by producing a Partial Least Square-Structural Equation Modelling (PLS-SEM) model using Smart Partial Least Square (Smart-PLS) software.

Results: The findings indicated a strong positive relationship between attitudes and intentions to support the dengue vaccine, followed by a perceived benefit. The perceived benefit was the most significant predictor for attitude to dengue vaccine, followed by religiosity, attitudes to technology, and trust in key players. The findings provide insights into the multi-dimensional association of the determinants of attitude-intention to support the dengue vaccine.

Conclusion: Although the findings showed that stakeholders in Malaysia are optimistic about the dengue vaccine, the effectiveness of this vaccine has not been tested in Malaysia. Hence, the ongoing research must be intensified. Therefore, this study can be used to guide decision-making on the execution of the dengue vaccine not only in Malaysia but also in other countries with a history of serious dengue transmission.

Background

Dengue is no longer a strange disease because dengue cases are commonly reported. This scenario poses a threat to health and the economy in tropical and subtropical countries [1]. The main vectors responsible for the dengue disease are *Aedes aegypti* and *Aedes albopictus.* Besides, these mosquitoes are also responsible for chikungunya and Zika viruses [2]. Several serotypes of dengue diseases are DENV 1, DENV 2, DENV 3, and DENV 4. The development of the dengue vaccine is the best solution for the future. Nevertheless, the vaccine needs to protect the community from all the serotypes. Dengue vaccine must be effective, user-friendly, and guarantee a better health quality. Stakeholders' views and acceptance are crucial to ensure positive support if this method is allowed to be implemented.

After decades of research by Sanofi Pasteur, the first dengue vaccine, Dengvaxia (CYD-TDV), was licensed in Mexico in December 2015 for individuals between 9-45 years old, living in endemic areas. The vaccine is now available in 20 countries [3] and has been used in large-scale vaccination programmes in the Philippines, engaging over 800,000 school children [4]. Nevertheless, the potential impact of Dengvaxia on reducing dengue burden has been demonstrated in endemic populations [5]. Flasche et al. (2016) expected that dengue vaccine implementation would reduce dengue symptoms and hospitalisation rate by up to 30% over 30 years, despite some unfavourable outcomes in populations with low seropositivity [6]. Nevertheless, according to Pasteur's research, the vaccine may increase the risk of severe dengue among people who have never been infected with the disease [7]. Its efficacy rate is only effective among those infected with dengue before (seropositive). If Dengvaxia is administered to those not previously infected by dengue fever (seronegative), the aftermath of the symptom will be much worse.

Shim (2017) showed that age targeted Dengvaxia vaccination is cost-effective in Brazil. The results indicated that routine vaccination of 70% of nine-year-olds reduces the dengue infection by 79% and is cost-effective across a range of vaccination costs [8]. The cost-effectiveness of the vaccine depends on the age-targeted group only. If the targeted age group widens, the cost-effectiveness is reduced [8]. Espana et al. (2021) discovered that the vaccine could reduce severe dengue by preventing 5.5% of hospitalisations [9]. Besides, their findings also revealed that this intervention could be cost-effective in Puerto Rico at the cost of USD 382. Moreover, herd immunity from Dengvaxia promises a sense of security and safety from dengue disease [9]. Dengvaxia has 66% efficacy, which could benefit public health and economics because the protection level is considerable [10].

Malaysia needs to consider the outcomes of previous studies, which show that dengue vaccine implementation in other countries provides benefits due to cost-effectiveness and efficacy in reducing the hospitalisation rate due to dengue. Nevertheless, most research in Malaysia focused on the willingness to pay for the dengue vaccine. Yeo and Shafie (2018) researched the public's acceptance of the dengue vaccine to determine their willingness to pay for the vaccine, the respondents from Pulau Pinang positively reacted to the dengue vaccine and indicated their willingness to pay for the vaccine for the sake of their health [1]. In another research, Arifah et al. (2018) showed that health workers in Klang Valley were willing to pay between RM1 to RM500 for the dengue vaccine. Thus, their willingness to pay for the vaccine shows their acceptance of the vaccine [11].

