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**Research Article**

# Enhancing community engagement to alleviate mosquito breeding in selected villages during the implementation of the Dengue Haemorrhagic Fever Control program in the Sri Satya Sai district, Andhra Pradesh, India.

**Dr. G. Sivanna**
State Disaster Response and fire service
Email: siva.gurikani84@gmail.com

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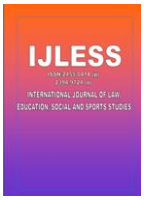


**ABSTRACT**
Dengue haemorrhagic fever (DHF) continues to be a major public health concern in India. Disease control measures have been implemented, including larvicide, fogging, and mosquito control. The project would benefit from increased community participation. This study aims to increase community participation in Dharmavaram Municipality's mosquito control initiative in Pothulanagepallepi and Ravulacheruvu. This study uses a quasi-experimental design to compare the levels of empowerment experienced by larval surveyors, specifically Malaria and Dengue Officers, and health assistants (HAs). Mosquito larvae were surveyed using the single larvae method. The research population was made up of each household in two villages. A random sample of 100 homes was drawn from each village. The preliminary larval survey conducted in Pothulanagepallepi village revealed a larvae free value (LFV) of 68%, CI of 20.81%, HI of 32%, and BI of 46. The larvae in Ravulacheruvu village were distributed as follows: 78% free, 19.64% CI, 22% HI, and 33 BI. In Pothulanagepallepi village, a community-based intervention resulted in a significant increase in the free larvae rate to 89% after seven weeks, with a CI, HI, and BI of 3.67% each. The village of Ravulacheruvu had an 85% larval abundance, 8.4% CI, 15% HI, and 21% BI. The findings of this study show that larvae surveyors, specifically Malaria and Dengue Officers, are the most effective at empowering communities for dengue vector control. A sensitivity index based on mentions was created. Only one of the sixteen health plans provided the average population participation sensitivity index.
Keywords: Dengue haemorrhagic fever, community participation, mosquito control efforts, dengue fever, Malaria & Dengue Officer, Health assistant .

## Introduction

Dengue Haemorrhagic Fever (DHF) remains a public health issue with social and economic consequences. The social losses include panic in the family, the death of family members, and a lower life expectancy. The occurrence of successive dengue epidemics around the world, particularly in India, has piqued the interest of technicians, researchers, and society as a whole, given the potential

consequences, such as the degree of widespread transmission of the disease every month of the year, with an increase in morbidity and mortality[1].

Around 80% of villages and municipalities are infested with the transmitting insect, *Aedes aegypti*, which is considered a domiciled species that has fully adapted to the urban environment and various environmental situations in India[2].

In general, the fight against the mosquito that transmits dengue fever presents several critical aspects, such as noncompliance with legislation when inspecting and eliminating breeding sites in points considered strategic, due to their importance in the dispersion of the vector, the difficulty of building inspection to suppress or treat water reservoirs, the lack of qualified labor for inspection and treatment in properties, in addition to legal limitations on hiring pe Other structural aspects have a direct impact on mosquito control, such as the need to regulate public water supply[3], as well as regular garbage collection and disposal, particularly on the outskirts of cities.

These difficulties stem from the emphasis on population-wide education and communication efforts to reduce mosquito breeding sites and maintain a healthy home environment. This allows for conscious and active community participation in *Aedes aegypti* surveillance and control actions[4]. *Ae aegypti* has been identified as one of the primary axes of an effective control program, while also being one of the most difficult tasks to implement.

The State Health Organization of Andhra Pradesh warns that one of the most significant barriers to effectively controlling mosquito outbreaks has been public health bodies' inability to mobilize the resources required to achieve and maintain the impact on behaviour of populations at risk of dengue, and recommends the integrated management model to prevent and control as a communication strategy for behaviour change aimed at specific problems[5]. The country's National Dengue Control Program consists of ten components that address various dengue control strategies, one of which proposes actions to encourage community participation as a control strategy for reducing domestic mosquito breeding sites.[6]

However, the prevention and control of communicable diseases entails a series of actions aimed at health determinants and conditions, highlighting the need for interdisciplinary approaches and public policy strategies that are integrated into each location's health policies. In this way, the health plan is configured to formalize management's intentions and desired results, ensuring that the Unified Health System responds to the population's demands and health needs in an effective, timely, and quality manner..

