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Original Research Article

Dengue-free community as an approach for understanding the value and challenges of inter-agencies partnerships in an intervention program

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ABSTRACT

Background: One of the key requirements for accomplishing a mutual goal is the formation of partnerships. 'Partnership' is an ill-defined concept, subject to multiple interpretations and frequently used interchangeably with alliance, coalition, network and collaboration among other terms. World Health Organisation had emphasized dengue prevention and control as a top priority, thus an inter agencies strategy and intervention study was launched to document the effectiveness of a local-level inter agencies approach and partnerships.
Methods: The Free-Dengue Community approach, which involved stakeholder partnerships between parties such as the Ministry of Health, Ministry of Science, Technology, Local Municipalities, Health District Offices and National University of Malaysia, was developed as an inter-agencies plan for dengue prevention, of which the core objective was to design and implement activities for communication and social mobilization. In the control area, routine dengue control activities continued without additional input. Entomological indices were compared within and between the areas before and after the 12 week intervention period.
Results: The approach consolidated the inter-agencies partnerships whereby the dengue cases in the localities had dropped and via this study, the module of Dengue-Free Community was mapped and documented. The result also highlighted the contributions made by each of the partner in bringing down the dengue cases in the selected localities. Furthermore, the number of ovitrap index also decreasing proving that the approach is effective. The community kit and home-kit provided to the community also helped in reducing the number of Aedes eggs in the intervention program.
Conclusions: The partnership using the Dengue-Free Community approach achieved its aim of increasing the level of cooperation between the authorities to support social mobilization, and results shed light on how to tackle the challenges of inter-agency partnerships and the required approach for a better understanding of the levels at which individuals operate within such partnerships.

Keywords: Dengue, Integrated vector management, Community participation, Aedes, Intervention, Dengue free community

INTRODUCTION

Mosquitoes are the vectors of deadly human pathogens including agents of malaria, dengue, filariasis, yellow fever, west nile and encephalitis. Mosquito-borne diseases occur in more than 100 countries and cause substantial loss of life with more than 700,000,000 people infected globally every year.[1] In addition to public health costs there is a major economic and social impact in those countries where large epidemics occur.[2]

The use of vaccine in controlling dengue has not been available for public health use in the very near future. Therefore, primary prevention of transmission is crucial to decrease the burden of dengue. For the moment, the control of Aedes mosquito is the most accessible strategy.[3] One of the most effective way to manage this vector is by eliminating the breeding sites of Aedes mosquito from the human habitat.[4,5] Hence social and behavioural interventions at household level are thought to be the most viable measures for reducing the dengue vector.[6] Dengue vector control is effective in reducing vector populations, particularly when interventions use a community-based.[7] However, the approach must be integrated, tailored to local eco-epidemiological and sociocultural settings and combined with educational programmes. Only then, the increase of knowledge and understanding of the approach will lead to the best of practice.

Integrated Vector Management (IVM) is a rational decision-making process to optimize the use of resources for vector control. The aim of the IVM approach is to contribute to achievement of the global targets set for vector-borne disease control by making vector control more efficient, cost effective, and ecologically sound and also sustainable.[8] Use of IVM helps vector control programmes to find and use more local evidence, to integrate interventions where appropriate and to collaborate within the health sector and with other sectors, as well as with households and communities. Social mobilisation, environmental management, epidemiological and entomological surveillance, and chemical and biological control are the key elements to IVM. Part of its policies and strategies are to improve the efficacy, cost-effectiveness, environmental impact and sustainability of vector control strategies in collaboration with the local community and other public and private sectors.[8]

Social mobilisation which part of the tactics is community empowerment is one of the most important elements in IVM strategy. It allows the community to drive the control of the disease in their environment as they are who most suffer the consequences of dengue.[9] The community participation is necessary at various stages in the local vector control strategy: in assessing the community's problems and needs, in implementing activities, in evaluating and lastly in monitoring strategy[8].

