



INTERNATIONAL JOURNAL OF LAW,
GOVERNMENT AND COMMUNICATION
(IJLGC)
www.ijlgc.com



PUBLIC ACCEPTANCE TOWARDS DENGUE PREVENTION TECHNIQUES IN MALAYSIA: A SCOPING REVIEW

Nurul Hannan Ahmad Uma^{1*}, Noor Sharizad Rusly², Nur Asmadayana Hasim³, Yusnaini Md. Yusoff⁴, Muhammad Firdaus Aziz⁵

¹ Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, UKM Bangi
Email: P154059@siswa.ukm.edu.my

² Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, UKM Bangi
Email: n.sharizadrusly@ukm.edu.my

³ Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, UKM Bangi
Email: asmadayana@ukm.edu.my

⁴ Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, UKM Bangi
Email: yusnaini@ukm.edu.my

⁵ Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, UKM Bangi
Email: firdaus95aziz@ukm.edu.my

* Corresponding Author

Article Info:

Article history:

Received date: 27.03.2025

Revised date: 14.04.2025

Accepted date: 15.05.2025

Published date: 05.06.2025

To cite this document:

Uma, N. H. A., Rusly, N. S., Hasim, N. A., Yusoff, Y. M., & Aziz, M. F. (2025). Public Acceptance Towards Dengue Prevention Techniques In Malaysia: A Scoping Review. *International Journal of Law, Government and Communication*, 10 (40), 263-282.

DOI: 10.35631/IJLGC.1040019

Abstract:

This research aims to explore the public's acceptance of dengue prevention techniques in Malaysia, specifically emphasizing alternative approaches like autocidal traps. It offers a recent review and analysis of previous researches, investigating the behavioral factors that impact public support for dengue control techniques. Online articles from Scopus, PubMed, Web of Science, Google Scholar, and UKMLibrary were used. The scoping review protocol was applied in this study. A total of 15 relevant articles published from 2019 to 2025 were filtered and grouped into three primary categories for review: conventional techniques (e.g., fogging, larviciding), alternative techniques (e.g., Wolbachia, GM mosquitoes, autocidal traps), and behavioral factors. Findings indicated that while knowledge, perceived effectiveness, risk perception, and trust in authorities significantly impact acceptance, alternative prevention techniques receive comparatively less public support due to limited awareness and engagement. Furthermore, many current studies lack a theoretical framework, which limits the depth of behavioral understanding. This review underscores the critical need for theory-based public health research to enhance community involvement, particularly in dengue hotspot areas like Klang Valley, and to guide future policies and strategies for dengue prevention.



Introduction

Dengue fever continues to constitute a major vector-borne disease of significant concern in Malaysia, with the incidence of reported cases escalating in frequency and severity, thereby posing an increasing challenge to public health systems. In 2024, Malaysia recorded a total of 122,423 dengue cases, representing a slight decrease of 0.6% compared to the previous year (The Star, 2025). However, the number of dengue-cases deaths increased significantly to 117 cases, marking a 17% rise from 2023 (The Star, 2025). As of 29 April 2025, the cumulative number of reported dengue cases nationwide had reached 19,868 (*iDengue*, 2025.), highlighting that dengue remains a significant public health concern in Malaysia.

For many decades, conventional mosquito control methods such as fogging, larviciding and eliminating mosquito breeding sites have been the main public health strategies used to reduce the spread of dengue. Nevertheless, the persistent outbreaks and the alarming rise in mosquito populations that exhibit resistance to commonly used insecticides strongly indicate that these conventional approaches may no longer suffice in isolation and require complementary strategies. In order to address these issues, alternative techniques, including the implementation of autocidal traps, the introduction of *Wolbachia*-infected mosquitoes, and the utilization of genetically modified (GM) mosquitoes have been developed and introduced to control dengue fever.

Among these innovations, autocidal traps stand out as a particularly promising community-level intervention that effectively mimics natural breeding environments, thereby luring and subsequently exterminating mosquitoes that contribute to the transmission of dengue. Even though these devices have shown strong effectiveness in many field trials, their overall success depends heavily on how well the public accepts them and how actively the community gets involved. This is especially significant in crowded urban areas like the Klang Valley, where the risk of dengue spreading is much higher. The Klang Valley has been identified as the region with the highest incidence of dengue cases in the country, with the state of Selangor consistently reporting the highest number of cases. As of 29 April 2025, Selangor recorded 8,617 cases, accounting for more than 43% of the total national caseload (*iDengue*, 2025). In Klang District alone, 8,202 cases were reported throughout 2024, including three fatalities. Specific localities such as Sentosa, Kota Kemuning, Sementa, and Meru each recorded over 1,000 cases, positioning Klang as one of the most critical dengue hotspots in Malaysia.

A comprehensive investigation conducted by Rusly et al. (2024), which is entitled "Public's Attitudes towards Autocidal Trap in Malaysia," meticulously identifies a significant variables that are instrumental in influencing the public's acceptance of autocidal traps as a viable method for the prevention of dengue fever in Malaysia. The research meticulously emphasizes the importance of acquiring an in-depth understanding of various behavioral components, including perceived benefits, perceived risks, and behavioral intentions, which play crucial roles in shaping the attitudes and acceptance levels of the community towards these preventive measures. In a similar vein, a scholarly study authored by Arham et al. (2023), with the title "Fogging to Combat Dengue: Factors Influencing Stakeholders' Attitudes in Malaysia,"

highlights the critical significance of perceived benefits and trust in authorities as key determinants that shape public attitudes towards the application of fogging techniques to control dengue. Collectively, these studies underscore the undeniable necessity of comprehending the various behavioral factors that influence public perception to significantly enhance the overall effectiveness and efficiency of the diverse strategies employed in dengue prevention initiatives.

This specific research is intended with the clear objective of recognizing and thoroughly analyzing the various factors that greatly affect public acceptance of autocidal traps as a feasible approach for dengue control in the Klang Valley area. Considering the region's notably high population density and the concerning rates of dengue cases, the knowledge acquired from this study is crucial for guiding the creation of effective policy initiatives, improving community involvement, and devising strong implementation plans that can be effectively carried out to alleviate the effects of dengue fever.

Literature Review

This chapter explores the current knowledge base concerning public acceptance of dengue prevention technologies, specifically autocidal traps, within the context of Malaysia. The chapter addresses five main areas: (i) strategies for dengue control in Malaysia, (ii) the significance of public acceptance in vector control measures, (iii) behavioral factors that affect acceptance, (iv) theoretical models that explain these behaviors, and (v) the research gap that inform the current study.

