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VALIDATION OF A DENGUE PREVENTION BEHAVIOR QUESTIONNAIRE: IMPLICATIONS FOR PUBLIC HEALTH

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ABSTRACT

India has high rates of dengue, a vector-borne disease. As long as people continue to allow mosquitoes to breed in their housing compound, government efforts will not be sufficient to prevent the disease. Dengue prevention depends heavily on individual or community behaviour. The associated factors that contribute to dengue prevention behaviour, however, cannot be measured by a standard instrument. A newly developed instrument for measuring dengue prevention behaviours was validated and compared to a previously tested instrument. This study involved 300 respondents as a preliminary study to a larger study. A latent variable exploration was carried out with exploratory factor analysis (EFA). Using the EFA, 10 factors were identified (knowledge of dengue, behaviour toward dengue prevention, fear and awareness of dengue, A study determined that 70.2% of the total variance was attributed to factors such as motivation to take preventive measures, medical practices associated with dengue fever, cooperation in dengue prevention, perceptions of susceptibility, perceptions of severity, perceived benefits from taking steps to prevent dengue, and perceived barriers to taking steps to prevent dengue.). Dengue-prevention behaviours can be measured with the questionnaire in a valid and reliable manner.

Key words: Dengue, Prevention, Awareness of dengue, community medicine, prevalence.

INTRODUCTION

Vector-borne diseases such as dengue are among the most common. Human settlements are natural breeding grounds for *Aedes aegypti*. As a consequence of this mosquito habitat, humans can be exposed to mosquito bites and, subsequently, dengue fever, caused by the dengue virus. Keeping water for erratic water supplies, house conditions such as clogged roofs and shrubbery in the yard, and unplanned landfills are just a few of the things humans do every day. In addition, Indirect breeding grounds for mosquitoes are created when containers containing water are improperly disposed of. They also suggest that communities can play an important role in controlling mosquito breeding by keeping their settlements clean, in addition to showing how mosquito breeding is linked to human behaviour. [1, 2]. Individuals or communities rarely segregate containers that can serve as breeding sites for *Aedes* mosquitoes, despite their

importance. Dengue is a disease with a high prevalence of incidence and low prevalence of good attitudes regarding prevention. [3-6]

There are several factors that affect behaviour towards dengue prevention. Although this study focused on psychosocial factors, health belief model factors, and general knowledge about dengue, it also touched upon the health belief model factors or components. Individual psychological aspects and their social environment are closely related through psychosocial factors. Also, it involves a combination of internal factors, including the mind, thoughts, emotions, feelings, and behaviours, with external factors, such as interactions and relationships with other people, as well as cultural, religious, and professional factors [7-11]. An individual or a group of psychosocial factors may influence health behaviour. Besides directly influencing health behaviour, the factor(s) may also indirectly influence it. A number of psychosocial

factors are considered, including anger, fear, self-satisfaction, motivation, etc.[12,13] In addition to fear and awareness about dengue, medical practices for preventing dengue fever, motivation to adopt dengue prevention measures, and cooperation in preventing dengue, psychosocial factors were considered in this study. A total of four major components were identified from the HBM, including perceived susceptibility, perceived vulnerability, perceived benefit of practice of dengue prevention, and perceived barriers to practicing dengue prevention. [14] A question about dengue vectors, dengue viruses, breeding sites for dengue vectors, active biting times, symptoms of dengue, and prevention measures was asked for general knowledge.

It is important for people to practice dengue prevention by removing water collection containers from their homes, checking clogged rain channels and drains, sweeping and burying coconut shells, old tires or empty tins in their backyard, and checking and changing water in flower pot bases. [15,16] To determine whether a newly developed questionnaire valid and reliable can be used to assess the factors associated with dengue prevention behaviour, this study has been initiated.

