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## PUBLIC HEALTH RESEARCH

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### Using Nominal Group Technique to develop COMBI Related Health Contents of a Mobile Application

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#### ABSTRACT

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<b>Introduction</b>	The Communication for Behavioral Impact (COMBI) program functions as a platform for developing effective ways to prevent and control outbreaks in community settings that are technically sound and culturally acceptable, relevant and feasible for communities to execute. This research aimed to systematically develop the health content for the mobile application using the nominal group technique (NGT) to improve the implementation of COMBI in preventing and controlling dengue in Malaysia.
<b>Methodology</b>	We assembled a group of individuals focusing on implementing the COMBI program and developing a mobile application. Using the NGT, a proven and structured method for conducting group meetings to reach a consensus, we agreed on the crucial contents to prioritise for developing a mobile application as the new approach to delivering the COMBI program. The panel met once via an online platform in November 2022, and the meeting lasted for two and a half hours.
<b>Results</b>	14 participants participated in the expert panel. During the sharing ideas activity, the panel generated 22 items. The response rate for voting was 100%. After determining the acceptance of each item, the panel retained 20 items from the original list to establish the rank order. Only one round was needed for the panel to reach a consensus to accept all the final 20 items (distributed into 11 categories) as the content for the mobile app. The selected components agreed upon by the expert panel encompassing information on COMBI, essential facts about dengue including the pathogen, the vector (characteristics of Aedes mosquito and its potential breeding sites), and the symptoms and signs, information on preventive methods including search and destroy

breeding sites, application of larvicide, and methods to prevent mosquito bites, dengue situation (daily cases and outbreak report), actions during dengue outbreak, law enforcement in dengue control, update on COMBI activities, reminder alert program for search and destroy activity, dengue monitoring for dengue patient, problem reporting system, as well as Uniform Resource Locator related to dengue. These can support communities by disseminating key messages regarding dengue and equipping them with enough motivation and skills to prevent dengue transmission at the community level.

**Conclusion**

This is the first known consensus study to identify engaging mobile app content to improve the COMBI program's delivery and implementation using the NGT. We recommend the technique as an effective tool for designing interventions against communicable diseases.

**Keywords**

COMBI; dengue; mobile application; mobile health; nominal group technique

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## INTRODUCTION

Dengue is considered the most prevalent mosquito-borne viral disease by the World Health Organization (WHO).<sup>1</sup> It is caused by four distinct serotypes of dengue virus (DENV-1–4) and is mainly transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes. Dengue is now endemic in more than 100 countries throughout WHO regions, with Asia accounting for approximately 70% of the global disease burden.<sup>2</sup>

Malaysia's first significant dengue epidemic occurred in 1974, with an incidence rate of 7.3 cases per 100,000 populations. This was followed by outbreaks in 1982 (14.8 cases per 100,000 population)<sup>3</sup> and subsequently recurred every four to five years.<sup>4</sup> In 2014, there was a four-fold increase in national dengue cases due to environmental factors, rapid urbanisation, and serotype switch.<sup>5</sup> From then on, dengue remained a significant public health threat. Before COVID-19, dengue has the highest incidence rate among communicable diseases in Malaysia, with 397.71 cases per 100,000 population.<sup>6</sup> The economic consequences are substantial, encompassing the societal repercussions of lost work (7.2–8.8 days) and school days (3.2–4.1 days) because of dengue.<sup>7</sup> The high incidence of dengue, its potential complications and fatalities, and the economic burdens have posed a significant burden on the national health care system.<sup>8</sup>

The Ministry of Health in Malaysia has implemented the National Dengue Strategic Plan (NDSP) 2022–2026 to address this issue. The all-encompassing strategy comprises three fundamental elements: strengthening dengue surveillance, improving accessibility to diagnosis and treatment, and intensifying endeavors in prevention and control. The government is also dedicated to enhancing the healthcare system and promoting research and innovation in dengue-related areas to support the NDSP.<sup>9</sup>