Strategies for Dengue Control in Malaysia

Dengue fever continues to be a significant public health issue in Malaysia, influenced by its tropical climate, rapid urban development, and densely populated areas (Andoy-Galvan et al., 2024). Over the years, the Malaysian government has employed a range of traditional vector control methods to control the spread of the *Aedes* mosquito, which is the primary carrier of dengue. Common techniques encompass fogging, the use of larvicides in aquatic environments, and community-driven sanitation campaigns aimed at removing breeding sites (Taib & Atil, 2023). In addition, Malaysia has historically depended on conventional vector control strategies to address dengue outbreaks, including fogging, larviciding, and environmental sanitation initiatives. These methods are usually carried out by local health authorities and require significant community participation. While they have been effective in the past, their long-term viability is now being questioned due to new challenges, such as insecticide resistance and decreasing public involvement (Dobson, 2021). These strategies have constituted the foundation of Malaysia's dengue control initiatives, frequently implemented reactively during outbreaks and primarily overseen by local health authorities. While these approaches have historically contributed to lowering transmission rates, their reliance on ongoing public involvement has presented persistent challenges.

Nonetheless, the efficacy of these traditional methods has been increasingly undermined by various evolving factors. Insecticide resistance among *Aedes* mosquito populations has been widely reported, reducing the effectiveness of fogging activities (Nurul-Nastasea et al., 2023). Concurrently, public indifference (Kusuma et al., 2021) and distrust towards government initiatives (Costa et al., 2022) have surfaced as significant obstacles to the effectiveness of sanitation campaigns, especially in urban settings where community participation is often inconsistent. These challenges pose serious questions regarding the long-term viability and

cost-effectiveness of conventional dengue control initiatives. Consequently, public health officials and researchers are now investigating alternative and complementary strategies that can overcome these limitations while providing enhanced efficacy.

In response, innovative vector control techniques have gained popularity both in Malaysia and worldwide. These methods include releasing Wolbachia-infected mosquitoes, that reduce dengue transmission by limiting the mosquitoes' ability to carry the virus (Sanggara et al., 2024), using genetically modified (GM) mosquitoes that decrease mosquito populations by causing sterility (Vythilingam & Wan-Yusoff, 2017), and deploying autocidal traps that attract, capture, and kill adult mosquitoes to prevent the spread of dengue (Taib & Atil, 2023). While initial field trials and laboratory studies have yielded encouraging results for these interventions, particularly in high-risk areas, their actual success ultimately hinges on broad public acceptance and effective community-level implementation. Among these emerging solutions, autocidal traps remain the least understood from a social and behavioral standpoint (Ong, 2016), indicating a notable gap in the existing literature concerning public acceptance and sustained adoption in the Malaysian context.

The Significance of Public Acceptance in Vector Control Measures

Public acceptance serves as a vital factor in the effectiveness of public health initiatives, especially those that necessitate ongoing individual involvement or changes in behavior. In the realm of dengue vector control, strategies like fogging and the introduction of innovative technologies, such as autocidal traps, depend on active community engagement to achieve their intended results. The difficulty lies in inspiring individuals to embrace, sustain, and participate in these measures. Although advancements in technology and science regarding vector control are crucial, their effectiveness is dependent upon the willingness of the community to incorporate and endorse these strategies within their everyday lives (Mustapha et al., 2022). The level of public cooperation in dengue management can profoundly affect the success of these initiatives (Pérez & Ochoa-Cortes, 2022), as it hinges on individuals' readiness to take personal responsibility, whether through adopting new preventive technologies or upholding environmental cleanliness.

The significance of public acceptance in vector control has been underscored by numerous studies illustrating that individual perceptions, attitudes, and trust in health authorities significantly impact engagement with health interventions (Jahromi et al., 2024). The Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA) represent two primary frameworks that elucidate how these psychosocial elements influence behavior. Both theories highlight that attitude toward behavior, perceived social norms, and perceived behavioral control are predictors of whether an individual will take action (Gelbrich et al., 2023). In the context of dengue control, if the public perceives a method as ineffective, overly complex, or unnecessary, it is unlikely to gain widespread acceptance, irrespective of its scientific validity (Estallo et al., 2024). Thus, comprehending how the public views and assesses new control technologies, such as autocidal traps, is essential for crafting interventions that resonate with local populations.

Furthermore, there is increasing evidence that the effectiveness of community-based health initiatives, including those addressing vector-borne diseases, is significantly shaped by the communication strategies used to engage the public. Studies have shown that knowledge and attitudes towards dengue significantly impact preventive behaviors. For instance, a study in

Punjab, Pakistan, found a positive relationship between knowledge and attitudes towards dengue, with a 54.7% positive impact on attitudes through public service messages (Rizvi & Ali, 2022). In light of Malaysia's diverse demographic landscape, it is vital to consider how information regarding innovative technologies like autocidal traps is presented to ensure it is relatable and convincing for all communities. Therefore, understanding the elements that drive public acceptance of dengue prevention strategies involves not only assessing the technical efficiency of these approaches but also acknowledging the significance of social dynamics and trust in public health authorities.

Behavioral Factors That Affect Public Acceptance

The literature emphasizes several behavioural factors that affect public acceptance of dengue prevention techniques, with knowledge, perceived effectiveness, trust in authorities, and risk perception standing out as the most significant.

Knowledge

Research conducted by Abd Rahman et al. (2020) highlights the crucial role of public knowledge in shaping perceptions of new technologies. A greater understanding of dengue transmission, the seriousness of its implications, and the strategies employed for its control is associated with an increased likelihood of adopting prevention technologies. However, misinformation or a lack of comprehension can often lead to resistance against new methods. Hence, it is essential to provide thorough and accurate information regarding the advantages and safety of autocidal traps to encourage public support (Tan & Said, 2021).

Perceived Effectiveness

Perceived effectiveness serves as another critical element influencing acceptance. Research consistently indicates that individuals are more inclined to endorse a prevention method if they believe it will significantly reduce the risk of infection. For instance, public interest in technologies like GM mosquitoes has been greater in regions where residents are confident that these interventions will effectively diminish dengue transmission. In the case of autocidal traps, insufficient visible outcomes or a lack of understanding about their operation may impede acceptance. Therefore, presenting concrete evidence of efficacy, especially through local field trials, can be instrumental in overcoming skepticism and fostering trust in the method (Cheah et al., 2022).