Keeping in mind that popular participation in dengue control is essential and constitutes one of the sustainability axes of an effective surveillance and control program; that the participatory process is not spontaneous and requires an intervention that involves different actors in its formulation and execution[7], including public authorities; and that its implementation should be included in municipal health plans, especially in municipalities with dengue. Another type of community participation that is expected to boost the RFR (Rat Free Rate) is involving the leaders of Neighbourhood Associations (NA). The NA head is expected to be able to motivate his residents to look for larvae in their homes, record the findings on a larval form, and return the form to the NA head. It is hoped that homeowners' active participation will help to increase the RFR in their respective environments. In this study, larvae will be observed before and after the Malaria & Dengue Officer and NA head conduct activities to eradicate mosquito nests in each village to determine the RFR. Efforts to prevent this disease have included, among other things, breaking the chain of mosquitos that transmit it through the use of larvicide, fogging, and the eradication of mosquito nests. EMN is a safer, cheaper, and simpler method of eradication. As a result, government policy in dengue vector control focuses more on this program, despite the fact that this method relies heavily on community participation[8].

This study aims to increase community participation in implementing the EMN program by assessing the increase in RFR and reduction in HI (House Index) by empowering active and passive participation of NA heads, as well as identifying barriers to implementing EMN in the EMN-DHF program.

This study examined the importance given to the inclusion of popular participation in dengue control by the formulators of communal health policy, in the respective plans, in selected villages of Sri Sathya Sai district, which lies between 13° 40' and 14° 6' Northern Latitude and 76°-88' and 78° 30' Eastern Longitude, Andhra Pradesh, India, from June 2022 to October 2022

**Materials and Methods**

This research was conducted in two villages, namely Pothulanagepallepi and Ravulacheruvu Villages, which was carried out from June 2022 to October 2022. The selection of these villages was based on:

- These two villages are dengue endemic villages.
- Both villages have already carried out community participation development in the form of training for government teachers in elementary schools, but until now larva monitoring activities by trainees have not been carried out.

Research Location: The area of Dharmavaram Municipality is 40.45 Ha. The distance of the village from the village city government centre is 4 km, while the distance from Dharmavaram is 5.5 km. The place where regular larva surveys are carried out is Pothulanagepallepi. This area is an organized residential area with an area of 30 Ha. The HAs selected were HA 2, HA 3, and HA 5 with four larva monitors. Most of the people who live in this area are civil servants. In the morning, some people do activities outside the home, so meetings with the community are held in the afternoon, and larval survey activities are held on Saturday afternoons.

The administrative area of Pothulanagepallepi Village consists of 4 drainages and 17 ponds. The distance of the village from the village city government centre is 2 km, while the distance from Dharmavaram is 3 km. The place chosen for carrying out the larva survey was RW 04 which was represented by HA 003 and HA 004. Most of the people in the two research areas came from the Javanese tribe. The people's livelihoods are entrepreneurs and traders.

This research uses a quasi-experimental design, by conducting different tests on two PSN approaches. After the intervention (training) the results are monitored through an increase in LFV.

The population in this study was all houses in two villages, the sample size was 100 houses in each village which were randomly selected for larva collection.

The research team contacted both subdistrict heads to ask for permission to carry out larva surveys. Specifically, for the Pothulanagepallepi Village Head, the research team asked for permission to form a Malaria & Dengue Officer. This activity was carried out over two days and was attended by officers from the Dharmavaram Health Service, Dharmavaram Community Health Centers, representatives from the Pothulanagepallepi and Ravulacheruvu villages, the head of RW 04, the head of HA 02, HA 03 and HA 05 and Malaria & Dengue Officer candidates from Pothulanagepallepi subdistrict and the head HA 04 from Ravulacheruvu Village.