A study focusing on attitude and intention analysis referring to stakeholders' acceptance of the dengue vaccine is much needed. Dengue vaccination should be considered a part of an integrated dengue prevention strategy to control dengue spread in Malaysia. Dengue vaccine could be a leap of faith for Malaysians to live dengue fever-free. Nonetheless, the government and authorities need to consider the stakeholders' views on the dengue vaccine. Besides, stakeholders must be provided knowledge and awareness on who is more preferred to take the vaccine and who is at risk if the vaccine is approved to be implemented. Whether vaccinated or not, individuals must consent to accept or reject the vaccine in the future. The communities and cities can be protected from the dangers of this infectious disease through implementing dengue vaccination. Therefore, this study aimed to examine the relationship between the predictor factors that determine stakeholders' attitude and intention towards the dengue vaccine by producing a model with Partial Least Square Structural Equation Modelling (PLS-SEM) approach using the Smart Partial Least Square (Smart-PLS) software. The purpose of utilising this approach is to offer methodological input to the study and provide a practical PLS-SEM model to understand the predictor factors that influence the attitude-intention relationship in determining stakeholders' acceptance of the dengue vaccine.

THEORY AND RESEARCH HYPOTHESES

The model theory of this study is based on the study by Amin and Hashim (2015) [12]. Their study utilised the attitude model introduced by Fishbein in 1963 [13]. Four components proposed in the research model of this study include general factors, specific factors, attitude, and intention. General factors are predictive factors consisting trust in key players, attitudes to technology and religiosity. Previous studies tested all these factors as general factors in determining stakeholders' acceptance of dengue controlling techniques [12,14,15,16,17,18]. These general factors have been observed to play a crucial role in directly and indirectly determining a person's attitude and intention. Nevertheless, these general factors have been initially pioneered through past studies for trust in key players [19, 20, 21, 22, 23, 24, 25, 26], attitudes to technology [22, 27, 28, 29], and religiosity [27, 28].

Specific factors, namely perceived benefit and perceived risk are predictive factors. Both of these factors have made clear direct contributions to determine attitudes and intentions towards dengue controlling techniques in past studies [12, 14, 15, 16, 17, 18]. These two factors play significant roles by being an essential basis directly related to the formation of attitude and intention in past studies. These factors are commonly known to have an inverse relationship in determining attitude and intention [29, 30, 31, 32, 33, 34, 35].

Attitude and intention are components that determine the views, acceptance, or approval to express support for something. Attitude represents beliefs that describe actions to behave based on positive or negative intention [36, 37, 38]. Therefore, 15 hypotheses were developed according to the study's framework to determine the relationship of predictor factors with the attitude and intention of stakeholders' acceptance of the dengue vaccine (Refer to Figure 1).

H1*: When stakeholders have more positive attitudes towards the dengue vaccine, they will have a higher intention to accept it.*

H2*: When stakeholders perceive more benefits associated with the dengue vaccine, they will have a higher intention to accept it.*

H3*: When stakeholders perceive more risks associated with the dengue vaccine, they will have a lower intention to accept it.*

H4*: When stakeholders perceive more benefits associated with the dengue vaccine, they will be more positive to accept it.*

H5*: When stakeholders perceive more risks associated with the dengue vaccine, they will be less positive to accept it.*

H6*: When stakeholders trust key players, their attitude will be more positive to accept the dengue vaccine.*

H7: *When stakeholders prioritise technology, their attitude will be more positive to accept the dengue vaccine.*

H8: *When stakeholders are more religious, their attitude will be more positive to accept the dengue vaccine.*

H9: *When stakeholders trust key players, they will perceive more benefits on the dengue vaccine.*

H10: *When stakeholders more prioritise technology, they will perceive more benefits on the dengue vaccine.*

H11: *When stakeholders are more religious, they will perceive more benefits on the dengue vaccine.*

H12: *When stakeholders trust key players, they will perceive fewer risks on the dengue vaccine.*

H13: *When stakeholders more prioritise technology, they will perceive fewer risks on the dengue vaccine.*

H14: *When stakeholders are more religious, they will perceive fewer risks on the dengue vaccine.*

H15: *When stakeholders perceive more benefits from the dengue vaccine, they will perceive fewer risks associated with the dengue vaccine.*

Methodology

STUDY DESIGN, LOCATION, AND DURATION

A multi-dimensional survey instrument was designed to identify factors influencing stakeholders' acceptance of the dengue vaccine in Klang Valley, Malaysia. Klang Valley was chosen as the location of the study because this area is the hotspot of dengue cases in Malaysia (http://idengue.arsm.gov.my) and the centre of socio-economic development. The multi-dimensional survey instrument was modified from previously published work by Amin and Hashim (2015) [12], which comprises seven variables: trust in key players, attitudes to technology, religiosity, perceived benefit, perceived risk, attitude, and intention to dengue vaccine. Respondents were asked to evaluate their opinion on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) for each item in this instrument. The survey instrument was designed in Malay and translated into English to allow respondents to respond in their native language. Experts in environmental health, social science, governance, and language validated the instrument before the field test. The study was conducted from September 2016 to September 2017.

