

ORIGINAL ARTICLE

Development And Validation of a Cognitive, Affective And Behaviour (CAB) Questionnaire On Dengue In Malaysia

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ABSTRACT

Introduction: Dengue fever is one of the world's most severe mosquito-borne diseases, with high morbidity and mortality rate. Poor dengue prevention practices are one of the factors contributing to dengue outbreak. National Health and Morbidity Survey (NHMS) have collected lots of population data on the prevalence of various non-communicable and communicable diseases, including dengue. NHMS 2020 however, focus on communicable diseases i.e., Dengue, Malaria, HIV & Covid-19. Notwithstanding, data on Cognitive, Affective and Behaviour (CAB) domains are scarce. Thus, this study was aimed to develop and validate CAB questionnaire on dengue in Malaysia. **Material and Methods:** The questionnaire was developed by adapting and improvising similar previous questionnaires used during NHMS 2015, selected published questionnaires, expert panel and literature review. A sample of 200 respondents was used to evaluate the internal consistency of the final instrument. **Results:** 5 experts reviewed the content validity of the CAB questionnaire while 20 respondents tested its face validity. The Cronbach's alpha coefficients scores were within the acceptable range from 0.661 to 0.677. Various adjustments were made by deleting items with low Cronbach alpha values in attempt to attain the highest possible alpha values, but further deduction could not be made due to the retention of several important domain-measurement items. **Conclusions:** The validity and reliability of the CAB-IHBR-Dengue-A-01 questionnaire were of 'acceptable' ranges and can be used to assess CAB. The questionnaire is a valid and reliable tool for assessing the CAB's ability to influence dengue prevention among Malaysians.

Keywords: Cognitive, Affective, Behaviour, Dengue prevention

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INTRODUCTION

Dengue fever is one of the most severe mosquito-borne diseases in terms of global public health, with high morbidity and mortality. Dengue fever cases in Malaysia have risen steadily since 2000, an increase from 32 cases per 100,000 in 2000 to 390 cases per 100,000 in 2019 with infection being more common in persons over the age of 15 (1). The majority of dengue cases were registered in urban areas (70–80%), where factors such as high density and rapid progress were thought to be major causes of dengue transmission. (2). In Malaysia, 82,124 dengue cases were reported in urban areas compared to 8,180 cases in rural areas for the year 2020 (1).

Dengue fever is thought to be a child's disease, but it is becoming more common among adults in the tropics. It has also been discovered to be more serious in adults

who may be potentially saved from early detection of dengue infection, bleeding tendencies, and signs of circulatory failure. More studies on adults are needed to assess the best treatment options and to see if any clear warning signs or risk factors can be taken into account. (3).

One of the factors contributing to the increase in dengue cases is poor dengue prevention practices, particularly in areas where the disease is prevalent. Other factors include lack of environmental management and improper waste management at the household level e.g. poor management of plastic food container or used tires; and also, poorly maintained small pool usually used to collect water for vegetation. (4). According to National Health and Morbidity Survey (NHMS) 2015 (5), only 30.6% of local communities carried out search and destroy activities through communal work (gotong-royong) and out of the total community members, only 58.3% participated in such communal work (gotong-royong) activities. According to the findings of Wong and Sazali's (6) focus groups, most participants, regardless of ethnicity, failed to change stagnant water in pots and vases on a regular basis or search for mosquito breeding

sites due to either forgetfulness or laziness in doing so.

The effectiveness of initiatives to educate the public about dengue and how it spreads is important to ensure the success of community efforts for dengue prevention and control. Individuals with more knowledge of dengue are reportedly more active in adopting prevention initiatives compared to those who lack knowledge of dengue. (7) However, there are some indicators which suggest that knowledge about dengue does not always result in the adoption of recommended preventive behaviours. (8)

Since 1996, previous NHMS have collected a large amount of population data on the prevalence of various non-communicable and communicable diseases. However, data on the Cognitive, Affective and Behavioural (CAB) domains are scarce. The term CAB, refers to domains of learning such as cognitive (i.e. knowledge and awareness), affective (i.e. perception and feeling), and behavioural (i.e. practise), which is slightly broader and more detailed than the conventional Knowledge, Attitude, and Practise (KAP) (9, 10). Effective communicable diseases control such as dengue requires a thorough understanding of community-level awareness, attitudes, and practices (11, 12). This information is needed for the planning and implementing health education programs amongst the community. Monde, 2012 (13) suggested several roles in exploring CAB domains in a population survey: a) To identify the level of a known problem; affirm or refute a hypothesis; provide new perspectives on the facts of a situation. b) To enhance basic theme-related awareness, attitudes, and practises; ascertain what is understood and done about different health-related subjects. c) To establish a benchmark (reference value) for future comparisons and assist in determining the efficacy of health education programmes in improving health-related behaviours. Apart from that, to propose an intervention approach that takes into account the unique local circumstances and the cultural factors that affect them and to design activities that are appropriate for the targeted community.