Larval surveys are carried out by:

- Conduct home visits and inspect artificial or natural water reservoirs (TPA) using the single larva method.
- Record the number, position/location of landfills relative to the house, type, condition of the cover and basic materials and materials.

- In Pothulanagepallepi Village, Malaria & Dengue Officer carried out a larva survey. One Malaria & Dengue Officer person checked 25 houses in one HA. The survey was carried out six times every week. The results of the examination are submitted to local health center officials.
- In Ravulacheruvu Village, the survey was carried out by homeowners six times, which was carried out every week. The HA head took larvae forms at 100 people's homes who had been assigned to carry out larva monitoring in their homes. The results are submitted to local health center officials.
- Evaluate the implementation of larva surveys using the single larva method which was carried out twice, namely before (week 0) and after (week VII) the larva inspection by the Malaria & Dengue Officer and the head of the HA. to find out HI, CI and BI.

Based on the number of affirmative mentions, a sensitivity index was constructed, which ranged from 0 to 5, with 0 being considered zero sensitivity index, when no response was affirmative; 1 = very low index, when there were 1 to 5 mentions; 2 = low index, from 6 to 11 mentions; 3 = average index, for 12 to 16 mentions; 4 = high index, for 17 to 21 mentions and 5 = very high index, when there were more than 22 mentions. It was understood that the greater the number of affirmative responses, the greater the sensitivity of the plans to popular participation in dengue control. The construction of the sensitivity index made it possible to identify the extent to which popular participation in dengue control actions is included in each Dharmavaram Municipality.

**Malaria & Dengue Officer formation and training**

Before carrying out the larva survey by Malaria & Dengue Officer and the HA head, Malaria & Dengue Officer formation and training were carried out. The number of Malaria & Dengue Officer formed was four people in Pothulanagepallepi Village, while one HA head was expected to be a motivator for the implementation of PSN-DBD in Ravulacheruvu Village.

During the training, Malaria & Dengue Officer and HA heads were given material about introducing dengue fever, dengue epidemiology, dengue vectors, controlling dengue vectors, how to fill out the dengue larvae form, Malaria & Dengue Officer's duties and responsibilities.

Interviews were conducted with village officers, HA heads and Malaria & Dengue Officer to obtain information regarding the success or failure of PSN DBD in the research area. The number of respondents was seven people, consisting of: one person each from the Pothulanagepallepi and Ravulacheruvu village officers, one person from the Dharmavaram municipality, four Malaria & Dengue Officer people and one HA head.

The data collected was analysed univariately and bivariate (difference test) regarding the success of the two PSN approach models. The indicators used are as follows:

- House Index (HI) is the house with positive larvae divided by the house examined times 100.
- Container Index (CI) is the positive container flick divided by the container checked times 100.
- Bertheau Index (BI), namely larval positive containers divided by the houses examined.
- LFV is the number of houses where no larvae were found divided by the houses inspected times 100.

**Results**

The initial larval survey (week 0) in Pothulanagepallepi Village yielded an LFV of 68%, with a CI of 20.81%, HI 32%, and BI 46%. The initial larval survey in Ravulacheruvu Village yielded an LFV of 78% with a confidence interval of 19, 64%, HI 22%, and BI 33. In the initial phase, Ravulacheruvu Village had a higher LFV than Pothulanagepallepi Village.

The final larval survey (week VII) conducted after the implementation of PSN DBD with community participation revealed that LFV in Pothulanagepallepi Village was 89%, with CI figures of 3.6%, HI 11%, and BI 1, whereas LFV in Ravulacheruvu Village was 85%, with CI 8.4%, HI 15%, and BI 21. These findings indicate that LFV in Ravulacheruvu Village is lower than in Pothulanagepallepi Village, which contradicts the findings from the initial larval survey.

