



# Alternatives to Improve Mosquito Eradication Behavior: A Systematic Review

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## Abstract

**Background:** Mosquito-Borne Diseases (MBDs) are still a health problem faced, especially in developing countries. Reducing the number of mosquitoes can be done by breaking the reproduction chain by getting rid of places that become nests. This systematic review aims to get an idea of what strategies or efforts can improve or change people's behavior in eradicating mosquito nests.

**Methods:** This review was done using the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) statement. Literature searches were conducted several databases such as Science Direct, Cochrane Library, and Wiley Online Library and Google Scholar on published articles between 2010 and 2021. At first, the screening process was conducted based on inclusion and exclusion criteria. Then, the full text of the remaining articles was read carefully, and eligible articles was selected according to the objectives of the study. Next, the methodological quality of the selected papers was reviewed, and the required information was extracted from those with acceptable quality. Sixteen studies met the criteria for this systematic review.

**Results:** Based on data extraction in the 16 eligible articles, five strategies or efforts to improve community behavior towards mosquito nets eradication was presented include Door-to-Door monitoring of house conditions, using control cards, empowering groups in the community (SHG), health education with the SGD approach, and promote the prevention of MBDs through social media.

**Conclusion:** All the strategies in this study are adequate for the community, but the pattern that should be done is to find out the root of the problem early (bottom-up). Communities need to be mediated to recognize their environment better, what they need related to health problems, especially MBDs.

## ARTICLE HISTORY

Received: Aug 08 2020  
Received in revised form: Dec 3 2020

Accepted: Jan 21 2021  
Published online: Dec 21 2021  
DOI: [10.29252/jgbfmm.18.2.53](https://doi.org/10.29252/jgbfmm.18.2.53)

## Keywords:

Mosquito  
Borne Diseases  
Behavior  
Dengue

Article Type: Original Article



## Highlights:

### What is current knowledge?

There are several strategies to improve community behavior in eradicating or controlling MBDs.

### What is new here?

Effective strategies in controlling dengue vectors by the community are increasing community participation, decreasing house index, container index, and Breteau index, decreasing population exposure to dengue vector bites, decreasing Pupa index.

## Introduction

Mosquito-Borne Diseases (MBDs) is an essential issue in the theme of public health because the situation is very complex. Several important factors, such as biological, ecological, and socioeconomic factors, greatly influence the incidence of MBDs in a particular area of the community or society (1, 2). Various diseases are included in MBDs, such as malaria, dengue fever, typhoid, chikungunya, lymphatic filariasis, and Japanese encephalitis. These diseases have contributed significantly to the morbidity and mortality rates since they were first discovered. The prevalence of MBDs is common in areas with poor environmental sanitation conditions (3).

MBDs are a growing urban problem due to unplanned urbanization, industrialization, and overpopulation, coupled with rural to urban migration. In 2017, an estimated 219 million cases of malaria happened worldwide. Fifteen countries in sub-Saharan Africa and Southeast Asia account for 80% of global malaria incidence (1).

With the still high incidence of diseases caused by Mosquito-Borne Diseases (MBDs), it is necessary for the government and the public to make efforts to overcome both prevention and control, one of which is vector control. Vector control is the immediate action that can be taken on a community basis. Community empowerment has been an essential pillar in the approach to principal health care since the 1970s. At the International Conference on Primary Health Care in 1978, the Alma Ata Declaration placed community participation

at the center of effective primary health care delivery. It was also emphasized that the active participation of the community in planning and implementing programs could be in the form of contributing resources, money, or their own time, which is then expected to principal to a logic of ownership, responsibility, and ultimately more control over the determinants of their health (4). Community participation is vital for the prevention and control of the MBDs outbreak. Community participation is far below expectations because it depends on people's awareness and practice of the disease (5).

The primary purpose of community empowerment is to mobilize the community to deal with health problems or other problems of concern to them. Community empowerment strategies can cause social cohesion, experience of community, and reinforce community assets, improving health consequences. The community empowerment approach has proven to be effective in promoting behavioral alteration in various health parts, including adolescent health growth (6), women's health (7), and HIV/AIDS prevention (8).

Control of larval sources leftovers an effective mosquito control plan. Classifying and reducing inundation on a large scale is impractical, expensive, and unsuitable for sustainable vector control if the government does it alone (9, 10). Meanwhile, mosquito control by involving the community has proven successful in both the short and long term. Therefore, complementary efforts from centralized (government) and community initiatives are needed to increase effectiveness and sustainability as mosquito control methods (3, 11, 12).

