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Systematic Review

Effect of community-based intervention on awareness of dengue and its prevention among urban poor community in India: a systematic review approach

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ABSTRACT

Owing to increased epidemic activity and difficulties in controlling the insect vector, dengue has become a major public health problem globally. The prevention and control of dengue rely mainly on vector control methods. A systematic review was conducted using four databases (PubMed, Cochrane, Google Scholar and Scopus) and a manual search of the reference lists of the identified studies. Data from included studies were extracted, analyzed. Applying all inclusion and exclusion criteria 23 articles was included. Further relevant articles using this keywords Aedes dengue breeding habits housing and community intervention were selected. Eight studies combined community participation programme with dengue control tools. Findings of the published literature indicate that at baseline, almost half the respondents did not know that dengue is serious but preventable, or that it is transmitted by mosquitoes. The analysis showed that dengue vector control is carried out by vertically structured programmes of national, state, and local administrative bodies through fogging and larval control, without any involvement of community-based organizations, and that vector control efforts were conducted in an isolated and irregular way. The most productive container types for Aedes pupae were cement tanks, drums, and discarded containers. Evidence that community-based dengue control programmes alone and in combination with other control activities can enhance the effectiveness of dengue control programmes is weak. This review demonstrates a paucity of reliable evidence for the effectiveness of any dengue vector control method. Standardized studies of higher quality to evaluate and compare methods must be prioritized to optimize cost-effective dengue prevention. Clear best practice guidelines for the methodology of entomological studies should be developed.

Keywords: Effect, Community based, Prevention, Dengue, Quasi-interventional study

INTRODUCTION

Vector transmitted diseases are today one of India's biggest public safety issues constitute about 17% of all communicable diseases. It is estimated that 50-100 million new dengue infections will arise per year causing more than 1 million deaths worldwide each year.[1] There were 157315 cases and 166 deaths recorded in India during 2019 (National vector-borne disease control program (NVBDCP), MOH India).

In India, 16517 cases and 545 deaths have been suggested throughout the 1996 dengue outbreak after which there has been an upsurge of cases from 2010 onward. In 2015, 99913 cases have been reported which had been better than the instances mentioned in 2014. Tamil Nadu had

5% of the countrywide burden within the year 2015. The average burden of the disorder is appearing glossy due to the vast beneath reporting of dengue inside fitness systems.[2] Dengue outbreaks and deaths were recorded in the final decade from the northern states of Haryana, Punjab and Uttar Pradesh; the southern states of Andhra Pradesh, Tamil Nadu, and Karnataka; the western states of Gujarat and Rajasthan; and the eastern states of Western Bengal.

Dengue epidemics are periodic, peak after monsoon during which thousands of people could be impacted.[3] Although most of the rebound from a mere febrile condition, the dengue shock with subsequent deaths occurs in a limited yet substantial proportion. The factor which leads to the drastic increase in the prevalence of the disease is rapid urbanization with poor water and drainage management.[4]

Urban poverty in India tops 25 percent; about 81 million people stay below the poverty line in metropolitan areas. In India, the urban poor are counted out by rural ones. In India, urbanization is expected to hit 50% over the next decade. This group of the population lives in informal settlements, most of which are affected by poor quality environment, and overcrowded homes. There are limited studies in India based on health education in the community as an intervention targeting the urban poor populations. It is necessary to encourage people in the community to receive knowledge about the disease and benefits of disease prevention so that people can change their behavior and take action to prevent the disease.[5]

The impact of the community-based intervention plan for dengue fever awareness and its prevention, especially in urban poor populations need to be identified. It will not only help to determine the extent of awareness and treatment of dengue fever but will also, help government and policymakers to formulate strategies to fill the gap in the level of awareness, practices, and implementation of a control program acceptable to the at-risk population. This study systematically reviews the available evidence on the effectiveness of community-based intervention in controlling dengue transmission.

Objectives

Objectives of this study were to assess the level of awareness on dengue fever and its preventive measures among the urban poor population in India as evident in recent studies; to examine the effectiveness of the intervention program for dengue fever prevention among urban poor communities in India by comparing published data.

METHODS

Vector control remains the only available method for the primary prevention of dengue. Several interventions exist for dengue vector control, with limited evidence of their efficacy and community effectiveness. This systematic review compiles and analyzes the existing global evidence for community effectiveness of dengue vector control.