Sustainable programmes and modification of individual behaviour are essential in any mosquito control measures.[6] Therefore, the community must ready to take responsibility for the control of mosquitoes in their neighbourhoods. However, to maintain sustainability, such efforts should continue as long as the threat of dengue exists and become culturally embedded in their communities.[8,9]

In Malaysia alone, the estimated economic burden of dengue illness in 2010 was USD 102.25 million (RM397.91 million) per year, approximately USD 3.72 per capita.[10] This brings the total cost of dengue in Malaysia in 2010 to about US$175.7 million. The paper reported that this is 72% above the cost of the illness. This does not include the cost of prevention, surveillance and vector control activities. These activities significantly increase the total economic burden as suggested by studies. A paper published by the United States National Library of Medicine reported that, Malaysia spent US$73.5 million on its National Dengue Vector Control Program in the year 2010. About 92.2% is spent primarily on district level prevention activities such as fogging.[11]

Despite spending a substantial amount of money on vector control, Malaysia recorded an all-time high number of cases in 2015, about 120,836. Various parties, including the Ministry of Health have predicted that the number of dengue cases will be higher in 2016.[12] This study was carried out in an effort to reduce the burden of dengue in Malaysia. The goal of this program was to devise an innovative and holistic system to control dengue outbreaks in Malaysia and export this system on a government-to-government basis. To further strengthen the aspect of community participation in dengue control in Malaysia, this study was intended to support the current efforts of the Malaysia Ministry of Health to implement community-based programmes that can result in sustainable behavioural impact to address the problem of dengue. The pilot study of the system was rolled out through the community outreach programme called dengue free community (DFC).

METHODS

Study site and its characteristics

The study sites in Malaysia comprised of 3 communities in Johor, the southern part of the Peninsular Malaysia (Figure 1). The project was conducted and closely monitored for nine months between June 2015 and March 2016. These localities were representatives of the geographic, social, economic and epidemiologic situation in most of Malaysia. These localities were classified as urban and suburban with similarly widely distributed residential zones composed of mixed residential and commercial zones. Residents were predominantly middle class with good/satisfactory housing condition; often 5 storey walk-up apartment type residences or landed

single and double storey linked-houses with small patios or gardens. In general, households and buildings were tightly packed and infrastructures are adequate which includes connecting roads, electricity and tap water supply. These areas are under the local municipality jurisdictions, meaning there is local maintenance of roads and systematic garbage/waste collections.

Intervention methods

By design, this is a Quasy experimental study. Prior to field implementation, the project team engaged with local community stakeholders to forge alliances & collaborate with NGOs, local councils, resident associations as well as schools and colleges in the activation of the project. The project team also analysed and retrieved hotspot data from the idengue website (idengue.remotesensing.gov.my/idengue/) and engaged with the local health authorities to validate the hotspots at the time of activation. These engagements are important to assess and determine capacity requirements (i.e. availability of personnel, expertise, equipment etc.) for implementation of DFC.