Dengvaxia, a licensed vaccine for dengue, is now accessible without an antiviral cure.<sup>10</sup> However, it is not fully effective and has safety concerns, which limits its protective capabilities.<sup>11</sup> Thus, prevention highly depends on vector control targeting the *Aedes* sp. mosquito in most Southeast Asian countries, including Malaysia.<sup>12,13</sup> Conventional vector control methods rely on top-down approaches to decrease transmission by using chemicals like larvicides and space spraying and employing biological agents such as bacteria or guppy fish [14], which are reactive and ineffective in Malaysia.<sup>15–17</sup> Additionally, these methods require significant manual effort and are not economically efficient.<sup>13</sup> This is due mainly to the rapid increase in high-rise structures, little involvement from the community, and the development of insecticide resistance.<sup>16,18,19</sup>

Therefore, there is a growing need to engage and mobilise the local community to be involved in vector control actively and continuously, as the presence of *Aedes* sp. depends on human behaviour. This is in line with one of the fundamental elements of NDSP: to intensify efforts in prevention and control, especially at the community level.<sup>9</sup> Community acceptance is crucial in implementing current vector control strategies.<sup>20</sup> Hence, it is imperative for communities to actively engage as partners in all aspects of planning, executing, monitoring, and evaluating vector control programs.<sup>21–23</sup>

The WHO recommends a strategy called Communication for Behavioral Impact (COMBI), which aims to promote significant changes in behaviour through effective communication and social mobilization.<sup>24</sup> COMBI serves as a critical platform for designing efficient strategies to prevent and manage outbreaks in community settings that are technically, culturally appropriate, relevant, and feasible for communities to implement. The COMBI strategy has been implemented to manage leprosy in Mozambique, lymphatic filariasis in Nepal, Sri Lanka, and Zanzibar; and tuberculosis in Bangladesh, India, and Kenya.<sup>24</sup>

In Malaysia, the pilot project of COMBI was initiated in August 2001 in Johor as a means of managing and preventing dengue.<sup>25</sup> Currently, 3,627 localities are adopting COMBI with 30,310 volunteers throughout Malaysia.<sup>26</sup> This platform promotes public awareness initiatives that aid communities in disseminating essential information about dengue and empowering them for healthy behavior change to prevent dengue transmission at the community level. The conventional method involves establishing a committee in the local community to implement the COMBI program. This committee will appoint promoters to mobilise their community to prevent dengue. In implementing COMBI, the community must address three crucial aspects: knowledge, attitude, and practices, so the promoted behaviours can be sustained. Currently, this conventional method is still being implemented as it is.<sup>27</sup>

Several local studies have identified the impact of COMBI. Rozhan et al. proved the potential effect in reducing dengue morbidity.<sup>28</sup> Hod et al. concluded that COMBI is efficacious in improving the target population's knowledge, attitude, and practice (KAP) level.<sup>29</sup> On the contrary, Mohammed Nawi et al. discovered that the target population's average knowledge and attitude scores are marginally higher than those of the control population; however, the differences do not have any statistical significance.<sup>30</sup>

Regarding entomological assessment, Rozhan et al. found that the risk of dengue transmission is lower post-intervention.<sup>28</sup> On the other hand, Hod et al. discovered that outdoor and

indoor ovitrap surveillance demonstrated a decrease in the ovitrap index following the intervention, however the difference is not statistically significant.<sup>29</sup> Nevertheless, the program does lead to a decrease in the abundance of the *Aedes* mosquitoes in the living environment, suggesting that the target population take responsibility for managing their surroundings, potentially creating unfavorable breeding conditions.

Mohammed Nawi et al. found that the program's failure to sustain itself was attributed to a lack of continuous monitoring, commitment from community and health authorities, intensive campaigning or publicity, or initiative by the local community; irregular inspections by responsible authorities and a shortage of human resources for program implementation and monitoring its progression also contributed.<sup>30</sup> Apart from that, Suraiya et al. discovered that to mobilise the community and ensure the sustainability of COMBI programs, there is a need for strong leadership and unwavering commitment at the community level.<sup>31</sup> The leaders' failure to force the committee to carry out activities renders them from initiating the COMBI program, leading to inadequate management to mitigate the dengue outbreak. These are among the limitations faced for conventional approach of COMBI.