Search strategy

The methods adapted for search of published literature are as follows -"KAP on dengue intervention" or " assessing dengue transmission risk" or "impact of health education-based intervention" OR "vector control interventions to prevent dengue"

Four databases namely scopus, google Scholar, pubmed, and cochrane library have been adopted for systematic search of publication. Scopus, PubMed, and Cochrane library offered a good coverage of peer-reviewed articles, while google scholar has been included to have a broader coverage of the grey literature given the scarcity of publications in dengue Intervention involving community participation. The literature search was also supplemented with a snowball searching to pursue references of reference involving the review papers (Figure 1).

Articles were screened by title and abstract; after applying inclusion and exclusion criteria, the full texts of the remaining articles were retrieved and finally included articles were summarized. The data matrix included data/information on baseline characteristics of households and/or communities, geographical characteristics, details of the intervention and control groups, details of the process of administration of the intervention, logistical data and dynamics of community participation. The following entomological indices were extracted to the database: (i) breteau index; (ii) house index; (iii) container index and (iv) pupae per person. If reported by the studies, adult mosquito indices and human epidemiological parameters were extracted. Because of the very limited number of studies available, no study was excluded for quality reasons. However, the quality of each individual study is reported in the results section and considered in the discussion and overall conclusion.

Eligibility criteria

Literature search covered all dengue articles, theses, and review papers published before June 2020; studies conducted in developing countries based on the World Bank checked the list and were restricted to English language publications.

The rapid review was guided by five steps of the evidence-informed decision making (EIDM) approach recommended by Dr. Dobbin, rapid review guidebook Steps for conducting a rapid review. Health evidence™ tool was utilized to search for and access relevant research evidence; appraising the methodological quality of research evidence; synthesizing the evidence.

Inclusion criteria

Inclusion criteria were original articles focusing on for dengue control: no language restrictions, any period, regardless of study sites; community effectiveness studies; peer-reviewed publications presenting original data evaluating the community effectiveness and studies with control group(s) during the intervention, studies with pre- and post-intervention assessments and interventional and cross-sectional studies.

Exclusion criteria

Exclusion criteria were studies using combinations of entomological interventions (multiple intervention studies); non-trial studies; efficacy studies; and studies focusing predominantly on efficacy. Abstracts, conference posters, short communications, and letters to the editor, studies with not enough information on community effectiveness and surveillance data or reviews.