Several survey results explain the importance of the community's role in preventing and controlling the incidence of diseases caused by mosquitoes. The results of Sitti Chadijah's research (13) in Palu City, Central Sulawesi, Indonesia, found that community empowerment participation in dengue vector control was surveyor larvae (jumentik). Furthermore, Wiwik Trapsilowati's research (14) in Semarang City, Central Java Province, Indonesia, showed that the application of community empowerment methods in controlling dengue vectors (PMPV-DHF) in the intervention area obtained very good participation from DHF cadres, both in capacity building, involvement, volunteerism and scope of activities, with a score above 80% entomological evaluation in the intervention area with the indicator The larva free rate has a tendency to increase.

Therefore, it is crucial to comprehend interventions to intensify or transform community behavior in eradicating mosquito nests to reduce the incidence of

Mosquito-Borne Diseases (MBD). The review aims to examine some relevant literature that focuses on improving the behavior of the community to eradicate mosquito nests in their respective living areas. This study provides an overview of several alternatives for policymakers in the success of national and international goals related to MBDS.

**Methods**

**Design**

This review was showed using the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) statement. Through this study, various models or strategies are seen to improve community behavior in eradicating or preventing MBDS.

**Identification of relevant studies**

Relevant articles were searched and collected using databases such as ScienceDirect, Google Scholar, Cochrane Library, and Wiley Online Library, with a publication period between 2010 to 2021. Keywords were adjusted according to Mesh terms for health studies. The keywords used vary, depending on the search engine used. In general, the keywords focus on 'community participation' OR 'health promotion' OR 'community behavior' OR 'community engagement' OR 'citizen science' OR 'community empowerment' OR empower\* AND 'mosquito borne disease' OR 'mosquito vectors' OR dengue OR Dengue Hemorrhagic Fever OR Malaria OR Aedes OR Anopheles OR 'disease vectors' AND surveillance OR 'communicable disease control' OR 'behavior control' or 'mosquito control' OR prevention OR management.

**Selection of studies according to the pre-established criteria**

Inclusion criteria include intervention studies, programs, training, or educational strategies to support the improvement of community behavior in eliminating mosquito nests; analyze the effectiveness of the intervention by measuring changes in people's knowledge, attitudes, perceptions, or practices in eradicating mosquito nests; focuses on the community or groups or groups in society. Our search strategy focuses on English and Indonesian language databases and publications. Articles were excluded or not reviewed if they only discussed the prevalence of MBDS incidence, analysis of risks associated with MBDS incidence (not referring to intervention strategies or health promotion), comment to editor, or systematic review.

**Data Extraction and Analysis**

Titles and abstracts are screened in each database. Complete text filtering was performed using Mendeley and extracted into Microsoft Word. The first author determined the selection of articles after a joint review of all authors' first sixteen full-text articles to establish explicit inclusion and exclusion criteria. The interpretations are presented in the table by taking the critical parts of the article.

**Quality appraisal**

Overall, articles were assessed using the NIH study quality assessment tool. A scoring sheet was advanced to measure the research methodology and devotion to the scoring criteria for each study that met the inclusion criteria of this study. Studies with scores <30% of the criteria are classified as "poor," scores between 30 and 70% are classified as "moderate," and scores >70% are classified as "good" study quality. The studies taken are studies that are classified as moderate and reasonable.

**Results**

The search returned 19,206 articles; after removing the duplicated articles, 11,638 articles were remaining, of which 11,615 articles were removed after screening titles and abstracts. The remaining 23 articles were reviewed and checked for eligibility, so seven articles were excluded. The final results were collected as many as 16 articles that encountered the inclusion criteria.

**Characteristics of studies included**

Sixteen articles were included in this review, four studies conducted in Indonesia, three studies in India, two studies in Cuba, and one each in Australia, Brazil, Bhutan, Burkina Faso, Malaysia, Philippines, and Thailand. The studies used a variety of designs, including quasi-experimental (n=12), RCT (n=3), and longitudinal (n=1). The sample size varied from 100 to 27,030, the study population with various ethnic backgrounds, including Asian, Hispanic, Australian, and African.

**Analysis of community role enhancement model**

This study identifies several strategies to improve community behavior in eradicating or controlling MBDS, including group management, where this model focuses on collaboration between researchers, Puskesmas, local government (Kelurahan/Village, sub-district), supervisors, city sanitation, Barangay (Kelurahan/subdistrict) officers, health cadres (15, 16), community leaders, community organizations, private waste officers (17), health cadres (18). Another strategy is a direct action to the community, including Health education (19-21), intensive campaign (22), Educational training (23-25), Fight the Bite (26), Community workshops, clean-up campaigns, distributing Information

Education, and Communication (IEC) (16, 27-29), Counseling (15), and, Control cards (18).