Based on the recent National Health Morbidity Survey, only 19.5% of the respondents were aware of the existence of the COMBI program.<sup>32</sup> Additionally, the implementation of a movement control order (MCO) to curb the spread of the COVID-19 virus significantly reduced the regular operations of the dengue prevention and control system, including COMBI implementation, resulting in a worrying increase in dengue cases among Malaysians.<sup>33</sup>

There are three convincing justifications for improving the implementation of COMBI in Malaysia: (1) COMBI has established itself as the leading method for dengue prevention and control among communities in the country, demonstrating its reliability in engaging them and promoting behavioural changes to battle dengue, (2) COMBI's distinctive approach to dengue prevention in Malaysia, which is specifically designed to suit the country's varied population and cultural circumstances, enhances its significance for research purposes, and (3) Unlike other countries that utilise COMBI for multiple diseases, Malaysia's exclusive emphasis on COMBI for dengue prevention underscores its specialisation and unparalleled efficacy in tackling a specific and urgent public health concern.

Hence, this indicates the need for a paradigm shift to find an innovative and effective implementation of COMBI to change community behaviour. Among the initiatives that can be taken is digitalising the COMBI program. Digital behaviour

change interventions (DBCIs) use digital technologies for health promotion by providing individual support to change specific behaviors in specific contexts.<sup>34</sup> Mobile applications, websites, SMS text messaging programs, and email are all examples of DBCIs.

Mobile applications, often known as mobile apps, are software programs developed on mobile devices such as smartphones or tablets.<sup>35</sup> Increasing smartphone ownership has spurred the development of mobile apps. Compared to traditional health education methods, the mobile app provides an interactive and faster way of disseminating information to a large population at a low cost, thus improving public service delivery.<sup>36</sup> In recent years, there have been an increased need for health promotion programs aiming at the general healthy population. Mobile app programs have been utilised to boost physical activity, enhance dietary habits, encourage weight loss, reduce smoking and alcohol intake.<sup>37-40</sup>

The vision is to make the COMBI program available directly to the community. The digitalisation of COMBI as a mobile app holds the potential for better implementation among the Malaysian community. To determine the appropriate contents and features of the mobile app for COMBI, there is a need to use a systematic process involving multiple stakeholders and existing evidence. Hence, this new implementation approach can fill gaps in its delivery, improving the COMBI program uptake and making it more sustainable.

Considering the potential variation of viewpoints within a group, it is crucial to effectively employ structured approaches, such as consensus techniques, to manage subjective judgements in group work.<sup>41</sup> The Delphi method, the consensus development conference, and the nominal group technique (NGT) are the three primary consensus approaches employed in medical and health services research.<sup>42</sup> The NGT is a systematic and established approach that involves a series of steps to enable a group meeting. It enables the group to generate and prioritise responses to a specific question. The participants in the group possess expert knowledge in a particular area of interest.<sup>42-45</sup>

Several projects have applied the NGT method for developing mobile apps.<sup>46-48</sup> In this paper, using the NGT method, we systematically identified and selected the health contents that should be in the mobile application to improve the implementation of COMBI for preventing and controlling dengue in Malaysia.

## METHODS

This study was approved by the Universiti Kebangsaan Malaysia Medical Research Ethics Committee (project code: FF-2022-230; date of approval: 14 July 2022) and the Medical Research & Ethics Committee, Ministry of Health Malaysia

(code: NMRR ID-22-01158-HEC (IIR); date of approval: 3 August 2022). The content development work took place in November 2022, applying group discussion based on the NGT method, which comprised four key stages: silent generation, round robin, clarification, and voting (ranking or rating).<sup>44</sup> Other sources had thoroughly documented detailed explanations of these stages in the NGT method.<sup>49,50</sup> In summary, the NGT process was depicted in Figure 1. Our NGT process adhered to the checklist established by Humphrey-Murto et al. to ensure methodological rigor while employing consensus group methods.<sup>50</sup>

While the number of participants can vary, traditional groups have around four to seven participants but may have up to fourteen.<sup>49</sup> People with relevant experience and knowledge about the issues being explored are suitable participants.<sup>51</sup> We identified three public health physicians, one health education officer, one entomologist, one public health assistant, and three COMBI volunteers, known for their broad knowledge and expertise in dengue prevention and control activities and implementing COMBI in Seremban district.