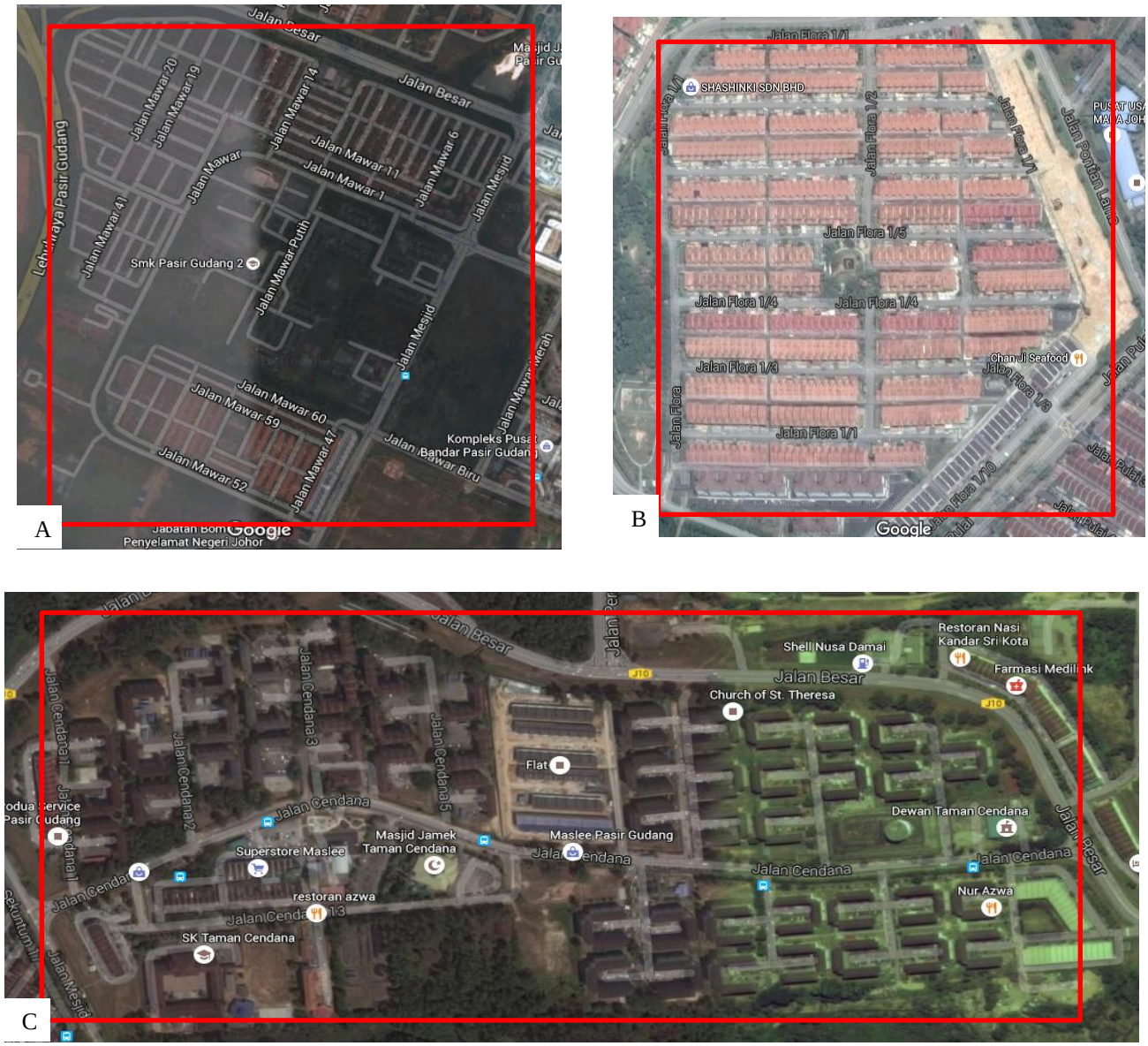

Figure 1: Geographic locations of urban and peri-urban communities showing (A= Taman Mawar, B= Taman Pulai Flora, C= Taman Cendana respectively).

REAP (reduce, educate, activate and prevent) approach was implemented in each of the selected areas throughout the 3 month duration of intervention. By implementing the REAP approach, DFC empowered and equipped

people with the necessary tools to effectively control the Aedes mosquito population at the source, by effectively eradicating larvae and ensuring a sustainable prevention and protection programme.

The incidence of dengue cases in those selected DFC areas was closely monitored using raw dengue data supplied by either local councils or the district health office. To determine the impact of DFC on the reduction of dengue, data of cases 3 months prior to the DFC implementation date (pre-DFC) was extracted for reference. The trend of dengue cases in intervention areas 3 months pre-DFC was compared with data 3 months post-DFC to calculate the weighted average and incidence rate of dengue cases and determine the impact of DFC programme on dengue morbidity in the 13 localities.

Mobilizing area monitoring team

Area monitoring team (AMT) comprised a group of undergraduate students who had been trained to embrace the REAP methodology. Prior to the intervention, members were screened and selected to become specialists.