ETHICS STATEMENT

According to the Medical Review and Ethics Committee (MREC), Ministry of Health Malaysia's Guidelines for the Ethical Review of Clinical Research or Research involving Human Subjects, ethical approval and informed consent was waived because this study involved the use of questionnaires to explore public behaviour with no collection of identifiable confidential information.

SAMPLE SIZE, PARTICIPATION, AND DATA COLLECTION

Faul et al. (2009) suggested conducting statistical analysis for social and behavioural sciences using the G*Power 3.1.9.2 software [39]. Therefore, this software was used to determine the sample size using statistical power of 0.80 [40], size effect (f = 0.15), and significance level (p = 0.05). The analysis indicated that this study only required 277 respondents. Resultantly, this survey was undertaken face-to-face among 415 Malaysian adults (aged 18 years and above) using stratified random sampling. Initially, the respondents were stratified into two groups, namely the scientists and the public. The merging of these two groups is significant since they have common interests in accepting dengue vaccine implementation. Academicians, postgraduate students, research officers working in environmental science, biological sciences, health, and genetic sciences research, and those participating in dengue control and prevention are categorised as scientists. The public consists of people living in outbreak regions in the Klang Valley, classified as areas with high Aedes mosquito numbers. The participation of the respondents was voluntary. Nevertheless, informed consent was obtained verbally, and the respondents' details were kept confidential. However, after validity and reliability screening, only 399 respondents (the scientists, n = 202; the public, n = 197) were analysed due to complete responses and no biasness.

DATA ANALYSIS

The descriptive statistics were analysed using the Statistical Package for Social Sciences (SPSS®) version 24 to assess the data reliability and the internal consistency of the constructs. As this research is exploratory, PLS-SEM is recommended. Therefore, SmartPLS software version 3.3.3 evaluated the predicting factors and their relationships on the structural model analysis [41]. This approach is particularly beneficial in justifying the interaction between multiple factors to explain complicated behaviour [42]. Firstly, the measurement model was investigated to determine the validity and reliability. Subsequently, the structural model was tested to test the hypotheses, including the model fit test [43, 44]. In addition, a bootstrapping approach with 5000 resamples was utilised to determine the relevance of the path coefficient and loading. A normality test for statistical analysis was also performed to confirm that the data did not cut off the normality criterion [42, 43, 45, 46].

Findings And Discussions

Table 1 shows the demographic details of 399 respondents from Klang Valley, Malaysia. The respondents were 197 scientists and 202 public, where 51.1% were female, and 48.9% were male. More than 70% of them were less than 40 years old. Approximately 42.4% of respondents were Malays, which reflected the actual population ratio in the Klang Valley, where most of them are Malays [47]. Table 2 shows the overall mean scores for religiosity (6.07), intention to dengue vaccine (5.71), trust in key players (5.51), attitude to dengue vaccine (5.71), and perceived benefit (5.38) were rated high. The stakeholders responded that they were entirely dedicated to their religion, trusted the key players, viewed the dengue vaccine as incredibly beneficial, and had a positive attitude and intention to accept it.

Nevertheless, the stakeholders were rated moderate for attitude to technology (Mean = 4.74, above the mid-point of 4.0) and perceived risk (Mean = 3.58, below the mid-point of 4.0). The findings imply that the stakeholders were more attracted to technology and believed that the dengue vaccination had limited risk.

MEASUREMENT MODEL ANALYSIS

The analysis of the convergent reliability and validity of the variables is shown in Table 3. Convergent validity can be determined if the factor loadings are larger than 0.7 [48, 49], the composite reliability (CR) is more than 0.70 [50], and the average variance extracted (AVE) is larger than 0.50 [51, 52]. The findings indicated that the factor loadings of the items were higher than 0.7, except for several items (PBV1 = 0.693; PBV5 = 0.692; ATT1 = 0.698). Nonetheless, according to Byrne et al. (2010), if the total AVE exceeded 0.50, the factor loadings below 0.70 were retained [51]. Therefore, all the variables had AVE values exceeding 0.50, and the values of CR were greater than 0.70, which is considered acceptable.