**The effect of intervention on community's behavior**

Five studies are showing positive results on dengue vector control by the community, such as increased community participation (17, 28), decreased house index, container index, and Breteau index (25, 27, 29) decreased population exposure to dengue vector bites, decreased Pupae index (22). Furthermore, seven studies focused on increasing public awareness and or behavior towards Mosquito-Borne Diseases (MBDS), including management of water reservoirs (17), use of control cards (18), Improved preventive actions (25, 26, 30), cleaning up places that are breeding grounds for mosquitoes (16, 20), healthy home conditions (19). The other four studies focused on improving community KAPs with the expected result being an increase in public awareness of the importance of preventing MBDS through healthy living behaviors, one of which is keeping the house and the surrounding environment clean (15, 21, 23, 24).

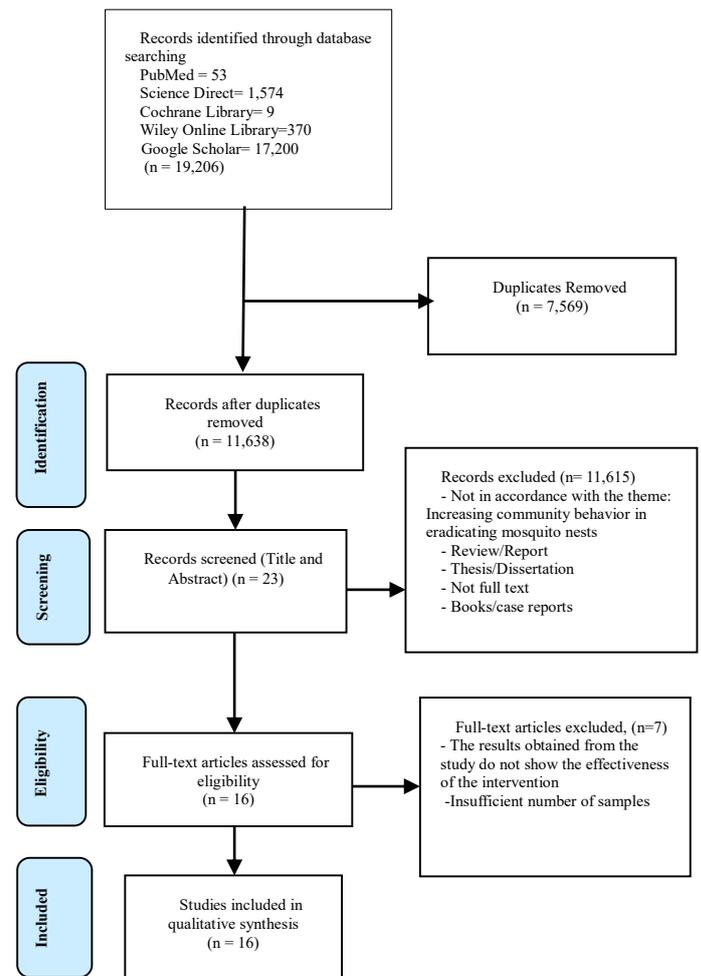


Fig 1. Prism Flow Diagram of Literature Search

**Discussion**

All reviewed studies used various strategies to increase public awareness, behavior, knowledge, perceptions, or practices, especially those related to reducing mosquito breeding through eradicating possible or favorable places as nests. Knowledge is a critical element of an individual or community empowerment (31). Gubler and Clark emphasize the importance of enhancing information in mosquito management, including changing attitudes toward the 'acceptance' of raising grounds in and around people's houses (32). The tactics identified in this review suggest that active education (e.g., door-to-door education) is more effective than passive education strategies like pamphlet distribution, television, and radio commercials. When carried out separately from other strategies, the passive education approach shows little or no influence on mosquito management outcomes (33-36). These findings are reinforced by the broader behavioral alteration literature, which has shown that knowledge gaining as a strategy alone is often not sufficient to attain sustainable health outcomes (37, 38).

