# HEALTHCARE WORKERS' PERCEPTIONS, ATTITUDES, AND DETERMINANTS OF THEIR WILLINGNESS TO PARTICIPATE IN COMMUNITY DENGUE PREVENTION AND CONTROL ACTIVITIES

Nur Ar Rabiah **Ahmad**[1,2]*, Farizah **Mohd Hairi**[2] , Zaza Hulwanee **Mohd Zainee**[3], N Bakaiwati S.P. **Nadarajan**[4], Nur'ain **Mohd Ghazali**[1]

[1]Biomedical Epidemiology Unit, Special Resource Centre, Institute for Medical Research, National Institutes of Health, Ministry of Health Malaysia, Jalan Setia Murni U13/52, Seksyen U13 Setia Alam, 40170 Shah Alam, Selangor, Malaysia.

[2]Department of Social Preventive Medicine, University of Malaya, 50603 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia.

[3]Vector Unit, Public Health Division, Negeri Sembilan State Health Department, Jalan Rasah, Bukit Rasah, 70300 Seremban, Negeri Sembilan, Malaysia.

[4]Quality Unit, Seremban District Health Office, Jalan Lee Sam, Bandar Seremban, 70590 Seremban, Negeri Sembilan, Malaysia.

Corresponding author: arrabiah@moh.gov.my

## ABSTRACT

Dengue fever remains a significant public health concern in Malaysia, with healthcare workers (HCWs) playing a critical role in managing cases and educating communities. However, their engagement in community dengue prevention and control activities is not well understood. Therefore, this study examined HCWs' perceptions, attitudes, and the factors associated with their willingness to participate in community dengue prevention and control activities. The cross-sectional study was conducted among 240 HCWs across two medical facilities from February to March 2024. Perceptions and attitudes were assessed using a validated self-administered questionnaire. Data were analyzed descriptively, and the association was examined using multivariable logistic regression. All of the participants (100%) perceived themselves as having knowledge about dengue, dengue mortality (98.3%), dengue prevention (89.6%) and the usefulness of dengue early warning tools (91.7%). Additionally, the majority of HCWs demonstrated positive attitudes towards community dengue prevention and control activities. However, some expressed concern about the effectiveness of their efforts without community participation (27.1%) and reliable outbreak predictions (10.8%). Multivariable analysis showed that HCWs who perceived themselves as knowledgeable about dengue prevention (aOR: 8.39, 95%CI: 2.86-24.56), wanted to reduce dengue cases (aOR:13.68, 95%CI: 1.83-102.22) and regularly monitored dengue situations/hotspots (aOR:5.42, 95%CI: 2.14-13.72) were significantly more willing to participate in community dengue prevention and control activities. Overall, the study shows that HCWs generally exhibit positive perceptions and attitudes towards community dengue prevention and control activities, which are strongly associated with their willingness to participate in these efforts.

**KEYWORDS**: Dengue, Healthcare workers, Perception, Attitude, Prevention

## INTRODUCTION

Dengue is a viral disease caused by four closely related serotypes (DENV-1 to DENV-4) of the Flaviviridae family (Back and Lundkvist 2013), with clinical outcomes ranging from mild fever to severe, life-threatening conditions. Endemic in 128 countries, including tropical and subtropical regions, dengue affects an estimated 50 to 100 million people annually, resulting in around 20,000 deaths worldwide (Salim et al. 2021; Abidemi, Abd Aziz, and Ahmad 2020). In Malaysia, dengue has been endemic since its first documentation in 1902 in Penang (Pang and Loh 2016), with cyclical outbreaks recorded every four to five years, most notably in 2010, 2015, and 2019. The Ministry of Health (MOH) anticipates a significant surge in dengue cases in 2024 and 2025, potentially surpassing previous records (CodeBlue 2022).