The discriminant validity analysis also found that the variables have met the requirements (Refer to Table 4). In the Fornell-Larcker criterion assessment, each variable has a more excellent square root value of AVE than the other variables [53]. The value of the Heterotrait-monotrait ($HTMT_{0.90}$)correlation for each of the variables was acceptable because the values were less than 0.85 [54, 55]. The measurement model analysis was also measured by standardised root mean square residual (SRMR) and normed fit index (NFI) as suggested by Lohmoller (1989) [56]. Good fit model must have SRMR value below than 0.08 [57] and the NFI value closer to 0.9 [58, 59]. In this study, the SRMR value was 0.074, and the NFI value was 0.71, considered an acceptable fit (Refer to Table 5). The variance inflation factor (VIF) values for all the variables were lower than 5.0, suggesting no collinearity concerns the inner model [60].

STRUCTURAL MODEL ANALYSIS

The structural model analysis started with the coefficient of determination (R^2) testing. The R^2 value for the intention (0.564) suggested that exogenous variables in the model could explain 56.4% of the variance in intention to dengue vaccine. The R^2 value of the attitude was 0.371, suggesting that the exogenous variables explain 37.1% of the factor. Furthermore, the exogenous variables explained 19.6% of the variance in perceived benefit and 18.9% of the variance in perceived risk. The analysis continued with the blindfolding procedure to measure the predictive accuracy of the model predictions (Q^2), where the value must be beyond zero [61].

The Q^2 values for the perceived benefit (0.109), perceived risk (0.111), attitude (0.198), and intention to dengue vaccine (0.383) confirmed that the predictive relevance of the model was adequate for the exogenous variables. According to Cohen (1988) [62], attitude (f^2 = 0.465) has a large effect size on intention to dengue vaccine compared with perceived benefit (f^2 = 0.141). Perceived benefit has a medium effect size on attitude (f^2 = 0.184), while the effect size of religiosity (f^2 = 0.067), attitude to technology (f^2 = 0.012), and trust in key players (f^2 = 0.011) was small. The findings also showed that trust in key players (f^2 = 0.112), attitude to technology (f^2 = 0.051), and religiosity (f^2 = 0.026) have a small effect size on perceived benefit. Lastly, attitude to technology (f^2 = 0.113) and trust in key players (f^2 = 0.082) have a small effect on perceived risk. Table 6 illustrates the results of R^2, Q^2, and f^2 values.

DIRECT RELATIONSHIPS ANALYSIS

The relationship between exogenous and endogenous variables was evaluated by examining the path coefficients' size in the structural model. Attitude (β = 0.544, t = 11.322, p < 0.001) was the most important direct predictor of intention to dengue vaccine, followed by perceived benefit (β = 0.299, t = 6.377, p < 0.001) (Refer to Table 7 and Figure 2). The findings indicated that when the respondents were inclined to have a good attitude to the dengue vaccine and viewed that it has higher benefits, they would have a positive intention to accept it. Attitude is an important factor in influencing intention whether they express likes or dislikes and support or reject anything [63]. Arham et al. (2021b) showed that attitude was the most important factor in expressing support for the use of Wolbachia techniques to control dengue [18]. Besides, perceived benefit also plays a role in determining intention. Mustapa et al. (2019) explained that the acceptance of new technology, especially in the field of health, disclosure of important benefits in determining intention [64].

Perceived benefit (β = 0.459, t = 10.415, p < 0.001) was the most significant direct predictor of attitude to dengue vaccine followed by religiosity (β = 0.211, t = 4.996, p < 0.001), attitude to technology (β = 0.095, t = 2.076, p = 0.019), and trust in key players (β = 0.095, t = 1.872, p = 0.031) (Refer to Table 7 and Figure 2). The results suggested that when stakeholders perceived higher benefits, clung to their religion, acknowledged that the benefits of technology outweigh risks on nature, and had a high level of trust in the key players involved in the dengue vaccine, they expressed a good attitude and accepted it. These findings indicate differences between the study of Arham et al. (2021b) and Amin and Hashim (2015) [12, 18]. Arham et al. (2021b) pointed out that perceived benefit and risk influenced acceptance towards Wolbachia techniques [18]. In contrast, Amin and Hashim (2015) showed that perceived benefit and trust in key players were the factors influencing stakeholders' attitudes towards genetically modified mosquito techniques in an effort to control dengue [12].

Nevertheless, the stakeholders will manifest a positive attitude towards dengue control techniques when they feel the benefit. According to Amin et al. (2018), the Malaysian community has firm religious beliefs, and the acceptance of the new technologies depends on their spiritual level [35]. Conclusively, the stakeholders in this study have firm religious beliefs and do not feel that the dengue vaccine extends beyond religion. Trust in key players, such as implementers and researchers, will balance good relationships among stakeholders [65]. This notion is clearly shown in this study, where stakeholders trust key players and accept new technologies beyond the values of nature. Dengue vaccine possibly does not pose any danger to environmental health if the authorities carry out their duties properly.