According to statistical results (paired T test), empowering Malaria & Dengue Officers in PSN DBD had a significant impact on increasing LFV and decreasing HI numbers (p=0.00), whereas empowering HA heads had no significant impact on increasing LFV and reducing HI (p=0.2). (Table 1). Larval surveys are permitted in Pothulanagepallepi Village under the terms of the agreement. Figure 1 depicts every day of the week.

Table 1. Results of larval surveys before and after intervention in Pothulanagepallepi and villages

| Larval index | Pothulanagepallepi | | p-value | Ravulacheruvu | | p-value | Dharma varam Municipality | | p-value |
|---|---|---|---|---|---|---|---|---|---|
| | Week 0 | Week VII | | Week 0 | Week VII | | Week 0 | Week VII | |
| HI | 33% | 12% | 0 | 23% | 16% | 0.204 | 21% | 22% | 0.2 |
| BI | 47 | 11.3 | - | 34 | 22 | - | 30 | 17 | 0.1 |
| CI | 21.21% | 3.80% | - | 20.00% | 8.50% | - | 18.00% | 6.00% | 0.0 |
| LFV | 69% | 90% | 0 | 80% | 87% | 0.204 | 74% | 78% | 0.1 |

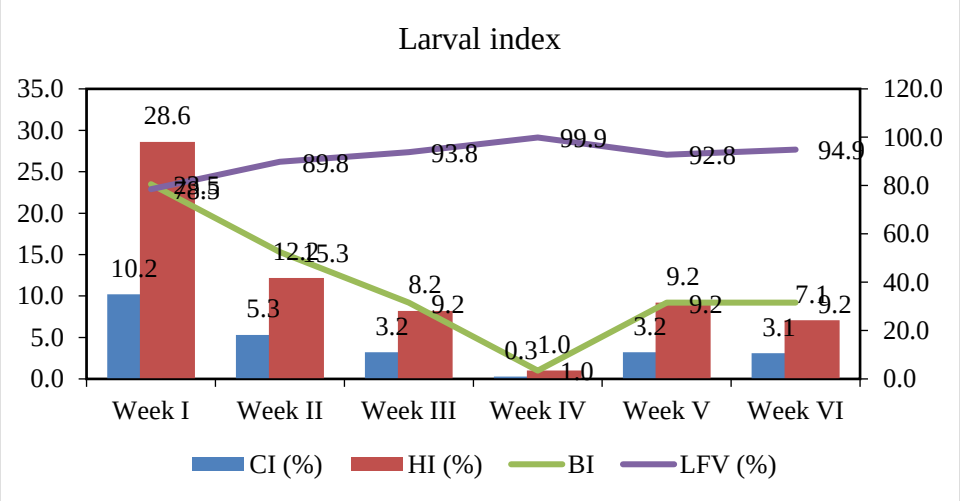


Figure 1. Results of larval surveys conducted every week by a larva monitor in Pothulanagepallepi Village in June 2022- October 2022