Dengue outbreaks have escalated rapidly, leading to serious public health threats, economic losses, and social disruptions. Meteorological factors such as rainfall, temperature, and humidity play a significant role in dengue transmission by influencing the behaviour and breeding of *Aedes* mosquitoes (Singh et al. 2022; Xu et al. 2014). Malaysia's climate, characterized by these factors, facilitates increased mosquito populations and heightens transmission risks. Effective community-level dengue prevention and control measures, such as the use of mosquito nets and repellents by individuals, public clean-up initiatives (e.g.: "gotong-royong"), activities to eliminate mosquito breeding sites, and home-based larvicide application, are crucial in supporting the MOH in managing dengue. These efforts promote healthy behavioural changes and encourage shared responsibility within communities (Singh and Taylor-Robinson 2017; Ong 2016).

Healthcare workers (HCWs) are uniquely positioned in dengue management as both community members and health professionals. Their perceptions and involvement in community dengue prevention and control activities are crucial, yet the extent to which they translate their knowledge into effective participation remains unclear. Previous research has primarily focused on the general public's perceptions and attitudes towards dengue prevention, showing a strong desire for community involvement (Zaki et al. 2019; Leong et al. 2019). However, to our knowledge, no study has specifically explored HCWs' unique perspectives on this issue. Research has also demonstrated that while HCWs generally possess a good understanding of dengue transmission and prevention, their practices often fall short due to barriers, such as time constraints and perceived role limitations (Nikookar et al. 2023; Suwanbamrung et al. 2020). Public health campaigns tend to target the general population, potentially overlooking the specific needs and challenges faced by HCWs. Additionally, some studies indicate that HCWs may view dengue prevention as primarily a government responsibility, leading to an overreliance on governmental measures and a lack of personal initiative in community activities (Nikookar et al. 2023). Although research has assessed the knowledge, attitudes, and practices (KAP) of HCWs regarding dengue (Selvarajoo et al. 2020), there remains a gap in understanding how these factors influence their participation in community-level activities. Moreover, most studies focus on HCWs' roles within clinical settings, rather than their role in the community.

Therefore, this study aims to fill this gap by assessing HCWs' perceptions and attitudes towards community dengue prevention and control activities and identifying the factors associated with their willingness to engage in these efforts. By focusing on HCWs' unique perspectives, this study provides insights into enhancing their role in public health strategies beyond their routine duties, ultimately contributing to more effective and sustained dengue prevention efforts.

## MATERIAL AND METHODS

### Study setting, sampling, sample size and instrument

This study employed an analytical cross-sectional design involving 240 HCWs selected through simple random sampling from a state health department and a district health office, conducted in Malaysia from February to March 2024. The sample size was estimated at 240 using the single population proportion formula with a 10% inflation rate. HCWs' perceptions, attitudes and willingness to participate in community dengue prevention and control activities were assessed using a validated bilingual self-administered questionnaire with binary response options adopted from a study by Zaki et al. (2019).

### Statistical analyses

Descriptive analysis included frequencies and percentages. Binary logistic regression was conducted using Jeffreys's Amazing Statistic Program (JASP) 0.17.1 to determine factors associated with HCWs' willingness to participate in community dengue prevention and control activities. Variables that demonstrated a p-value < 0.25 in the univariable

analysis were then selected for inclusion in the multivariable logistic regression analysis, which was conducted using the stepwise method. Assumptions of logistic regression were sufficiently met before analyses. Odds ratio (OR) and the 95% confidence intervals (95% CI) were reported, with the significance level set at $p < 0.05$.

## RESULTS

### HCWs' socio-demographic characteristics

Of the 240 HCWs, 138 (57.5%) and 102 (42.5%) were females and males respectively. The majority of HCWs were over 30 years old (91.2%), Malays (85.8%) and owned current residences (78.7%) which are predominantly terrace houses (69.6%). In addition, most HCWs were married (86.7%) with household sizes equal to or more than 5 people (54.2%) and a household monthly income of more than RM6,000 (54.2%). The majority of HCWs have never been infected with dengue (75.4%) and have not managed dengue before at their workplace (75.8%) (as shown in Table 1).