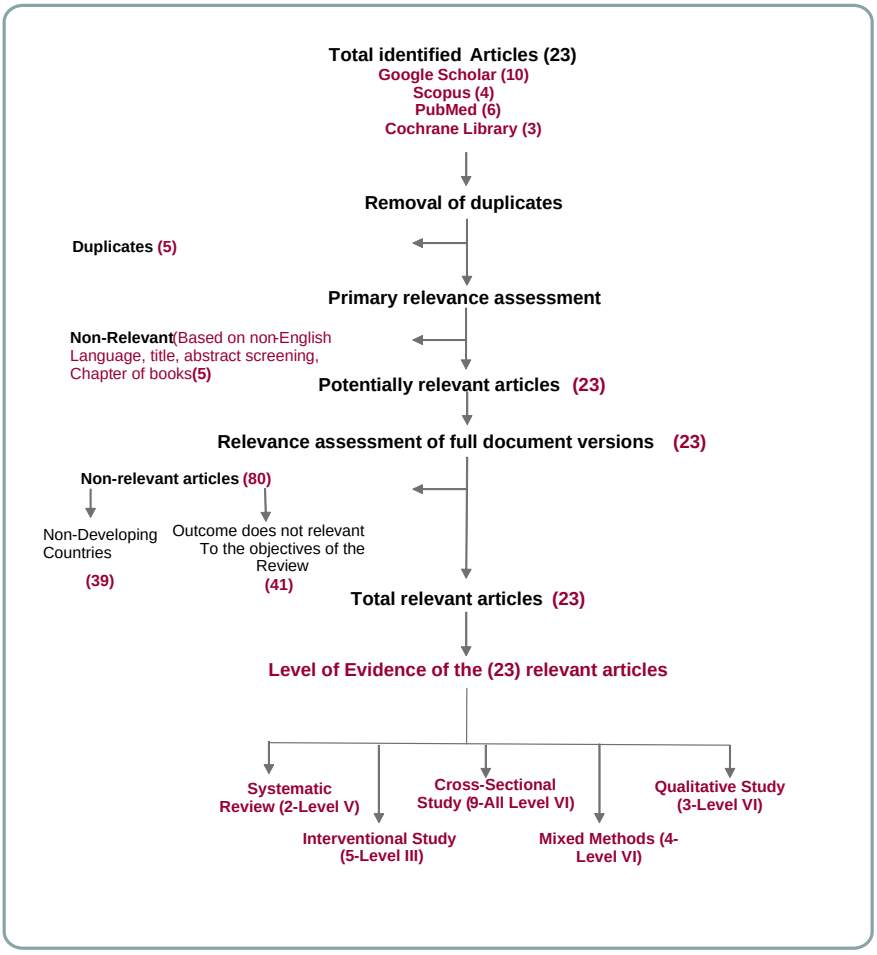

Figure 1: Search strategy.

RESULTS

A total of 113 articles only from India were initially identified. 23 articles met the eligibility criteria fully (Table 1), after removing duplicates, and the application of inclusion and exclusion criteria. The majority of the results were generated by Scopus, Google Scholar, PubMed, and Cochrane library have been adopted for a systematic search of publication. Review papers published before June 2020. 7 community effectiveness studies were found, Data were only from Asia. In total, 23 studies were from India. List of included studies showed in the appendix B.

The aim of this study was to introduce health education to prevent dengue and to evaluate its effect on the awareness and practices of people relating to the causes and prevention of dengue among urban poor people in Delhi. Pre- (n=484) and post- (n=496) intervention surveys from 15 sub-clusters from five slums/slum-like settlements in Delhi were carried out. Health education-based intervention was carried out through partnership with the municipal bodies and non-governmental organizations. Participants showed similar Socio-demographic characteristics in both surveys. Results of intervention showed significant increase in knowledge on cause, symptom perception and mosquito behavior in terms of breeding and biting habits. The study found that there was a significant increase in practice of personal protection

measures. The participation of people increased during intervention compared to the routine programme. Health education-based interventions are instrumental in improving people's knowledge and behaviour. Hence, there is a need to strengthen routine health educational activities as a supportive strategy in the health system. New integrated approaches such as eco-bio-social approaches with community participation are to be developed and tested in endemic settings like Delhi.[6]

Table 1: List studies and gaps/highlighted issues the studies published and authors have stressed upon.

S. no.	Title of study (only those which are latest and most suitable with your objectives.	Year of publications	Authors	Grey areas and gaps identified or indicated
1.	Community Perception and Risk Reduction Practices toward Malaria and Dengue: A Mixed-Method Study in Slums of Chetla, Kolkata	2020	Debayan Podder	Intensified social behavior change communication with active community participation is the need of the hour to prevent malaria and dengue occurrence and future outbreaks.
2.	Impact of health education-based intervention on community's awareness of dengue and its prevention in Delhi, India	2017	Yadlapalli S. Kusuma	Health education-based interventions are instrumental in improving people's knowledge and behaviour. Hence, routine health educational activities as a supportive strategy in the health system need to be strengthened. New integrated approaches such as eco-bio-social approaches with community participation are to be developed and tested in endemic settings like Delhi.
3.	An awareness program on dengue fever among adults residing in an urban slum area, Coimbatore	2017	Sugunadevi G.	Health education on Awareness of Dengue Fever among adults aged 20 to 30 years in urban slum at Coimbatore has produced an improvement in knowledge by 48 percent
4.	Health educational intervention is an effective tool for control the dengue disease as current menace	2014	Bhawna pant	There is better improvement found in knowledge attitude and practice for the control dengue after educational session. This study concludes that health educational intervention is an effective tool for prevention and controls the Dengue as disease.
5.	Vector Control Interventions to Prevent Dengue: Current Situation and Strategies for Future Improvements to Management of Aedes in India	2017	Amarjeet Singh	In this context, there is a pressing need for an evidence-based selection process to determine how best to detect and exterminate the breeding of Aedes mosquitoes. This review considers existing vector control strategies as well as discussing some of the novel approaches that are in preparation, placing particular emphasis on relevance to the worsening public health issue of dengue endemicity in India.
6.	Community based interventional study on dengue awareness and vector control in a rural population in Ernakulam, Kerala	2017	Leyanna Susan George	This BCC strategy was successful in this population due to community acceptance, however it requires constant reinforcement for its sustainability.
7.	Knowledge, attitude and practice on dengue fever and its prevention and control measures in urban slums of South India	2017	Khadervali Nagoor	The awareness regarding dengue and mosquito control measures was satisfactory to an extent. Surveillance along with periodic health education to the community and proper training of health personnel is required.
	Effect of Health Education on DF: A Comparison of Knowledge, attitude, and practices in Public and Private High School Children of Jeddah	2018	Hassan B. Usman	Health education programs are essential for DF prevention and management. Institutes whose populations consist of students with various language backgrounds should not be ignored. Bilingual educational sessions are important in such private institutes. Our results indicate additional emphasis is required on putting interventional knowledge into practice.

