

Original Article

Asian Pacific Journal of Tropical Medicine

apjtm.org

doi: 10.4103/apjtm.apjtm_184_25

Factors affecting parents´ willingness to pay for dengue vaccination for children in endemic areas, Indonesia: A multicenter crosssectional study

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ABSTRACT

Objective: To predict parents' willingness to pay for dengue fever vaccination through the perception of dengue vaccine based on the Health Belief Model (HBM).

Methods: A multicenter crosssectional study was conducted on parents who had children aged ≤ 5 years and were participating in integrated health service post activities in 3 districts/cities with the highest incidence of dengue fever in Southeast Sulawesi. The instruments used to collect data in this study consisted of a participant characteristics questionnaire, a dengue vaccine perception questionnaire based on the HBM, and a willingness to pay for dengue vaccine questionnaire. *Chi*-square test and multivariate logistic regression analysis were used to determine the correlation between the perceived HBM subscales and willingness to pay for dengue vaccination.

Results: A total of 310 people participated in this study with an average age of (29.9±5.6) years. Most of them were females (284/310, 91.7%), 80.9% (251/310) had a high education status and 87.4% (271/310) had direct experience with DF. The results showed good perceptions including Perceived Susceptibility (adjusted *OR* 3.7, 95% *CI* 2.7-6.3, *P*<0.001), Perceived Severity (adjusted *OR* 2.8, 95% *CI* 1.7-5.5, *P*<0.001), Perceived Benefits (adjusted *OR* 2.8, 95% *CI* 1.7-4.5, *P*<0.001), and Cues to Action (adjusted *OR* 3.1, 95% *CI* 1.9-5.1, *P*<0.001) were positively correlated with willingness to pay for the dengue vaccine comparing with poor perceptions, whereas Perceived Barriers showed no significant effect on willingness to pay for the dengue vaccine.

Conclusions: These results suggest that a person's willingness to pay for dengue vaccine increases with their understanding of the risks and advantages of immunization as well as encouraging outside incentives. As a result, these elements are crucial in raising community involvement in the immunization campaign.

KEYWORDS: Helath Belief Model; Dengue; Dengue vaccine; Willingness to pay

Summary

Question: Can the constructs of the Health Belief Model predict individuals' willingness to pay for the dengue vaccine in endemic areas?

Findings: In this quantitative cross-sectional study involving 310 respondents from dengue-endemic regions, Perceived Susceptibility, Perceived Severity, Perceived Benefits, and Cues to Action were significantly associated with willingness to pay for the dengue vaccine, while Perceived Barriers showed no significant effect. Respondendents with higher Perceived Susceptibility were 3.7 times more likely to express willingness to pay.

Meaning: Strengthening positive perceptions may improve public acceptance and willingness to pay for the dengue vaccine in endemic settings.

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How to cite this article: Salam MR, Idrus I, Kurniawan F, Ilyas UKP, Darmayanti E, Rustam IW, et al. Factors affecting parents' willingness to pay for dengue vaccination for children in endemic areas, Indonesia: A multicenter crosssectional study. Asian Pac J Trop Med 2025; 18(10): 443-450.

Article history: Received 27 March 2025 Revision 20 October 2025
Accepted 27 October 2025 Available online 31 October 2025

1. Introduction

Dengue virus, an arbovirus transmitted to humans by *Aedes* mosquitoes, causes dengue fever (DF), which is a significant public health problem worldwide. The virus consists of four widely distributed serotypes, known as DENV one to DENV four[1,2]. Increased vascular permeability, leading to plasma leakage and increased likelihood of haemorrhagic events, is a hallmark of DF[3]. In addition, DF is currently transmitted to humans in more than 125 countries, including Indonesia[4,5]. Actually one of the most common diseases in Indonesia is DF, which can cause loss of productivity and serious complications[6].

Based on World Health Organization (WHO) newly launched global dengue surveillance system (May 2024), approximately 13 million dengue cases have been reported globally in 2024, including nearly 42 000 severe cases and more than 8 700 related deaths. Dengue transmission is ongoing in 90 countries across all WHO regions, with the highest burden in endemic tropical and subtropical areas. The Region of the Americas accounts for the majority, with over 12 million cases and 7 152 deaths, followed by South-East Asia with 357 808 cases and 1 379 deaths, and the Western Pacific with 219 441 cases and 154 deaths[7]. On the other hand, about 75 518 cases and 705 deaths occurred in Indonesia in 2021. Southeast Sulawesi has the highest case fatality rate of 1.9% and the highest mortality rate for the under-five age group of 38.46%[8].