**Table 1.** Socio-demographic characteristics of HCWs (n=240)

| Variables | Response | Frequency (%) |
|---|---|---|
| Gender | Female | 138 (57.5%) |
| | Male | 102 (42.5%) |
| Age | >20 - 30 years | 21 (8.8%) |
| | >30 - 40 years | 98 (40.8%) |
| | >40 - 50 years | 81 (33.8%) |
| | >50 years | 40 (16.7%) |
| Race | Malay | 206 (85.8%) |
| | Chinese | 5 (2.1%) |
| | Indian | 21 (8.8%) |
| | Others | 8 (3.3%) |
| Own current residence | No | 51 (21.3%) |
| | Yes | 189 (78.7%) |
| Type of house | Individual house | 27 (11.3%) |
| | Twin/Semi-D | 24 (10.0%) |
| | Terrace | 167 (69.6%) |
| | Flat | 10 (4.1%) |
| | Apartment/Condominium | 12 (5.0%) |
| Highest education | Secondary school | 54 (22.5%) |
| | Diploma | 84 (35.0%) |
| | Degree | 72 (30.0%) |
| | Master | 30 (12.5%) |
| Marital status | Single | 26 (10.8%) |
| | Married | 208 (86.7%) |
| | Divorced | 3 (1.3%) |
| | Widow/widower | 3 (1.3%) |
| Division | Management | 62 (25.8%) |
| | Public Health | 122 (50.8%) |
| | Medical | 8 (3.3%) |
| | Dentistry | 8 (3.3%) |
| | Pharmacy | 24 (10.0%) |

| | Food Safety & Quality | 16 (6.7%) |
|---|---|---|
| Manage dengue at the workplace? | No | 182 (75.8%) |
| | Yes | 58 (24.2%) |
| Infected by dengue? | No | 181 (75.4%) |
| | Yes | 59 (24.6%) |
| No. of people in the household | < 5 people | 110 (45.8%) |
| | ≥ 5 people | 130 (54.2%) |
| Household monthly income | ≤ RM 6,000 | 110 (45.8%) |
| | > RM 6,000 | 130 (54.2%) |

**HCWs' perceptions towards community dengue prevention and control activities**

All HCWs stated that they know what dengue is. Most HCWs correctly acknowledged that dengue can cause mortality (98.3%), believed that they and their families could be infected by dengue (93.3%), had low to medium risk of getting dengue infection (77%), had sufficient knowledge to prevent dengue (89.6%), agreed on dengue reinfection (69.2%), were very concerned regarding recurrent dengue infection (80%) and perceived early warning as a useful tool for dengue prevention (91.7%). However, the majority do not perceive dengue as a serious problem in their residential areas (55.4%) as shown in Table 2. Furthermore, the majority of HCWs perceived that every household (97.5%), health authorities (95.4%), local councils (93.7%), and community leaders (90.8%) should be responsible for community dengue prevention and control activities (as shown in Figure 1).

**Table 2.** Perceptions of HCWs towards community dengue prevention and control activities (n=240)

| Variables | Response | Frequency (%) |
|---|---|---|
| You know what dengue is | Yes | 240 (100%) |
| Dengue can cause mortality | No | 4 (1.7%) |
| | Yes | 236 (98.3%) |
| You and your family can get dengue | No | 16 (6.7%) |
| | Yes | 224 (93.3%) |
| What is your risk of getting dengue? | High | 55 (23%) |
| | Medium | 117 (48.7%) |
| | Low | 68 (28.3%) |
| Do you have sufficient knowledge to prevent dengue? | No | 25 (10.4%) |
| | Yes | 215 (89.6%) |
| Dengue is serious in your area | No | 133 (55.4%) |
| | Yes | 107 (44.6%) |
| You can get dengue many times | No | 74 (30.8%) |
| | Yes | 166 (69.2%) |
| How concerned are you if it is second time dengue infection? | Concerned | 42 (17.5%) |
| | Slightly | 6 (2.5%) |
| | Very | 192 (80%) |
| Early warning is a useful tool for preventive measure | No | 20 (8.3%) |
| | Yes | 220 (91.7%) |