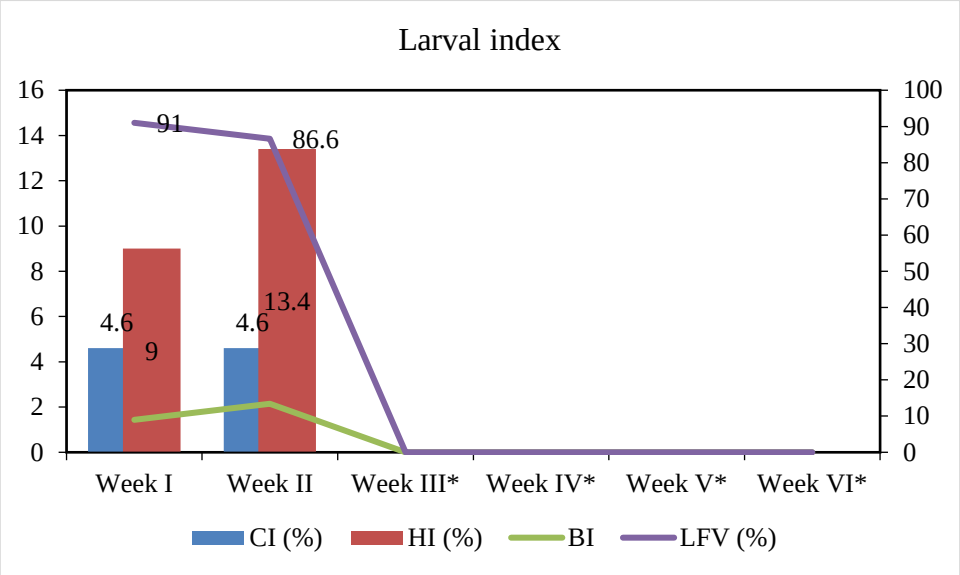


Figure 2. Results of the Larval Survey Conducted with the Participation of HA Heads in Ravulacheruvu Village in June 2022- October 2022 (Note: * larval survey was not carried out)

Based on the agreement, in Ravulacheruvu Village, larval monitoring is carried out every Saturday, but the survey is only carried out twice (Figure 2.).

**Survey**

To obtain information regarding PSN DBD, interviews were conducted with village heads[9], HA heads and Malaria & Dengue Officer. All answered that they had heard of PSN-DBD. This is because during the formation and training of Malaria & Dengue Officer, material about PSN-DBD was provided.

Malaria & Dengue Officer, HA heads and village officers strongly support the need to make regulations for the implementation of PSN-DBD on the grounds that awareness of cleaning the environment is not the same for everyone, the rules will be made for public health too, so that people pay more attention to the environment and can no longer avoid it because it has bound by regional regulations, and so that there is a deterrent effect on people who do not heed the PSN-DBD regulations.

In Pothulanagepallepi Village, according to Malaria & Dengue Officer, what causes PSN-DBD not to run is because there is a lack of public awareness about dengue fever and the water supply from PDAM is not running smoothly, even though all residents use this facility, so inevitably residents are forced to store water and not drain the reservoir. water used for several days. Meanwhile, in Ravulacheruvu Village, water supply is not a major problem because residents mostly use injection wells, so water is always available and easy to obtain. Another cause put forward by the Head of the HA was the residents' low level of knowledge about dengue fever and the perception that PSN-DBD was the job of health.

Respondents strongly supported the implementation of 3M activities (Draining, Burying and Covering), so that respondents recommended that the community be involved in this activity. If the community is involved, they will know the benefits of 3M's activities and will finally be aware of the importance of environmental cleanliness.

To reduce dengue cases in both villages, respondents suggested; education, especially about the larvae of the vectors that transmit dengue fever (*Aedes aegypti* and Ae. albopictus), because the public in general does not understand the life cycle and behavior of this type of mosquito. Apart from that, it is necessary to form Malaria & Dengue Officer, intensify 3M activities, distribute abates, and announce the name of the head of the family when larvae are found in the house (psychological effect),

so that they will be embarrassed and raise awareness about cleaning their house and environment. All recommended activities should involve community health center officials or the Dharmavaram Health Service. The lack of direct involvement of health workers in the community in providing education or providing information about dengue fever causes the public to pay less attention to the dangers of this disease.

In Pothulanagepallepi Village, the Malaria & Dengue Officer are able to carry out larvae inspections in 25 residents' homes per day, and if done together, they are able to inspect 50 houses per day. This is because one Malaria & Dengue Officer person is tasked with checking larvae in water reservoirs, while the other person is tasked with recording the monitoring results on the larvae form. In Ravulacheruvu Village, even though the HA head only collected larvae forms, it took two days to monitor 100 houses.

Obstacles encountered in the field that caused the work of the Malaria & Dengue Officer and HA heads to not run as expected were that there were residents who were unwilling to have their houses inspected, the house owner was not present, or the reception of the house owner was less than sympathetic.