Vaccination is the safest and most effective way to control the risk of known infection, and has long-term therapeutic value[9,10]. Because some prevention methods, such as vector control, are ineffective in preventing dengue infection and reducing the number of DF cases, dengue vaccination should be considered as another prevention method in Indonesia[11,12]. Previous studies have found that dengue vaccination and vector control work better together than either control measure alone. In addition, there has been significant progress in the development of a dengue vaccine in the past decade. In Indonesia, this vaccine was licensed by the Food and Drug Supervisory Agency of the Republic of Indonesia in 2016, but distribution of the dengue vaccine has not been evenly distributed[13]. A key reason is that these vaccines have not yet been integrated into the National Immunization Program (PIN), making them accessible only through private, out-of-pocket services. It is not possible to include it in the national immunization program because of limited initial data on public perception of this vaccine. Negative perceptions of the dengue vaccine may affect the success of the vaccination program[14,15].

As fake news spread across various platforms, including social media, is influencing parents heavily today, vaccine hesitancy has become a common phenomenon. This has a direct impact on vaccine acceptance and coverage, so much effort should be made to disseminate information about vaccines long before a vaccine is available. To achieve this, planning a tailored vaccine communication program is essential to understand the level of acceptance and perception of parents regarding vaccines[16].

Understanding and dispelling myths about vaccinations may be accomplished by investigating parents' opinions regarding the effectiveness of vaccines and their willingness to pay for the dengue vaccine. In order to help the government provide vaccinations, willingness to pay is essential, particularly for the dengue vaccine. This suspicion derives from the government's limited ability to deliver healthcare, particularly in overburdened health systems. The importance of willingness to pay in the discussion of vaccines has been emphasized by several research. It may be possible to understand why minority populations may show vaccination hesitation by investigating the cultural, socioeconomic, and psychological factors that influence views of vaccine effectiveness. Therefore, the two areas of willingness to pay and perceived vaccination efficacy are relevant in vaccine talks among minority groups. To the best of our knowledge, no research has been done among these populations to ascertain their vaccination intentions and probable actions, this study is pertinent[6,17,18].

According to the Health Belief Model (HBM), community perceptions of the vulnerability and benefits of interventions can influence decisions to engage in health behavior. This also applies to parents' decisions to vaccinate their children against DF. Willingness to pay for the vaccine will be influenced by parents' perceptions of the disease and the vaccine[19].

Studies adopting the HBM or protection motivation theory have shown that pandemic vaccine acceptance is strongly influenced by disease risk perception, vaccine efficacy and safety perception, vaccination history, community attitudes toward vaccination, doctor recommendations, vaccine prices, and sociodemographic characteristics. Vaccine hesitancy among the elderly is a major barrier to promoting vaccine acceptance[20]. Low- and middle-income countries should implement measures to improve community hesitancy to increase vaccine coverage for dengue prevention and control[21].

Therefore, this study aims to assess the perception and willingness to pay for dengue vaccine in parents in Southeast Sulawesi, Indonesia using the HBM method. So that this study can provide insight to policy makers, vaccine developers, and distributors to help provide references and factors causing public perceptions of willingness to pay for dengue vaccine.

2. Methods

2.1. Research design

This study attempts to test and predict the willingness to pay for

dengue vaccination through the perception of dengue vaccine based on the HBM. Therefore, this study is classified as a quantitative study with a multicenter crosssectional study approach on parents who participate in integrated service post (Posyandu) activities in 3 districts/cities with the highest incidence of DF in Southeast Sulawesi, namely Kendari City, Bau-Bau City and South Konawe Regency[22].

2.2. Setting and samples

This study involved parents who have children aged ≤5 years and are participating in integrated health service post activities in 3 districts/cities with the highest incidence of DF in Southeast Sulawesi, namely Kendari City, Bau-Bau City and South Konawe Regency. Sampling used the convenience sampling technique by considering the inclusion criteria of parents who have children aged ≤ 5 years, domiciled in the research area and agreed to participate in the study. Parents with children ≤5 years of age were considered as the target population because their children represent a vulnerable group with higher susceptibility to infection and complications.