In this regard, a study was conducted using a new set of questionnaires, which validate a CAB questionnaire on dengue in Malaysia. A CAB survey may be used to determine a target group's existing awareness, attitude and practice on a particular health issue in order to recognize their interests, challenges, and potential obstacles before designing and implementing an intervention. (14).

MATERIALS AND METHODS

Study design

Quantitative approaches were used in this study as the primary objective was to validate procedures and conduct reliability tests on the instrument used to assess dengue knowledge, perception, and behaviour related to

dengue prevention (15). The instrument was developed to evaluate CAB on dengue prevention among Malaysians aged 13 years old and above in two phases: Phase one is for item generation and questionnaire improvement, which included interviewing respondents, expert judgments, and material validity testing by experts; phase two is for reliability or internal consistency testing. The age of 13 years and above is used as a minimum requirement as some previous studies (AhbiRami & Zuharah, 2020; Gupta et al., 2016; Khun & Manderson, 2007) have indicated that providing individuals with adequate knowledge and promoting preventive behaviours in terms of dengue prevention as early as the age of 13 years can help them develop a favourable attitude towards dengue prevention and practise it.

The study was funded by the Malaysian Ministry of Health (MOH), and it was registered with the National Medical Research Registry (NMRR) under the number NMRR-19-897-47732. It was also authorized by the Malaysia Medical Research and Ethics Committee (MREC). All respondents received written information about the study's purpose and procedures, as well as the option to withdraw at any time. The researchers assured respondents that their personal information would be kept confidential. Before the study began, each participant had given informed consent.

Questionnaire Development

The dengue CAB questionnaire was developed by adapting and improvising previous questionnaires used during NHMS 2015. As MOH carries out the NHMS survey once every five years, this current study was used for NHMS 2020, which final result is still pending. It is interesting to note that currently, existing tools pertaining to CAB that were locally validated for dengue-based surveys are limited in Malaysia.

Several procedures in development stage:

A. Inclusion and exclusion criteria

Inclusive criteria for this study required the respondent to be a Malaysian, aged above 13 years old and must also be mentally fit. Previous study suggests that providing children with knowledge can help them develop a positive attitude and practice for dengue prevention, which can be useful in managing childhood dengue transmission through health education activities delivered to communities and schools (16,17,18). Respondents below 18 years old, were required to obtain informed consent from their parents or lawful guardians. Exclusion criteria disqualifies respondents who were minor subjects, who failed or were unable to acquire informed consent from their parents or lawful guardians.

B. Content Validity

Content validity referred to how much the instrument fully assesses and measure the subject matter (19). The aim of the content validity study was to see if the

instrument's language, content and structure were adequate for measuring CAB among respondents from a specific target population. The process of content validity involves when the instrument fully measures the construct of interest in terms of relevance and representativeness. The content of the dengue CAB questionnaire was determined by 5 expert panel members in dengue control. Opinions gathered from a Subject-Matter Expert (SME) panel comprised of Epidemiologist, Public Health Specialist, Health Educationist and Entomologist assisted the team to select suitable items into sections and evaluating the initial version of the instrument. The appointed SME panellists were included in the monthly discussion/workshop especially at the item development stage.

C. Face Validity

Face validity was determined after content validity, using the revised version of the dengue CAB questionnaire. Face validity is an assessment of the instruments so that it looks valid to the examinees who answers it (20). Face validity refers to researchers' subjective evaluations of the presentation and relevance of the measuring instrument in terms of whether the items in the instrument are understood, relevant, reasonable, unambiguous, and clear. (21). Thus, a pre-test was conducted to eliminate contents deemed as unsuitable, difficult to understand or irrelevant e.g., for respondents of particular age. One of the methods was to conduct instrument or questionnaire assessment through pre-testing. Pergener et al., 2015 (22), suggested that the minimum sample size requirement for pre-test is 30 respondents. In addition, previous pre-test studies on dengue indicated that the number of respondents needed for a pre-test must at least involve between 12 to 50 respondents (23, 24). For this study, face validity was assessed by recruiting 30 respondents from the target population to complete the respective instrument and to give opinion on the cognitive comprehension (language, difficulty level, clarity, relevance of the questions), and ease of using the instrument. The criteria for the purposive sampling included 15 respondents from urban areas and 15 respondents from rural areas and a combination of various ethnic groups. The combination by all ethnic groups selected as respondents was to ensure that the language used in this instrument could be understood by all races.