Trust in key players (β = 0.310, t = 6.554, p < 0.001), attitude to technology (β = 0.207, t = 4.319, p < 0.001), and religiosity (β = 0.147, t = 3.195, p = 0.001) have a positive association with perceived benefit

(Refer to Table 7 and Figure 2). This finding suggests that when stakeholders trust people who play significant roles in the dengue vaccine, are deeply attached to their religion and are more inclined to technology (negative), they benefit from the dengue vaccine. Nevertheless, attitude to technology (β = -0.317, t = 5.896, p < 0.001) and trust in key players (β = -0.280, t = 6.157, p < 0.001) had a negative association with perceived risk (Refer to Table 7 and Figure 2). Although they have a tendency towards technology compared to nature values, they put higher trust in key players as they feel less risk on the dengue vaccine.

The study's findings clearly show a bipolar relationship between predictor factors with perceptions of benefit and risk, as Alhakimi and Slovic (1994) described [66]. Mustapa et al. (2021) discovered that stakeholders' acceptance of new technology is significantly influenced by high perceived benefits and low perceived risks [67]. Therefore, the finding is further elucidated by previous studies, who showed an inverse relationship between general predictor factors such as belief in priorities, attitudes towards nature, and religion with perceptions of benefit and risk in determining the acceptance of Wolbachia and Outdoor Residual Spraying techniques [17, 18]. In conclusion, general predictor factors positively influence stakeholders' benefits if they feel the benefits outweigh the risks. According to scholars, perceived benefit and risk are difficult to conceptualise separately because of their complex relationships that have inverse relationships [31, 32, 33].

MEDIATION ANALYSIS

Mediation analysis assesses the indirect effect of the path coefficients that have a positive sign between exogenous and endogenous variables via the mediator. As shown in Figure 2, attitude and perceived benefit were expected to act as a mediator. According to Zhao et al. (2010), the indirect effect can be calculated by dividing the direct effect on the exogenous and endogenous variables by the total mediating effect to measure the significance of the variance accounted for (VAF) value [68]. If the VAF value exceeds 20%, the mediating effect is present.

Table 7 and Figure 2 shows that attitude mediates the positive relationship between perceived benefit and intention to dengue vaccine (β = 0.299, t = 6.377, p < 0.001) with the VAF value of 45.51%. Thus, the results confirmed that attitude act as a mediator, indicating that when the stakeholders perceive the higher benefits of the dengue vaccine, they expressed a positive attitude, which translated to a positive intention to accept dengue vaccine.

Hence, the findings also concluded that perceived benefit act as the mediating role in the relationship between trust in key players and attitude (β = 0.095, t = 1.872, p = 0.031) with the VAF value of 59.97%, attitude to technology and attitude (β = 0.095, t = 2.076, p = 0.019) with the VAF value of 50.0%, and religiosity and attitude (β = 0.211, t = 4.996, p < 0.001) with the VAF value of 24.24%. These findings demonstrate that when the respondents have higher trust in key players, rated positively on technology, and clung to their religion, they tend to assess the benefit of dengue vaccination as being elevated. They endorse it with a positive attitude.

Conclusion

The contribution of this paper is three-fold. Firstly, this study is the first in Malaysia to develop a model to determine the relationship of predictor factors with the attitude and intention of stakeholders towards the dengue vaccine in Klang Valley. This contribution is essential because this model facilitates and is helpful to responsible parties, especially the Malaysian government, to consider the predictor factors that determine stakeholders' acceptance of this technique. Secondly, this model is crucial as a benchmark for scientists and the pharmaceutical industry to intensify research because stakeholders positively accept the dengue vaccine as a control resolution. The stakeholders have a high level of trust in key players handling the dengue vaccine and the attitude of accepting this technology. Hence, the stakeholders believe the vaccine does not violate religious norms and accept the vaccine due to its benefits. Thirdly, the findings indicated the positive acceptance of the dengue vaccine among the stakeholders. Therefore, the study's findings serve as guidance for the decision-making process concerning implementing the dengue vaccine in Malaysia and other countries with a severe history of dengue transmission. In conclusion, the dengue vaccine is a good effort, but continuous research must be conducted to ensure universal safety.