Trust In Health Authorities

Trust in health authorities also plays a vital role in shaping acceptance. Public health initiatives are frequently assessed through the prism of trust in governmental bodies and their intentions. If the public questions the competence or integrity of the institutions advocating new technologies, such as autocidal traps, they may be more inclined to dismiss them (Millstein, 1996). Tan and Said (2021) discovered that trust in health authorities significantly affects individuals' willingness to engage in dengue prevention measures. Consequently, transparency, effective communication, and a track record of successful public health programs are essential for cultivating this trust.

Risk Perception

Risk perception is also a critical factor. Individuals who perceive a high level of risk associated with dengue, whether due to personal experiences or elevated transmission rates in their community, are more likely to implement preventive actions (Amin et al., 2021). This

underscores the significance of situational awareness and the contextual factors that influence public behavior in response to disease outbreaks.

Theoretical Models of Behavioural Acceptance

To address the limitations of descriptive models like KAP, recent research has increasingly adopted well-established behavioural theories such as TPB and TRA. It is crucial to use well-established behavioral theories such as the Theory of Planned Behavior (TPB) and the Theory of Reasoned Action (TRA). This is because these theories are widely acknowledged for their capacity to elucidate health-related behaviors, including those pertaining to preventive measures in vector control (Millstein, 1996). According to the TPB, the intentions of individuals to engage in preventive behaviors are shaped by three primary factors: (i) their attitudes toward the behavior, (ii) subjective norms (the social pressure to perform the behavior), and (iii) perceived behavioral control (the perceived ease or difficulty of executing the behavior) (Ajzen, 1991). In the context of autocidal traps, individuals' perceptions of the technology, whether they view it as an effective and user-friendly solution, along with the social norms that promote involvement, can significantly affect their decision to adopt the technology.

In addition, TRA concentrates mainly on the significance of attitudes and subjective norms, positing that behavioral intentions are influenced by an individual's beliefs regarding the consequences of a behavior and the societal pressure to conform (Ajzen, 2012). These theories have been effectively applied in various health settings to anticipate and alter behaviors, such as the uptake of vaccinations and other preventive health measures. In the realm of dengue control, leveraging TPB and TRA can assist in pinpointing the fundamental psychological factors that must be addressed to improve the acceptance of autocidal traps. For instance, if public perceptions are unfavorable or if there is considerable social opposition to the technology, interventions may need to concentrate on reshaping these views through targeted communication and public education initiatives.

Research Gaps and Rationale for Current Study

Despite the rise of alternative technologies for dengue control, the existing literature indicates a significant lack of emphasis on public acceptance of autocidal traps specifically within the Malaysian setting. As noted by Ibrahim et al. (2023), majority studies continue to focus on traditional methods, neglecting the behavioral factors that affect the adoption of innovative interventions.

Moreover, there is a shortage of interdisciplinary research that integrates viewpoints from public health, behavioral sciences, and environmental psychology. This lack of integration obstructs a comprehensive understanding of the public's attitudes and behaviors, and it limits the creation of culturally relevant and socially acceptable dengue prevention approaches. This issue is particularly urgent in urban areas such as Klang Valley, where high population density and elevated transmission risks necessitate more effective and inclusive public health initiatives.

In conclusion, this study aims to fill these gaps by investigating the behavioral factors influencing public acceptance of autocidal traps through the framework of well-established theoretical models. In doing so, it intends to provide valuable insights that aid in the development of sustainable and community-oriented dengue prevention programs.

Method

A scoping review is a relatively new approach to evidence production and differs from systematic reviews in purpose and aims. Scoping reviews aim to provide an overview of the available research evidence without producing a summary answer to a discrete research question (Sucharew & Macaluso, 2019). They highlight the significance of scoping reviews for four primary reasons: (1) to map the existing literature; (2) to identify research gap; (3) to clarify definition and key concept; and (4) to assess the extent of evidence. Scoping reviews are used to organize and chart the available literature on a topic. An overview of these scoping review steps are simplified in Figure 1 below.

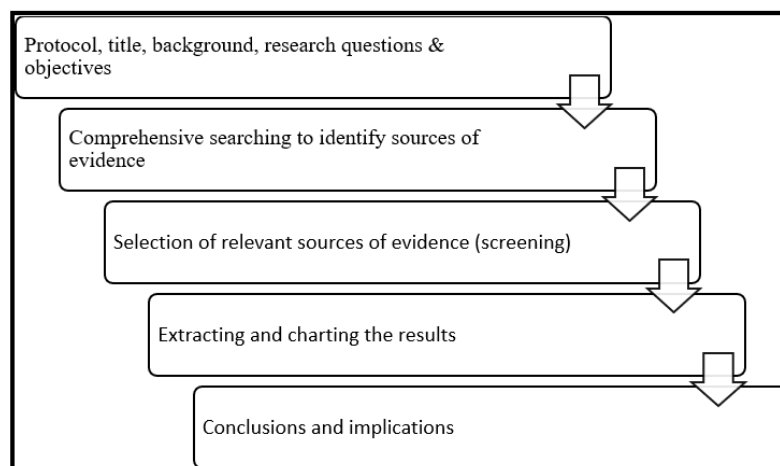


Figure 1: Overview Of Scoping Review Steps

Source: (Sucharew & Macaluso, 2019)

A total of 15 journal articles were chosen to examine the various instruments, approaches, and tactics for implementing the acceptance of dengue prevention techniques among the public. These articles were published in various settings between 2019 and 2025. The articles chosen were related to public acceptance only. The Prisma flow diagram is shown in Figure 4. A total of 82 articles were found from the database, with a combination of journal articles, research papers, and duplicate citations. Relevant articles were systematically chosen to conduct this scoping review.