The sample size of the study was determined using the Cochran formula for an unknown population:

$$n = \frac{Z^2 \times P\,(1-P)}{e^2}$$

The value of e^2 the acceptance of sampling error (e=0.1), P is the proportion of the population (P=0.5), the Z value at the 95% confidence level (Z=1.96). Based on the calculation results obtained, the minimum sample size is 97 respondents for each of the three districts/cities with a total of 291 respondents.

2.3. Measurement and data collection

The instruments used to collect data in this study consisted of a participant characteristics questionnaire, a dengue vaccine perception questionnaire based on the HBM, and a willingness to pay for dengue vaccine questionnaire. The first questionnaire consisted of 8 items grouped using nominal and ordinal scales, namely age, sex, employment status, education, family income, experience of disease and dengue vaccine. The second questionnaire was a willingness to pay questionnaire to assess willingness to pay for dengue vaccine. This dichotomous variable includes the options yes = 1 (willing to pay for dengue vaccine) and no=0 (not willing to pay for dengue vaccine).

The HBM-based dengue vaccine perception questionnaire has a total of 16 questions modified from previous studies by Indraswari (2021)[19], Berger (2021)[23], Erawan (2021)[24], Dewi (2023)[25], Seangpraw (2022)[26], Akinyemi (2021)[27], Palanca-Tan (2023[28] and Wong (2020)[29]. Five subscales include Perceived Susceptibility (three questions), Perceived Severity (3 questions), Perceived Benefit (three questions), Perceived Barriers (three questions), and Cues to Action (four questions). With a four-point Likert scale answer from one (strongly disagree) to four (strongly agree), this survey gauges respondents' opinions on their willingness to pay for the dengue vaccine, both positively and negatively. If the overall score is less than the average value, negative perception is classified, and if the total score is greater than the average, positive perception is classified. 50 respondents were used to assess the validity and reliability of this survey in other areas that have the same characteristics as the research area. This questionnaire meets the results of the construct validity test for perceived vulnerability of 0.452-0.615, perceived severity of 0.309-0.762, perceived benefits of 0.452-0.683, perceived barriers of 0.452-0.762, and action cues of 0.313-0.683 indicating that the items on the scale are valid (r> 0.279) at a significance level of 5%. In addition, the Cronbach's alpha value of the questionnaire shows good reliability with a value of α=0.853 (Table 1).

Table 1. Results of validity and reliability tests of Health Belief Model questionnaire items.

Variable	Items	*R* table*	Cronbach's α#
Perceived Susceptibility	3	0.452-0.615	
Perceived Severity	3	0.309-0.762	
Perceived Benefit	3	0.452-0.683	0.853
Perceived Barriers	3	0.452-0.762	
Cues to Action	4	0.313-0.683	

*Valid if the *R* table value > 0.279 at a significance level of 5%, #reliable if Cronbach's alpha value > 0.7.

2.4. Data analysis

The distribution of sample characteristics, attitudes about dengue vaccination according to the HBM, and readiness to pay for dengue vaccine were all described by analytical observations made throughout this study. In order to categorize each variable for descriptive analysis, this study used frequencies and proportions to generate summary statistics. To investigate the association between the aspects of HBM perception and willingness to pay for dengue vaccination, the *Chi*-square test was employed. To determine the correlation between the perceived HBM subscales and willingness to pay for the dengue vaccination, adjusted multivariate logistic regression analysis was used after unadjusted analysis.

2.5. Ethical consideration

This study received ethical approval from the Health Research Ethics Committee (KEPK) of IAKMI Southeast Sulawesi (No. 145/

KEPK-IAKMI/VI/2024) on June 19, 2024. The approval ensures that the research adheres to ethical and moral principles in line with the Declaration of Helsinki (1975) and the National Guidelines for Health Research Ethics (PNEPK) issued by the Indonesian Ministry of Health (2011). These guidelines are designed to protect participants' rights, uphold research integrity, and enhance research quality. Informed consent was obtained from the parents of all participants involved in the study.

3. Results

3.1. Characteristics of the participants

A total of 310 people involved in this study have provided their answers to the survey presented in Table 2. Respondents come from various backgrounds relevant to this study, so that the data obtained can provide a comprehensive picture of the aspects studied.

Respondents who participated in this study were (29.9±5.6) years old. The age of 25 is widely used in public health studies to distinguish emerging from full adulthood, reflecting developmental and social role transitions[30], most respondents (263/310, 84.8%) were >25 years old in this study. Majority of them had a high education status (251/310, 80.9%) and were unemployed (193/310, 62.3%). As for the experience aspect, almost all respondents had direct experience with DF (271/310, 87.4%).

