

REVIEW ARTICLE

Benefits and barriers of community participation in dengue control: A systematic review

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Abstract

Dengue is a global health problem. Community participation plays a crucial role in the prevention and control of dengue. This systematic review aims to examine the benefits and barriers of community participation in controlling dengue fever. Searching several journal databases including PubMed, ScienceDirect, Scopus, ProQuest, and Web of Science from 2013 to 2023. Various activities involving community participation in controlling dengue fever have proven to be beneficial, such as reducing vector density and increasing knowledge, attitudes and behavior regarding dengue fever control in the community. Various barriers in increasing community participation in dengue control include individual factors, community factors and Societal factors. It is important to develop programs that consistently involve the community in the prevention and control of dengue fever, as well as overcome barriers that may influence community involvement in the prevention and control of dengue fever. (*Afr J Reprod Health* 2024; 28 [10s]: 482-498).

Keywords: Community participation, dengue control, benefits, barriers

Résumé

La dengue est un problème de santé mondial. La participation communautaire joue un rôle crucial dans la prévention et le contrôle de la dengue. Cette revue systématique vise à examiner les avantages et les obstacles de la participation communautaire dans le contrôle de la dengue. La recherche a été effectuée dans plusieurs bases de données de journaux, y compris PubMed, ScienceDirect, Scopus, ProQuest et Web of Science, de 2013 à 2023. Diverses activités impliquant la participation communautaire dans le contrôle de la dengue se sont avérées bénéfiques, comme la réduction de la densité des vecteurs et l'augmentation des connaissances, des attitudes et des comportements concernant le contrôle de la dengue dans la communauté. Divers obstacles à l'augmentation de la participation communautaire au contrôle de la dengue incluent des facteurs individuels, des facteurs communautaires et des facteurs sociétaux. Il est important de développer des programmes qui impliquent constamment la communauté dans la prévention et le contrôle de la dengue, ainsi que de surmonter les obstacles qui peuvent influencer l'implication communautaire dans la prévention et le contrôle de la dengue. (*Afr J Reprod Health* 2024; 28 [10s]: 482-498).

Mots-clés: Participation communautaire, contrôle de la dengue, avantages, obstacles

Introduction

Dengue is a global health issue, with approximately 104 million reported cases and 40,000 deaths worldwide, posing a risk in 128 countries¹. Apart from its impact on health and mortality, dengue also carries economic implications. Research in Latin

America and the Caribbean indicates an annual cost of around 3 billion USD, with 70% attributed to inpatient care costs². Similarly, in Asia, the burden varies between approximately 6.7 to 1445.9 USD for inpatient and outpatient care respectively, and ranges from 12,035 to 1,453,237 USD for fatal dengue cases³. The risk factors for dengue disease

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are associated with social and environmental factors such as population density, human mobility, access to water sources, water storage practices, climate conditions conducive to the proliferation of the dengue virus vector such as high temperature, high humidity, higher rainfall⁴⁻⁶. There are other factors too, like knowledge, attitudes, and practices of mosquito control in the community, as well as the implementation of sustainable vector control activities in the community^{7,8}. Other studies have also identified factors related to the presence of the causative agent of the disease *Ae. aegypti*, such as housing conditions that support vector presence, negative risk perceptions of dengue fever, and impoverished and slum areas⁹⁻¹¹.

The World Health Organization (WHO) has designated dengue as a priority disease to be addressed in achieving the Sustainable Development Goals (SDGs) by 2030, aiming to reduce the number of cases to 2.35 million and achieve a 0% Case Fatality Rate (CFR). One of the five technical elements in the WHO Global Strategy for Dengue Prevention and Control 2021–2030 is to engage and mobilize communities¹. Community participation can be loosely defined as the involvement of people in a community in projects to solve their own problems¹². Community participation also means not only limited to physical involvement but also encompasses idea generation, contribution to decision-making, and sharing of responsibilities¹³. The World Health Organization describes community participation as a process by which people are enabled to become actively and genuinely involved in defining the issues of concern to them, in making decisions about factors that affect their lives, in formulating and implementing policies, in planning, developing and delivering services and in taking action to achieve change¹⁴. Active engagement of the community plays a crucial role in ensuring the efficient operation of health systems and serves as the initial stride towards authentic community empowerment in the realm of health¹⁵⁻¹⁷. Community participation in dengue prevention and the control of dengue vector transmission involves the engagement of the community in dengue prevention efforts, including mosquito larvae monitoring, reporting, and the