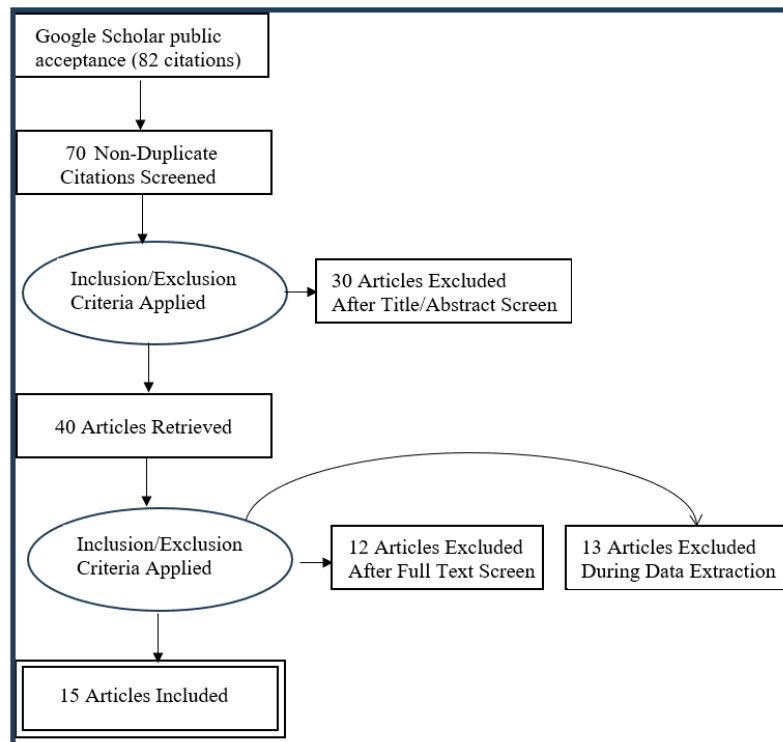


Figure 2: Prisma Flow Diagram

Source: (Sucharew & Macaluso, 2019)

Table 1 shows the inclusion and exclusion criteria for the chosen articles. In general, a few inclusion criteria were applied when choosing the articles. First, the articles had to be published between 2019 and 2025. Second, the articles had to focus on public acceptance. Third, articles had to be specifically examined dengue prevention techniques implemented in Malaysia. Lastly, the findings of the articles had to be able to explain the behavioural factors influencing public acceptance of dengue prevention techniques in Malaysia, particularly in relation to knowledge, perceived effectiveness, trust, and risk perception.

Table 1 : Inclusion and Exclusion Criteria

Criteria	Inclusion Criteria	Exclusion Criteria
Focus of study	Studies on public acceptance of dengue prevention techniques	Studies unrelated to public acceptance or not involving dengue prevention
Geographical scope	Research conducted in Malaysia	Research conducted outside Malaysia
Publication year	Articles published between 2019 and 2025	Articles published before 2019 or not yet peer-reviewed
Type of intervention	Includes fogging, larviciding, source reduction, autocidal traps, Wolbachia, GM mosquitoes	Studies not addressing any dengue prevention technique

Study design	Empirical studies, including surveys, interviews, and case studies	Editorials, opinion pieces, or theoretical papers with no empirical data
---------------------	--	--

Excluded articles were mainly those that did not meet the timeframe. Articles that did not focus on public acceptance of dengue prevention techniques were excluded. The articles chosen had to be directly related to dengue control efforts within the Malaysian context. This was the main exclusion criterion. Some of the excluded articles involved studies conducted outside Malaysia or examined unrelated topics such as clinical treatment or virology. Others did not follow the format of a well-designed empirical study, while a few lacked vital information on methodology or participant criteria. From the 40 articles retrieved, 15 were selected for the scoping review after full-text screening and data extraction.

Results and Discussion

As shown in Table 2, the study on public acceptance towards dengue prevention techniques within the Malaysian population has highlighted significant research gaps, offering chances to improve the effectiveness of dengue prevention techniques. Addressing these gaps will strengthen public health approaches for reducing dengue outbreaks in Malaysia.

Table 2: Inclusion and Exclusion Criteria

No	Name of Author and Year of Publication	Research Title	Summarisation of the Research
1	Rahman et al. (2022)	Scoping Review: Barrier to The Knowledge, Attitude and Practice on Dengue Prevention	The study investigates barriers to the knowledge, attitudes, and practices (KAP) of dengue prevention by reviewing 25 articles published between 2010 and 2018. The research identifies internal factors, such as individuals' attitudes and perceptions, as well as environmental factors, like inadequate drainage systems and building designs that create Aedes mosquito breeding habitats, as key obstacles to effective dengue prevention. The findings emphasize the importance of continuous community programs to improve public awareness and attitudes toward dengue prevention, suggesting that both behavioral and environmental changes are needed to reduce the spread of dengue.
2	Taib & Atil (2023)	Tackling Dengue Issue Need Proactive Measures: A	The review emphasizes the need for a multi-faceted approach to dengue prevention and control in Malaysia,

	Narrative Review of Current Level of Prevention and Control of Dengue in Malaysia	advocating for an integrated strategy that combines environmental management, community involvement, and innovative methods like Wolbachia-infected mosquito releases and sterile insect techniques. It also highlights the importance of proactive measures, such as early warning systems and forecasting models that use meteorological and historical data, to predict dengue outbreaks. These systems enable timely interventions, improving resource allocation and reducing dengue transmission in high-risk areas.
3	Zaki et al. (2019)	Public perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia.
		The study examined Malaysian public perceptions and attitudes towards a dengue early warning system. While 97.1% of respondents were aware of dengue and its link to climate factors, 45% lacked understanding of how climate data could predict outbreaks, revealing a knowledge gap that may hinder engagement. Despite strong awareness and a desire to reduce cases (91.5%), 64% of respondents did not regularly check for local dengue updates. The study emphasizes the need for better public education on the climate-dengue connection and preferred communication methods, with 66.4% of respondents favoring television for receiving early warnings.
4	Jasman et al. (2024)	Dengue prevention and public perception of barriers to eliminate mosquito breeding sites among Malaysians
		This research examines the surge in dengue cases in Malaysia, with a 150.7% increase in 2022 compared to 2021, and evaluates public involvement in dengue prevention. Conducted through a cross-sectional survey in 2020, the study found that only 36.7% of participants engaged in the recommended "Search and Destroy" practice weekly, though many cleaned rain gutters and cleared clogged drains. The study highlights a significant link between compliance

