





# BMJ Open Exploring community behaviours and stakeholder challenges in engaging communities with dengue prevention behaviour in Malaysia: implementation research for a qualitative study with a community-based participatory research design

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## ABSTRACT

**Objectives** To use a community-based participatory research (CBPR) design to explore local community behaviours and stakeholders' challenges in engaging communities in dengue prevention behaviours in Hulu Langat, Selangor, Malaysia.

**Design** This CBPR design in implementation comprised in-depth interviews (IDIs) and focus group discussions (FGDs). Themes were identified from the data with inductive and deductive thematic analysis.

**Setting** FGDs were conducted in local community areas and IDIs were conducted in the local authority (LA) office and the Hulu Langat district health office.

**Participants** All FGD and IDI participants consented to the study, and included health authorities (n=4), LAs (n=7), community leader (n=1), faith leader (n=1), patients diagnosed with dengue (IDIs, n=2) and permanent residents of Hulu Langat who had been exposed to dengue infectious disease (FGDs, n=27).

**Results** The main themes were categorised into community behaviour and stakeholder challenges. The community behaviour-related themes were awareness of dengue disease and *Aedes* mosquitoes, perception of risk and severity, and involvement of authorities. The themes related to stakeholder challenges were resource constraints and capacity issues, jurisdictional constraints and coordination, and educational dissemination and vandalism.

**Conclusions** The actions of the authorities shape community and stakeholder behaviours. Effective communication, including clear and aesthetically pleasing messages, motivates individuals to take appropriate actions. It is crucial for the authorities to engage in inclusive communication and consider diverse perspectives, such as those of residents and individuals exposed to dengue infection. Authorities that provide

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A community-based participatory research design was used to explore the behaviours and challenges in engaging communities in dengue preventive behaviours through in-depth interviews and focus group discussions with local community representatives, health authorities and local authorities workers of various levels to gain their perspectives.
- ⇒ A qualitative research approach provides in-depth insights into stakeholder and community perceptions, attitudes and behaviours regarding dengue prevention, which can be useful for developing more effective prevention strategies.
- ⇒ Qualitative research is typically not generalisable; thus, the findings might not apply to other contexts beyond the study population.
- ⇒ The focus on community behaviours and stakeholder challenges might limit the study scope to understanding only a narrow aspect of dengue prevention, potentially overlooking other important factors.

accurate and unbiased information foster transparency and enable informed decision-making by all stakeholders.

## INTRODUCTION

Dengue fever is a viral infection transmitted by mosquitoes, which poses a significant health challenge, particularly in tropical and subtropical regions.<sup>1 2</sup> Malaysia has recently experienced increasing incidence rates

of dengue fever.<sup>3 4</sup> Stakeholders from various parties, such as government authorities and community, have cooperated to implement measures to control dengue fever spread and minimise its impact.<sup>5 6</sup> For example, the communication for behavioural impact (COMBI) concept has been widely used in Malaysia,<sup>4 7</sup> along with health education campaigns through broadcasts to disseminate accurate information on dengue transmission methods, symptoms and preventive measures to the public.<sup>8 9</sup> Additionally, households and communities are responsible for reducing potential mosquito breeding sites,<sup>10 11</sup> supported by education, social mobilisation and community engagement from the health sector and local authorities.<sup>12–14</sup> However, the effectiveness of these strategies depends on a comprehensive understanding of stakeholder needs, constraints and unique community circumstances.<sup>15</sup>

Effective and sustained dengue vector control programmes require multisector collaboration and coordination.<sup>16–18</sup> Community-based participatory research (CBPR) methodologies are recommended to actively involve communities in exploring health issues.<sup>19 20</sup> Many studies highlighted that community participation and action are crucial for successful dengue vector control activities.<sup>20–22</sup> Community engagement with a sense of ownership is essential to achieve long-term success in dengue vector control.<sup>21</sup> In recent decades, there has been a growing trend of community-based participatory interventions using integrated engagement strategies.<sup>23</sup> However, such strategies are subject to challenges that hinder effective community engagement and sustained dengue vector control efforts, such as limited awareness, insufficient resources, cultural barriers, unfulfilled needs and the effect of the COVID-19 pandemic.<sup>16 24 25</sup>