In general, this review found that an effort to improve community behavior towards eradicating mosquito nests requires good cooperation between the local government, health services, community or community organizations, community leaders, or people who can represent in carrying out the planned program. The cross-sectoral collaboration shows effectiveness with the expected results (23, 27, 39, 40). Several studies have shown that health workers responsible for community health, including people who represent the community, are given training for some time in preparation to assist the community directly to increase awareness or change people's behavior about MBDs (39). In 2012, while another study in India only gave briefings to the Women Self-Help Group (SHG) related to monitoring activities of community houses, especially water reservoirs in each community's house (27). In addition, women's SHGs also show an active role in inviting the community to participate directly in cleaning their environment, especially the environment around their respective homes (27).

SHGs are informal groups of people who come together to solve their problems together. Self-assist companies can serve many exclusive functions relying at the state of affairs and wishes (41). In the setting of ladies's empowerment, it's miles assumed that after ladies come together, they discover energy and pass toward similarly understanding and awareness. This process forms the basis for further empowering women. Self-assist organizations are a precious platform for enhancing women's health finished increasing knowledge and awareness about health issues and financial security during health emergencies (42). The contribution of individuals, families, and groups is integral in promoting health. Individuals, families, and groups are considered as participating in the health field when they are collectively accountable for their health, their families, and the environment, and are interested in establishing plans, implementing them, and solving problems in society (43).

Water management interventions such as closing water reservoirs are included in the main activities to reduce the number of mosquitoes that cause disease (44). The study in the Philippines implemented an intervention to control water reservoirs by involving the city sanitation inspectorate, sub-district officers (Barangay), and health cadres. Instructions and guidance were given to the community to observe immature forms of mosquitoes in water reservoirs and report difficulties encountered to health workers assigned to the area or local CHW. Although the desired results were not achieved, observations of the behavior change process provide an illustration of significance of information the social nature of urban communities, one of which is not responsive to the government's recommendation to participate in the provided training as evidenced by the lack of community members attending the training conducted by researchers (45). It is in line with a study in Pakistan which stated that the inactivity or indifference of the community to government programs related to eradicating mosquito nests increased in epidemic conditions that occurred in a region. Good dengue control practices depend on public awareness campaigns and disseminating data approximately dengue; therefore, communities can eliminate dengue breeding locates if they contribute in dengue awareness campaigns and discuss dengue fever (46).

One of the studies conducted an intervention in the form of giving a control card to each household. This control card contains a list of activities for cleaning the house and the environment; homeowners are encouraged to put a mark or checklist on the activity items listed on the control card. A designated field officer will visit each house at an unspecified time or not known by the community to check the control card given. If an activity is not checked on the control card, the officer will ask why do not do it. At the end of the study, it was found that many households did not provide a checklist on their control card for reasons of forgetting or being lazy to fill it out (18). Both the government initiatives and the intervention research provided here are top-down, which may have contributed to resistance to intervention involvement. The community is, of course, involved in the research, but as participants rather than co-creators. It could explain the poor participation rate in the feasibility study, with just around one-fourth of participants using the control card as intended. There are three main reasons behind the community's refusal to participate, according to field officers: They believe that field officers, not themselves, are responsible for maintaining cleanliness (18). Previous research has suggested that bottom-up approaches are much more likely to be successful and sustainable (47). Therefore, it is imperative for the health authorities to know the community's opinion on the programmed DHF control program, in addition to continuously increasing the knowledge and motivation of the community to participate.

The embodiment of a bottom-up strategy that can be applied and has proven effective in understanding public perception is the Small Group Discussion (SGD). A study conducted in Indonesia even found significant results compared to the lecture method (16). Group Discussions allow participants to express their complaints and opinions on a problem topic without feeling intimidated by the discussion group leader or other participants (48).

Several obstacles in implementing Health Education in the community include lack of personnel, public health experts, and inadequate materials. The community is not interested in contributing in these educational activities, and they feel unable to control various things in life where they have to prioritize efforts in terms of their livelihoods (20). However, for dengue-related health education at the academic (student) level at universities, Health Education may increase student awareness quite significantly. Health Education is provided

through a social media platform, so it is highly recommended that the government use this method nationally, considering the number of social media users to date has increased very rapidly (21). In line with other studies in Malaysia, it is stated that good knowledge about Dengue positively improves people's attitudes and practices towards Dengue prevention (49). The type of knowledge needed by the community is, of course, about the morphological process of the vector, the signs and symptoms are shown by Dengue sufferers, to what actions must be taken to break the life chain of the Dengue vector, including family actions that must be taken if a family member suffers from Dengue or MBDs (50).