The overall dengue CAB questionnaire consisted of five main domains namely Section A (6 items) – Awareness and participation on COMBI (Yes/No); Section B1 (7 items) - Perceived threat of dengue; Section B2 (8 items) – Perceived effectiveness of dengue control activities (individual); Section B3 (7 items) – Perceived effectiveness of dengue control activities (authority) ; Section B4 (8 items) – Perceived barrier for non-participation on dengue control activities and Section C (6 items) – Participation on dengue control activities (Yes/No). Response for domains B1, B2, B3 and B4

used Likert Scale of five points; “Strongly Disagree”, “Disagree”, “Not Sure”, “Agree” and “Strongly Agree”. Numerical scores of 1, 2, 3, 4 and 5 will be given to each scale respectively. Scores for negatively phrased items will be re-coded as 5, 4, 3, 2, and 1 respectively. Possible scores for B1 ranged from (8 to 35); B2 (8 – 40); B3 (7 – 35) and B4 (8 – 40). Total number of items was 42.

D. Scoring Grades

The CAB scores were converted into percentage scores by dividing the respondents' scores by the possible maximum scores and multiplying by 100. The total score of each outcome was calculated using Bloom's cut-off point (25) which classified the scores at between 80 to 100 percent (good or positive); 50 to 79 percent (moderate or neutral) and less than 50 percent (poor or negative) (26). Previous local studies and in other countries also applied Bloom's cut-off point in determining scoring classification regarding CAB on dengue (27, 28, 29).

Sample Size and Sampling Method

The sample size for this pilot study is 200 respondents. This is in line with previous studies carried out by among others, Sekaran, 2003 and; Browne, 1995 (30,31), which suggest that a minimum of 30 respondents or larger is required in any pilot study. In addition, earlier sample size estimations in a dengue preventive pilot study used between 50 and 200 respondents (32, 33, 34).

Ethical consideration

The protocol for this study was approved by the Medical Research and Ethics Committee (MREC), Ministry of Health and was registered with the National Medical Research Registry (NMRR-19-897-47732).

Data Collection

The study was conducted from October to December 2019 in five different residential areas in Selangor, Malaysia. Selangor was chosen as it records the highest number of dengue cases in Malaysia. The questionnaire was used by the researchers to collect data. The purposive criteria were based on strata sampling method (100 urban/100 rural) to represent the study population. For each strata, the proportion were 40 Malays, 30 Chinese and 30 Indians. Respondents were chosen using quota sampling, a non-probability sampling technique in which researcher create a sample of individuals representing Malaysia's three major ethnic groups (Malay, Chinese and Indian). The locations representing urban areas were Subang Jaya, Setia Alam and Shah Alam while the rural areas were Meru and Hulu Selangor. The five locations were randomly chosen from a list of nine districts in the state of Selangor that are categorized as urban/rural and have a diverse ethnic composition. Before the start of field work, the Research Assistant received background information on the study's intent and goals, as well as a special training session on how to conduct the survey.

The team was also briefed on proper communication channels, protocols and chain of command during the session, which emphasized on the importance of data quality and accuracy. (35). The response rate was 83.5%; with a total of 167 questionnaires returned and analysed.

Statistical analysis

The research team used SPSS version 22.0 to analyse the data. The instrument's validity and reliability were the focus of the analysis procedures. The consistency of a measure is referred to as reliability, whereas the validity of an instrument is referred to as how well it measures what it is supposed to measure. (36). The content validity assessment was conducted through a review by subject-matter experts. Face validity was determined by the respondents' comprehension of the items or questions in terms of their relevance, reasonableness, and comprehension. The internal consistency test was used to determine the reliability which is indicated by the Cronbach's Alpha value. Even though Tavakol & Dennick (37) suggested the acceptable values of alpha ranging from 0.70 to 0.95; this current study considered Cronbach's Alpha ≥ 0.6 as acceptable. This is further supported by Moss et al., 1998 (38) who suggested that in regard to evaluating psychiatric evaluation checklist, recommended Cronbach Alpha greater than 0.6 is considered acceptable. Furthermore, one study Ursachi et al., 2015 (39) in marketing research suggested that 0.6-0.7 indicates an appropriate level of reliability.

RESULTS

Demographic Data

Among the 167 respondents who returned completed questionnaires, 71 (42.5%) were males and 96 (57.5%) females. A total of 114 (68.3%) respondents were Malay, 25 (15%) Chinese and 24 (14.4%) are Indian. On regard to level of education, 86 (51.5%) had diploma or above and 76 (45.5%) had passed secondary school or below (Table I).