elimination of potential mosquito breeding sites. Strong community participation in these aspects can help reduce the risk and impact of dengue fever epidemics¹⁸. As an example, the concept of community participation has been utilized in Mexico to enhance awareness of the consequences of dengue fever. "Patio Limpio" consists of training local communities to systematically identify, eliminate, monitor, and evaluate vector breeding sites within households under their supervision. The outcome of a community participation program in the state of Guerrero found that approximately 54% of households were clean and free from mosquito breeding sites, while households not visited and assessed were deemed to have a 2-4 times higher risk of contracting dengue fever compared to visited households¹⁶.

Community plays a significant role in the success and sustainability of vector control. While coordination among various stakeholders is essential, vector control heavily relies on harnessing local knowledge and skills within the community. Engaging and mobilizing the community involves collaborating with local residents to enhance vector control and build resilience against future disease outbreaks¹⁹. Our systematic review aims to assess the benefits and barriers of community participation in dengue control. Examining the specific benefits of community participation in dengue control is a step towards future planning to reduce the burden of dengue disease and identifying the barriers to community participation is necessary to develop effective and sustainable interventions in dengue control.

Methods

Search strategies

This study used the Preferred Reporting Items for Systematic Reviews and Meta-analyses checklist guidelines (PRISMA)²⁰. The article search was carried out on 20 September – 10 October 2023 and was carried out by the first researcher. The research used several journal databases: PubMed, ScienceDirect, Scopus, ProQuest, and Web of Science, as well as manual searches. The study was

Table 1: Search strategy in selected database

Database	Search strategy	Filter	Number of Articles
PubMed	(((((("community participation") OR ("community-based")) OR ("community engagement")) OR ("community involvement")) OR ("community empowerment")) OR ("community mobilization")) AND (dengue)) OR ("dengue fever") AND (barriers)	Year: 2013 – 2023, Language: English Text availability: Full Text	54
ScienceDirect	("community participation" OR "community-based" OR "community engagement" OR "community involvement" OR "community empowerment" OR "community mobilization") AND (dengue OR "dengue fever") AND (barriers)	Year:2013 – 2023, Research article 2018 – 2023, Document type: Article Source type: Jurnal Language: English	134
Scopus	TITLE-ABS-KEY ("community participation") OR ("community-based") OR ("community engagement") OR ("community involvement") OR ("community empowerment") OR ("community mobilization") AND (dengue) OR ("dengue fever") AND (barriers)	Year:2013 – 2023, Document Type: Article Language: English	376
Web of Science	(((((ALL=("community participation")) OR ALL=("community-based")) OR ALL=("community engagement")) OR ALL=("community involvement")) OR ALL=("community empowerment")) OR ALL=("community mobilization")) AND ALL=(dengue)) OR ALL=("dengue fever")) AND ALL=(barriers)	Year:2013 – 2023, Document Type: Article Language: English	58
ProQuest	("community participation" OR "community-based" OR "community engagement" OR "community involvement" OR "community empowerment" OR "community mobilization") AND (dengue OR "dengue fever") AND (barriers) NOT ("meta-analysis" OR review)	Year:2013 – 2023, Full text Article Language English	42

limited to papers published during the period 2013 to 2023, in order to engender recency of information. This Systematic Reviews has been registered on Prospero with number ID CRD42023479727. The search strategy for database journals is presented in Table 1.

Inclusion and exclusion criteria

The inclusion criteria used in this research include (1) original articles, (2) articles in English, and (3) open access, (4) article that involve community participation in dengue control, providing information on at least one benefit or barrier of community participation in dengue control. The exclusion criteria were already published on the subject matter as reviews, systematic reviews, or meta-analyses.