Abbreviations

ADV: Attitude to dengue vaccine; ATT: Attitude to technology; AVE: Average variance extracted; CR: Composite reliability; CYD-TDV: Dengvasia; DENV: Dengue virus; HTMT: Heterotrait-monotrait; INT: Intention to dengue vaccine; NFI: Normed fit index; PBV: Perceived Benefit; PLS: Partial least squares; PRV: Perceived Risk; REG: Religiosity; SEM: Structural equation modelling; SPSS: Statistical package for the social sciences; SRMR: Standardised root mean square residual; TKP: Trust in key players; VAF: Variance accounted for; VIF: Variance inflation factor.

Declarations

Ethics approval and consent to participate: Research involving the use of survey procedures (questionnaires) of public behaviour and with no collection of identifiable private information was waived from ethical approval and informed consent from Medical Review & Ethics Committee (MREC), Ministry of Health Malaysia.

Consent for publication: Not applicable.

Availability of data and material: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interest.

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Authors' contributions: A.F.A. managed the data collection, analysed the data and drafted the manuscript. L.A. designed the study, interpreted the data, participated in all aspects of the manuscript. L.A. and Z.M. supervised the research. L.A. A.F.A. Z.M. and M.Y. developed the questionnaire. M.A.C.M. contributed to the revising of the manuscript. A.F.A. and N.S.N. managed the PLS-SEM analysis. All authors contributed and approved to the final manuscript of the paper.

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Tables

Table 1. Profiles of respondents (*n* = 399)

Demographic Variables		Frequency	Percentage %
Type of Stakeholders	Scientists	197	49.4
	Public	202	50.6
Gender	Male	195	48.9
	Female	204	51.1
Age (years old)	18-28	185	46.4
	29-39	132	33.1
	Above 40	78	19.5
Race	Malay	169	42.4
	Chinese	108	27.1
	Indian	91	22.8
	Others	31	7.8

Table 2. Mean score and interpretation

Factor	*Mean ± Standard Deviation*	*Interpretation*
Intention to Dengue Vaccine	5.71 ± 1.02	High
Attitude to Dengue Vaccine	5.42 ± 1.00	High
Perceived Benefit	5.38 ± 1.08	High
Perceived Risk	3.58 ± 1.29	Moderate
Trust in Key Players	5.51 ± 0.94	High
Attitudes to Technology	4.74 ± 1.38	Moderate
Religiosity	6.07 ± 1.09	High

Note: 1.00-3.00, low; 3.01-5.00, moderate; 5.01-7.00, high.

Table 3. Internal consistency and convergent validity

Factor	*Item*	*Loading*	*CR*	*AVE*	*Validity*
Intention to Dengue Vaccine	INT1	0.838	0.929	U0.687	YES
	INT2	0.886			
	INT3	0.809			
	INT4	0.788			
	INT5	0.837			
	INT6	0.811			
Attitude to Dengue Vaccine	ADV1	0.698	0.860	0.552	YES
	ADV2	0.728			
	ADV3	0.704			
	ADV4	0.806			
	ADV5	0.772			
Perceived Benefit	PBV1	0.693	0.902	0.569	YES
	PBV2	0.773			
	PBV3	0.775			
	PBV4	0.787			
	PBV5	0.836			
	PBV6	0.692			
	PBV7	0.714			
Perceived Risk	PRV1	0.762	0.918	0.616	YES
	PRV2	0.773			
	PRV3	0.802			
	PRV4	0.789			
	PRV5	0.799			
	PRV6	0.775			
	PRV7	0.793			
Trust in Key Players	TKP1	0.857	0.878	0.706	YES
	TKP2	0.839			
	TKP3	0.824			
Attitudes to Technology	ATT1	0.782	0.944	0.738	YES

	ATT2	0.867			
	ATT3	0.898			
	ATT4	0.900			
	ATT5	0.895			
	ATT6	0.804			
Religiosity	REG1	0.882	0.956	0.730	YES
	REG2	0.834			
	REG3	0.815			
	REG4	0.803			
	REG5	0.830			
	REG6	0.911			
	REG7	0.865			
	REG8	0.891			

Note: AVE value must greater than 0.5; CR value must greater than 0.7.