Content and Face Validation

In terms of validity assessment, at least 3 levels of test were conducted, namely the content validity; face validity and cognitive de-briefing respectively.

Content Validity Assessment for Dengue CAB Questionnaire

For content validation, the Subject-Matter Expert reviewed the first and second versions of the questionnaires and highlighted on certain items which required further revisions. All questions were reviewed for language, wording, technical term used and overall structure to provide clarity of meaning and also flow of the questionnaire. Most of the domain were not deleted since the contents were comprehensible and easy to understand. The main issue concerning the first version of the pre-test questionnaire was the difficulty

Table I: Respondents Demography

| Items | Frequency | Percent (%) |
|--------------------------------|-----------|-------------|
| AREA | | |
| Urban | 113 | 67.7 |
| Rural | 54 | 32.3 |
| GENDER | | |
| Male | 71 | 42.5 |
| Female | 96 | 57.5 |
| ETHNICITY | | |
| Malay | 114 | 68.3 |
| Chinese | 25 | 15.0 |
| Indian | 24 | 14.4 |
| Bumiputera Sabah | 1 | 0.6 |
| Bumiputera Sarawak | 2 | 1.2 |
| Others | 1 | 0.6 |
| HIGHEST EDUCATION LEVEL | | |
| No Formal Education | 1 | 0.6 |
| Primary School | 7 | 4.2 |
| LCE/SRP/PMR | 7 | 4.2 |
| MCE/SPM | 54 | 32.3 |
| HSC/STPM | 8 | 4.8 |
| Diploma/ Degree/Master/PhD | 86 | 51.5 |
| Lain-lain | 4 | 2.4 |

to follow the question flow especially on multi-way or screening type question particularly on parts related to Communication for Behavioural Impact (COMBI). Improvements were made by bolding or increasing the font size of the question number, instructions and some keywords.

In addition, some words and sentences were rearranged and rephrased for better understanding. Under the perception domain, some of the items that used Likert scales of '0' to '10' were changed to 5 simple options to reduce the distribution of the answering pattern that might lead to low reliability when analysed. Reduction of some answering options was done to gather the proper method respectively from respondents. In order to acquire specific correct activities on prevention on dengue breeding sites, questions concerning indoor and outdoor activities were clearly segregated. One major aspect in correcting the Dengue CAB instrument was rephrasing and changing certain specific words in line with the local communication phrases commonly used and understood in Malaysia.

Face Validity Assessment for Dengue CAB Questionnaire

For COMBI questions, the full abbreviation of the word COMBI was consistently spelled out in full to provide clarity, while the answering option 'not sure' (tidak pasti) was added to provide more options for respondents. There were also some alterations made for screening type question purposes to capture required data e.g. in perception domain, repellents (krim penghalau nyamuk) was added as an optional answer. Under Question

AA2, the sentence was rephrased to make it simpler for respondents to understand. The answering option for Question B1 was revised to capture more variety of answers. Question B2 was constructed in order to know respondents' activities to prevent dengue breeding sites. The decision to put 'can choose more than one answer' (lebih dari satu jawapan diterima) in the instructions was made to compile more viable data. For Question B3, two of the answering options were found to be carrying the same meaning; so one was omitted. The phrase "saluran air hujan" was changed to "saluran air" (gutter or ditch) for better understanding. Under Question B6, one of the options was dropped as it was deemed unreasonable. The words "asap ULV" was changed to "semburan kabus" and fogging for Question BB1 because it is a more popular and commonly understood phrase for 'ULV fog' among Malaysian. A total of 20 respondents participated in the face validity assessment where the time spent to complete the dengue CAB questionnaire was approximately between twenty to twenty-five minutes per respondent.

Cognitive De-Briefing for Dengue CAB Questionnaire

Cognitive De-Briefing was done on 20 respondents. On the wordings and terminologies used, several suggestions and advices were provided and the instrument was amended to ensure that it remains relevant, clear and simple. The addition and/or omission of multiple-choice options in the knowledge domain, as well as rewording and item rearrangement, have all been made to improve readability and understandability.