Data extraction

The first step in extracting data was to determine the same articles (duplicates) based on the article title, and then duplicate articles were deleted. The next step was to evaluate the articles based on the titles and abstracts. The titles and abstracts that did not meet the requirements according to the criteria were removed. Papers that meet the inclusion and exclusion criteria will be reviewed in full text. Articles were categorized into two groups – those that reported barriers and those that dealt with benefits. Reviewers worked independently to synthesize relevant information. Information about the authors, objectives, methods, key findings, and other pertinent data addressing the research objectives were extracted.

Results

Reporting results and study selection

The initial electronic search yielded 1622 articles, which were subsequently reduced to 714 after filtering based on keywords and criteria such as publication year, article type, language (English), and other relevant factors. Duplicate articles were also removed during this process. Following the screening of titles and abstracts, 58 articles were selected for more in-depth review by examining the full text, as depicted in Figure 1. After thorough scrutiny of the full texts, 16 articles met all the inclusion criteria for this review.

Among these, ten articles focused on highlighting the benefits of community participation in dengue control, with nine being quantitative studies (experimental) and two employing mixed methods. On the other hand, six articles concentrated on exploring the barriers to community participation in dengue control. The breakdown of these studies revealed that three were qualitative, one was observational, and two utilized mixed methods. The characteristics of the studies and their key findings are summarized in Table 2.

From the results of Table 3 above, it is shown that several studies have revealed various approaches involving community participation in dengue prevention and control, successfully reducing entomological indicators such as House Index (HI), Container Index (CI), Breteau Index (BI), Pupa per Person Index (PPI), and other entomological indicators, as well as improving knowledge, attitudes, and practices in dengue prevention among the community. Various community-based approaches are used, including the eco-bio-social approach, ecosystem-based interventions, positive deviance approach, community peer approach, formation of mosquito breeding site eradication groups, and involving communities in other activities such as community empowerment and community-based dengue fever reporting. In involving community participation in dengue control, there are various field barriers that must be overcome as the basis for future policymaking. These barriers include individual

factors such as the level of knowledge, attitudes, self-efficacy, community trust, lack of interest, awareness, and community readiness, as well as low motivation among the community. Meanwhile, from the community factor perspective, there is a lack of support from community leaders and organizations, high insecticide use by the community, weak community efforts, weak community relations with the Department of Health/NGOs, and low social capital. The next factors based on the review results contributing to involving community participation in dengue control are societal factors such as excessive workload and lack of communication skills in the health sector, lack of detailed policy guidelines and weak enforcement of dengue-related policies or regulations, as well as limited budgets and resources.

Discussion

Community participation involves the direct involvement of communities or groups at risk of dengue impact¹⁶. Community participation in dengue control can take various forms or approaches, including community-based environmental management and community empowerment programs^{36,37}.

Benefit of community participation

The review findings indicate that dengue control, employing various strategies along with community participation, yields benefits in the success of the conducted interventions. Numerous studies suggest that actively involving the community, whether through education, empowerment, or direct engagement in preventive activities, has a significant positive impact on reducing the *Aedes aegypti* mosquito population and enhancing community knowledge, attitudes, and behaviors related to dengue control. Another study reveals that, in addition to knowledge, the attitudes and behaviors of community involvement will facilitate acceptance and strengthen a sense of ownership in the community. With a sense of ownership, not only does it encourage communities to actively participate in developing plans, but it also helps sustain the intervention over time through the use of