**Figure 1.** Entities perceived by HCWs as responsible for community dengue prevention and control activities (n=240)

**HCWs' attitudes towards community dengue prevention and control activities**

The majority of HCWs showed a strong willingness to reduce dengue cases in their areas (97.5%), emphasized the importance of dengue early warnings for outbreak prevention (99.2%), and acknowledged that early warnings help to prevent the disease (97.9%). They regularly checked dengue situations/hotspots (55.8%), viewed chemical fogging alone as insufficient (68.8%), and were ready to take additional preventive measures if dengue risk increased (95.4%). They recognized the responsibility to remove mosquito breeding sites both personally (97.5%) and by their families (90.8%) and were confident in their role in dengue reduction (99.2%). HCWs also agreed that dengue outbreaks in their community can be controlled if every household is committed to removing mosquito breeding sites (98.7%) and that consistently eliminating these sites, even during non-outbreak periods (97.1%), is essential.

Upon receiving an early warning, HCWs will increase source reduction activities (97.9%), share the information with others (94.2%), avoid outdoor activities at dawn or dusk (91.7%), request for chemical fogging (64.6%), call local authorities for control measures (55.4%) and use a mosquito net to prevent bites (55%).

Despite this, some HCWs felt confident in early warnings only if issued by government agencies (77.1%) and believed their efforts would be wasted if neighbours did not participate in prevention measures (27.1%) or if outbreak predictions failed (10.8%). Some of them also relied on information about outbreak severity to determine the necessity of preventive actions (79.2%) and might discontinue preventive measures if the dengue risk appeared low (14.2%). Additionally, they thought no further measures were needed due to government actions were already in place (6.3%) (as shown in Table 3).

**Table 3.** Attitude of HCWs towards community dengue prevention activities (n=240)

| Variables | Response | Frequency (%) |
|---|---|---|
| Want to help to reduce the number of dengue cases in my area | No | 6 (2.5%) |
| | Yes | 234 (97.5%) |
| Early warnings important for outbreak prevention | No | 2 (0.8%) |
| | Yes | 238 (99.2%) |
| A warning of dengue in advance helps to avoid dengue | No | 5 (2.1%) |
| | Yes | 235 (97.9%) |
| Believe an early warning only if the information is provided by the government | No | 55 (22.9%) |
| | Yes | 185 (77.1%) |
| I check current dengue situations or hotspots around my area regularly | No | 106 (44.2%) |
| | Yes | 134 (55.8%) |
| Chemical fogging by the local authority is good enough for us to prevent dengue infection | No | 165 (68.8%) |
| | Yes | 75 (31.2%) |
| I will take extra action to prevent dengue infection if I know the risk of dengue is increasing | No | 11 (4.6%) |
| | Yes | 229 (95.4%) |
| Not my responsibility to remove mosquito breeding sites in my residence | No | 234 (97.5%) |
| | Yes | 6 (2.5%) |
| Responsibility of my family member to remove mosquito breeding sites in my residence | No | 22 (9.2%) |
| | Yes | 218 (90.8%) |
| I can help to reduce dengue cases in my area by removing mosquito breeding sites at home | No | 2 (0.8%) |
| | Yes | 238 (99.2%) |
| Dengue outbreak in my community can be controlled if every household is committed to remove mosquito breeding sites | No | 3 (1.3%) |
| | Yes | 237 (98.7%) |
| A waste of time and effort on dengue control if the prediction does not come true | No | 214 (89.2%) |
| | Yes | 26 (10.8%) |
| Pointless for me to take action since my neighbours will not | No | 175 (72.9%) |
| | Yes | 65 (27.1%) |
| I need to know how severe the predicted dengue outbreak will be in order to decide whether preventive measures are required | No | 50 (20.8%) |
| | Yes | 190 (79.2%) |
| I will stop the actions to prevent dengue infection if I know the risk of dengue in my area is low | No | 206 (85.8%) |
| | Yes | 34 (14.2%) |
| Individual households do not need to do anything because the government already did | No | 225 (93.7%) |
| | Yes | 15 (6.3%) |
| Necessary to continue the removal of mosquito breeding at home even during the period when there's no dengue outbreak | No | 7 (2.9%) |
| | Yes | 233 (97.1%) |