Dengue-free squad

The dengue-free squad (DFS) is formed from residents who had been a member of a COMBI team or an active member from the community. For the dengue intervention programme, the members underwent a half-day training program educating them on the objectives, methodologies and vector control strategies, while the project team established a close rapport with the AMTs.

The community participated in distribution of health education materials, especially in the dissemination of dengue-related health and environmental sanitation messages throughout the community. Health education materials were designed to be locally relevant, culturally understandable and acceptable. These included wall banners about the vector breeding habitats and prevention strategies by the Johor Bahru Health District Office and also flyers and pamphlets with reminders and warnings about the danger of dengue and dengue haemorrhagic fever.

The DFS, also facilitated the researchers to organize and hold meetings, providing tea and snacks to attendees. The DFS was also actively involved in clean-up campaigns, assuming responsibility for cleaning the surroundings. Social media platforms such as Facebook and WhatsApp application were used to communicate between the DFS and researchers. When complaints from the residence about inadequate or poor service of waste removal were conveyed or reported, the DFS would communicate the issue to the authority and also proactively devise their own solutions.

Vector control tools

The DFC-Home kit consists of a 30 g Mousticide in the Rice Husk formulation, ALOT (Aedes Larvae Ovi-trap Device), 500 ml DENGUARD mosquito repellent lotion, an educational children's book about the Aedes mosquito and user guide and CD-ROM containing educational material regarding dengue prevention. To promote awareness of dengue and its prevention among children, a short DFC-related animation series of 'Upin and Ipin', a popular Malaysian animated series was incorporated into the CD-ROM (3 episodes with 7 minute run time each). During the initial 3 months of DFC implementation, DFS members and local residents were trained on effective utilization of these tools to ensure sustainability of the DFC programme, and distribution of the DFC-Home Kits was commenced following this 3 month period.

Questionaires and key informant interviews with health-care providers and community leaders

Questionaire was employed as the tool to assess the mainly the knowledge of the residence and small part on the attitude and preventive practices. The questionnaire was adopted from a study conducted by the National Institute of Behavioral of Malaysia.with its Cronbach-alpha validity at 0.706.

Key informant interviews were conducted using semi-structured question guides using local language. Key informants were selected from the DFS and consisted of those working as corporation officials, government workers, basic health workers, or employees of NGOs/community-based organizations. A total of 10 key informants were selected.

Data management and analysis of survey data

All data was checked for data entry, and entry was subsequently carried out by trained personnel to ensure the quality of the data entry. SPSS ver.22 software was used due to its range check, skip check, and data export facilities. To evaluate the difference in reduction in dengue cases from baseline to post-intervention between intervention clusters and control clusters, a 'difference-of-differences' approach was used. First the average difference between post-intervention and baseline was calculated for the intervention clusters and control clusters, and then the difference of the two differences were calculated (a negative value indicating a larger reduction, or a smaller increase, in the intervention areas).

Ethical approval

Ethics approval to conduct this research was granted by the Ethics Committee for Research of Faculty of Health Sciences, National University of Malaysia. The Ethical code number is UKM PPI/111/8/JEP-2016-393.

RESULTS

Knowledge, practice and opinions of the community

Respondents' knowledge about dengue and how it is transmitted was adequate. They were familiar with the causes of dengue and aware of the Aedes mosquito. Most respondents had heard of the disease, almost half of them knew dengue was a serious but preventable illness and that it was transmitted by mosquitoes, but very few knew about the mosquito life cycle and breeding behaviour. The respondents also agreed that in order to have effective community participation, the community should be educated about the domestic nature of Aedes. Moreover, most of the respondents said the treatment for dengue fever was available in government and private hospitals. They also said they are aware about dengue control guidelines.