Table 2: Results of journal collection and analysis

No	First Author, (Year)	Study Aims	Design	Result	Key Finding
Benefit					
1	Kendra Mitchell-Foster et al (2015) ²¹ .	Researching the effectiveness of the eco-bio-social approach for dengue fever prevention compared to the existing insecticide and biolarvicide-based programs in an endemic area in Machala, Ecuador.	Cluster randomized controlled trial	The eco-bio-social approach, consisting of three key intervention programs school-based education, mosquito breeding site eradication program, and active community participation has successfully reduced the Pupa per Person Index (PPI) and increased community awareness in the prevention and control of dengue fever.	The eco-bio-social approach, involving active community participation, can be an effective alternative for dengue fever prevention and control programs.
2	César Basso et al (2015) ²² .	The research aims to develop and evaluate innovative intervention methods for preventing Dengue in Salto, Uruguay.	Cluster randomized controlled trial	Ecosystem-based intervention involving community participation (removal of unused water containers, improved environmental management, and covering large water tanks) conducted in Salto, Uruguay, reduced the number of breeding sites for <i>Aedes aegypti</i> mosquitoes compared to the control group implementing routine measures in the dengue prevention program although not to statistically significant levels). A larger sample size is needed to obtain a statistically significant difference.	Ecosystem-based interventions involving active community participation can reduce the population of <i>Aedes aegypti</i> mosquitoes, but statistically significant evidence is lacking and larger samples are needed to prove it
3	Muhammad Shafique et al. (2022) ²³ .	Testing the effectiveness of the positive deviance approach in enhancing knowledge,	Mixed method	The Positive Deviance (PD) approach can enhance knowledge, attitudes, and behaviors related to dengue in	The implementation of the Positive Deviance approach as a form of

		attitudes, and practices related to dengue prevention in the impoverished community of Islamabad, Pakistan.		communities by utilizing positive deviant groups as role models. Research results also indicate that the PD approach can be adopted as an effective tool for community engagement and behavior change related to health in communities in Indonesia and potentially elsewhere.	participatory approach in the community can enhance knowledge, attitudes, and practices for preventing the spread of dengue fever in impoverished communities in Islamabad, Pakistan.
4	John Christian Hustedt et al. (2021) ²⁴ .	Evaluating the effectiveness of utilizing larvivorous fish (guppy) in conjunction with the use of pyriproxyfen larvicide and community involvement in reducing the entomological indices of Aedes mosquitoes in Kampong Cham, Cambodia.	A Randomized Controlled Trial	The combination of using larvivorous fish, pyriproxyfen larvicide (Sumilarv® 2MR), and community involvement is an effective method in reducing the Aedes mosquito population in the Kampong Cham region, Cambodia.	The intervention involving the use of larvivorous fish, larvicides, and community engagement is an effective method in reducing the population of Aedes mosquitoes.
5	Retheesh Babu Gopalan et al. (2021) ²⁵ .	Evaluating the effectiveness of community-based interventions to control vector-borne diseases such as dengue fever and other illnesses in Alappuzha municipality, Kerala, India.	Quasy-eksperimental design	Community-based interventions involving the formation of community groups engaged in vector control, such as the establishment of resident committees and activities aimed at reducing mosquito breeding sites, can enhance community involvement in vector control activities and reduce vector indices before and after interventions.	Community-involved interventions result in positive changes in community behavior towards vector control and can reduce vector indices before and after the intervention.

6	Kristen Healy et al (2014) ²⁶ .	Testing the effectiveness of a community peer education program in reducing mosquito habitats of various types, especially <i>Aedes albopictus</i> .	Quasi-experimental design	Empowering trained volunteers (community peers) to provide education and encourage the community to take significant actions in reducing mosquito habitats has led to a substantial decrease in the number of mosquito breeding sites in residential areas.	The approach involving trained volunteers (community peers) actively providing education and encouraging action has successfully engaged the community in mosquito control, ultimately leading to a reduction in the number of adult mosquitoes in the area.
7	Jacob Bigio et al (2022) ²⁷ .	To assess the impact of an ecological-based (biophysical) and socially-involved (community engagement) dengue vector control strategy in schools and household communities in Kampong Cham Province, Cambodia.	Cluster-randomised trial	The intervention involving biophysical methods (biological larval control, adult <i>Aedes</i> control, breeding site container covers, solid waste management) and community engagement (education and training, communication and behavior change, participatory mapping) successfully reduced entomological indicators more effectively than the control group.	This combined package of biophysical interventions and community engagement is highly effective in reducing the entomological indices that contribute to dengue fever.
8	Neil Andersson, et al. (2020) ²⁸ .	To test whether community mobilization can enhance the effectiveness of dengue control.	Cluster randomized controlled trial	Community mobilization interventions (group discussions, formation of intervention design groups, community volunteer training) are effective in dengue control. The intervention group shows a lower risk of dengue virus infection in children, fewer reports of dengue cases, fewer houses with larvae or pupae among	Community mobilization (group discussions, formation of intervention design groups, community volunteer training) can enhance the effectiveness of dengue control.