The health campaign carried out by Australia as a developed country is very massive and structured under the name of the Fight the Bite program. It is insufficient to conduct MBDs campaign on social media, television, radio, and even magazines/newspapers; for expansion of this national campaign program by advertising or calling on the public to work together with the government to make the Fight the Bite program a success through posters distributed on strategic places such as bus terminals, airports, including the installation of billboards on the main streets of the city. In addition, this program also provides fight the Bite branding including stickers. After two years of intense implementation of this program, the results showed a significant increase in community awareness and prevention efforts independently (51).

This systematic review was carried out to find effective strategies in supporting public awareness, ultimately in developing countries, concerning eradicating mosquito nests, better known as Vector control, where activities include cleaning places that can potentially become vector breeding locations. This study provides a clear view and evidence of the effectiveness of strategies implemented by the government and new strategies developed by academics.

#### Limitation

The current review is limited on the literature search, where some databases are not used due to the limited resources to access some sources. However, the author's database in this study is considered representative of the entire existing study. This study in several studies does not thoroughly discuss the domain that is the variable. In addition, the selection of the language used is limited only to English-language studies.

#### Conclusion

The best strategy to improve or change people's behavior in eradicating mosquito nests or controlling MBDs is to recognize the root causes of problems in the community, especially the desires and obstacles in the community. Group Discussion can be an excellent choice to dig deeper into the community's perception and what steps are desired or best for themselves. Health Education, using control cards, door-to-door monitoring, empowering groups in the community, and promoting MBDs through social media is effective for the community, as long as it is under what is needed or following the community's ability.

#### Acknowledgements

We would like to express our gratitude to the chief of the Poltekkes Jambi for her kind suggestions and input for the development of this research and to all participants for their cooperation in this research

#### Funding source

The authors received no financial support for the research, authorship, and/or publication of this article.

#### Ethical statement

The study was approved by the Health Research Ethics Committee of Komisi Etik Penelitian Kesehatan Poltekkes Kemenkes Jambi (Reference number LB.02.06/2/190/2021).

#### Conflict of interest

The authors declare that there is no conflict of interest.

#### Author contributions

ECH and AJ were responsible for the study conception and design; AJ, SY, SF performed the data collection; AJ and SY performed the data analysis; ECH, and SF were responsible for the drafting of the manuscript; ECH and SF made critical revisions to the paper for important intellectual content.

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Table 1: Final Resources For The Systematic Review