In a pre-structured questioner survey conducted in 2014 in Krishna Nagar area, Bhopal, Madhya Pradesh, an interventional analysis showed that the analysis included an aggregate of 107 families who effectively answered all the trends and caught up with a poll. A sum of 63 % of males and an aggregate of 33% of females had taken an interest in our investigation and a sum of 18.8 % expansion in information after the post intercession. The presumption of the investigation was that network interceded training on dengue ailment and its outcomes have improved the patient's information, attitude, and practice (KAP) towards the ailment.[7]

In a ward in Njarackal Panchayath in the Ernakulam district of Kerala in 2016, a community based interventional study was conducted. To analyze the present mindfulness, frame of mind, and dengue behaviors among the ward's occupants and their vector control, an overall normative research was performed. After two months the fact to break down its effect, a post intervention overview was completed Post-intervention there was an increment in the knowledge regarding methods of dengue transmission (84.4% to 88.4%), age bunches normally influenced (51.6% to 57.4%), climatic conditions preferring its spread (64.5% to 90%), immunization accessibility (31.7% to 36.8%), mosquito species transmitting the ailment (29% to 43.2%) and its seasonal variation (20.4% to 49.5%).[8]

In 2013, the Subharti Medical College Meerut Community Medicine Department of Health Training conducted a quasi-Interventional Report. The information and practices in this study were deficient concerning dengue before the instructive session and better improvement was seen after the instructive session. The degree of consciousness of preventive practices was expanded to stop water assortment 30(09.4%), utilized full sleeves shirts 31 (09.68%), showering DDT 20 (06.3%), misting 20 (06.3%), utilized mosquito net 27 (08.4%), utilization of anti-agents 27 (11.6%), clean encompassing region 18 (05.6%), splashing lamp fuel/petroleum oil 37 (05.3 %), and consuming neem leaves 20 (06.2%) were fundamental mosquitoes control after intervention.[9]

This research was carried out to highlight the awareness and behaviours of the poor population living in the slums of Delhi linked to dengue fever. A household survey was conducted in 2013 among 3,350 households. This result could thus be explained by budget-related health choices made by this population which does not favor small children. The targets of the educational programs are to improve their impact should be housewives, as they are the ones mostly responsible for water storage and cleanliness of the house and its neighbourhood. Even with a dengue experience and an acute perception of the risk factors there is lack of proper management of environmental conditions along with the fact that word-of-mouth is the main source of information quoted should be a message for municipality health workers to give door-to-door information on how to prevent breeding sites and dengue infection.[10]

In a descriptive cross-sectional study conducted in 2015, a rural medical college located in Jamuhar village, Sasaram District, India, Narayan Medical College & Hospital, showed that 93 percent of 223 people interviewed reported fever as a significant symptom of dengue fever (DF). The knowledge about other symptoms of DF was low among participants. Only 17.5% knew that DF is transmitted by Aedes mosquitoes. The correct incidence of biting time was known by only 14%. Despite low knowledge, the participants had a good attitude and most of them reported good preventive practices against dengue prevention and control.[11]

A community based, cross-sectional study carried out during 2014, Bhavnagar, showed that there was a good knowledge of mosquito borne diseases (MBDs) as the majority (88.1%) respondents were aware of (MBDs) & 3/4 (76.3%) were aware of preventive measures against MBDs. In the present study, 68.1% of fever cases were found out of which 88% consulted government doctor for treatment. Most of (94.8%) respondents were using personal protective measures.[12]