To overcome these obstacles, it is necessary to integrate components such as active surveillance, emergency response, community-based mosquito control and vaccines, if available.<sup>25 26</sup> Tailored education, improved infrastructure, adequate resources, trust-building and adaptable strategies are essential to ensure sustained community participation.<sup>27</sup> The ongoing development of new strategies and tools highlights the need for continued innovation and the need for continued innovation and collaboration across disciplines and sectors. A key principle of CBPR is community member involvement in all process stages, including data collection and analysis. This ensures that the innovations demonstrate cultural sensitivity and responsiveness to community needs.<sup>28</sup> Qualitative data are important in CBPR as they can reveal community issues and serve as a baseline for developing interventions.<sup>29–31</sup> By promoting a shift towards method acceptability, CBPR emphasises problem-solving and the development of accessible research methods and materials that meet community needs.<sup>15</sup> CBPR is a valuable strategy for practical community projects, fostering trust, cooperation, community empowerment and capacity building.<sup>32</sup>

## METHODS

### Study framework

The study framework integrated the ideation model that served as deductive analysis to examine the social and cognitive factors, environmental challenges and emotional aspects influencing the intention of dengue prevention behaviours in Malaysia.<sup>33</sup> The ideation model is a predictive behaviour change model that has been successfully applied in multiple health contexts globally.<sup>34</sup> However, its application in dengue fever in Malaysia has not been explored. The ideation model is an extension of the health belief model, which considers individual-level and community-level influences, acknowledging that behaviour change is determined by individual motivations and also influenced by social norms, peer interactions and community dynamics.<sup>33 34</sup> Thus, this framework was used to examine the cognitive factors (knowledge and awareness), behaviours and challenges regarding dengue prevention.

### Study aim

CBPR methodologies are recommended to explore community attitudes towards dengue prevention and control in the area, and stakeholders' challenges in implementing a dengue prevention and control programme. Such methodologies actively involve community members and stakeholders in all stages of the research process, including data collection and analysis, to ensure cultural sensitivity and responsiveness to community needs. Qualitative data are particularly useful in CBPR approaches and can reveal community issues and act as a baseline for intervention development.

### Study setting

This study was conducted in a recurring dengue hotspot area administrated by the Kajang Municipal Council, Hulu Langat, Selangor, Malaysia.<sup>35 36</sup> A Selangor is a well-developed state in Malaysia with a high population density<sup>36 37</sup> and is a key factor in dengue spread due to its residents' behaviour.<sup>38 39</sup> As of March 2023, there was a 140.5% cumulative increase in dengue cases in Selangor compared with the same week in 2022.<sup>35</sup> The Hulu Langat district faces an increased dengue risk due to its unique combination of urban and rural areas, and diverse cultural practices.<sup>35 40</sup> The urban areas provide suitable breeding grounds for *Aedes* mosquitoes, while the rural areas might also present conditions conducive to mosquito breeding.<sup>41</sup> Additionally, the diverse cultural practices can affect dengue prevention efforts, thus requiring targeted intervention.<sup>42</sup> The cumulative dengue incidence in Hulu Langat was estimated to be 1608.6% higher than other Selangor districts.<sup>35</sup> The specific study setting of Hulu Langat is important for understanding and addressing the dengue outbreak in Malaysia, as researchers and public health officials can gain insights into the factors contributing to the high dengue incidence and develop targeted interventions to prevent and control the disease in this high-risk region.

## Study participants

The participants were selected based on specific criteria to ensure data relevance and inclusivity. The study involved adults aged  $\geq 18$  years. The age was chosen to target people with a mature understanding of the research topic and who could provide valuable insight. The participants were required to provide informed consent and were fully informed about the study purpose, the nature of their involvement and any potential risks or benefits. Permanent residents in the chosen community setting area were included in the study. The participants were required to be able to answer questions in Malay or English to ensure that they were comfortable in either language and eliminate language barriers that might hinder their ability to express their perspectives and experiences fully.