Table 4. Fornell-Larcker and HTMT Criterion

Fornell-Larcker Criterion

	INT	ADV	PBV	PRV	TKP	ATT	REG
INT	0.829						
ADV	0.709	0.743					
PBV	0.601	0.558	0.755				
PRV	-0.077	-0.111	-0.108	0.785			
TKP	0.425	0.313	0.371	-0.311	0.840		
ATT	0.214	0.221	0.259	-0.346	0.183	0.859	
REG	0.321	0.310	0.190	-0.042	0.158	-0.031	0.855

HTMT Criterion

	INT	ADV	PBV	PRV	TKP	ATT	REG
INT							
ADV	0.816						
PBV	0.670	0.658					
PRV	0.096	0.148	0.167				
TKP	0.503	0.391	0.445	0.353			
ATT	0.230	0.253	0.285	0.376	0.212		
REG	0.346	0.351	0.210	0.094	0.199	0.067	

Note: The square root of the AVE value in the results was more than the total variance shared by the other variable factors. $HTMT_{0.90}$ values do not exceed 1, indicating that the indicator for that factor is lower than the discriminant validity aspect.

Table 5. Good fit (SRMR and NFI value) and collinearity assessment

Good Fit Assessment				
SRMR (0.074); NFI (0.710)				
Collinearity Assessment				
	INT	ADV	PBV	PRV
ADV	1.457			
PBV	1.456	1.253		1.244
PRV	1.016	1.233		
TKP		1.280	1.064	1.184
ATT		1.215	1.038	1.092
REG		1.057	1.030	1.057

Note: SRMR value below than 0.08; NFI value closer to 0.9; R^2, VIF value must below 5.00.

Table 6. Determination of coefficient (R^2), predictive relevance (Q^2) and effect size (f^2)

	Determination Coefficient	*Predictive Relevance*	*Effect Size*					
	R^2	Q^2	ADV	PBV	PRV	TKP	ATT	REG
INT	0.564	0.383	0.465 (Large)	0.141 (Small)				
ADV	0.371	0.198		0.184 (Medium)		0.011 (Small)	0.012 (Small)	0.067 (Small)
PBV	0.196	0.111				0.112 (Small)	0.051 (Small)	0.026 (Small)
PRV	0.189	0.109				0.082 (Small)	0.113 (Small)	

Note: R^2, range from 0 to 1; f^2, large ≥ 0.35, medium ≥ 0.15, small ≥ 0.02; Q^2, greater than 0.

Table 7. The relationship predicting factors and moderators that influence attitude towards the ORS technique

Note: ***p*< 0.01, **p*< 0.05 (one-tailed)

Figures

	Hypothesised Path	*Path Coefficient*	*Standard Error*	*t-values*	*p-values*	*Decision*
H1	ADV→INT	0.544	0.048	11.322	0.000***	Supported
H2	PBV→INT	0.299	0.047	6.377	0.000***	Supported
H3	PRV→INT	0.016	0.034	0.468	0.320	Not Supported
H4	PBV→ADV	0.459	0.044	10.415	0.000***	Supported
H5	PRV→ADV	0.010	0.046	0.213	0.416	Not Supported
H6	TKP→ADV	0.095	0.051	1.872	0.031*	Supported
H7	ATT→ADV	0.095	0.046	2.076	0.019*	Supported
H8	REG→ADV	0.211	0.042	4.996	0.000**	Supported
H9	TKP→PBV	0.310	0.047	6.554	0.000***	Supported
H10	ATT→PBV	0.207	0.048	4.319	0.000***	Supported
H11	REG→PBV	0.147	0.046	3.195	0.001**	Supported
H12	TKP→PRV	-0.280	0.045	6.157	0.000***	Supported
H13	ATT→PRV	-0.317	0.054	5.896	0.000***	Supported
H14	REG→PRV	-0.023	0.047	0.489	0.312	Not Supported
H15	PBV→PRV	0.082	0.057	1.427	0.077	Not Supported