Table 2. Characteristic of the study participants (n= 310).

Sociodemography	Participants
Age, years, mean±SD	29.9±5.6
Young adults (≤25 years)	47 (15.2)
Middle adults (>25 years)	263 (84.8)
Sex	
Male	26 (8.3)
Female	284 (91.7)
Education level	
High (High School, University)	251 (80.9)
Low (No School, Elementary, Junior high)	59 (19.1)
Employment	
Employed	117 (37.7)
Unemployed	193 (62.3)
Income	
≤Minimum Wage (USD: 174.1)	220 (70.9)
>Minimum Wage (USD:174.1)	90 (29.1)
Heard of dengue fever	
Yes	271 (87.4)
No	39 (12.6)
Had dengue fever	
Yes	75 (24.1)
No	235 (75.9)
Heard of dengue vaccine	
Yes	56 (18.1)
No	254 (81.9)

Data were expressed as n (%) unless otherwise specified.

Table 3. Perceptions of dengue vaccination based on Health Belief Model (n=310).

Perception of dengue vaccination	Participants
Perceived Susceptibility	
Good	166 (53.5)
Poor	144 (46.5)
Perceived Severity	
Good	161 (51.9)
Poor	149 (48.1)
Perceived Benefit	
Good	143 (46.1)
Poor	167 (53.9)
Perceived Barriers	
Good	181 (58.4)
Poor	129 (41.6)
Cues to Action	
Good	202 (65.2)
Poor	108 (34.8)

Data were expressed as n (%).

3.2. Perceptions of dengue vaccination and the willingness to pay dengue vaccine

Based on the survey results related to perceptions of the dengue vaccine, the majority of respondents have a positive view of the various aspects measured. A total of 166 people (166/310, 53.5%) have good Perceived Susceptibility, indicating that they are aware of the risk of contracting DF and the importance of vaccination in preventing this disease. In the Perceived Severity aspect, as many as 161 people (161/310, 51.9%) consider that DF is a serious disease and can have significant health impacts if not prevented by vaccination. In Perceived Benefit, as many as 143 people (46.1%) stated that they understand the benefits of the dengue vaccine, although there are discrepancies in the percentages that need to be corrected for data accuracy. In addition, in Perceived Barriers as many as 181 people (58.4%) consider that barriers to vaccination can be overcome, indicating a fairly good level of acceptance. Finally, as many as 202 people (65.2%) have a positive perception of Cues to Action, indicating that they get enough encouragement to get vaccinated against DF. Overall, these data indicate that the majority of respondents have good awareness of the importance of dengue vaccination in preventing the disease and its adverse effects.

According to the survey's findings, 168 respondents (168/310, 54.2%) said they would be prepared to pay for the dengue vaccine, demonstrating that most respondents understood the value of immunization and its advantages in avoiding illness. However, up to 142 respondents (142/310, 45.8%) said they would not be able to afford the vaccination. This suggests that over half of the public is still hesitant to pay, even if the majority of respondents are eager to do so.

Table 4. Correlations between the perception of and the willingness to pay for dengue vaccine based on Health Belief Model (n=310).

Health Belief Model	Willingness to pay		*OR* (95% *CI*)	*P*
	Willing (%)	Not willing (%)		
Perceived Susceptibility				
Good	118 (38.1)	48 (15.5)	4.6 (2.6–7.4)	< 0.001
Poor	50 (16.1)	94 (30.3)		
Perceived Severity				
Good	109 (35.2)	52 (16.8)	2.8 (1.7–5.5)	< 0.001
Poor	59 (19.0)	90 (29.0)		
Perceived Benefit				
Good	97 (31.3)	46 (14.8)	2.8 (1.7–4.5)	< 0.001
Poor	71 (22.9)	96 (31)		
Perceived Barriers				
Good	95 (30.6)	86 (27.7)	0.8 (0.5–1.3)	0.48
Poor	73 (23.5)	56 (18.1)		
Cues to Action				
Good	129 (41.6)	73 (23.5)	3.1 (1.9–5.1)	< 0.001
Poor	39 (12.6)	69 (22.3)		

OR values derived from *Chi*-square.

Table 5. Crude and adjusted odds ratios (*OR*) of perception subscales associated with willingness to pay for dengue vaccine, using poor perception as the reference group.