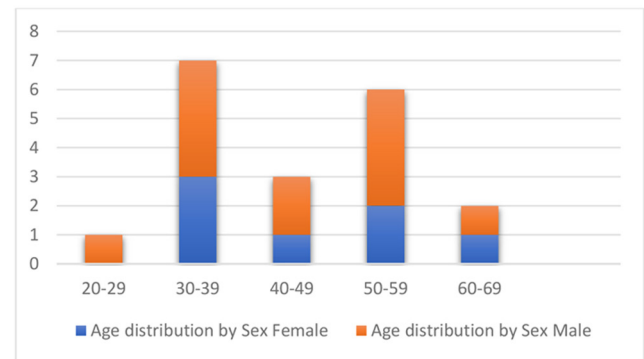
## Study design and participant selection

The qualitative aspects of this study are reported within a mixed-method framework and using a CBPR methodology. The study was conducted from August 2022 to November 2022 at the participants' locality or their preferred locations. Semistructured interview guides were prepared and approved by the research supervisory and ethical committees (see online supplemental additional file 1).

Before conducting the interview session, the moderator gathered relevant guideline documents to facilitate the in-depth interviews (IDIs) and focus group discussions (FGDs). The relevant data were extracted from that documentation to supplement the qualitative data. Data were collected until data saturation was achieved, which was defined as when no new information was collected from subsequent participants. In this study, the saturation point was reached after IDI 15 and FGD 27. The study used the FGDs, IDIs and the relevant documents (local authority (LA) and district health office mosquito control guidelines), which offered the advantage of data triangulation.

For the IDIs, purposive sampling was used to select LA and health authority (HA) staff who had worked in the dengue vector control unit for  $>2$  years. Additionally, suitable community leaders, known as *Pengerusi Persatuan Penduduk* (Residents' Association Chairpersons), were identified based on an initial needs assessment. The community leaders were interviewed to provide information about the locality that had repeatedly been assigned hotspot status. The community leaders suggested suitable community members for interviews including a faith leader, community members who had been diagnosed with dengue fever but were unable to participate in the FGD, individuals interested in providing their views through interviews and elderly people, who were recruited using purposive and snowballing techniques (see figure 1).

For the FGDs, participants in the research area were selected by convenience sampling. The focus group participant recruitment began with word-of-mouth referrals and the research assistants' personal contacts. Subsequently, snowball sampling was used when requesting the



**Figure 1** Characteristics of in-depth interview (IDI) participants.

focus group participants to refer the researchers to other likely participants known to them who also met the inclusion criteria, such as their friends or acquaintances. To encourage participation, the participants were provided with snacks, drinks and breakfast during the interviews (see figure 2).

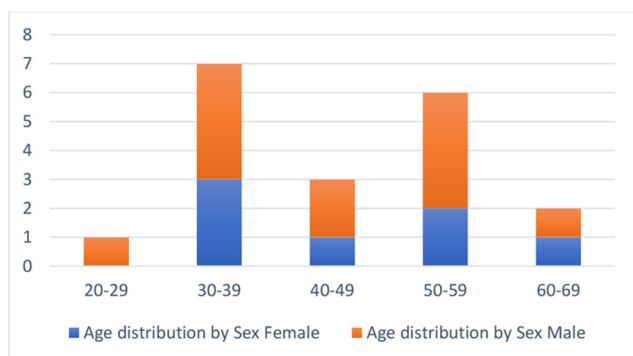
During the interviews, we specifically probed for differences and sought to understand the unique perspectives and concerns of each subgroup. We asked tailored questions to explore how perceptions, priorities and actions related to dengue prevention might vary based on gender, age, ethnicity, income level and other relevant demographic characteristics. The subgroup analyses and examination of data variation were aimed at providing a comprehensive understanding of the diverse community viewpoints. These analyses enabled the identification of prominent differences between subgroups, such as men and women, and exploration of the underlying factors contributing to these variations.

## Rigour and data trustworthiness

Data were triangulated using methods to enhance data credibility, including interviews, discussion and policy or guideline documentation. The quality of the collected and analysed data was enhanced by the research team experts, who had different methodological, epistemological and experiential backgrounds.<sup>43</sup> Member checking was performed at each step to ensure data rigour and credibility.<sup>44</sup> Field notes taken during the previous steps ensured data transferability, while confirmability and dependability were generated through quotations from the interview transcripts.<sup>44</sup> Apart from the first author, the coauthors acted as additional coders to increase the data richness.<sup>45</sup> A robust description of the data can enhance data transferability and rigour<sup>44</sup> and facilitate contextual evaluation.<sup>46</sup> These approaches were used to ensure data trustworthiness and reduce researcher bias.<sup>44</sup>

## Data collection and analysis

This study used IDIs and FGDs to gather information as a baseline for the intervention in the chosen community setting. The participants' privacy and convenience were ensured by conducting the FGDs at a meeting hall.