**Table 3.** continued.

| Variables | Response | Frequency (%) |
|---|---|---|
| After I receive an early warning of dengue outbreak from the government agency, I will: | | |
| a) Increase source reduction | Yes | 235 (97.9%) |
| | No | 5 (2.1%) |
| b) Avoid outdoor activities at dawn or dusk | Yes | 220 (91.7%) |
| | No | 20 (8.3%) |
| c) Share information with others | Yes | 226 (94.2%) |
| | No | 14 (5.8%) |
| d) Request chemical fogging | Yes | 155 (64.6%) |
| | No | 85 (35.4%) |
| e) Call local authorities | Yes | 133 (55.4%) |
| | No | 107 (44.6%) |
| f) Use mosquito net | Yes | 132 (55%) |
| | No | 108 (45%) |

**Factors associated with HCWs' willingness to participate in community dengue prevention and control activities**

Following multivariable analysis, it was found that the perception of having sufficient knowledge about dengue prevention (aOR: 8.39, 95%CI: 2.86-24.56), having a motivated attitude to reduce dengue cases in residential areas (aOR:13.68, 95%CI: 1.83-102.22) and frequently monitored local dengue situations or hotspots (aOR: 5.42, 95%CI: 2.14-13.72) were significantly associated with HCWs' willingness to participate in community dengue prevention and control activities.

However, HCWs living in high-rise properties (aOR: 0.16, 95%CI: 0.05-0.50) and having a monthly household income of more than RM 6,000 (aOR: 0.34, 95%CI: 0.13-0.91) were significantly less willing to participate in community dengue prevention and control activities (as shown in Table 4).

**Table 4.** Factors associated with HCWs' willingness to participate in community dengue prevention and control activities (n=240)

| Variables | I will take part in community dengue prevention and control activities | | Crude Odds Ratio (COR) | 95% Confidence interval | | p | Adjusted Odds Ratio (aOR) | 95% Confidence interval | | p |
|---|---|---|---|---|---|---|---|---|---|---|
| | Yes N (%) | No N (%) | | Lower bound | Upper bound | | | Lower bound | Upper bound | |
| **Type of house** | | | | | | | | | | |
| Landed (ref.) | 188 (86.2%) | 30 (13.8%) | | | | | | | | |
| High-rise | 15 (68.2%) | 7 (31.8%) | 0.34 | 0.13 | 0.91 | 0.031 | 0.16 | 0.05 | 0.50 | 0.001** |
| **Household monthly income** | | | | | | | | | | |
| ≤ RM 6,000 (ref.) | 97 (88.2%) | 13 (11.8%) | | | | | | | | |
| > RM 6,000 | 106 (81.5%) | 24 (18.5%) | 0.59 | 0.29 | 1.23 | 0.159 | 0.34 | 0.13 | 0.91 | 0.032** |
| **Do you think you have sufficient knowledge to prevent yourself from dengue?** | | | | | | | | | | |
| No (ref.) | 15 (60.0%) | 10 (40.0%) | | | | | | | | |
| Yes | 188 (87.4%) | 27 (12.6%) | 4.64 | 1.90 | 11.37 | 0.001 | 8.39 | 2.86 | 24.56 | <0 .001** |
| **I want to help reduce the number of dengue cases in my area** | | | | | | | | | | |
| No (ref.) | 2 (33.3%) | 4 (66.7%) | | | | | | | | |
| Yes | 201 (85.9%) | 33 (14.1%) | 12.18 | 2.15 | 69.19 | 0.005 | 13.68 | 1.83 | 102.22 | 0.011** |
| **I check dengue situations or hotspots around my area regularly** | | | | | | | | | | |
| No (ref.) | 78 (73.6%) | 28 (26.4%) | | | | | | | | |
| Yes | 125 (93.3%) | 9 (6.7%) | 4.99 | 0.80 | 2.41 | <0.001 | 5.42 | 2.14 | 13.72 | <0 .001** |