Variable	*OR* (95% *CI*)	Adjusted *OR* (95% *CI*)	*P*
Perceived Susceptibility (good *vs.* poor)	4.6 (2.9–7.5)	3.7 (2.7–6.3)	< 0.001
Perceived Severity (good *vs.* poor)	3.2 (2.0–5.1)	2.7 (1.6–4.5)	< 0.001
Perceived Benefits (good *vs.* poor)	2.9 (1.8–4.5)	2.0 (1.2–3.4)	0.008
Perceived Barriers (good *vs.* poor)	0.8 (0.5–1.3)	1.3 (0.8–2.2)	0.34
Cues to Action (good *vs.* poor)	3.1 (1.9–5.1)	1.7 (1.0–3.0)	0.07

3.3. Association between perception subscales and willingness to pay for the dengue vaccine

As shown in Table 4, the analysis's findings demonstrated a significant correlation between willingness to pay for the dengue vaccine and all subscales of dengue vaccination perception (P< 0.001), except for the Perception of Barriers (P=0.475). This indicates that respondents who had favorable perceptions of susceptibility, severity, benefits, and cues to action were more likely to express willingness to pay for the dengue vaccine. In contrast, perceptions of barriers such as side effects, safety, efficacy, and cost did not show a significant association with willingness to pay.

3.4. Perception subscales influencing the willingness to pay for dengue vaccine

As shown in Table 5, Good perceptions including Perceived Susceptibility (adjusted *OR* 3.7, 95% *CI* 2.7-6.3, P<0.001), Perceived Severity (adjusted *OR* 2.8, 95% *CI* 1.7-5.5, P<0.001), Perceived Benefits (adjusted *OR* 2.8, 95% *CI* 1.7-4.5, P<0.001), Cues to Action (adjusted *OR* 3.1, 95% *CI* 1.9-5.1, P<0.001) are positively correlated with willingness to pay for the dengue vaccine comparing with poor perceptions. While Perceived Barriers shows no significant effect on willingness to pay for the dengue vaccine.

4. Discussion

In Southeast Sulawesi, this study found that a person's willingness to pay for dengue vaccine increases with their understanding of the risks and advantages of immunization as well as the existence of encouraging outside incentives. According to a prior study, willingness to pay for the dengue vaccination was impacted by perceived susceptibility[19]. Therefore, when the dengue vaccine becomes available in the Indonesian market, policies or guidelines to increase vaccine coverage can be developed based on the evaluation of the HBM constructs (susceptibility, severity, barriers to vaccination, vaccine benefits, and cues to action) and their associations to willingness to pay.

The HBM model could guide the creation of interventions to support dengue vaccination as a spending priority as the HBM components are substantially correlated with willingness to pay for the vaccine. If the cost of the dengue vaccine exceeds a person's willingness to pay, determining their spending priority is crucial to boosting vaccination uptake[29].

4.1. Perceived susceptibility

Although many people are worried about the prospect of getting dengue, only a small percentage believe they are at a high risk of

getting the disease, according to data pertaining to health attitudes and descriptive findings of perceived susceptibility to dengue infection. This implies that the public's perception of risk has to be improved because it has been demonstrated that a high risk perception improves epidemic control and leads to preventative measures in many infectious disease outbreaks[27,29]. The worldwide toll and the massive resource consumption demonstrate the seriousness and danger of dengue illness. Parents who believe that dengue is a dangerous and susceptible disease are more likely to believe that immunizations are effective. These findings lend credence to the idea that parents in this field are aware of the dangers of viral infections. Eradicating misunderstandings or false information on the significance and susceptibility of infectious illnesses is crucial for parents who are thought to be less susceptible to dengue infection.

Other research also revealed that parents who have a high perception of vulnerability are people who believe that their family is vulnerable or at risk of contracting DF. So the greater the perceived risk, the greater the preventive behavior to reduce the risk[24].

In this study, parents' perception of vulnerability was the main factor that motivated them to pay for dengue vaccination. This is due to the fact that, based on previous experiences, parents believe that their children are at risk of DF. The more they believe that their children are at high risk, the more they are motivated to take preventive measures, including paying for vaccination.

4.2. Perceived Severity

Evidence from studies suggests that Perceived Severity of DF can increase parents' willingness to pay for dengue vaccine in Southeast Sulawesi. According to earlier research, the only psychosocial predictor that significantly influenced study participants' willingness to pay for vaccinations was Perceived Severity. The possibility of paying for vaccinations is increased when the illness is viewed as being of high severity[17]. In addition, other studies have also revealed that, in addition to higher price barriers that can affect willingness to pay, Perceived Severity of the disease can also be associated with willingness to pay for vaccines[29]. This is due to parents' beliefs about the negative effects caused by DF. The people of Southeast Sulawesi indicated that they tend to take precautions because they feel that DF is a serious and high-risk disease.