Author, Date, Title	Location	Study Type	Study Aim	Community Participation Strategies	Evaluation Methods	Study Results
Abbey Potter, Andrew Jardine, Annette Morrissey, Michael D. A. Lindsay. (2019). Evaluation of a Health Communication Campaign to Improve Mosquito Awareness and Prevention Practices in Western Australia (26)	Australia	Case-Control Study	This study presents the findings of an evaluation survey conducted after a two-year trial period to assess the campaign model's efficiency and efficacy, as well as the influence it has had on public awareness and mosquito prevention practices in WA.	Regional newspapers, geo-targeted Facebook advertising, a billboard, railway station shopalites, tourist maps, radio, television, outdoor cinema advertising, and a presence in the international airport departure lounge were all used to promote the campaign.	The computer assisted telephone interview (CATI) survey	
Tashi Tobgay, Deki Pem, Ugyen Dophu, Shyam P Dumre, Kesara Na-Bangchang, Cristina E Torres. (2013). Community-directed educational intervention for malaria elimination in Bhutan: quasi-experimental study in malaria endemic areas of Sarpang district (37)	Bhutan	quasi-experimental study	To determine the efficacy of a community-directed malaria preventive and control initiative in malaria-endemic areas of Bhutan's Sarpang district..	The community-directed educational intervention (CDEI) involved training health staff and local leaders who in turn trained community action groups (CAGs) that were nominated by the communities	Before the intervention, 13 in-depth interviews and 12 focus group discussions were conducted, and nine in-depth interviews and nine focus group discussions were conducted following the intervention.	The study resulted in a significant improvement during post-intervention in knowledge, attitude and practice (p < 0.001).
Prajapati Arpit, Parikh Sonal, Fancy Manish, Bala DV. (2012). Impact of educational intervention Regarding mosquito borne diseases and their Control measures among the link workers of Urban health centers (UHCS) of Ahmedabad City (25)	India	Pre-Post Intervention study	The pre-intervention questionnaire was used to assess link workers' knowledge of mosquito-borne diseases and control strategies. 14 days following a single educational session, provide training and assess knowledge improvement.	Single educational interventional training for 45 minutes in 14 days.	Questionnaires were used to examine participants before and after training.	The overall knowledge regarding mosquito & mosquito control measures was significantly improved after intervention (p value <0.05).
Suda Hanklang, Paul Ratanasiripong, Sulegorn Sivasan. (2018). Effectiveness of the intervention program for dengue hemorrhagic fever prevention among rural communities in Thailand: A quasi-experimental study (21)	Thailand	Quasi Experimental study, Case-Control approach	The goal of this study was to see how effective the intervention program for preventing dengue illness was in rural communities.	The intervention group got a five-week dengue hemorrhagic preventive program that included information broadcast, a campaign, a model house contest, and group instruction. The control group only received the standard of treatment provided by health-promoting hospitals.	Both groups had their questionnaire evaluations measured three times.	There were significant differences in knowledge, perceived susceptibility, perceived severity, perceived benefit, perceived barriers, preventive action and HI in the intervention group after received the five-week intervention program and at three-month follow-up (p < 0.05).
Tri Wahyuni Sukesi, Tri B. T. Satoto, Elsa H. Murhandarwati, Retna Sivi Padmawati. (2021). Effects of Health Education Based Intervention on Community's Perception, Healthy House, and Social Capital of Dengue in Endemic Area of Sleman Regency Indonesia (29)	Indonesia	Quasi experiment - Participatory action research approach	To determine the impact of DHF health education on community views, social capital, and healthy housing circumstances.	Health education about DHF.	Using Questionnaire after 6 months intervention.	The results show that in the 6th months after the intervention, there was an increase in the average score of all variables. The differences between pre- and post-intervention were statistically significant: Perceptions of dengue fever (p = 0.000); perceptions about DHF control (p = 0.000); the social condition for the component of concern, trust, and readiness to learn new ideas with p < 0.05; and all component of healthy house conditions with p < 0.05.
Natarajan Arunachalam, Brij Kishore Tyagi, Miriam Samuel, R. Krishnamoorthi, R. Manavalan, Satish Chandra Tewari, V. Ashokkumar, Axel Kroeger, Johannes Sommerfeld, Max Petzold. (2012). Community-based control of <i>Aedes aegypti</i> by adoption of eco-health methods in Chennai City, India (17)	India	A cluster randomized controlled trial study	To determine the efficacy of a community-based environmental intervention package for controlling the dengue vector <i>Aedes aegypti</i> , as well as the favorable and limiting factors..	Women's Self-Help Groups (SHG) in the community assisted in the distribution of water container covers and health education materials, as well as assisting the researchers in the organization of meetings by giving tea and refreshments to those who attended. During clean-up activities, the ladies were also actively involved and took responsibility for cleaning the surroundings. When complaints about insufficient solid waste pickup arose early in the trial, the researchers assisted the community on three occasions in obtaining services.	Household survey on people's knowledge, attitude, and practices using Questionnaire  Focus group discussions (FGDs) with health-care providers and community members.  Key informant interviews with health-care providers and community leaders.	Community-based approach that promoted interventions to prevent breeding of dengue vectors, and was targeted at multiple stake-holders within communities, led to substantial reduction in the density of dengue vectors. Participation of community members was ensured, addressing the fundamental need for people to be involved.
Andrea Caprara, Jose Wellington De Oliveira Lima, Ana Carolina Rocha Peixoto, Cyntia Monteiro	Brazil	Cluster randomized controlled trial	Implement a novel intervention method in Brazil based on an eco-health approach and	Workshops for the community; community participation in clean-up campaigns; covering elevated containers and in-house	Using Questionnaire and interviews.	The study results showed the effectiveness of the eco-health program in terms of a significant reduction of the dengue vector