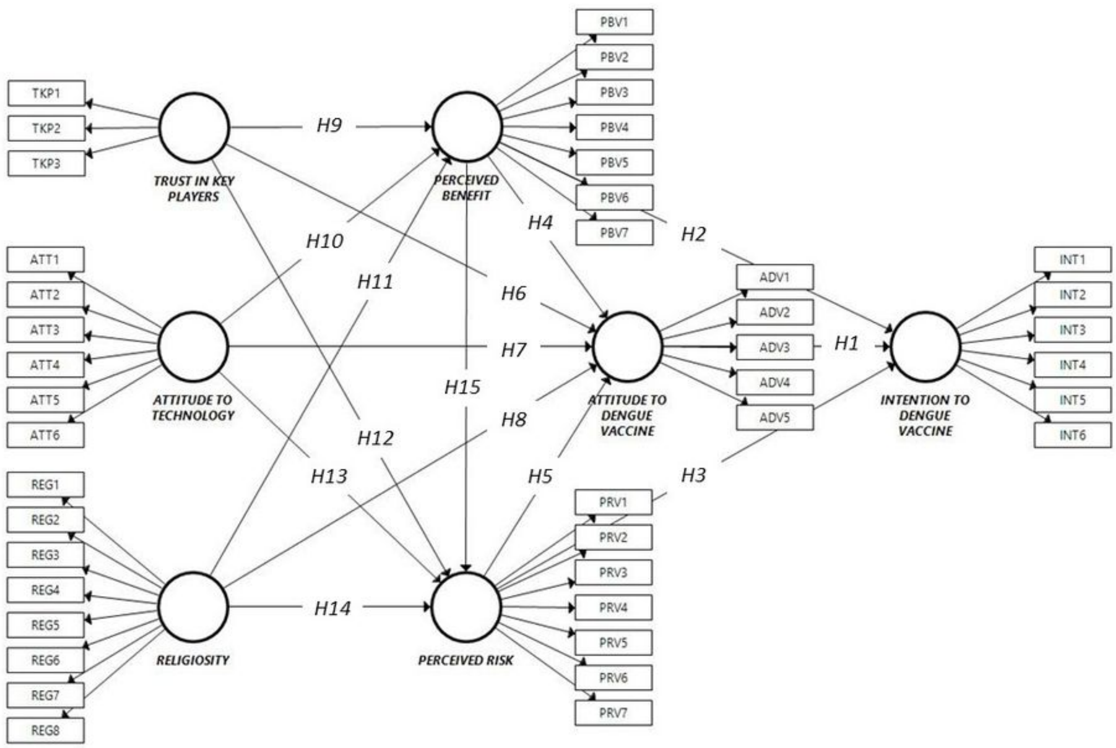

Figure 1

Research conceptual framework

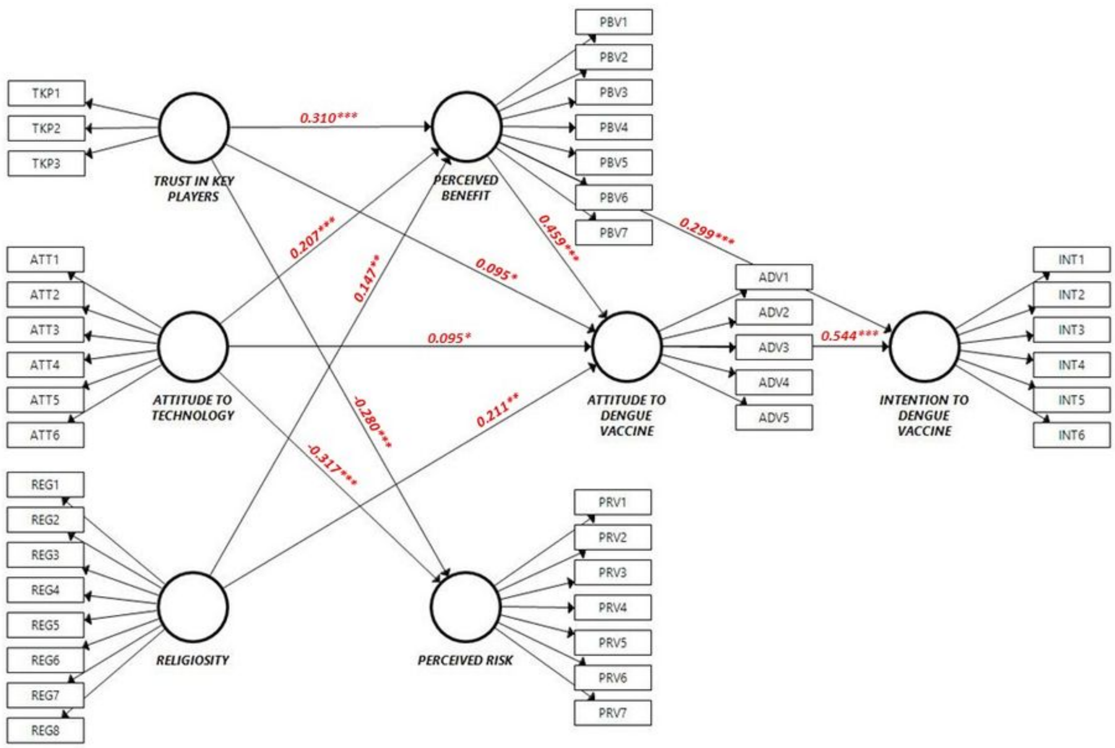

Figure 2

Model for stakeholders' acceptance of dengue vaccine in Malaysia.

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