We also purposely identified five software engineers who are experts in developing mobile apps to ensure the suggested content can be translated into a mobile app. We extended an invitation to them to form the expert panel. We conducted engagement sessions to provide a clear purpose for the study. Before their voluntary recruitment, participants were provided with verbal informed consent and made an educated decision to participate in the study. Rather than carrying out a series of nominal groups over several weeks, the preferred approach was to run one group, include all participants, and ensure representation across the service.<sup>52</sup>

Before the meeting, participants were instructed to peruse the guideline *COMBI Community Guideline: Social Mobilization and Communication Strategies for Dengue Prevention and Control*<sup>27</sup> and any literature on COMBI and community's effective dengue practices. This was to ensure that we employed a systematic method that involved the integration of evidence and expert opinion.

The panel met virtually for half a day. The session was recorded to provide a historical record that can be used for verification of decisions. The role of the moderator was to ensure the participants remained focused on the discussed topic and completed each step of NGT accordingly. At the

beginning of the meeting, AFNAH, as the moderator, briefly explained the NGT method to the participants. The introduction provided a factual description of the various stages of the NGT process. Then, the panel was presented with the specific question: *What information, motivation, and behavioural skills does the target user need to practice continuous dengue prevention based on the COMBI program?* The question was developed based on AFNAH's previous experience engaging the COMBI program at the national level and MRH's and RH's extensive work with dengue.<sup>29,53-56</sup>

We then employed the steps of traditional NGT. The first step was silent idea generation, where all participants listed individually, and without engaging in any form of discussion, their ideas on the question asked. Each participant had thirty minutes to silently record their ideas in response to the question. They wrote down their ideas on a piece of paper before the sharing ideas session.

Then, each participant presented their ideas. The moderator listed and displayed all ideas so all participants could see them. Participants could generate new ideas during this process but had to wait their turn before sharing them with the group. The process was completed once all ideas had been exhausted. Participants were not allowed to engage in debate or discussion during the listing of items.

Once all the items had been listed, a moderated discussion was conducted to clarify any inquiry, expand upon, or challenge the generated items. One item was discussed at a time. This step was completed when all ideas were discussed to ensure participant understanding, enabling them to make informed decisions later in voting. Similar ideas were grouped with agreement from all panel members.

The final step was voting, in which each panel member voted privately. Panel members were provided with a Microsoft Excel ranking sheet, where they were asked to vote for each generated item. The 5-point Likert scale assessed each item (1 = not at all important, 3 = moderately important, 5 = extremely important). The individual scoring on a ranking sheet was confidential. In the end, the scores for each idea were summed and converted to percentage form, ranked, and presented to the group for final discussion and consensus.