**Figure 2** Characteristics of focus group discussion participants.

However, the IDIs needed to be conducted during office hours; thus, most participants opted to have the interviews at their workplace.

Establishing rapport with the participants was crucial to foster open discussions before the IDIs were conducted.<sup>23</sup> Occasionally, the research team was assessed by the interviewees, so it was important to project a positive impression and constantly assess the interview setting. Accordingly, the research team adjusted its behaviour, intonation and mannerisms to gain the interviewees' respect.<sup>47-48</sup> Additionally, the interviews were conducted in private rooms away from the immediate work environment to create a more natural and neutral space for the participants. The IDIs and FGDs were moderated by the principal investigator (PI), who had experience in qualitative interviewing, while a research assistant took notes. Both the PI and research assistant had public health backgrounds.

Each session began with an introduction of the participants and investigation goals. Open-ended questions were used to allow participants to freely express their perspectives. The participants were interviewed regarding their fundamental knowledge and the factors that influenced community engagement. Furthermore, the participants were assured of the anonymity of their responses, and we emphasised that there were no right or wrong answers. The script also addressed community readiness, participation and commitment guided by the theory underlying the ideation model. The interviews typically lasted 60–75 min and were recorded with the participants' permission. The recorded files were transcribed within 24 hours and double-checked for quality assurance.

Qualitative data analysis was facilitated using ATLAS.ti for Windows (V.9.1.7.0). In addition to the audiotaped transcript, the moderator and note-taker's notes were referred to for specific discussion details. The collected data underwent thematic analysis according to Braun and Clark, which involved initial categorising using predefined codes, and subsequent open coding to identify emerging themes.<sup>45</sup> A deductive–inductive approach was used for the coding, where the deductive process was facilitated by the ideation

model component.<sup>45</sup> More specific axial codes were developed based on the open code.<sup>49</sup> Only relevant quotations were translated into English for research purposes.

### Patient and public involvement

No patients were involved in the planning or conduct of this study. However, some members of the public were recruited as participants for the qualitative interviews.

## RESULTS

### Community behaviours regarding dengue prevention

We identified the factors that might be barriers against community behaviours regarding dengue prevention based on authority, stakeholder and community perspectives. The participants listed several factors that affected the possibility of being bitten by mosquitoes and being exposed to dengue virus. The behaviours were categorised into: (1) awareness of dengue disease and *Aedes* mosquitoes, (2) perception of risk and severity and (3) involvement of authorities. These factors were also considered contributing factors to the recurrent dengue hotspot area in the locality (see table 1).

### Awareness of dengue disease and *Aedes* mosquitoes

Awareness of dengue disease and *Aedes* mosquitoes was discussed. Most participants knew that *Aedes* mosquitoes are black-and-white striped. The participants also provided clear information that *Aedes* mosquitoes carry the dengue virus and pose a threat to health. The participants' experience of being affected by dengue fever, whether their own or that of family members, relatives or neighbours, provided a clear understanding of the signs and symptoms of dengue fever, and confidence in the treatment methods required after contracting the disease. Most participants believed that there was no specific treatment for dengue fever and relied on traditional remedies such as 100PLUS (an isotonic drink), papaya leaf extract and crab soup. Although these approaches are unproven, the participants believed that they posed no harm as long as they could potentially cure the disease (see online supplemental additional file 2).

Dengue is a type of disease contained by a virus carried by *Aedes* mosquitoes. [FGD P9]

However, it is important to acknowledge that some individuals might not have a previous history of dengue fever. Therefore, people who have not personally experienced dengue fever might have limited awareness and understanding of the signs, symptoms and appropriate treatment methods.