*Note: A total of 38 variables were entered into the univariable analysis, of which 20 were significant at p<0.25 and included in the multivariable model;*
*** is p-value <0.05.*

## DISCUSSION

This study found that the majority of HCWs perceived dengue prevention activities and early warning tools as crucial for effective dengue control. In addition, they generally had accurate perceptions of dengue transmission and severity, likely due to their medical training and previous/current work experiences dealing with the disease. These findings align with previous studies conducted within the Malaysian general population (Zaki et al. 2019; Al-Zurfi et al. 2015; Mohd Hairi et al. 2003). Positive perceptions towards community dengue prevention and control activities are vital for ensuring permanent engagement, participation, support, and commitment from HCWs, which enhances the effectiveness and sustainability of these efforts.

However, this study also reported that HCWs do not perceive dengue as a serious problem in their residential areas. The reason for this finding could be due to the consistent and continuous practice of dengue preventive measures among HCWs in their residences. Also, it is possible that HCWs would react more proactively in the event of a dengue outbreak within their residences by promptly contacting and alerting local health authorities. This would prompt immediate action from relevant agencies, therefore reducing the risk of dengue breeding and transmission. As a result, HCWs may feel a greater sense of control over dengue problems, perceiving the threat as less significant because they believe immediate risks can be effectively managed and controlled, as found by studies in the literature (Mashudi et al. 2022; Octaviana et al. 2019). Nevertheless, given the endemic nature of dengue in Malaysia, it is important for HCWs to maintain vigilance and regard dengue as a significant public health problem that could impact their communities.

Regarding the attitudes towards community dengue prevention and control activities, this study revealed that HCWs exhibited a strong commitment to source reduction and vector control measures. These attitudes can be attributed to the extensive knowledge, specialised training, and practical experiences that HCWs possess about dengue. HCWs are aware of the dengue epidemiological triad, comprising environmental, agent, and host factors, which highlights the multifactorial nature of dengue and underlines the need for coordinated efforts from various agencies. These findings are consistent with the conclusions of previous studies, which also emphasised how HCWs' knowledge and experiences influence their attitude towards dengue prevention and management (Nikookar et al. 2023; Oche et al. 2021). In addition, our study replicated the finding by Veras-Estevez and Chapman (2017), which reported that HCWs agreed that dengue prevention and control activities should be a collective effort involving the community and relevant authorities.

Furthermore, HCWs responded positively towards early warning tools to guide community dengue prevention and control activities. Early warning tools can provide information on dengue cases/outbreaks in advance, therefore, allowing for the timely institution of community dengue prevention and control activities, which is reflective of a proactive response in dengue management (Sanchez Tejeda et al. 2023; Baharom et al. 2022). HCWs also admitted a strong willingness to participate in community dengue prevention and control activities, with many ready to adopt additional measures during high-risk periods. However, some of the HCWs indicated that their preventive actions depend on the perceived severity of dengue outbreaks, raising concerns about the sustainability of efforts. If HCWs, who are expected to lead by example in public health, tend to scale back preventive measures during perceived low-risk periods, it may lead to complacency and increased vulnerability to future outbreaks. The oscillation between heightened and lessened engagement based on perceived risk could result in missed opportunities for sustained vector control and community education, which are crucial for breaking the transmission cycle. This pattern also highlights the importance of fostering a mindset among HCWs that recognises the need for continuous, year-round preventive measures, rather than reactive approaches based solely on the proximity of outbreaks.