In 2013, a community-based cross-sectional study conducted in six selected villages, i.e. three in Mewat and three in Rohtak district, found that approximately 52 % of respondents in the Rohtak area and 42.68 % in the Mewat area committed to mosquito bite transmission of malaria, which was directly associated with the level of education. It was observed that high fever, chills, and body pain were considered as the major signs/symptoms of malaria. Television followed by friends and relatives and health care provider's acts as the major source of information about mosquito-borne diseases. Overall (76.2%) individuals from both study areas mentioned that malaria is a serious problem in their area but only 46.3% knew about various Government measures for the protection and treatment of malaria. Mosquito nets, mosquito coil, and repellents were commonly used as protective practices by the respondents but the difference was not found significant except for mosquito net ($p<0.05$) in both the study areas.[13]

DISCUSSION

There are gaps of knowledge on this matter and it needs to be addressed in future studies for effective control of dengue. Role of communities in intervention of dengue is not adequately studied.

This systematic review on 'effect of community based intervention on awareness of dengue and its prevention among urban poor community in India' revealed certain interesting observations. The dramatic growth in dengue over the past 35 years has been a remarkable epidemiological event and, as evidenced by its continued global spread, a challenge for which the public health

community was not prepared. It is not surprising that 20 of the 35 studies included in this review were published in the past 5 years, reflecting the increase in attention and resources devoted to devising effective control strategies as recognition of the dengue pandemic grew. However, the fact that the global increase in focus on dengue control generated so few studies performed at a standard required for inclusion in this review indicates that the magnitude of the response to the dengue pandemic has not been sufficient. Moreover, most of these studies investigated the impact of interventions on dengue vector indices alone, rather than dengue incidence. Finally, the inadequacy of the response to global dengue threat is demonstrated by the identification of 39 studies that measured the impact of vector control on dengue incidence in the past 20 years. Currently, the understanding is unclear for which of the interventions actually work, where or when they succeed or might work best, and the reasons behind their success or failure. Nowhere is the inadequacy more apparent than in the absence of appropriately designed trials to evaluate insecticide fogging or space-spraying for the prevention of dengue transmission. Although, space spraying is the standard public health response to a dengue outbreak worldwide, and is recommended by WHO for this purpose. It is impossible to determine how effective space-spraying programs, whether indoor or outdoor, without adequate evidence. It may be the case that outdoor fogging has the potential to impact on dengue vector populations sufficiently to impact transmission, but the minimum treatment frequency and geographic area requiring treatment remain unknown.[14]

Persons' health beliefs and their dengue-related knowledge, attitudes, and practices are likely to play important role in dengue control and management.[15] The success of dengue prevention and mosquito control efforts in the community relies on the effectiveness of initiatives to educate the public about dengue and how it spreads, how the general public can control Ae. aegypti mosquito breeding sites, and how to improve household environmental sanitation through sustained modification of human behavior.[16]

According to Stahl et al preventing dengue outbreaks is much cheaper than paying for the consequences of an outbreak. During the raining seasons, Burkina Faso 2018 is experiencing an alarming increase in dengue cases and the dengue vector population. The spread of the vector is associated with climate change, globalization, and rapid urbanization; however, many other major diseases can also be transmitted by the mosquito vectors of dengue.

The study provides supportive evidence for implementing community health education for awareness. It demonstrated significant influence on awareness generation and adoption of some of the behaviors to prevent and control dengue. However, efforts should be made for community participation, which may contribute to sustainable behavioral change. The municipal corporations of Delhi (MCD) carries out various healths education activities; however, these activities suffer owing to various factors, such as lack of resources in terms of personnel, public health expertise and insufficient material. People's disinterest in participating in these educational activities and their (felt) inability to control various things at their end can be attributed to the vulnerability of these people in the background of struggling to securing their livelihood, as well as experiencing compromised living conditions.