4.3. Perceived Benefits

Based on the findings of this study, there is a significant relationship between the Perceived Benefits and the willingness to pay for dengue vaccines. Previous studies have shown that the Perceived Benefits of vaccination are a good predictor of the willingness to prevent disease by being vaccinated[22]. Other studies have also shown that someone who has a high perception of the benefits of vaccination can increase a person's confidence in taking preventive measures that can provide benefits for their health, namely by spending money on vaccination[19,24]. Therefore, in this study, we interpret that the Perceived Benefits of interest in paying for vaccines have the consequence that the higher the benefits of the vaccine, the higher their interest in paying for the vaccine and *vice versa*.

4.4. Cues to Action

Cues to Action significantly influence willingness to pay for dengue vaccination. Cues to Action can be information, personal experiences, or external incentives that increase parents' awareness and motivation of the importance of dengue vaccination for their children. Previous studies have also found similar findings, Cues to Action are triggers for parents to take health action in the form of dengue vaccination[20,30].

Information is crucial in motivating individuals to get vaccinated against dengue, according to earlier research. Social media, health professionals, the government, and the Ministry of Health may all play a significant part in predicting public interest in urging parents to be vaccinated against dengue[32,33]. The significance of social media as a medium for widespread communication was also mentioned by the WHO. This is done for two reasons: first, social media allows people to interact often and obtain the most recent information rapidly; second, the majority of parents worldwide now utilize social media as a communication tool. The last justification is the dissemination of unfavorable information about vaccinations on social media by anti-vaccine campaigners. Rumors, falsehoods, inaccurate or deceptive information, and other such things are examples of these negative messages. WHO recommends that people respond to these negative messages positively, pay attention to parents' concerns, and correct misinformation[30,33].

Therefore, it is essential to increase vaccine acceptance through public health programs that promote the benefits of vaccination and reduce barriers that prevent vaccination. If there is a signal to act, most respondents will vaccinate if they receive complete information about the vaccine. The results suggest that the government should use national media and social networks to disseminate information about dengue vaccine[20,29].

Other studies also argue that the use of parental action cues to use vaccines comes from within and from outside. Encouragement from within is in the form of the intention to use the dengue vaccine to anticipate the transmission of DF, and encouragement from outside is in the form of family or closest relatives' experiences with DF, health workers so that they can encourage parents to vaccinate their children[34].

This study has several limitations. First, it employed a multicenter crosssectional design involving parents participating in the Posyandu program, in which most participants were mothers. Although this gender predominance might suggest potential selection bias, it does not substantially limit the generalizability of the findings, as the Posyandu program is a nationally implemented and widely attended community health initiative among parents in Indonesia. The high proportion of participants with higher education levels and prior dengue experience should also be considered when interpreting the results.

In conclusion, according to the study's findings, willingness to pay for the dengue vaccination is significantly influenced by Perceived Severity, Perceived Benefits, Perceived Susceptibility, and Cues to Action. These results suggest that a person's willingness to pay for dengue vaccine increases with their understanding of the risks and advantages of immunization as well as the existence of encouraging outside incentives. As a result, these elements are crucial in raising community involvement in the immunization campaign. Other factors that could affect willingness to pay for the dengue vaccination require more investigation.

Conflict of interest statement

There is no conflict of interest in this research.

Funding

This study was supported by Ministry of Higher Education, Science, and Technology Republic of Indonesia (Grant No. 0667/E5/AL.04/2024).

Authors' contributions

M.R.S. and Y.D.P. contributed to the conception and design of the study. Y.D.P., U.K.P.I., E.D., and I.W.R. were responsible for defining the intellectual content and conducting the literature search. U.K.P.I., E.D., and I.W.R. performed the experimental studies and participated in data analysis. M.R.S. contributed to data acquisition, while U.K.P.I., E.D., and I.W.R. performed data analysis. M.R.S. and Y.D.P. carried out the statistical analysis and prepared, edited, and reviewed the manuscript. M.R.S., I.I., F.K., and Y.D.P. also acted as guarantors of the work, taking responsibility for the integrity and accuracy of the data and analysis.

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Edited by Lei Y, Pan Y, Zhang Q