We thought it was okay because he had on-and-off symptoms, and we even took Panadol at home. Then, when the body ache became worse, we realized that



**Table 1** Schematic representation of main themes and subthemes

| 1. What are the current behaviours of the community towards dengue prevention and control in the locality?<br>2. What are the challenges faced by the stakeholders in their efforts regarding dengue prevention and control? |  |   |
|--|--|---|
|  | Community behaviour  | Stakeholder challenge   |
| Theme  | Awareness of dengue disease and <i>Aedes</i> mosquito  | Resource constraints and capacity issues  |
| Subthemes  | <ul style="list-style-type: none"> <li>▶ Effect of knowledge</li> <li>▶ Effect of experience</li> <li>▶ Effect of traditional medicine practice</li> <li>▶ Procrastination in seeking medical attention</li> </ul> | <ul style="list-style-type: none"> <li>▶ Resource allocation</li> <li>▶ Personnel and workload</li> </ul>                       |
| Theme  | Perception of risk and severity  | Jurisdictional constraints and coordination   |
| Subthemes  | <ul style="list-style-type: none"> <li>▶ Lack sense of belonging</li> <li>▶ Negligence in managing potential breeding sites</li> </ul>   | <ul style="list-style-type: none"> <li>▶ Lack of enforcement action</li> <li>▶ Inspection and compliance</li> </ul>             |
| Theme  | Authority involvement  | Education dissemination and vandalism   |
| Subthemes  | <ul style="list-style-type: none"> <li>▶ Lack of action taken</li> <li>▶ Dependency on stakeholders</li> </ul>   | <ul style="list-style-type: none"> <li>▶ Limited banners</li> <li>▶ Theft and disruption</li> <li>▶ Lack of interest</li> </ul> |

it was not okay, prompting us to visit the clinic. [IDI P15]

### Perceptions of risk and severity

The participants were greatly concerned about community behaviour in relation to the presence of discarded items and *Aedes* mosquito breeding sites. They noted that, due to a lack of interest or proper disposal options, many residents tended to discard objects that could collect water behind their houses, which created a favourable mosquito breeding environment. Neighbour conflicts and poor drain maintenance were also identified as contributing factors to the issue. The participants expressed frustration with the authorities' apparent disregard for the issue, suggesting that it had been ignored for an extended period.

In the past, everyone had aquariums, but then lost interest. Then, they wondered where to put the aquarium, so they placed it outside. Many incidents like that happened in this area. [IDI P14].

The participants also discussed some residents' tendencies to neglect their responsibility of maintaining their surroundings. Many working people avoided opening their back doors to avoid dealing with external issues, which was neglectful behaviour that exacerbated the problem. The participants suspected that mosquitoes might have originated from sources other than their immediate surroundings, such as vacant houses. They described instances where neighbours would take park their vehicles and dispose of rubbish and unused items on vacant properties, leading to rubbish accumulation behind the property. As communication with such neighbours was challenging, it rendered it difficult to address the issue effectively. Hence, the described community behaviour reflected their perceptions of the risk

and severity associated with community actions (see online supplemental additional file 2).

### Involvement of authorities

Community behaviour appeared to be characterised by a lack of action and insufficient effort from stakeholders in addressing dengue cases. The participants' frustration was evident as they felt that their surrounding cleanliness had been neglected. This lack of individual initiative was indicative of the community's expectation that stakeholders would address the issue entirely. Furthermore, the community's reliance on external assistance was evident, where collective effort for 'gotong-royong' (communal cleaning) activities required multiagency collaboration. The community's behaviour in addressing dengue cases demonstrated a lack of proactive action, dependence on stakeholders and external assistance, and expectations of government involvement. A shift towards individual and community responsibility, increased stakeholder engagement or authority involvement and more proactive government measures is essential to create a healthier and dengue-free community to address this issue.

Perhaps the government can take the initiative to monitor forest areas, even if they are not dense forests. In this way, we can carry out spraying activities with greater effectiveness, as it may be difficult to control breeding in these areas if left unchecked... [FGD P20]

### Stakeholders' challenges regarding dengue prevention

#### Resource constraints and capacity issues

The main challenge to community involvement was insufficient funding, which hindered the implementation of educational initiatives, provision of materials and necessary interventions. The lack of proper funding rendered

it challenging to conduct programmes effectively and reach all community members. In addition to funding constraints, access to dengue prevention education and information was limited. Not all community members had received formal education on the topic, relying instead on alternative sources such as the Internet. This highlighted the need for comprehensive and accessible education programmes.

If there is no allocation, then how can we carry out the massive, repetitive, intensive, and persistent (MRIP) program here, with banners and many other things such as health education? Then, there should be a token of appreciation for the volunteers. If there is none, it will be difficult. [HA05]

Furthermore, there were personnel and resource shortages, particularly in areas with large populations and numerous localities. This hampered the ability to cover all areas effectively and conduct activities such as mosquito breeding site identification, fogging and community outreach programmes. The stakeholders involved in dengue control were also subject to competing priorities. They often had other responsibilities and key performance indicators to fulfil, which affected the amount of time and effort dedicated solely to dengue control education and promotion. Therefore, sustained community involvement is crucial to effectively combat dengue and overcoming resource constraints and capacity issues would contribute to creating a more resilient and informed community (see online supplemental additional file 2).