			and house type, with 22.6% of participants perceiving high barriers to dengue prevention. It concludes that addressing these perceptions is essential for controlling dengue spread in Malaysia.
5	Arham et al. (2020)	Predicting Factors and Attitude towards Wolbachia-Infected Aedes Mosquitoes in Malaysia	The research assesses public attitudes towards Wolbachia-infected Aedes mosquitoes as a dengue control method in Malaysia, focusing on factors like trust in key actors, attitudes towards nature versus material, and perceived benefits and risks. Findings show that the public holds a generally positive attitude, perceiving the technique as beneficial while acknowledging moderate risks. This reflects a cautious approach to new technologies and a strong preference for environmental sustainability.
6	Arham et al. (2022)	“To do, or not to do?”: determinants of stakeholders’ acceptance on dengue vaccine using PLS-SEM analysis in Malaysia	This research explores the acceptance of the dengue vaccine among stakeholders in Malaysia, analyzing survey data from 399 respondents, including scientists and the general public, using partial least squares-structural equation modeling (PLS-SEM). The study finds a positive attitude and high perceived benefits of the vaccine, with perceived benefits being the strongest predictor of attitude. Other significant factors include religiosity, attitudes towards technology, and trust in key players. The study suggests that stakeholders are optimistic about the vaccine and calls for intensified research to support its adoption in high-risk areas. It provides insights for public health officials to promote vaccine acceptance in Malaysia and similar regions with high dengue transmission.
7	Ramlee et al. (2023)	Community perspective on prevention and	This research examines the Malaysian community's perceptions of dengue prevention and control strategies,

	control strategies of dengue infection in Malaysia	focusing on mosquito control methods and biocontrol techniques. A survey of 402 respondents in Putrajaya and Selangor found significant concerns about the health (83.0%) and environmental (56.0%) impacts of fogging, the most common mosquito control method. Other methods include ABATE (28.9%) and biocontrol with guppy fish (15.5%). Despite biocontrol methods being considered safe, only 5.0% of respondents were aware of them, with guppy fish identified as the most effective. The study highlights the importance of community perception in dengue control programs and suggests that new community programs could improve mosquito control efforts.
8	Arham et al. (2021) Stakeholders' attitudes to outdoor residual spraying technique for dengue control in Malaysia: A PLS-SEM approach.	This study examines the factors influencing stakeholders' attitudes towards the Outdoor Residual Spraying (ORS) technique for dengue control in Malaysia, using a Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. Conducted with 399 respondents from the Klang Valley, including scientists and the public, the research identifies perceived benefits and trust in key players as significant predictors of positive attitudes towards ORS. Religiosity is found to moderate the relationship between perceived benefits and risks with attitudes towards ORS. The study highlights the importance of social acceptance for the successful implementation of ORS and suggests that understanding these factors can aid policymakers in promoting this technique as an effective alternative for dengue control in developing countries.
9	Arham et al. (2023) Fogging to combat dengue: factors influencing stakeholders' attitudes in Malaysia	This research investigates the attitudes of stakeholders in Malaysia towards fogging, a conventional method used to control Aedes mosquitoes and prevent dengue outbreaks. The study involved

interviews with 399 respondents from the public and scientific community in the Klang Valley region, using a validated instrument to gather data. The analysis, conducted with Partial Least Squares Structural Equation Modeling (PLS-SEM) and Smart-PLS software, revealed that stakeholders generally hold positive views on fogging, despite moderate concerns about its risks. The perceived benefits of fogging emerged as the most influential factor in shaping these attitudes, followed by trust in the key players involved in the process. The findings suggest that while stakeholders support the continued use of fogging, there is a need for improvements in its safety and potential integration with environmentally friendly alternatives to achieve a dengue-free environment in Malaysia. This study provides valuable insights into the educational aspects and underlying factors influencing stakeholder attitudes, offering guidance for public health interventions.

- | | | | |
|----|----------------------------|---|--|
| 10 | Kai et al. (2019) | Perceptions, attitudes, and responses to dengue early warning among urban community in kuala lumpur | This study assessed urban residents' perceptions, attitudes, and responses to a dengue early warning system in Kuala Lumpur. About 75% of respondents found the system useful for community prevention, though many lacked knowledge of the link between climate factors and dengue transmission. The study identified significant associations between age, education level, perception, and attitude with willingness to engage in dengue prevention activities. Higher education and positive perceptions and attitudes were linked to greater community participation in preventive efforts. |
| 11 | Andoy-Galvan et al. (2024) | Understanding the future of dengue in | This study evaluated the knowledge, attitudes, and practices (KAP) of adults |

-
- | | | | |
|----|---|--|--|
| | Malaysia: Assessing knowledge, attitude, and homeowner practices in mitigating climate-driven risks | in low-cost housing (PPR) apartments in Kuala Lumpur regarding dengue prevention. It found that 76.7% had poor knowledge and 83.1% had negative attitudes, although 66.7% showed good preventive practices. Key predictors of KAP levels included community location, marital status, and prior dengue infection. The study highlights the need for targeted, community-specific interventions to improve dengue prevention, especially as climate change increases dengue risk. | |
| 12 | Ahmad Zamzuri et al. (2022) | Perceived Risk for Dengue Infection Mediates the Relationship between Attitude and Practice for Dengue Prevention: A Study in Seremban, Malaysia | This study examines the mediating role of perceived risk in the relationship between individuals' attitudes toward dengue and their preventive practices. Conducted through a cross-sectional survey of 341 respondents in Seremban, Malaysia, the research found that both attitude and risk perception significantly influence dengue prevention behaviors. Perceived risk acts as a partial mediator, indicating that higher risk perception enhances the impact of attitude on preventive practices. The study underscores the importance of risk perception in promoting effective dengue prevention. |
| 13 | Dapari et al. (2024) | Developing and validating a knowledge, attitude, and practice questionnaire regarding dengue among secondary schoolchildren in Malaysia | This study examines the mediating role of perceived risk in the relationship between individuals' attitudes toward dengue and their preventive practices. Conducted through a cross-sectional survey of 341 respondents in Seremban, Malaysia, the research found that both attitude and risk perception significantly influence dengue prevention behaviors. Perceived risk acts as a partial mediator, indicating that higher risk perception enhances the impact of attitude on preventive practices. The study underscores the importance of |
-

-
- risk perception in promoting effective dengue prevention.
- 14 Guad et al. (2021) Development and validation of a structured survey questionnaire on knowledge, attitude, preventive practice, and treatment-seeking behaviour regarding dengue among the resident population of Sabah, Malaysia: an exploratory factor analysis This study developed and validated a structured questionnaire to assess knowledge, attitude, preventive practices, and treatment-seeking behavior related to dengue among 468 residents in Sabah, Malaysia. The community-based cross-sectional study included 82 items covering socio-demographics, KAP, and treatment-seeking behavior. Data analysis using SPSS and R applied two-parameter logistic item response theory (2-PL IRT) for the knowledge section and exploratory factor analysis (EFA) for the remaining sections. Several low-performing knowledge items were removed, resulting in a reliable and valid instrument for future dengue-related research.
- 15 (Ghani et al., 2019) Comparison of Knowledge, Attitude, and Practice among Communities Living in Hotspot and Non-Hotspot Areas of Dengue in Selangor, Malaysia This study compares dengue-related Knowledge, Attitude, and Practice (KAP) between communities in hotspot and non-hotspot areas in Selangor, Malaysia. Results show that non-hotspot residents have significantly better knowledge ($p = 0.003$) and attitudes ($p < 0.001$), while no significant difference was found in practice ($p = 0.101$). Education level and household income were key factors influencing knowledge and attitude, with higher education linked to better outcomes. The study highlights the need for targeted public health education in hotspot areas, especially for populations with lower education and income, to strengthen dengue prevention efforts.
-

Recent research findings collectively provide a comprehensive insight into dengue prevention techniques in Malaysia, highlighting the importance of behavioral, environmental, and technological elements in influencing public reactions and the effectiveness of these programs.