Reliability

Reliability results for dengue CAB questionnaire indicated several items to be deleted to better improve values of Cronbach Alpha. The score was considered acceptable for group comparison when Cronbach's Alpha is (≥ 0.6) (32). For the affective domain, under perceived threat of dengue, item B1f – me and my family have no risk of contracting dengue (*saya dan ahli keluarga tidak berisiko dijangkiti denggi*) was omitted to enable the score of 0.661. For section B2, under perceived effectiveness of dengue control activities (individual): three items were deleted to enable the score of 0.622. Items deleted were B2b: I opined that wearing bright coloured trousers and long sleeve shirts does not protect me from aedes mosquito bites (*Saya berpendapat memakai seluar panjang dan baju lengan panjang berwarna cerah tidak memberi kesan dari digigit nyamuk aedes*), B2d: I opine that use of mosquito larvicide is not effective in dengue prevention (*Saya berpendapat menggunakan bahan pembunuh jentik-jentik tidak berkesan untuk mencegah denggi*) dan B2f: I am still sceptical that the use of mosquito coil, electrical mosquito repellents and other mosquito repelling devices is effective in preventing dengue (*Saya masih ragu-ragu dengan keberkesanan lingkaran ubat nyamuk, ubat nyamuk elektrik atau lain-lain alat penghalau nyamuk*). For section B3, under perceived effectiveness of dengue control activities

(authority), two items were deleted to enable the score of 0.607. Item B3c: I opine that health education activities by Health Department is effective in preventing dengue (*Saya berpendapat aktiviti Pendidikan kesihatan oleh pihak jabatan kesihatan berkesan mencegah denggi*) and B3d: I opine that the establishment of COMBI teams by Health Department is effective in controlling dengue (*Saya berpendapat penubuhan Pasukan COMBI oleh pihak kesihatan berkesan dalam mengawal denggi*). The perceived barrier for non-participation on dengue control activities scores Cronbach Alpha 0.677 (Table II).

Table II: Internal Consistency Of Cognitive, Affective and Behaviour Domain Items

| Section | Number Of Item | Item Deleted | Cronbach Alpha |
|--|----------------|-------------------|----------------|
| B1 - Perceived Treat of Dengue | 7 | - | 0.595 |
| | 6 | 1 (B1f) | 0.661 |
| B2 – Perceived Effectiveness of Dengue Control Activities (Individual) | 8 | - | 0.401 |
| | 5 | 3 (B2b, B2d, B2f) | 0.622 |
| B3 – Perceived Effectiveness of Dengue Control Activities (Authority) | 7 | - | 0.534 |
| | 5 | (B3c, B3d) | 0.607 |
| B4 – Perceived Barrier for Non-Participation on Dengue Activities | 8 | - | 0.677 |

DISCUSSION

This study aims to develop a questionnaire to assess CAB, which domains consist of Cognitive, Affective and Behaviour. Cognitive is measured by the level of knowledge and awareness of certain topics; the Affective domain is measured by attitudes and perception towards threat, treatment, effectiveness and severity of certain topics, while Behaviour is measured by health seeking, information seeking, practices, participation and associated factors. In this study, Cognitive domain is used to assess community's awareness and participation in COMBI program in dengue prevention, Affective domain is used to describe perceived effectiveness of dengue control activities and to assess perceived threat of dengue while Behaviour domain is used to assess respondent's participation on dengue control activities at community and individual level, as well as to assess perceived barrier for non-participation on dengue control activities.

Prior to the questionnaire being used in the field, several changes have been made based on face validity assessment. These include some alterations on the screening type question purposes to capture required data, rephrasing sentences to make it much simpler and straightforward, as well as reconstruction of certain

questions.

The questionnaire consists of 89 items, which consisted of 30 cognitive items, 30 affective items and 29 behavioural items. However, the total CAB were reduced to 83 items after the pilot test was conducted. A total of 6 items from affective domain were omitted, namely 1 item under Perceived Threat of Dengue, 3 items under Perceived Effectiveness of Dengue Control Activities (individual) and 2 items under Perceived Effectiveness of Dengue Control Activities (authority). The aforementioned omission is in adjustment to the reasonable Cronbach's alpha subsequently scored.

The final data analysis shows that the Cronbach's alpha coefficient for affective domain under Perceived Threat of Dengue was 0.661, Perceived Effectiveness of dengue control activities (individual) was 0.622 and Perceived Effectiveness of dengue control activities (authority) was 0.607, thus confirming the adequacy of the internal consistencies of the scales. It indicated that the questionnaire could be considered as a reliable CAB tool. While various adjustments were made by deleting items with low Cronbach alpha values in attempt to attain the highest possible alpha values, further deduction was no longer an option due to the imperative retention of several important domain-measurement items (40, 38).

CONCLUSION

The study showed that the three scales of cognitive, affective and behaviour were reliable and valid for assessing the dengue fever prevention in Malaysia. The research team is satisfied with these findings and hereby named the questionnaire as CAB-IHBR-Dengue-A-01. The validity of the developed CAB-IHBR-Dengue-A-01 questionnaire is found to be within acceptable ranges.

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