Several earlier studies demonstrated increased knowledge following health education-based interventions. However, some couldn't find a significant increase. Heintze et al.2007 reported positive effects of community-based strategies. Espinoza-Gomez et al. 2004 demonstrated a significant influence of house to house educational campaigns and suggested preventive measures for dengue should be based on community involvement more than in the vertical use of chemicals. Health education supported by strict legislative measures at local level is emphasized to help in lowering risk of dengue. Legislative measures were one of the strategies of vector management and, under model civic bylaws, fines or punishment can be imparted by the municipal corporation to the households or organizations, if breeding is detected. MCD serves legal notices to the owners of the premises (both the government and private) where the breeding of Aedes mosquitoes has been detected, and usually impose fines. However, the effectiveness of this legislation is not known. It may again be mentioned here, water storage and stagnation are common in these disadvantaged areas due to irregular and intermittent water supply, poorly maintained drainage systems and dilapidated housing without basic amenities. Thus, we also emphasize provision of regular water supply and active community participation in destroying the mosquito breeding habitats while enforcing legal measures for mosquito control as opined by Singh et al. For the success of dengue vector control, close interaction between communities and municipal vector control services is critical. Some studies from Delhi, and other parts of India, reported poor knowledge of community regarding dengue, while another study from Delhi reported good knowledge of the community.[17] It may vary community to community and kind of society/community study was conducted. Intensifying Efforts for creating public knowledge and mobilizing community about the correct use of preventive measures against mosquito borne diseases are crucial. The present study along with several other studies emphasizes the need for health education-based interventions to enable the communities to access the knowledge. To bring about behavioral changes in the community, imparting knowledge is an essential component; however, more integrative approaches with social mobilization and community participation along with other measures of vector control and surveillance were needed. Horstick et al revealed that the necessary input from social sciences is largely unavailable to vector-control services or collaborating agencies and

technical expertise to work with communities was also lacking. They also revealed that community participation was on the agenda of almost all countries but implementation was often weak. Coordinated involvement of local health services, trained vector control personnel, civil authorities and the community could encourage communities towards prevention and control measures.[18] An eco-bio-social approach for implementing an integrated community-based approach was found to be more effective. The importance of intersectoral cooperation is revealed by the studies. It is essential to impart and improve knowledge and awareness regarding dengue and its prevention methods. However, for dengue prevention community education programmes are not enough to bring behavioral change.[19]

In dengue transmission, Aedes aegypti is the main urban vector in India, and this species and Aedes albopictus variously are vectors of the Chikungunya and Zika viruses, two emerging human pathogens that constitute a new global threat. The urge to respond must be tempered by reality, and based on sound evidence despite the fears surrounding these threats. In the large urban zones where these vectors proliferate, to simply continue to use what has always been used, for that reason alone, or to pursue new approaches without sound supporting evidence would be wrong, and potentially a profligate waste of resources. Hence, there is an argument for instituting a global independent advisory body to guide decisions regarding the selection of approaches and tools for control or prevention of infections transmitted by urban Aedes sp. vector populations, and the design of appropriate multi-centric trials to evaluate their effectiveness. With this in mind, we hope that the findings of this review will contribute to the sound evidence base on which that approach would be founded.[20]

All studies which falls under inclusion criteria of this review, aimed at eliminating dengue from the local domestic environment, but most of them have not provided specific information regarding whether community members were involved in the planning, implementation or future direction of the dengue control program. In most of the studies, community members passively participated and did what they were said to do. Poor monitoring of behavioral change and lack of a coherent model for maintaining community involvement were identified as major threats for the sustainability of communication for behavioral impact on dengue control.

CONCLUSION

In conclusion, the role of community for effective and sustainable dengue vector control and dengue transmission is immense. However, this will only be possible when community is actively participating. Literature search and findings clearly show that rigid delivery of intervention, development of community management committees, efficient mobilization and sustained interest of the community residents are key factors. Unfortunately, this evidence is very limited as far as in-depth studies are concern. Data from geographical areas where dengue is not a significant health problem, very few studies are available. Our findings suggest that further studies be developed with the following considerations: 1) conducting medium- or large-scale and long-term, sustainable studies using communities or households as unit of allocation 2) use of quality research designs, such as cluster randomized control trials supplemented by qualitative methods 3) use of clearly defined outcome measures, both entomological indices and human epidemiological parameters 4) efficiently administered and documented interventions by involving the community.

There is a need to assess impact of health educational interventions for dengue vector control. Public health authorities should sustain their education and communication efforts and the budget for such efforts not only when an outbreak is ongoing. Communities must be reminded of when to carry out the actions, how to properly carry out the recommended behaviours. To achieve sustained behaviour changes in dengue vector control, continuous communication and interaction between governmental agencies and the communities is essential.

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