Knowledge, Attitudes, And Practises (KAP)

Numerous studies (Andoy-Galvan et al., 2024; Ghani et al., 2019; Rahman et al., 2022) underscore the gaps in knowledge and attitudes despite fairly good preventive practices among certain groups. For instance, Andoy-Galvan et al., (2024) found that 76.7% of residents in low-cost housing had poor knowledge and 83.1% held negative attitudes toward dengue, although 66.7% practiced preventive measures. Similarly, Ghani et al., (2019) observed that residents in non-hotspot areas showed significantly better knowledge and attitudes than those in hotspot areas. This suggests that socioeconomic and educational backgrounds are strong predictors of KAP levels, necessitating more targeted education campaigns. Efforts to improve assessment tools are evident in the work of Guad et al., (2021), who developed a validated questionnaire to measure KAP and treatment-seeking behaviors among Sabah residents. This reliable tool, refined through 2-PL IRT and EFA analysis, supports future research and intervention evaluations.

Community Engagement And Environmental Barriers

Several studies point to the importance of community-driven interventions and environmental challenges. Rahman et al., (2022) highlighted both internal (attitudes and perceptions) and external (poor infrastructure) barriers to dengue prevention. Jasman et al., (2024) reported low engagement with "Search and Destroy" practices and noted that perceived barriers and house type influenced compliance. Ramlee et al., (2023) emphasized community concerns over fogging's health and environmental effects and noted low awareness (5%) of safer biocontrol methods like guppy fish.

Perceptions Of Innovative Controls Method

Public and stakeholder views on innovative dengue control methods such as Wolbachia-infected mosquitoes and fogging were predominantly positive yet measured. Arham et al., (2020) reported encouraging attitudes towards Wolbachia, influenced by trust and perceived advantages, although worries about potential risks persist. Additionally, Arham et al., (2021, 2023) indicated that perceived advantages and confidence in key stakeholders significantly impacted the acceptance of Outdoor Residual Spraying (ORS) and fogging methods. These findings are vital for the societal acceptance of new vector control technologies.

Early Warning Systems And Risk Perception

Research conducted by Zaki et al., (2019) and Kai et al., (2019) reveals that although there is a high level of awareness regarding dengue and its connection to climate, the public's comprehension of the functioning of early warning systems remains limited. There are significant knowledge gaps, with 45% of individuals uncertain about how climate data correlates with dengue outbreaks (Zaki et al., 2019). Nonetheless, 75% of participants considered these systems to be beneficial (Kai et al., 2019), indicating a strong opportunity for increased engagement through improved education and communication. Ahmad Zamzuri et al., (2022) further highlighted that the perception of risk influences the link between attitude and behavior, suggesting that enhancing perceived vulnerability could bolster prevention techniques.

Stakeholders' Acceptance Of Dengue Vaccines And Spraying Techniques

A study conducted by Arham et al., (2022) indicates that Malaysian stakeholders are optimistic about the dengue vaccine, with the perceived advantages being the most significant predictor of their attitudes and intentions to embrace it. Additionally, factors like religiosity, trust in

authorities, and attitudes towards technology also had considerable influence. Similar patterns were observed in attitudes towards fogging and ORS (Arham et al., 2021, 2023), where trust and perceptions of benefits affected acceptance.

Conclusion

This scoping review highlights that public acceptance is crucial for the success of dengue prevention strategies in Malaysia, especially with emerging technologies like autocidal traps, Wolbachia-infected mosquitoes, and GM mosquitoes. While traditional methods such as fogging remain common, their effectiveness is increasingly limited by insecticide resistance and declining public participation. Key determinants of acceptance such as knowledge, perceived effectiveness, trust in authorities, and risk perception must be addressed through targeted education and transparent communication. Applying behavioral theories like the Theory of Planned Behavior and Theory of Reasoned Action can enhance understanding of public attitudes and inform more effective interventions. Ultimately, fostering community engagement and trust, particularly in urban high-risk areas like Klang Valley, is essential for advancing sustainable, community-driven dengue prevention programs in Malaysia.

Acknowledgement

This research received financial support from the Ministry of Higher Education (MOHE) via the Fundamental Research Grant Scheme (FRGS), grant number FRGS/1/2023/SSI03/UKM/02/1, as well as from Universiti Kebangsaan Malaysia for their assistance with this study.

References

- Ahmad Zamzuri, M. ‘Ammar I., Abd Majid, F. N., Dapari, R., Hassan, M. R., & Isa, A. M. M. (2022). Perceived Risk for Dengue Infection Mediates the Relationship between Attitude and Practice for Dengue Prevention: A Study in Seremban, Malaysia. *International Journal of Environmental Research and Public Health*, 19(20), Article 20. <https://doi.org/10.3390/ijerph192013252>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2012). Martin fishbein’s legacy: The reasoned action approach. *Annals of the American Academy of Political and Social Science*, 640(1), 11–27. Scopus. <https://doi.org/10.1177/0002716211423363>
- Andoy-Galvan, J. A., Patil, S. S., Wong, Y. H., Madhavan, P., Wee, L. H., Chong, P. P., Looi, C. Y., Shaik, I., Ponnupillai, A., Hasamnis, A. A., Bhargava, P., Mugilarasi, A., Wong, E. H., Yeong, C. H., Yau, W. K., Dinesh, M., Venugopalan, K. B., Muhamad, N. A., Ma’amor, N. H., ... Leman, F. N. (2024). Understanding the future of dengue in Malaysia: Assessing knowledge, attitude, and homeowner practices in mitigating climate-driven risks (No. 13:1355). *F1000Research*. <https://doi.org/10.12688/f1000research.157226.1>
- Arham, A. F., Amin, L., Mahadi, Z., Yaacob, M., & Razman, M. R. (2020). Predicting Factors and Attitude towards Wolbachia-Infected Aedes Mosquitoes in Malaysia. 19(2).
- Arham, A. F., Amin, L., Mustapa, M. A. C., Mahadi, Z., Yaacob, M., Arham, A. F., & Norizan, N. S. (2022). “To do, or not to do?”: Determinants of stakeholders’ acceptance on dengue vaccine using PLS-SEM analysis in Malaysia. *BMC Public Health*, 22(1), 1574. <https://doi.org/10.1186/s12889-022-13967-3>