Other than that, this study identified several key factors significantly associated with HCWs' willingness to participate in community dengue prevention and control activities. HCWs who perceived themselves as knowledgeable about dengue prevention and exhibited a strong commitment to reducing dengue cases showed a higher propensity for participation in community dengue prevention and control activities. The confidence in their knowledge equips them to act, while their sense of responsibility underpins their commitment to these initiatives. Considering that HCWs' attitudes are important in shaping public engagement in dengue prevention efforts (Hossain et al. 2024), continuous professional development and targeted education for HCWs are vital. Enhancing HCWs' knowledge will not only refine their perceptions and attitudes but also positively influence public participation in community dengue prevention and control activities.

Additionally, HCWs who consistently monitor dengue situations and local hotspots were found to be more motivated to participate in community dengue prevention and control activities. This indicates that increased awareness of local health issues, such as dengue outbreaks, improves HCWs' readiness to contribute to prevention efforts. This aligns with the findings of Nana-Ndjangwo et al. (2021), which highlight the importance of vigilance in fostering proactive participation. To leverage this, regular updates on dengue early warning systems, current trends, successful interventions, and

ongoing challenges should be provided. Keeping HCWs informed through this information can help sustain their interest and involvement in community dengue prevention and control activities.

We also found that HCWs residing in landed properties were more inclined to participate in community dengue public prevention and control activities compared to those living in high-rise buildings. The latter group may assume that preventive measure is adequately managed by the building management, thereby reducing their perceived responsibility. Moreover, there is a possible misconception that high-rise environments are not susceptible to mosquito breeding, leading to a false sense of security. However, a previous study indicated that mosquito breeding sites can still develop in high-rise buildings due to stagnant water in poorly maintained common areas, balconies, and elevators (Tee et al. 2019). Thus, targeted education and collaboration between residents and building management are essential to dispel this false sense of security and ensure comprehensive dengue control in both high-rise and landed properties.

The study also showed that HCWs with a monthly household income above RM 6,000 were less willing to participate in community dengue prevention and control activities. This may be attributed to the fact that higher-income HCWs often hold more demanding positions, leaving them with limited time and energy for community activities involvement. Addressing these barriers through supportive policies and workplace environments that encourage public health engagement could increase participation among higher-income HCWs. Also, those with higher socioeconomic status may perceive themselves as less vulnerable to dengue and underestimate their susceptibility, leading to their reduced participation in community prevention efforts as discussed in a systematic review by Mulligan et al. (2015). Hence, there should be an emphasis on raising awareness to foster a sense of personal responsibility for involvement in community-level dengue prevention activities among HCWs, irrespective of their social status.

Overall, this study provides valuable insights into HCWs' perceptions, attitudes, and willingness to participate in community dengue prevention and control activities. However, its limitation lies in the study being conducted at only two health facilities, which may affect the generalisability of the results. To improve the applicability and robustness of the findings, future research should include a larger sample size.

## CONCLUSION

In conclusion, the study revealed that HCWs generally possessed positive perceptions and attitudes towards community dengue prevention and control activities. Factors significantly associated with willingness among HCWs to participate in these activities were the type of housing, household monthly income, perceived knowledge of dengue prevention, a sense of commitment to reducing the number of dengue cases and actively monitoring dengue situations and hotspots in their residential areas. It is necessary to develop targeted, multifaceted strategies that address these determinants to ensure sustained and effective HCW involvement. Such strategies should focus on strengthening HCWs' knowledge, promoting a sense of personal and professional responsibility, and encouraging proactive engagement, ultimately leading to more effective community-level dengue prevention and control.

## ETHICAL DECLARATIONS

The study was approved by the Medical Research Ethics Committee (MREC), with reference number NMRR ID 23-03182-AB8 (IIR). Permission was obtained from the relevant state health department and district health office for access to the study sites. All participants provided their informed consent before participating in this study and their identities were kept anonymous.

## ACKNOWLEDGEMENTS

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