METHODS
Questionnaire

Dengue prevention behaviours were measured with the questionnaire. It was determined that 50 items were required to assess knowledge, behaviour, and factors related to dengue prevention. Statements and inquiries used a typical 4-point Likert scale ranging from strongly disagree (1) to strongly agree (4) in terms of statement form or inquiry form. Research on knowledge, attitudes and practices (KAP) in controlling dengue was used to construct and generate the items in the questionnaire. Moreover, it made use of the HBM as a framework for analyzing studies on dengue. The psychosocial factors identified in the study were also adopted and adjusted as a factor of importance but rarely examined in dengue studies. [17]

Field work

Participants in this study were 300 in total. All respondents to this study provided written consent and were recruited from three health clinics. Participants had to be 18 or older and be able to read and write well in order to qualify for inclusion. A questionnaire is verified by a sample size that balances the number of items in the questionnaire against the number of respondents, 1:5 at the very least. Responses were collected from each respondent by using a set of self-administered questionnaires. The questionnaire forms were distributed, checked, and collected back by two trained data collectors to ensure completeness. We received 100 percent responses, and the questionnaire took respondents between 10-15 minutes to complete. A written consent form was signed by all participants indicating their willingness to participate in

the study. However, the respondents had the right to withdraw at any time from the survey.

Statistical analysis

To analyse all factors beyond the inflexion point (where the curve started to flatten), the Statistical Packages for Social Science version 18.0 was used. (IBM SPSS Statistics 2012).

RESULTS
Study respondents' sociodemographic and socioeconomics:

There were 38.55% respondents aged between 18 and 34 years old. Their majority married and bachelor. Only 15 of them did not attend any school, while nearly half finished their high school education, graduates from university, and finished primary school. With a mean wage of INR18000- 54000 per month, the private sector is the leading employer in India. The majority of respondents lived within 1-10 km of the health facility, with more than half living near it (Table 1).

Validity and reliability

The items with low communalities were initially dropped one at a time, with the item with the lowest communality dropping out first and the analysis being rerun. We also dropped items that cross loaded with other items. The item showed high loading in two factors for three items found to cross load. There were two factors involved in the item 'Putting Abate in the water made me feel unsafe to use it'; cooperation and perceived benefit. Perceived benefit and perceived barrier were favourable, and awareness and perceived susceptibility were favourable, which implied that 'Dengue is no big deal' for me. There are four items with low communality; 'Practicing activities that prevent dengue are not important to me', 'I don't have the time to engage in dengue prevention activities', 'I have difficulty cleaning the house', and 'The prevention of dengue is solely the responsibility of the health personnel'. The final analysis did not include these items. Leaving only 40 items for the final round of EFA after excluding and removing items with low communality or cross-loading. EFA classified the items into ten factors. Cumulatively, these factors are responsible for 70.5 percent of variance. In addition to the fear and awareness of dengue in the community, other factors accounted for 25.4% of variance. Retained factors were those that had an Eigen value greater than 1 (Table 2). For determining factors to be retained, the Scree plot was also used in addition to Eigen values. Table 3 shows that construct validity was also achieved by considering the factor loadings of each item that are greater than 0.5. Each item was listed according to its factor loading. Factor loadings of at least 0.5 are required for all items retained. A Chronbach's alpha value greater than 0.7 for each factor was recorded as an indicator of the instrument's internal reliability, with the average of 0.755. There is a

satisfactory item-total correlation for all items (more than 0.5) except for one item, 'I did not find seeing a doctor helpful for my fever' (0.496). However, the item was retained due to the satisfactory factor loading and the value of product correlation just above the borderline (Table 3).

Table 1: Study respondents' sociodemographic and socioeconomics, n=300

CHARACTERISTICS	NUMBER
Age (years old)	
18 - 30	80
31 - 40	87
41 - 50	80
>50	53
Gender	
Male	99
Female	201
Religion	
Muslim	7
Buddhism	5
Hinduism	178
Christianity	97
Other	13
Marital status	
Bachelor	110
Married	170
Divorced	20
Highest education level	
Primary school	25
Did not attend school	15
University or colleg	155
Secondary school e	105
Occupation sector	
Government	60
Private	145
Self employed	38
Housewife	37
Other	20
Monthly income	
<INR18000	66
INR18000-INR 54000	150
INR54000-INR90000	57
≥INR90000	23
No income	4
Distance from health facility	
<1km	60
1km - 5km	166
5.1km - 10km	55
>10km	19