Vasconcelos Motta, Joana Mary Soares Nobre, Johannes Sommerfeld, and Axel Kroeger. (2015). Entomological impact and social participation in dengue control: a cluster randomized trial in Fortaleza, Brazil (27)			assess its effectiveness and costs in reducing <i>Aedes aegypti</i> vector density, as well as its acceptability, practicality, and long-term sustainability..	waste disposal without larviciding; mobilization of schoolchildren and senior citizens; and distribution of information, education, and communication (IEC) materials in the community.		population through targeted interventions in the most productive container types. The project also achieved an increase in people's knowledge of dengue and willingness to participate in preventive actions. The intervention strategy was based on community participation and a partnership approach with public control services.
Yadlapalli S. Kusuma, Deepa Burman, Rita Kumari, Anjana S. Lamkang, Bontha V. Babu. (2017). Impact of health education based intervention on community's awareness of dengue and its prevention in Delhi, India (20)	India	Quasi-experimental community-based interventional study.	Implementing health education for dengue prevention and assessing its impact on people's knowledge and habits linked to dengue causes and prevention among Delhi's urban poor..	Posters and banners are used in a health education initiative. Audio messages were broadcast in key locations such as grocery stores, restaurants, intersections, and local shrines/temples, as well as when travelling throughout the neighborhood.	Questionnaire	The intervention resulted in a considerable increase in knowledge about the cause, symptom perception, and mosquito breeding and biting activity. The use of personal protective measures has risen dramatically. When compared to the regular program, people were more engaged during the intervention.
Zahratul Elsa, Uun Sumardi, Lia Faridah. (2017). Effect of Health Education on Community Participation to Eradicate <i>Aedes aegypti</i> -Breeding Sites in Buahbatu and Cinambo Districts, Bandung (30)	Indonesia	Quasi experimental study, one group pre-test and post-test	To investigate the impact of health education on community participation in the elimination of mosquito breeding areas.	Door-to-Door education, Counseling.	Questionnaire	Pre-test findings revealed that after receiving health education, respondents' knowledge levels in both sub-districts increased significantly (p-value=0.000). In Cijawura Sub-district, the Container Index (CI) and House Index (HI) were 13.2 percent and 26.7 percent, respectively, followed by 9.6 percent and 28.4 percent in Cisaranten Wetan Sub-district. The CI value in Cijawura and Cisaranten Wetan Sub-districts fell significantly (p value 0.05) after health education, however the HI value did not (p value > 0.05).
Samiratou Ouédraogo, Tarik Benmarhnia, Emmanuel Bonnet, Paul-André Somé, Ahmed S. Barro, Yamba Kafando, Diloma Dieudonné Soma, Roch K. Dabiré, Diane Saré, Florence Fournet, Valéry Ridde. (2018). Evaluation of Effectiveness of a Community-Based Intervention for Control of Dengue Virus Vector, Ouagadougou, Burkina Faso (38)	Burkina Faso	Quasi-experimental study (Case-control)	The goal of this study was to see how effective a community-based intervention (CBI) for dengue vector control was in Ouagadougou, Burkina Faso's capital.	Dengue preventive training was given to a group of community people, leaders, and a community theater troupe. These members of the community then planned community events and acted as educators.	Questionnaire	Well-planned, evidence/community-based interventions that control exposure to dengue vectors are feasible and effective in urban settings in Africa that have limited resources.
Wan Rosalina Wan Rosli, Suriya Abdul Rahman, Jasvinder Kaur Parhar, Muhammad Izuddin Suhaimi. (2018). Positive impact of educational intervention on knowledge, attitude, and practice towards dengue among university students in Malaysia (22)	Malaysia	One group pre-post intervention	Researchers assessed the level of baseline knowledge, attitude, and practice (KAP) among university students regarding dengue infection to determine the most effective media for dengue awareness and to evaluate the impact of an educational intervention in the form of a health education program to improve the participants' KAP levels.	The invited personnel from the Ministry of Health Malaysia delivered the Health Education Campaign.	Questionnaire	This study found that educational interventions were helpful in raising dengue awareness, and that respondents' preferred source of information for learning about dengue was social media.
Sujono Riyadi & Ferianto. (2021). Health promotion method of small group discussion effectively increases the behavior of mosquito eradication in Gunung Kidul Yogyakarta (36)	Indonesia	Quasi-experiment	To see if the lecture style and small group discussions on community behavior are beneficial in eradicating mosquitoes.	Health promotion, Small Group Discussion.	Periodic larva checks every week for three consecutive weeks.	With a p-value of 0.001, this study suggests that offering health promotion via lecture or small group discussion has an influence on community behavior changes in removing mosquito nests.
Fe Espino, Jesusa Marco, Nelia P Salazar, Ferdinand Salazar, Ysadora Mendoza & Aldwin Velasco. (2012). Community-based dengue vector control: experiences in behavior change in Metropolitan Manila, Philippines (39)	Philippines	Quasi Experiment, Two group pre-post intervention	To describe how the community reacted when a new vector control intervention, household water container management, was implemented.	During a series of meetings and seminars with representatives from the local government and health authorities, as well as barangay captains and homeowners' association presidents, the concept of household water container management was introduced.	Six months after the intervention's implementation, group talks were held. The impressions of the households, challenges in completing the assignment, and suggestions for improvement were all considered. Similarly, through focus groups and interviews, BHWs and sanitation inspectors reported their experiences with applying the techniques. For three months, direct observation was used to monitor the management of household water containers. Field notes, meeting minutes, group discussions, and interviews were used to document community reactions to the intervention.	The observation of behavior modification processes underscored the necessity of understanding the social structure of urban areas, which is typically disregarded when dengue control programs and researchers offer new dengue control measures.
Sulistiyawati S, Fardhiah DA, Sitti RU, Tri BTS, Luffan L, Maria N, Joacim R, Camilla A, and Ása H.(2019). Dengue Vector Control through Community Empowerment: Lessons Learned from a Community-Based Study in Yogyakarta, Indonesia (19)	Indonesia	1st phase: Cross-sectional Study 2nd phase : Quasi-Experiment, Pre-post intervention study	By evaluating the existing state of people's dengue fever prevention knowledge, attitudes, and practices, a baseline for developing a vector control intervention in the local community can be established.	Control cards focused on critical household duties for dengue control were chosen as an intervention to raise awareness and assist individual families' dengue prevention efforts.	The number of larvae infested buildings and containers was measured in both villages before and after the intervention to see if the control cards improved people's cleaning habits. Based on an 80 percent statistical power, a 5% confidence limit, and a 35 percent predicted frequency of positive larvae, minimum sample sizes were determined to be 141 homes in Mantrijeron and 143 households in Demangan.	The usage of control cards resulted in a low level of community participation. In several socioeconomic groups, despite continuing programs aimed at engaging the community in dengue prevention, knowledge levels were low and adherence to taught practices was poor. Bottom-up solutions involving all community members in dengue control, not just those who currently follow excellent practices, are essential to boost motivation levels.
Marta Castro, Lizet Sánchez, Dennis Pérez,	Cuba	Cluster randomized	Researchers intended to explore how effective a	Routine Vector Controlled : Entomological Surveillance,	Members of the CWGs and the management group assessed	The score for community participation improved from 1.4 to 3.4. In the