- Arham, A. F., Amin, L., Mustapa, M. A. C., Mahadi, Z., Yaacob, M., & Ibrahim, M. (2021). Stakeholders' attitudes to outdoor residual spraying technique for dengue control in Malaysia: A PLS-SEM approach. *PLOS Neglected Tropical Diseases*, 15(6), e0009493. <https://doi.org/10.1371/journal.pntd.0009493>
- Arham, A. F., Amin, L., Mustapa, M. A. C., Mahadi, Z., Yaacob, M., Wasli, M. M. P., & Rusly, N. S. (2023). Fogging to combat dengue: Factors influencing stakeholders' attitudes in Malaysia. *BMC Public Health*, 23(1), 1140. <https://doi.org/10.1186/s12889-023-16054-3>
- Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Luchetti, M., Terracciano, A., & Sutin, A. R. (2021). Preventive Behaviors During the COVID-19 Pandemic: Associations With Perceived Behavioral Control, Attitudes, and Subjective Norm. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.662835>
- Ayodele, J. O., Kromberg Underwood, M. L., Ammari, D. A., Goldstone, K., & Agogo, E. (2024). Chapter 24—Enhancing trust and transparency for public health programs. In S. J. N. McNabb, A. T. Shaikh, & C. J. Haley (Eds.), *Modernizing Global Health Security to Prevent, Detect, and Respond* (pp. 457–473). Academic Press. <https://doi.org/10.1016/B978-0-323-90945-7.00008-7>
- Bagasra, A., Allen, C. T., & Doan, S. (2023). Perceived Effectiveness of COVID-19 Preventive Practices and Behavioral Intention: Survey of a Representative Adult Sample in the United States. *JMIR Human Factors*, 10, e39919. <https://doi.org/10.2196/39919>
- Cooper, C. A. (2023). Vaccine hesitancy and respect for public health measures: Citizens' trust in politicians and public servants across national, subnational and municipal levels of government. *SSM - Population Health*, 22, 101386. <https://doi.org/10.1016/j.ssmph.2023.101386>
- Costa, L. D. da, Barros, A. D., Lorenzo, C., Mendonça, A. V. M., & Sousa, M. F. de. (2022). Perception of the population on the role of authorities and communities in controlling arboviruses. *Saúde Em Debate*, 46, 790–802. <https://doi.org/10.1590/0103-1104202213414I>
- Dapari, R., Muniandy, K., Hwa, L. C., Bakar, S. A., Desa, M. N. M., Sandhu, S. S., Mustapha, N. F., Zamzuri, M., 'Ammar I. A., Hassan, M. R., Dom, N. C., & Rahim, S. S. S. A. (2024). Developing and validating a knowledge, attitude, and practice questionnaire regarding dengue among secondary schoolchildren in Malaysia. *Discover Social Science and Health*, 4(1), 68. <https://doi.org/10.1007/s44155-024-00130-z>
- Dengue cases drop in Malaysia, but deaths rise by 17%, says Ahmad Zahid. (2025, January 28). *The Star*. <https://www.thestar.com.my/news/nation/2025/01/28/dengue-cases-drop-in-malaysia-but-deaths-rise-by-17-says-ahmad-zahid>
- Dobson, S. L. (2021). When More is Less: Mosquito Population Suppression Using Sterile, Incompatible and Genetically Modified Male Mosquitoes. *Journal of Medical Entomology*, 58(5), 1980–1986. <https://doi.org/10.1093/jme/tjab025>
- Estallo, E. L., Madelon, M. I., Benítez, E. M., Camacho-Rodríguez, D., Martín, M. E., Stewart-Ibarra, A. M., & Ludueña-Almeida, F. F. (2024). Empowering Communities through Citizen Science: Dengue Prevention in Córdoba. *Biology*, 13(10), Article 10. <https://doi.org/10.3390/biology13100826>
- Gelbrich, K., Müller, S., & Westjohn, S. (2023). Chapter 16: Behavior and prediction of behavior. <https://www.elgaronline.com/monochap/book/9781803923192/book-part-9781803923192-22.xml>
- Ghani, N. A., Shohaimi, S., Hee, A. K.-W., Chee, H.-Y., Emmanuel, O., & Alaba Ajibola, L. S. (2019). Comparison of Knowledge, Attitude, and Practice among Communities Living