Table 2: Using principal component analysis with rotation of the component matrix, factor analysis was performed for the items

Factors	Eigen Value	Variance Contribured %	Cumulative percentage of variance contributed, %	Number of item
Awareness of dengue and fear of it	11.15	18.4	24.3	5
The perceived benefits of a dengue	6.13	9.5	28.6	5

prevention program				
Prevention of dengue: behaviour	2.75	5.7	41.6	3
Dengue prevention barriers perceived	2.14	4.3	47.7	5
Practice of medicine	1.66	3.7	48.7	4
Prevention of dengue by practicing preventive behavior	1.64	3.4	52.0	4
Dengue susceptibility perceived by the individual	1.52	3.2	55.0	4
Dengue prevention through cooperation	1.34	2.4	57.4	4
A perception of dengue's vulnerability	1.35	2.3	61.5	3
An understanding of dengue	1.28	2.3	70.2	5

Table 3: An evaluation of the items' reliability

Factors and items	Factor Loading	Mean (sd)	Item-total correlation	Chronbach's Alpha
Awareness of dengue and fear of it				0.842
There is a high risk of death from dengue fever if it is not treated	0.552	3.42(0.94)	0.620	
It is the individual's responsibility to keep their home surroundings free of breeding sites for *Aedes*	0.671	3.43(0.84)	0.586	
Mosquito breeding sites must be found and eliminated by each individual	0.514	3.21(0.95)	0.557	
dengue fever makes me anxious	0.725	3.36(0.84)	0.639	
Death can result from dengue fever	0.775	3.49(0.80)	0.673	
In order to prevent dengue fever, I eliminate mosquito breeding sites	0.724	3.41(0.76)	0.620	
Dengue awareness				0.783
Dengue fever is caused by the following cause or causes	0.745	0.21(1.03)	0.581	
Check the box for dengue virus vectors	0.723	2.57(1.05)	0.602	
A dengue-causing mosquito usually breeds near its usual breeding site	0.671	2.44(1.02)	0.632	
Tick the dengue-causing mosquitoes bite during specific times	0.721	2.50(1.12	0.651	
Make a list of the symptoms you know about dengue fever	0.777	2.77(0.90)	0.760	
Tick control practices that protect against dengue fecundity	0.640	2.15(1.07)	0.622	
Dengue prevention benefits perceived				0.905
Containers that can hold water should be cleaned from residential areas	0.835	3.47(0.79)	0.805	
Eliminate mosquito breeding areas around your house by cleaning drains	0.839	3.43(0.82)	0.815	
Getting rid of used tires	0.811	3.21(0.91)	0.796	
Symptoms of dengue fever should be treated as soon as they appear	0.826	3.06(0.92)	0.770	
Preventing dengue: behavior				0.818
If you clean your drains around your house once a month, how frequently do you check clogged rain channels?	0.723	2.52(0.93)	0.745	
What is the frequency of cleaning your home within a month?	0.757	2.45(0.93)	0.885	
In the past month, how often did you rake and bury, such as old tires, empty tins, and food and beverage containers?	0.653	2.24(1.03)	0.694	
What is the average number of times you changed the water inside the bases of your flower vases within a month?	0.616	2.50(0.94)	0.878	
Dengue prevention barriers perceived				
In the event of a fever, I have difficulty seeing a doctor	0.645	3.14(0.84)	0.632	