9	Achmad Farich et al (2020) ²⁹ .	This study aims to analyze the effects of community empowerment in preventing dengue fever in Lampung Province, Indonesia.	Quasi-eksperimental	<p>visited homes (house index), fewer containers with larvae or pupae among inspected containers (container index), fewer containers with larvae or pupae among visited homes (Breteau index), and fewer pupae per person.</p> <p>That there is a positive effect of community empowerment (building capacity and planting mosquito-repelling plants) on knowledge, attitudes, and behaviors as well as entomological indicators (larval-free houses, house index, Breteau index) in the intervention group, while no difference was found in the container index between the intervention and control groups.</p>	<p>That community empowerment (building capacity and planting mosquito-repelling plants) can enhance knowledge, attitudes, and behaviors in preventing dengue fever. Community empowerment also aids in improving entomological factors (larval-free houses, house index, Breteau index).</p>
10	Oscar Alberto Newton-Sánchez et al (2020) ³⁰ .	Analyzing the impact of an ecosystem-based community participation program on dengue fever incidence in urban communities in the state of Colima, Mexico.	Randomized controlled trial	<p>That the implementation of an ecosystem-based community participation program (formation of specialized groups, identification of issues in each community and prioritization of these issues, community education, government and local leader cooperation in creating mosquito control regulations, community-based reporting of dengue cases) can</p>	<p>Community participation programs with an ecosystem approach can reduce Aedes larvae, measured through the Breteau Index.</p>

				reduce <i>Aedes aegypti</i> larvae in the intervention group measured by the Breteau Index, but has a limited impact on dengue incidence.	
Barriers					
11	Abdul Zahir et al (2016) ¹⁸ .	Determining the role of community participation in dengue prevention in the Swat District located in the Northern Region of Khyber Pakhtunkhwa, Pakistan.	Crossectional	Several community participation factors influencing control practices include community organization for dengue mosquito eradication, community leaders, community efforts, insecticide use by the community, and community involvement in awareness campaigns, dissemination of information among the community, community relations with health departments/NGOs, and other institutions for dengue control.	Organizing, community leaders, community efforts, insecticide use by the community, and community involvement in awareness campaigns, dissemination of information among the community, community relations with health departments/NGOs, and other institutions have an impact on dengue control practices.
12	Jelte Elsinga et al. (2017) ³¹ .	This study aims to explore community participation in efforts to enhance Mosquito Breeding Site Control (MBSC) and to design interventions that can improve community involvement in mosquito breeding site control in Curaçao.	Mixed Methods	Barriers to practicing MBSC include government support, knowledge, attitudes, and self-efficacy (individual's perception of their ability to act) in conducting MBSC. Interventions (using media and education, enhancing government actions, involving key individuals in the community to motivate) can improve MBSC in the environment.	Several barriers to community involvement in dengue control include inadequate government support, low knowledge, attitudes, and the community's low self-efficacy in engaging in dengue control.
13	Thang Nguyen-Tien et al. (2019) ³² .	Exploring barriers in implementing dengue vector	Qualitative Research	The barriers to implementing effective community engagement are as follows: 1)	Lack of community interest and attitude,