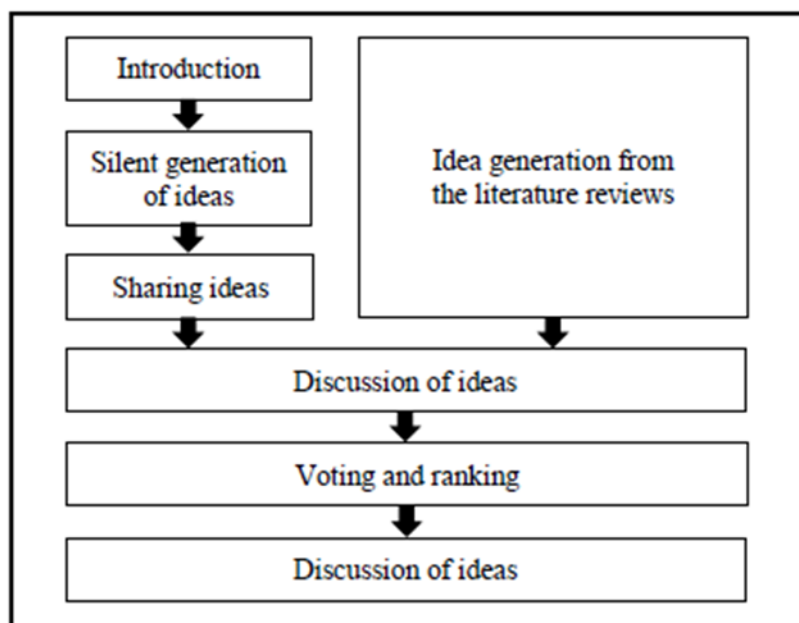


Figure 1 The NGT process.<sup>49</sup>

## RESULTS

Utilisation of NGT facilitated the integration of idea generation and problem solutions as two mutually reinforcing components of a unified process. Hence, this method is highly suitable for developing mobile app content based on the COMBI program.

A single NGT meeting was sufficient to reach a final consensus, unlike other studies, which required serial meetings to obtain in-depth elaboration of themes. Our meeting was conducted in November 2022 via Zoom platform and attended by all 14 appointed experts. The meeting lasted for 2.5 hours.

During the sharing ideas activity, the panel generated 22 items presented using Microsoft Excel for clarity. After that, the participants reviewed each item, clarifying and discussing specific points, identifying commonalities, and grouping them into categories. All proposed items were retained to be voted on by the participants.

Table 1 showed the results of the voted items, organised into 13 general categories. The data analysis process for the NGT was based on the percentage of score value where an item was accepted when the percentage was 70% or more.<sup>57</sup> After determining the acceptance of each item, we established the rank order. The panel retained 20 items from the original list of 22 for ranking.

As we can observe in Table 1, the essential items were COMBI introduction (#1), information

on vector (#1), breeding sites (#1), search and destroy (#1), prevent mosquito bites (#1), and larviciding methods (#1) followed by check list for search and destroy activity (#2), date and time setting for selected search and destroy activity (#2), notification for selected search and destroy activity (#2), dengue cases and outbreak reporting (#3), information on agent of dengue (#3), symptoms and signs (#3), actions during outbreak (#3), outpatients dengue monitoring record (#3), home care advice for dengue patient (#3), information on danger signs of severe dengue (#3), law enforcement (#4), problem reporting system (#5), update on COMBI activities (#6) and last but not least, Uniform Resource Locator (URL) link related to dengue (#7). After the final discussion, the panel reached a consensus to accept all the final 22 items (distributed into 11 categories) as the content for the mobile app.

The group did succeed in producing the final content for the mobile app. The NGT secured the production of a list, which will be applied as guidance for developing the mobile app later. The suggested content was based on the experience of professionals and COMBI volunteers, the COMBI guideline from the Ministry of Health, and the best evidence. The findings were practice-near, experience-based, and therefore directly applicable to the COMBI program in general practice. The panel also agreed to name the mobile app as eCOMBI-Dengue.

**Table 1** Items generated, descriptors and categories. Percentage of agreement, acceptance (based on percentage of agreement) and order of preference (based on acceptance)