#### Jurisdictional constraints and coordination

There was a difference in the division of jurisdictional guidelines. One notable challenge was the lack of enforcement authority and inconsistent penalties for non-compliance. For example, the area under LA jurisdiction might not be subject to enforcement action, while the government HA is authorised to implement enforcement actions. This inconsistent enforcement can lead to a sense of injustice and undermine the effectiveness of dengue control efforts. When authorities discover numerous breeding sites but fail to issue fines or take appropriate actions, it creates the perception that non-compliance is unpunished. This might reduce the community's motivation to actively participate in dengue prevention measures and compromise the overall effectiveness of education programmes (see online supplemental additional file 2).

We were so frustrated when a group came to check, not from MPKJ. They found 31 bottles of mosquito breeding sites in front of the house. However, they did not issue any fine. [FGD P11]

#### Educational dissemination and vandalism

The interviews revealed that when the locality was declared a hotspot area, the authorities typically installed banners and opened booths to disseminate information

to the communities. However, the limited number of available banners was a significant challenge. The authority only possesses three banners with different educational messages aimed at encouraging residents to maintain cleanliness and care within their homes and surroundings. This banner shortage hinders the authorities' ability to effectively disseminate educational information to residents. Furthermore, the banners face the issue of theft and disruptions. Driven by various motivations, some people engage in unauthorised banner removal or damage, which disrupts the dissemination process. This not only diminishes the authorities' efforts but also limits the residents' access to crucial information necessary to combat the challenges posed by the hotspot area.

It's true that we hang banners, but sometimes the banners disappear. Banner theft is a normal issue, as I was informed by the staff. We don't know whether it was done by the residents or passers-by who took the banner. We are not sure if they took it to cover their car or to use as a tablecloth for a party. This is a common issue, unless we hang the banners too high for them to take. It can disrupt our education and promotion efforts for dengue control in that area. [HA03]

Another obstacle identified from the interviews was the lack of interest among certain community members. Despite the authorities' diligent efforts to communicate the importance of adhering to hygiene practices and precautionary measures, a subset of residents would remain uninterested. As it becomes challenging to engage and motivate individuals to actively participate in efforts aimed at protecting their community well-being, this apathy further impedes the dissemination of educational information within the locality, particularly when vandalism occurs (see online supplemental additional file 2).

## DISCUSSION

Dengue fever has been increasing for more than a decade, with only brief dips during COVID-19 outbreaks. Dengue fever has no cure and requires conservative treatment and is a threat to Malaysia and other countries with similar climates. The dengue virus is spread by *Aedes aegypti* mosquitoes, which are dependent on humans for survival. The behaviour of *Aedes* mosquitoes, which are highly adaptable and thrive in urban environments, renders them a significant concern in densely populated areas.<sup>48</sup> While the essential roles of the behaviour of *Aedes* mosquito and its vector have been established, it is critical to acknowledge the role of human behaviour in dengue fever transmission and control.<sup>49</sup> Human behaviours are complex and influenced by multiple factors, such as social norms, attitudes and social constructs.<sup>49</sup> Thus, community-level understanding of the beliefs, disease perspectives and challenges to avoiding mosquito bites can inform the development of appropriate and sustainable

disease control interventions.<sup>49</sup> Currently, collaboration between multiple agencies and at-risk communities is crucial to combat dengue fever effectively and mitigate its impact.<sup>50</sup> Effective coordination, education and community engagement can generate a holistic approach that addresses both *Aedes* mosquito behaviour and the role of human behaviour in dengue transmission.<sup>50</sup>