		control programs in urban areas in Hanoi.		lack of interest and dependence on actions from the local health sector committee, 2) lack of enthusiasm from mass organizations and community leaders, 3) excessive workload and lack of communication skills from the health sector, 4) low awareness and readiness of the community, 5) lack of detailed policy guidelines and low enforcement of related policies, and 6) limited budget.	insufficient enthusiasm from mass organizations and community leaders, heavy workload and lack of communication skills from the health sector, low awareness and readiness of the community, lack of detailed policy guidelines and low enforcement of policies, and limited budget are barriers to enhancing participation in dengue control.
14	Asri et al. (2017) ³³ .	To describe the social capital within a community in combating Dengue Hemorrhagic Fever (DHF)	Qualitative Reseach	Social Capital: Forming social groups, Sector collaboration, Community voluntary work, Support from local leaders.	social capital dapat digunakan untuk memperkuat keterlibatan komunitas dalam pencegahan demam berdarah dengue.
15	Tammy Allen et al (2023) ³⁴ .	To explore community participation approaches used in the management of Aedes mosquitoes and the factors influencing the choice of these approaches in Torres Strait, Australia.	Qualitative Reseach	The research results indicate that various community participation approaches are employed in two main Aedes mosquito management programs in Torres Strait, namely the Aedes albopictus Elimination Program and the Torres Strait Regional Island Council Environmental Health Program. These approaches are chosen for	The study also provides recommendations on how to enhance community participation in Torres Strait, which may also be considered in similar tropical regions. The community

				reasons related to regulations, attitudes and beliefs, and resources.	participation approaches are selected based on considerations related to regulations, attitudes and beliefs, as well as resources.
16	Sulistiyawati et al (2019) ³⁵ .	Identifying the knowledge, attitudes, and practices of the community regarding dengue prevention and testing the community empowerment-based control card intervention to improve container cleaning practices.	Mixed method Phase 1 Crosssectional Phase 2 Experiments	Community knowledge about preventing dengue fever is quite low. The attitudes and practices of the community in preventing dengue fever are relatively good, although there are still some areas that need improvement. The use of control cards as a standalone intervention is not effective in enhancing container cleaning practices. Active community participation in dengue vector control programs needs improvement, involving the community in campaigns and education.	Interventions involving the community are not successful when community participation is low. There is a need to enhance community participation through campaigns and education. Communities not only require knowledge but also strong motivation to engage in vector control activities, making it essential to implement bottom-up strategies involving the community in the design, implementation, and evaluation of each health intervention.