From the results of interviews with respondents, it turns out that they need rewards to become Malaria & Dengue Officer. All Malaria & Dengue Officer stated that the expected form of reward was money with an amount ranging between Rp. 2,000 to Rp. 5,000/house, while for the participation of the HA Head it is IDR 1,000/house, on the grounds that his job is only to collect larvae forms. Another alternative that is recommended is ease of treatment (free treatment at a health facility if you become a Malaria & Dengue Officer).

Regarding the sensitivity index, the municipal plan of Sri Sathya Sai district, Andhra Pradesh presented an average sensitivity index for the population's participation in dengue control, the municipal plans of Dharmavaram Municipality presented a low sensitivity index, and the other health plans presented very low sensitivity index, with the exception of the Itu plan, which presented a zero-sensitivity index. There was no record of high or very high levels of sensitivity in the plans.

From the point of view of coherence and internal consistency between the different constituent parts of the plans, in relation to popular participation in dengue control, coherence was identified in four plans between the considerations present in the introduction and analysis of the health situation, objectives and goals, intervention proposals. In six plans, there were mentions of popular participation in dengue control in the introduction and analysis of the health situation, objectives and goals, but there were no references in the intervention proposals to operationalize the objective or goal set.

It was found in the Campinas and Santos plans that there were references to popular participation in the introduction and analysis of the health situation, intervention proposals, without there being a definition of objectives and goals for the proposals.

The health plans of Marília, District collector and DMHO highlighted the dengue situation in the Dharmavaram Municipality and the importance of popular participation in control, but did not establish objectives and goals or intervention proposals related to popular participation in dengue control. In one of the plans, there was no affirmative response to the questions asked.

**Discussion**

The results of the initial larval survey (week 0) in Pothulanagepallepi Village showed LFV of 68%, and there was an increase at the time of the final larval survey to 89%. This shows that there has been an increase in LFV, although it is still below the expected national LFV of 95%. The results of the paired T test showed that empowering Malaria & Dengue Officer in PSN DBD had a significant influence on increasing LFV and decreasing HI numbers (p=0.00). This is because the larva survey

carried out by Malaria & Dengue Officer is carried out every Sunday for six times. The existence of 3M activities will really help in the success of PSN-DBD. According to Sulistyawati et al., (2019)[10], 3M's actions are the most appropriate way to prevent and control the occurrence of dengue fever.

The requirement for Malaria & Dengue Officer to take part in Malaria & Dengue Officer training causes Malaria & Dengue Officer to know about the dangers of dengue fever, the cycle and behavior of vectors that transmit dengue fever, especially the larvae, water reservoirs that have the potential to become breeding grounds for dengue vectors, and the usefulness of implementing PSNDBD, which may be the cause of the success of PSN-DHF in the region. This resulted in an increase in larvae-free rates at the end of the study. This is in accordance with the results of research by Ashok Kumar (2010)[11] which shows the influence of knowledge about dengue fever on the behavior of cleaning the house and environment by the community. It turns out that Malaria & Dengue Officer's knowledge about PSN-DBD is not followed by community knowledge. The existence of people who refuse to have their houses inspected indicates that people are not yet aware that the presence of dengue fever larvae in their homes means they are actually "caring for the disease". The reasons they gave when checking their house were, the host was not there, so the helper was afraid to let other people into the house, they were busy (because there was an event/celebration), and said that the house was clean so there was no need to inspect it.

In Ravulacheruvu Village, at the time of the initial survey (week 0) the LFV obtained was 78% and rose to 85% at the time of the final survey (week VII). LFV in this village is also still below national LFV standards. The results of the paired T test for empowering HA heads in PSN DBD did not have a significant effect on increasing LFV and decreasing HI rates (p=0.2). The larva survey in Ravulacheruvu Village was only carried out two weeks out of the planned six weeks. The existence of other activities that required the HA head to be directly involved and timed at the same time as research activities caused the implementation of the larva survey to not run as expected. Another thing that caused the larva survey activity to only be carried out twice was because the number of households that had to be monitored by the HA head was 100 houses (results of interviews with the HA head). At the start of the research, it was planned that the person who would be empowered as a community motivator was the RW head, but after getting information from the village head, it turned out that one RW represented approximately 3-5 HAs. One HA consists of approximately 50 heads of families, so it was decided that the person who would be empowered as a community motivator to carry out larva surveys would be the HA head.