This study highlighted the advantages of having basic knowledge of *Aedes* mosquito characteristics, dengue infection signs and symptoms and mosquito larvae eradication as effective preventive practices. Acquiring basic knowledge on the *Aedes* mosquito vector and its potential breeding sites is vital to shape community behaviours.<sup>51</sup> Community members equipped with this essential knowledge will become empowered to take proactive measures to prevent the spread of dengue fever within their neighbourhoods.<sup>51 52</sup> However, most participants in this study, who are familiar with the *Aedes* mosquito, and its transmitted disease had experienced it themselves or via family members or neighbours. This demonstrates that awareness is mainly cultivated when a person has experience with a disease. This finding was supported by reports that stated that people who had previously contracted dengue fever were more knowledgeable about the disease and more likely to take preventive measures such as using mosquito repellent and protective clothing.<sup>53</sup> CBPR approaches are crucial to address the knowledge gap for individuals who have never had personal experience with dengue fever.<sup>32</sup> While personal experience can provide valuable insights, it is equally important to ensure that those without direct encounters with the disease have access to relevant information and education. CBPR methods offer a means to achieve this by actively involving the individual in the learning process and facilitating knowledge and experience exchange within a community setting.<sup>15 32</sup>

This study was conducted in an area that has repeatedly been assigned dengue hotspot status, and thus it is very important to determine the gaps between community members and between community members and the authorities. A CBPR process that involves community members, researchers and gatekeepers represents the main component of a successful dengue strategy.<sup>41</sup> The sustainability of dengue interventions must consider the challenge faced by stakeholders and community members' behaviours.<sup>53</sup> In addressing this issue, the strength of qualitative studies is that they facilitate researchers' understanding of the underlying beliefs, knowledge gaps and misconceptions that shape community members' perceptions and actions regarding dengue prevention.<sup>54</sup> Engaging in CBPR processes that involve community members, researchers and gatekeepers can yield a more comprehensive understanding of the local context.<sup>31 33</sup>

A diverse and multicultural community can have serious consequences for personal health and overall well-being. Neighbours can be important for preventing dengue fever in their communities.<sup>55</sup> In this context, neighbours of various backgrounds, cultures, ethnicity

and beliefs can share a diverse range of knowledge, experiences and perspectives when preventing dengue fever in the community. For example, neighbours from different cultures might have specific practices or remedies to prevent mosquito-borne diseases such as dengue fever, and some cultures might have traditional, inherited methods of mosquito control or herbal remedies. Moreover, neighbours from diverse backgrounds can collaborate and pool their resources to create a collective effort towards preventing dengue fever.<sup>42</sup> They can cooperate using various methods such as effective communication and community events that can unite diverse and multicultural community members. Conversely, such diversity could also give rise to potential challenges or serious consequences. For example, the potential barriers to accessing healthcare services and resources due to language barriers or cultural differences is one such consequence.<sup>56</sup> Individuals from different cultural backgrounds may have varying levels of awareness or understanding of dengue fever and its prevention methods, which can affect the overall effectiveness of community-wide prevention efforts.<sup>56 57</sup>

To empower the community, it is essential to actively involve community members in the decision-making processes and implementation of dengue prevention strategies tailored to their needs.<sup>58</sup> Empowerment will allow community members to take ownership of their health and well-being, fostering a sense of responsibility and agency in combating dengue.<sup>58</sup> Comprehensive education and awareness programmes can provide community members with accurate information about the risks and severity of dengue fever. For example, community members can be involved in conducting regular inspections of their surroundings for potential breeding sites, organising clean-up campaigns to eliminate stagnant water, and implementing community-wide initiatives to promote a clean and mosquito-free environment. To do so, it is important to equip community members with the necessary resources and support.<sup>59</sup> The authorities should initiate such steps by strengthening basic knowledge within residents' associations to introduce the importance of being affected by dengue fever. Moreover, establishing regular communication between the authorities and residents' associations is essential.<sup>59 60</sup> This can involve organising meetings for information exchange, where residents can seek guidance, ask questions and report any dengue-related concerns. Rapport should be established between the authorities and residents' associations to foster trust and collaboration.<sup>61</sup>

The FGDs revealed that the community members often felt disappointed by the authorities' actions in addressing dengue fever outbreaks. For example, no action was taken despite the discovery of numerous breeding sites, persistent drain hygiene issues and delayed fogging operations. The community members' feelings in addressing the current problem illustrated the clear need to incorporate participatory approaches to improve the situation. Issues should be addressed

by taking the appropriate actions, such as issuing summons. To that end, it is crucial for community members to understand the jurisdictional differences between LAs and district government authorities. Nevertheless, it is equally important to emphasise the need for cooperation and collaboration between these two entities when implementing actions to combat *Aedes* mosquitoes and breeding sites in the locality. Therefore, residents' association members should be informed of the jurisdictional differences.