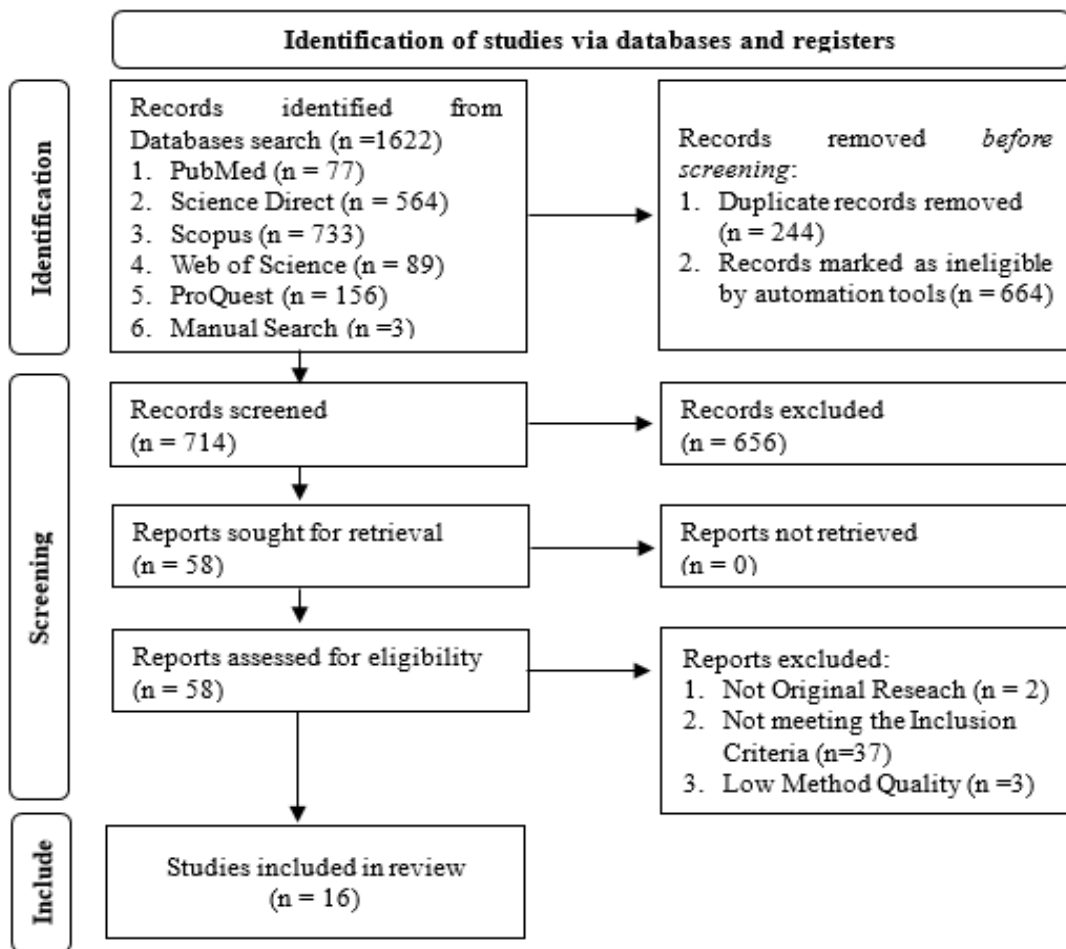


Figure 1 : PRISMA flow diagram identification of articles included in systematic review²⁰.

Table 3: Summary of selected document

Author	Year	Community Participation Approach	Benefit Community Participation for Dengue	
			Reducing Entomological Indicators	Increase Knowledge/Attitude/Practice
Benefits				
Kendra Mitchell-Foster et al	2015	Eco Bio Social Approach (school-based education, mosquito breeding site eradication program, and active community participation)	√	√
César Basso et al	2015	Ecosystem-based intervention (removal of unused water containers, improved environmental management, and covering large water tanks)	√	-

Muhammad Shafique et al.	2022	Positive Deviance Approach (utilizing positive deviant groups as role models)	-	√
John Christian Hustedt et al	2021	Combination Community involvement and using larvivorous fish	√	-
Retheesh Babu Gopalan et al	2021	Community group vector control (establishment of resident committees and activities aimed at reducing mosquito breeding sites)	√	-
Kristen Healy et al	2014	Community Peers to provide education and encourage the community to take significant actions in reducing mosquito habitats	√	-
Jacob Bigio et al	2022	Community engagement and biophysical methods (biological larval control, adult Aedes control, breeding site container covers)	√	-
Neil Andersson, et al	2020	Community mobilization interventions (group discussions, formation of intervention design groups, community volunteer training)	√	-
Achmad Farich et al	2020	community empowerment (building capacity and planting mosquito-repelling plants)	√	√
O A Newton-Sánchez et al	2020	ecosystem-based community participation program (formation of groups, identification and prioritization of community problems, community education, collaboration between government and regional leaders to create mosquito control regulations, community-based reporting of dengue fever cases)	√	-
Barriers				
Author	Year	Individual Factors	Community Factors	Societal Factors
Abdul Zahir et al	2016	-	Community Leader, insecticide use by the community, community effort, community relationship with health department/NGOs	-
Jelte Elsinga et al	2017	Knowledge, attitudes, self-efficacy	-	-
Thang Nguyen-Tien et al	2019	Lack of interest, awareness and readiness of the community	Lack of enthusiasm from mass organizations and community leaders	excessive workload and lack of communication skills from the health sector, lack of detailed policy guidelines and low enforcement of related policies, limited budget.
Asri et al.	2017	-	Social Capital: Forming social groups, Sector collaboration, Community voluntary work, Support from local leaders	-
Tammy Allen et al	2023	Attitude and Belief of community	-	Regulation, Resource
Sulistyawati et al.	2019	Motivation of community	-	-

community-based monitoring and accountability mechanisms³⁸.