Items generated	Descriptors	Categories	Percentage score value (%)	Acceptance result	Ranking
Daily dengue cases	Dengue cases are reported daily (including dengue-related deaths)	Dengue situation / real-time surveillance	95.7	Accepted	3
Weekly dengue cases	Dengue cases are reported weekly (based on epidemiological week)		95.7	Accepted	3
Dengue outbreak localities	Dengue outbreak reported daily		95.7	Accepted	3
Introduction of COMBI	Brief description of COMBI	COMBI information	100	Accepted	1
Information on agent	The pathogen	Important facts about dengue	95.7	Accepted	3
Information on vector	The characteristics of the main vector species which transmit dengue (physical features, behavior, and life cycle)		100	Accepted	1
Information on breeding sites	Potential breeding sites of the Aedes mosquitoes (indoor and outdoor)		100	Accepted	1
Information on symptoms and signs	Dengue symptoms (including warning signs)		95.7	Accepted	3
Information on search and destroy activity	Best preventive measure to destroy mosquito breeding sites	Preventive measures	100	Accepted	1
Information on how to prevent mosquito bites	Methods to protect from mosquito bites (including guidelines on how to use aerosol and repellent)		100	Accepted	1
Information on the larviciding method	Guideline on the application of insecticide to water bodies or water containers		100	Accepted	1
Actions during outbreak	List of activities during the dengue outbreak	Outbreak response	95.7	Accepted	3
Destruction of Disease-Bearing Insects Act 1975 URL link	List of relevant sections (including penalty)	Law enforcement	94.3	Accepted	4
	URL for relevant local dengue portals	URL link	74.3	Accepted	7
Update on COMBI activities	Promotional posters on prevention and control activities	Advertisement	75.7	Accepted	6
Chat forum	A platform for online discussion	Chat forum	54.3	Not accepted	-
Contact number	List of health facilities with contact numbers	Contact number	68.6	Not accepted	-
Outpatient dengue monitoring record	Vital signs and laboratory monitoring (including point-of-care tests)	Dengue monitoring	95.7	Accepted	3
Home care advice for dengue patient	List of what should be done and what should be avoided for dengue patients		95.7	Accepted	3
Date and time setting for selected search and destroy activity	Set date and time to conduct search and destroy activity	Reminder alert program	98.6	Accepted	2
Notification for selected search and destroy activity	Provide the user with timely reminder to act		98.6	Accepted	2
Problem reporting system	Report difficulty or challenge that needs to be addressed related to dengue to respected agencies (e.g. health district office, local authority, solid waste management corporation)	Problem reporting system	84.3	Accepted	5

## DISCUSSION

We selected the NGT method in the present study for the following reasons: (1) We were seeking to explore ideas in developing mobile app content based on the COMBI program; this best aligned with the NGT, as idea generation was an inherent aspect of this method; (2) The structured interactive process adopted in this project gave all panel members an equal opportunity to contribute significantly throughout the process, and; (3) Discussion and debate were possible to resolve the difference of opinion. We had successfully demonstrated the feasibility of utilising the NGT to develop mobile app content to prevent dengue based on the COMBI strategy.

Having a single meeting and generating recommendations is possible as the topic has been narrowed down, and engagement sessions have been conducted before the meeting to provide clear directions and relevant background information. The meeting only lasted for two and a half hours; hence, the results can be obtained quickly, which was ideal for researchers who required prompt results. It was appropriate as our panel members were interested in attending a single session rather than answering multiple questionnaires several weeks apart.

A key characteristic of employing the NGT is that a question is thoroughly investigated from different perspectives, creating a platform for knowledge-sharing and, therefore, identifying knowledge gaps. Our panel members incorporated their knowledge and experiences during the meeting, ensuring no insights were lost and obtaining enough information for the next steps. It also facilitates a prompt collection of data, as observed in previous studies employing the NGT,<sup>58,59</sup> and enables the acquisition of a substantial amount of data within a short duration.<sup>58</sup>

Another appealing aspect of the NGT is its immediate dissemination of voting results to expert panels and researchers upon vote tallying.<sup>60</sup> The expert panel, composed of individuals with a broad range of expertise, has established and prioritised essential components that should be included in the mobile app. To the best of our knowledge, this is the first consensus study using NGT to identify the content of mobile apps to improve the COMBI implementation. The panel members were satisfied with the 22 items selected and confident they reflected the conventional implementation of COMBI. Anticipating the result might give the panel members a feeling of accomplishment.<sup>51</sup>

COMBI is a community platform that has shown potential in improving the KAP level and decreasing the density of vectors;<sup>28,29</sup> however, it requires understanding from the community.<sup>17</sup> Previous studies have shown that primary prevention, including removing potential mosquito breeding sites, such as removing stagnant water,

covering water containers with lids and using insecticide, are suggested as effective dengue preventive practices in Malaysia.<sup>12,61</sup> These vector control activities and laws, such as the Destruction of Disease Bearing Insects (Amendment) Act 2000, necessitate community support, cooperation, and participation.<sup>62</sup> Hence, providing a basic understanding of the disease and its preventive methods is crucial.