Despite jurisdictional differences, it is also crucial to emphasise the importance of cooperation between LAs and district government authorities. Both entities are vital in combatting *Aedes* mosquitoes and eliminating breeding sites. Regular coordination meetings, joint planning sessions and information-sharing mechanisms can foster collaboration. Joint inspections, resource-sharing and coordinated enforcement actions can also contribute to a comprehensive approach to dengue prevention. Formal protocols or agreements should clarify roles, streamline processes and encourage collaboration. Furthermore, community members can advocate for cooperation, provide feedback and participate in community-driven initiatives to promote joint efforts in combatting *Aedes* mosquitoes.

In the present study, the budget was the primary source of concern among the community and stakeholder groups, as the allocated funds were insufficient to support the health education and promotion programmes. According to Hennink *et al*,<sup>62</sup> limited budget is a common barrier to implementing and maintaining health education and promotion programmes in low-income and middle-income countries. Inadequate funding might make it difficult for the programme to create and disseminate educational materials, train staff and conduct outreach activities. Furthermore, insufficient funding can result in inconsistent health message delivery, reducing programme effectiveness. To address this challenge, strong commitment from international organisations and private donors to invest in health promotion programmes at all government levels (national and local) is required. Alternative funding sources and collaborations with other sectors can also aid the sustainment of such programmes and expand their reach and impact. Prioritising funding for health education and promotion programmes can improve health outcomes and aid the achievement of global health goals.

### Limitations

CBPR is subject to limitations when conducting community research, as recruiting individuals who are available to participate in FGDs can be difficult, particularly in communities where residents have work and family obligations. This challenge introduces the potential for response bias, as those who are available and willing to participate may have differing perspectives or experiences

than those who are not able to engage. Additionally, the community setting for IDIs may contribute to social desirability bias, potentially influencing participants to provide responses aligning with perceived social norms or expectations. Despite efforts to create a non-judgemental environment during the IDIs, the potential for social desirability remains, impacting the accuracy and depth of information obtained during the interviews. There is also the potential for participant selection bias, as the recruitment process may inadvertently attract individuals who hold certain views or have specific characteristics, leading to a limited representation of the community's diversity. Thus, assembling a community of volunteers willing to participate in FGDs can be time consuming. Offering incentives such as breakfast can increase participation, and participants' work and family obligations can be accommodated with flexible scheduling options such as evening or weekend sessions.

### CONCLUSION

Community and stakeholder behaviours are influenced by a complex interplay between LAs and the community. While LAs are significant in shaping health-related behaviours, it is important to recognise that community members also adopt strategies based on their perspectives. Our findings suggested that both parties, either community members or stakeholders, can make decisions on health and well-being as long as community members are well guided and empowered to actively participate in the decision-making.

Community members who are informed about health-related issues and provided with the necessary resources and support can become valuable agents of change. Effective guidance involves providing accessible and accurate information to community members, ensuring that they understand the potential health risks and benefits associated with different choices. It also requires creating a supportive environment that encourages open dialogue and collaboration between community members and stakeholders. Actively involving community members in decision-making processes takes into account their diverse perspectives and experiences. This inclusivity aids trust-building, fosters ownership and ultimately increases the likelihood of successful health-related initiatives. Community members who feel valued and respected are more likely to embrace and actively participate in activities that promote health and well-being. Furthermore, it is crucial for the stakeholders to recognise the unique strengths and assets within the community. Leveraging these strengths, such as local knowledge, cultural practices and existing social networks, enables the tailoring of interventions that better align with the community's values and needs. This approach would enhance health programme effectiveness and empower the community to take ownership of its well-being.

Community and stakeholder behaviour is contingent on the actions of the authorities. This is related to



components in the ideation model, which suggests that people's beliefs about the severity of a disease, their disease susceptibility and the benefits and barriers to taking action influence their behaviour. It is important for authorities to embrace new communication trends to effectively promote healthy behaviours and control diseases such as dengue. This encompasses cultural workshops integrating traditional crafts, dances or rituals with health education; collaborative health challenges gamified and tracked through an app; and outdoor fitness and education events. These events provide a platform for experts to share health insights while participants actively learn. Involving the community and stakeholders in these interactive approaches can significantly increase the likelihood of successful disease control and prevention.

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