Dengue control through community participation can be carried out directly by empowering the community or combined with various other activities. Some examples of activities involving direct community empowerment include the positive deviance approach, where positive deviance groups are used as role models. This approach can be an effective tool for changing community knowledge, attitudes, and behaviors in efforts to prevent and control dengue²³. The next direct community empowerment activity involves enhancing the capacity of community peers to provide education and eradicate dengue-transmitting mosquito habitats²⁶. This includes forming vector control groups to be trained in and conduct vector control measures such as eliminating mosquito breeding sites, cleaning the environment, and covering water storage containers^{22,25,27,28}. As for empowerment activities combined with other measures, they include empowering communities in vector control combined with the distribution of larvivorous fish²⁴, as well as combined with the distribution of mosquito-repellent plants²⁹. Eco-bio-social interventions consist of school-based education, a program to eradicate mosquito breeding sites, and active community participation²¹. Lastly, the ecosystem-based community participation program involves forming groups, identifying and prioritizing community problems, educating the community, collaborating between government and regional leaders to establish mosquito control regulations, and implementing community-based reporting of dengue fever cases³⁰.

Based on the points presented above, it is crucial to consistently involve the community in dengue control efforts. The expansion of public education programs on dengue and its prevention will enhance community understanding and awareness of the disease's dangers. Furthermore, the implementation of the positive deviance approach can serve as an effective intervention example that engages the community to encourage necessary behavioral changes in dengue prevention. The formation of strong and trained vector control groups is also necessary to effectively manage the

environment and reduce populations of disease-carrying mosquitoes. Additionally, the integration of ecological solutions such as larvivorous fish or mosquito-repellent plants can provide an additional environmentally friendly approach to vector control. Close cooperation between the government, local leaders, and the community is required to coordinate dengue control efforts effectively. Finally, periodic evaluations of implemented programs will help identify successes and areas for improvement, enabling these programs to be continuously refined and adapted to meet community needs. By taking these steps, it is hoped that dengue control efforts can become more effective and sustainable in the future.

Barriers to community participation

Community participation plays a crucial role in dengue control practices. Various factors causing low community participation in dengue control efforts are important to identify for policy-making and future intervention planning. Several studies have revealed that the low community participation in dengue control is attributed to several factors. As for these factors, they belong to the individual factor category, which includes knowledge, attitude, self-efficacy, lack of interest, awareness, community readiness, trust, and low motivation within the community^{31,32,34,35}. The next factor is the community factor, which comprises lack of support from community leaders and organizations, high insecticide use by the community, weak community efforts, weak community relations with the Department of Health/NGOs, and low social capital^{18,32,33}. The next factors based on the review results contributing to involving community participation in dengue control are societal factors such as excessive workload and lack of communication skills in the health sector, lack of detailed policy guidelines and weak enforcement of dengue-related policies or regulations, as well as limited budgets and resources^{32,34}.

It is important in the future in health interventions especially in dengue control to involve and empower the community, in community empowerment for example it is very important to consider factors that

affect the ability of the community to fully engage in information, consultation, participation, and empowerment initiatives³⁹. Furthermore, communities reside in areas with barriers to vector control participation are highly vulnerable to future outbreaks. Moving forward, control strategies should target these at-risk areas as well as regions within dengue transmission zones⁴⁰.

Conclusion

Various activities involving community participation in dengue fever control have proven effective in reducing entomological indicators such as House Index (HI), Container Index (CI), Breteau Index (BI), Pupa Index per person (PPI), and other entomological indicators, while also positively impacting the knowledge, attitudes, and practices of the community in dengue control. Barriers to community participation in dengue control include individual factors, community factors, and societal factors. In developing dengue prevention and control programs, it is important to involve the community and address these various barriers.

Contribution of authors

All Authors participated in the study. IA: analysed data, LS: conceptualized and designed the study, MS: Reviewing the article before submission, FS: Reviewing the article before submission, HJ: collected data, AR: Taking responsibility in the construction of the whole or body of the manuscript. All authors have read and approved the final manuscript.

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