This study had successfully demonstrated the feasibility of using NGT to select the content of mobile applications to prevent dengue based on the COMBI strategy. Panel members consisting of individuals with various expertise and experience had prioritised the essential content that should be present for the eCOMBI-Dengue application. To the best of our knowledge, this is the first consensus study using NGT to identify mobile application content to improve COMBI implementation. The panel members were satisfied with the 20 items selected and were confident that they reflected the goals and implementation of COMBI's activities, covering health communications and behavioral changes.

The selected content proposed by the expert panel encompasses information on (1) COMBI, (2) essential facts about dengue including the pathogen, the vector (characteristics of *Aedes* mosquito and its potential breeding sites), as well as the symptoms and signs, (3) preventive methods including search and destroy breeding sites, application of larvicide, and methods to prevent mosquito bites, (4) dengue situation (daily cases and outbreak report), (5) actions during dengue outbreak, (6) law enforcement in dengue control, (7) update on COMBI activities, and (8) URL related to dengue. These will improve community knowledge, motivation, and perceived risk of dengue and change their attitude towards the disease.

Another crucial component is a reminder alert program that allows future users to set activity for search and destroy activities by zones (indoor and outdoor) and determine when to carry out the chosen activity. They will receive timely notification to act. Those diagnosed with dengue can also refer to the dengue monitoring component which will contain outpatient dengue monitoring records, home care advice, and danger signs of severe dengue to prevent severe dengue. In addition, a problem reporting system can provide information that can lead to the transmission of dengue, such as the presence of an illegal dumping site that can potentially become a breeding site. This allows respected agencies to take appropriate action to dispose of such dumping sites. These intervention functions aim to educate and empower the users with promoted behavioral skills to prevent dengue and improve healthcare-seeking behavior. The eCOMBI-Dengue application with the identified health contents, therefore, needs to be tested in the



field to determine whether it is feasible and acceptable to be utilised at the community level.

## LIMITATIONS

We must emphasise specific difficulties we faced during our NGT process. The presence of a sizable group (14 participants) added complexity to maintaining focus during the discussion, and dominant participants could influence the group.<sup>50-52</sup> The lower-ranking staff may have found the larger group intimidating and less inclined to participate. Therefore, it is essential for the moderator to encourage interaction among panel members, ensure universal participation and adherence to the subject matter, manage any excessively dominating members, and maintain an impartial stance.

Like many other NGT studies, the smaller number of participants might hinder the generalisability of applying the findings to the broader population.<sup>50,63</sup> Nevertheless, the selected contents are not solely based on the participants' expertise in Seremban. It also incorporates local literature reviews to ensure that the forthcoming mobile app can be utilised in other localities. In addition, Seremban district is the capital of Negeri Sembilan state. It is responsible for approximately 90% of the reported dengue cases in the region, which aligns with the pattern observed in the capital cities of other states with a high incidence of dengue, such as Johor Bharu district and Petaling district.<sup>6</sup> Hence, the comparability of Seremban with other districts may ensure the generalisability of our results.

## CONCLUSIONS

This study is the first known consensus study to identify engaging content of mobile apps to improve the delivery and implementation of the COMBI program utilising the NGT. This method has demonstrated its suitability for such a project. It is a valuable approach for facilitating the development of a new health intervention implementation. The new implementation of COMBI via mobile app will support communities by disseminating key messages regarding dengue and equipping them with enough motivation and skills to prevent dengue transmission at the community level. This platform has the potential to improve health prevention behaviour. It can ensure the long-term sustainability of the COMBI program, as communities can adopt appropriate behaviors against dengue.

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### Author contributions:

AFNAH, MRH, RH, KYS, NKMA and MNJ were involved in the conceptualisation, methodology,

result syntheses, and original draft write-up. MLMZ, RD, SSSAR, SAMH, MAIAZ and QMG were involved in the review and editing. All authors read and approved the final manuscript. The authors alone are responsible for the views expressed in this article, and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated. All authors read and approved the final manuscript.

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All relevant data are within the manuscript.

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### Competing interests:

The authors declare no conflicts of interest.

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