Before the HA head carries out his duties as a motivator for residents to carry out larvae checks in their respective homes, education should be carried out for 100 people representing households. This activity could not be carried out because it was difficult to gather residents, so it was decided to carry out house-to-house outreach. The failure to provide outreach to the community may be the reason why the PSN-DBD implementation did not run as expected, because from the start the community did not participate in this activity, so the community did not have a correct understanding of the PSN-DBD implementation. This is in accordance with the results of research by Zahir et al (2016)[12], where it was stated that the failure of the dengue eradication program in reducing dengue cases was closely related to the absence of community participation. not going well. To develop an activity program that is needed by the community, optimal community participation is needed from the start of the planning process. Apart from community participation, the role of the health sector is still very much needed, according to Haldane et al (2019)[13], that guidance and attention from the health sector to activities carried out by community leaders is still lacking so active participation from health workers is needed to be directly involved in the community.

In Sri Sathya Sai district, Andhra Pradesh, classified as a medium sensitivity index, previous studies that focused on popular participation in dengue control and its association with the

epidemiological scenario of dengue in the locality, may have contributed to the Dharmavaram Municipality, when formulating its policies intervention, incorporate such results into the municipal surveillance and control program[14].

It is worth noting that the sensitivity index, based on municipal health plans, may not reflect the real situation of each Dharmavaram Municipality, since the plan has a more generic and comprehensive character, and some municipalities explain in complementary documents the specific programs for controlling health problems. diseases, including dengue. On the other hand, one of the motivations for verifying the sensitivity of municipal plans regarding popular participation in dengue control was the assumption that, if an action proposal is included in health plans, it is more likely to be made viable, through the mobilization of human and financial resources.

**Conclusions and recommendations**

There was an increase in LFV and a decrease in HI, BI and CI by empowering Malaria & Dengue Officer, but there was no increase in LFV and a decrease in HI, BI and CI by empowering HA heads. Malaria & Dengue Officer empowerment in PSN-DBD has a significant influence on increasing LFV and reducing HI. The obstacle that causes the HA head's participation to not take place is that there are activities that are carried out at the same time as research activities. The most effective form of PSM (community participation) in controlling dengue fever in the two villages is by empowering Malaria & Dengue Officer.

It is necessary to continuously motivate the HA head so that regular monitoring of larvae can run as expected. The involvement of health workers is very necessary to empower the community to monitor larvae regularly.

The construction of sensitivity indices based on health plans in municipalities in the State of Andhra Pradesh can be useful to discuss dengue control, asking to what extent low or high sensitivity contributes to greater or lesser vulnerability of the population to risk situations of becoming ill and dying, especially with the prospect of an increase in severe forms of the disease.

Municipal health plans are an instrument for managing municipal health policy and represent the sector's response to the needs of the population, even considering that there is dissonance between the proposals formulated and their implementation, which constitutes a limitation of studies restricted to analysis of official documents.

Even so, it is important to carefully evaluate current programs and actions at the local level and correct or propose goals that contribute to reducing conditions of programmatic vulnerability as well as emphasizing shared responsibility between public authorities and society.

The complex task of preventing dengue epidemics involves a set of measures of a political, technical and social nature, which, due to their potential magnitude of transmission and transcendence, goes beyond the limits of the health sector. The option of investing in community participation could translate into structuring action for health surveillance and a more effective control strategy.

**Conflict of Interest**

The authors declare that they have no conflicts of interest.

**References**

[1]. Halstead SB. Dengue haemorrhagic fever--a public health problem and a field for research. Bull World Health Organ. 1980;58(1):1-21.