<p>Nestor Carbonell, Pierre Lefevrec, Veerle Vanlerberghe, Patrick Van der Stuyft. (2012) A community empowerment strategy embedded in a routine dengue vector control programme: a cluster randomized controlled trial (40)</p>	<p>controlled trial</p>	<p>community empowerment method combined with a routine dengue vector control program could be in La Lisa, Havana City, Cuba.</p>	<p>Periodic House Inspection, Application of Larvicides (temephos) in Water Containers, Adulticides (pyrethroids) when Aedes aegypti foci are detected, Health Education and Enforcing Mosquito Control Legislation through Fines, a participatory strategy rooted in empowerment and popular education</p>	<p>participation using Rifkin's framework, providing a score (1 = none, 2 = weak, 3 = fair, 4 = good, and 5 = excellent) to each of the framework's dimensions: needs assessment, leadership, organization, resource mobilization, and management.</p>	<p>intervention and control clusters, good knowledge of breeding sites increased by 52.8 percent and 27.5 percent, respectively.</p>
<p>Lizet Sanchez, Jonh Maringwa, Ziv Shkedy, Marta Castro, Nestor Carbonell, and Patrick Van der Stuyft. (2012). Testing the effectiveness of community-based dengue vector control interventions using semiparametric mixed models (41)</p>	<p>Cuba</p>	<p>Longitudinal study</p>	<p>To evaluate the achievements of a six-year project including inter-sectoral collaboration and community empowerment in Playa Municipality, Cuba.</p>	<p>Two major stages of the intervention are separated by two dengue outbreaks. The first step aimed to improve cross-sectoral coordination. A parallel strategy focusing on community empowerment was launched in August 2003 in half of the intervention area. Routine dengue control activities proceeded in the control region without any additional input.</p>	<p>Entomologic surveillance, Breteau Index (BI) per health area</p> <p>Before beginning the intervention, the BI in the control area had the lowest value. This was reversed one year after inter-sectoral dengue control activities were launched in the intervention region. Despite spraying in all locations, until December 2002, there were significant differences in BI between intervention and control areas. Although no variations were seen over the next two years, they became substantial again in December 2004, which coincided with the deployment of a community-based vector control approach in the intervention region.</p>

### How to Cite:

Emilia Chandra, Asni Johari, syaiful syaiful, Sukmal Fahri. Alternatives to Improve Mosquito Eradication Behavior: A Systematic Review. *Journal of Research Development in Nursing & Midwifery*, 2021; 18 (2): 53-59