Checking the mosquito larvae around my house is difficult for me	0.560	3.04(0.88)	0.540	
Mosquito nets are difficult for me to use at night	0.788	2.92(0.85)	0.660	
When it comes to killing mosquitoes, I struggle to use repellents or insecticide sprays	0.814	2.72(0.90)	0.560	
Dengue fever treatment practices				0.77
The only time I'll visit the clinic is if my fever worsens	0.622	3.24(0.78)	0.505	
The best way to treat a fever for me is to buy medicine at a pharmacy or take existing medicine at home.	0.611	3.55(0.79)	0.562	
I did not find any benefit in seeing a doctor for a fever	0.665	2.97(0.95)	0.492	
My own medicine is all I need if I get a fever	0.634	3.13(0.82)	0.515	
Dengue prevention behavior motivation			0.825	
Dengue prevention activities will only be conducted if I am rewarded	0.785	2.26(1.07)	0.660	
It will only be possible for me to cooperate if the authorities give me instructions for cleaning the house	0.804	2.06(1.05)	0.734	
For the house to be free of mosquito breeding sites, I need government support on a continuous basis	0.804	2.39(1.07)	0.646	
Perceived susceptibility			0.845	
As a person my age, I have a lower chance of contracting dengue than other people my age	0.795	3.04(1.02)	0.843	
Dengue wouldn't affect me since my immune system is strong	0.832	3.36(0.90)	0.844	
It is unlikely that I will contract dengue next year	0.790	3.35(0.91)	0.680	
Dengue prevention through cooperation			0.690	
Are you often involved in dengue control activities with health personnel?	0.790	2.80(0.90)	0.530	
Do you often participate in neighborhood clean-up activities to keep your building and drains clean?	0.803	2.93(0.92)	0.565	
Whenever a health worker requests permission to examine mosquito breeding places inside or outside the house, I give it	0.731	2.95(0.90)	0.587	
A precautionary measure I took was to cover food and beverages when fogging activity was announced and opening all windows in the house to allow the fume to get in	0.704	2.84(0.82)	0.549	
A perception of dengue's vulnerability			0.594	
In the absence of treatment, dengue fever will become more severe	0.713	2.74(0.90)	0.622	
Dengue hemorrhagic fever is a part of dengue fever	0.670	2.43(0.94)	0.630	
It is easy to treat dengue when it is contracted	0.596	2.62(0.80)	0.586	

DISCUSSION

Attempts are made to validate the psychometric properties of a questionnaire related to dengue prevention behavior in India. [18] There was satisfactory internal consistency among the selected scales. This scale produced 0.755 Cronbach's alpha coefficient, confirming it's internal consistency. When the exploratory factor analysis was conducted, ten factors were clearly identified. Even though the Scree test may perform well with strong factors, it has subjectivity and ambiguity, particularly when breaks do not appear to be clear or when there are two or more. Thus, factors to be retained were determined in accordance with the other criteria. According to Kaiser's criteria, along with Scree test, a number of factors were retained. Statistics scholars consider tests to be sufficiently reliable for measuring instrument structures when their internal reliability values are 0.70 or higher. The Cronbach's alpha values in this study indicated a high level of internal reliability. There was a wide range of questionnaire scores (mostly 0.6 and 0.7). 0.755 was considered to be the average score, indicating that the questionnaire could be considered reliable. A value similar to this can be found in validation studies on knowledge attitudes and practices (KAP). [19] Furthermore, an instrument's reliability can also be determined by its corrected item-total correlations, which measure the

relationship between scores on each item and the overall scale scores. Except for one item, all items in the instrument assessed achieved the accepted value. Among the factors that contributed the most variance to dengue prevention behaviour in this study is the psychosocial factor (fear and awareness toward dengue). Studies on dengue rarely explore psychosocial dimensions despite how important they are. Based on the results of this study, it seems clear that assessing and exploring this factor along with other factors is essential to gaining a better understanding of determinants of preventive behaviour.

CONCLUSION

This study utilized a validated and reliable questionnaire to assess the factors associated with preventing dengue. The findings suggest that this questionnaire could serve as a valuable tool for future research endeavors focused on dengue prevention and community health. By identifying key factors influencing dengue prevention efforts, such studies have the potential to inform the development of targeted interventions and strategies aimed at reducing dengue transmission rates and improving public health outcomes. Further research utilizing this questionnaire may provide valuable insights into effective approaches for combating dengue and promoting community well-being.

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