[2]. Telle O, Nikolay B, Kumar V, Benkimoun S, Pal R, Nagpal BN, Paul RE. Social and environmental risk factors for dengue in Delhi city: A retrospective study. PLoS Negl Trop Dis. 2021 Feb 11;15(2):e0009024.

[3]. Buhler C, Winkler V, Runge-Ranzinger S, Boyce R, Horstick O. Environmental methods for dengue vector control - A systematic review and meta-analysis. PLoS Negl Trop Dis. 2019 Jul 11;13(7):e0007420.

[4]. Rather IA, Parray HA, Lone JB, Paek WK, Lim J, Bajpai VK, Park YH. Prevention and Control Strategies to Counter Dengue Virus Infection. Front Cell Infect Microbiol. 2017 Jul 25;7:336.

[5]. Arunachalam N, Murty US, Kabilan L, Balasubramanian A, Thenmozhi V, Narahari D, Ravi A, Satyanarayana K. Studies on dengue in rural areas of Kurnool District, Andhra Pradesh, India. J Am Mosq Control Assoc. 2004 Mar;20(1):87-90.

[6]. Mutheneni SR, Mopuri R, Naish S, Gunti D, Upadhyayula SM. Spatial distribution and cluster analysis of dengue using self organizing maps in Andhra Pradesh, India, 2011-2013. Parasite Epidemiol Control. 2016 Nov 4;3(1):52-61.

[7]. Nguyen-Tien T, Probandari A, Ahmad RA. Barriers to Engaging Communities in a Dengue Vector Control Program: An Implementation Research in an Urban Area in Hanoi City, Vietnam. Am J Trop Med Hyg. 2019 Apr;100(4):964-973.

[8]. Tapia-Conyer R, Méndez-Galván J, Burciaga-Zúñiga P. Community participation in the prevention and control of dengue: the patio limpio strategy in Mexico. Paediatr Int Child Health. 2012 May;32 Suppl 1(s1):10-3.

[9]. Gupta RK, Raina SK, Shora TN, Jan R, Sharma R, Hussain S. A household survey to assess community knowledge, attitude and practices on malaria in a rural population of Northern India. J Family Med Prim Care. 2016 Jan-Mar;5(1):101-7.

[10]. Sulistyawati S, Dwi Astuti F, Rahmah Umniyati S, Tunggul Satoto TB, Lazuardi L, Nilsson M, Rocklov J, Andersson C, Holmner Å. Dengue Vector Control through Community Empowerment: Lessons Learned from a Community-Based Study in Yogyakarta, Indonesia. *International Journal of Environmental Research and Public Health*. 2019; 16(6):1013.

[11]. Ashok Kumar V, Rajendran R, Manavalan R, Tewari SC, Arunachalam N, Ayanar K, Krishnamoorthi R, Tyagi BK. Studies on community knowledge and behavior following a dengue epidemic in Chennai city, Tamil Nadu, India. Trop Biomed. 2010 Aug;27(2):330-6.

[12]. Zahir A, Ullah A, Shah M, Mussawar A. Community Participation, Dengue Fever Prevention and Control Practices in Swat, Pakistan. Int J MCH AIDS. 2016;5(1):39-45

[13]. Haldane V, Chuah FLH, Srivastava A, Singh SR, Koh GCH, Seng CK, Legido-Quigley H. Community participation in health services development, implementation, and evaluation: A systematic review of empowerment, health, community, and process outcomes. PLoS One. 2019 May 10;14(5):e0216112

[14]. Ouédraogo S, Benmarhnia T, Bonnet E, Somé PA, Barro AS, Kafando Y, Soma DD, Dabiré RK, Saré D, Fournet F, Ridde V. Evaluation of Effectiveness of a Community-Based Intervention for Control of Dengue Virus Vector, Ouagadougou, Burkina Faso. Emerg Infect Dis. 2018 Oct;24(10):1859-1867.