- in Hotspot and Non-Hotspot Areas of Dengue in Selangor, Malaysia. *Tropical Medicine and Infectious Disease*, 4(1), Article 1. <https://doi.org/10.3390/tropicalmed4010037>
- Guad, R. M., Mangantig, E., Low, W. Y., Taylor-Robinson, A. W., Azzani, M., Sekaran, S. D., Sim, M. S., & Azizan, N. (2021). Development and validation of a structured survey questionnaire on knowledge, attitude, preventive practice, and treatment-seeking behaviour regarding dengue among the resident population of Sabah, Malaysia: An exploratory factor analysis. *BMC Infectious Diseases*, 21(1), 893. <https://doi.org/10.1186/s12879-021-06606-6>
- iDengue_Version 3.0. (n.d.). Retrieved April 30, 2025, from https://idengue.mysa.gov.my/ide_v3/index.php?utm_source
- Jahromi, A. S., Jokar, M., Abdous, A., Sharifi, N., Abbasi, T., & Rahmanian, V. (2024). Global systematic review and meta-analysis of knowledge, attitudes, and practices towards dengue fever among the general population. *Asian Pacific Journal of Tropical Medicine*, 17(5), 191. https://doi.org/10.4103/apjtm.apjtm_925_23
- Jasman, N., Farhana, S. N., Saleh, K. Z., Jaafar, N., Zaini, Z., Kaundan, M. K., & Panting, A. J. (2024). DENGUE PREVENTION AND PUBLIC PERCEPTION OF BARRIERS TO ELIMINATE MOSQUITO BREEDING SITES AMONG MALAYSIANS. *The Indonesian Journal of Public Health*, 19(3), Article 3. <https://doi.org/10.20473/ijph.v19i3.2024.406-418>
- Kai, L. Y., Yu, C. Y., Yee, K. P., Abdullah, S. N., Hang, T. Q., Rahimi, A., Yusop, M. S., Ismail, F. Z., Farid, N. D. N., How, L. S., & Zaki, R. A. (2019). PERCEPTIONS, ATTITUDES, AND RESPONSES TO DENGUE EARLY WARNING AMONG URBAN COMMUNITY IN KUALA LUMPUR. *Malaysian Journal of Public Health Medicine*, 19(2), Article 2. <https://doi.org/10.37268/mjphm/vol.19/no.2/art.292>
- Kusuma, Y. S., Goswami, A. K., & Babu, B. V. (2021). Dengue awareness, preventive behaviours and Aedes breeding opportunities among slums and slum-like pockets in Delhi, India: A formative assessment. *Transactions of The Royal Society of Tropical Medicine and Hygiene*, 115(6), 653–663. <https://doi.org/10.1093/trstmh/traa103>
- Millstein, S. G. (1996). Utility of the theories of reasoned action and planned behavior for predicting physician behavior: A prospective analysis. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 15(5), 398–402. <https://doi.org/10.1037//0278-6133.15.5.398>
- Mustapha, S. N. I., Shohaimi, S., Adam, M. B., Nallappan, M., Ab Rahman, A. H., & Salari, N. (2022). A Comparative Study on Dengue-related Knowledge, Attitude, and Practice in Hotspot and Non-Hotspot Areas in Selangor. *Pertanika Journal of Science and Technology*, 31(1), 437–456. <https://doi.org/10.47836/pjst.31.1.26>
- Nurul-Nastasea, S., Yu, K.-X., Rohani, A., Zurainee, M. N., Tengku-Idris, T. I. N., Dianita, R., Sabrina, M. R., & Wan Najdah, W. M. A. (2023). Insecticide resistance status of *Aedes aegypti* and *Aedes albopictus* in Malaysia (2010 to 2022): A review. *Asian Pacific Journal of Tropical Medicine*, 16(10), 434. <https://doi.org/10.4103/1995-7645.378561>
- Ong, S.-Q. (2016). *Dengue Vector Control in Malaysia: A Review for Current and Alternative Strategies*.
- Pérez, R. margarita H., & Ochoa-Cortes, F. (2022). Participación comunitaria para combatir el dengue. *Ciencia Huasteca Boletín Científico de la Escuela Superior de Huejutla*, 10(20), Article 20. <https://doi.org/10.29057/esh.v10i20.8207>
- Rahman, A. B., Jasman, N., Ahmad, N., Salleh, K. Z., Harun, S. N. F., & Krishnan, M. (2022). Scoping Review: Barrier to The Knowledge, Attitude and Practice on Dengue

- Prevention. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(4), Article 4. <https://doi.org/10.47405/mjssh.v7i4.1421>
- Ramlee, S. N. S., Yusof, N., Azirun, S., Kassim, Z., Saidi, L. A., & Yusof, W. S. E. Y. W. (2023). COMMUNITY PERSPECTIVE ON PREVENTION AND CONTROL STRATEGIES OF DENGUE INFECTION IN MALAYSIA. *Zulfaqr Journal of Defence Management, Social Science & Humanities*, 6(2), Article 2. <https://zulfaqrjdmssh.upnm.edu.my/index.php/zjdmssh/article/view/126>
- Rizvi, S. A. A., & Ali, S. (2022). Analyzing & Evaluating the Effects of Public Service Messages about Dengue in Punjab-Pakistan. *PERENNIAL JOURNAL OF HISTORY*, 3(1), Article 1. <https://doi.org/10.52700/pjh.v3i1.110>
- Rusly, N. S., Arham, A. F., & Amin, L. (2024). Public's attitudes towards autocidal trap in Malaysia. *International Journal of Health Sciences*, 8(2), Article 2. <https://doi.org/10.53730/ijhs.v8n2.14992>
- Sanggara, P. M., Dewi, D. A. R., Alfiansyah, F., Susila, G. B. N. K. T., Widuri, L. I. T., Eleje, G. U., Sylfiasari, R., Ulfa, F., & Alexander, A. (2024). The Effectiveness of Wolbachia Deployment as a Dengue Control Method: A Systematic Review. *OSF*. <https://doi.org/10.31219/osf.io/du8x4>
- Sauchelli, S., Pickles, T., Voinescu, A., Choi, H., Sherlock, B., Zhang, J., Colyer, S., Grant, S., Sundari, S., & Lasseter, G. (2023). Public attitudes towards the use of novel technologies in their future healthcare: A UK survey. *BMC Medical Informatics and Decision Making*, 23(1), 38. <https://doi.org/10.1186/s12911-023-02118-2>
- Shafie, A. A., Moreira, E. D., Di Pasquale, A., Demuth, D., & Yin, J. Y. S. (2023). Knowledge, Attitudes and Practices toward Dengue Fever, Vector Control, and Vaccine Acceptance Among the General Population in Countries from Latin America and Asia Pacific: A Cross-Sectional Study (GEMKAP). *Vaccines*, 11(3), Article 3. <https://doi.org/10.3390/vaccines11030575>
- Sucharew, H., & Macaluso, M. (2019). Methods for Research Evidence Synthesis: The Scoping Review Approach. *Journal of Hospital Medicine*, 14(7), 416–418. <https://doi.org/10.12788/jhm.3248>
- Taib, N. M., & Atil, A. (2023). Tackling Dengue Issue Need Proactive Measures: A Narrative Review of Current Level of Prevention and Control of Dengue in Malaysia. *Archives of Epidemiology & Public Health Research*, 2(1), 148–153.
- Vythilingam, I., & Wan-Yusoff, W. S. (2017). Dengue vector control in Malaysia: Are we moving in the right direction? *Tropical Biomedicine*, 34(4), 746–758.
- Zaki, R., Roffeei, S. N., Hii, Y. L., Yahya, A., Appannan, M., Said, M. A., Wan, N. C., Aghamohammadi, N., Hairi, N. N., Bulgiba, A., Quam, M., & Rocklov, J. (2019). Public perception and attitude towards dengue prevention activity and response to dengue early warning in Malaysia. *PLOS ONE*, 14(2), e0212497. <https://doi.org/10.1371/journal.pone.0212497>