From the study, only 26.2% of the respondents have sufficient knowledge on Aedes, dengue and breeding spots, while 61.5% and 71.1% of the respondent have good attitude and practice respectively. Despite the association between good attitude and good practice, we found that it did not necessarily correspond with good knowledge level. This can result in the dissemination of misleading information and consequently, incorrect dengue prevention. This relationship between attitude/ practice and knowledge, or lack thereof, may be one of the causes of high number of dengue cases in the area. Sufficient education will help to increase the knowledge level of residents and hence lower the number of dengue cases.

Table 1: Issues on attitude and practice of a dengue hotspot area resident.

No.	Issue
1	Low awareness of dengue campaign activity
2	Did not take action or join in the dengue campaign activity
3	Individual house cleanliness
4	Too lazy to take action
5	No sharing of responsibilities within the community
6	Less involvement from the women, kids and youth.
7	Family commitment
8	Working Commitment

The same results were also reflected in the FGDs. From our discussion there were some issues raised by the community leaders and key informants (Table 1). The findings indicated participant's issues regarding the attitude and practice of the community in relation to the concept of shared responsibility of dengue prevention in their neighbourhood.

Community perception and acceptance of intervention tools – the home kit

In the study, we also looked at the perception and acceptance of each component in the Homekit. In our focus group discussions, participants were asked to look into the relative weaknesses and the strengths of the Homekit in delivering dengue protection among the community. ALOT devices were placed strategically across the study areas to reduce the Aedes population. The ALOT effectively functions as a trapping device for mosquito which reduces the population. Respondents typically endorsed the efficiency of the ALOT, stemming from first-hand field experience during the DFC program, and were able to accurately recall its functions and correct usage. Mousticide larvicide in the Rice Husk (RH) formulation was used together with the ALOT to enhance the function of the lethal ovitrap, thus preventing the larvae from growing according to one of the respondents. However, many respondents also claimed they used Mousticide RH exclusively in the ALOT as they had not found any breeding sites around their house that required additional application. Moreover, some of the respondents were unable to distinguish between Abate (larvicide given from health personnel) and the Mousticide RH provided in the Homekit.

Denguard is a repellent lotion provided as one of the tools to protect from mosquito bites. One respondent in particular used it diligently due to their susceptibility to the allergic effects of mosquito bites. Some participants however, expressed reluctance towards its adoption and claimed to use it only when fishing or jungle trekking, while others stated they intentionally didn't use Denguard due to the perception that it is not effective for repelling mosquitoes.

As for the children's book, it was highly accepted by children and its cartoon format was found to be particularly interesting to them. According to a few respondents that read the book, they claimed it contained useful information with attractive and interactive presentation. Most parents however, were not attracted to it as an educational stimulus claiming it to be only for children's use. Some respondents also said their children did not read the book because it was intended for a younger audience.

The guide book is the authoritative source of information on correct use of the various home kit tools. According to respondents from section 3, despite having been previously taught how to use the kit, they still referred to the guide book as a source of reassurance in confirming the correct procedures. Some claimed to read the guide book thoroughly, while others read only certain parts that interested them. Based on feedback, they guide was easily understood as instructions were written in concise and comprehensible language. According to respondents from section 8, they used the ALOT as instructed from the guide book however found a few pieces of

information were not included, such as specific locations to place the ALOT.

All respondents involved in the FGD did not use the CD and many not been aware of it. Perhaps it was due to the lack of information written on the CD or the guidebook promoting the content of the CDs to attract the users. Some claimed it was out-dated and or dysfunction, as many modern laptops did not even have CD compartment, while other's CD players were broken. A few respondents suggested changing the CD to flashdrive or pendrive, to be more in line with current technology. Each CD of the home kit toolbox contained 3 Upin & Ipin dengue-free squad episodes - a communication channel that children are used to spread dengue awareness in their daily life.

Out of all respondents present for FGD, only a single individual was familiar with the DFC website and used it to check the news at his locality once. Analysis showed most of the respondents was not aware of the website. Lack of communication and advertising cause the respondents to be unaware of the existence of the website.

Intervention efficacy

After obtaining the buy-in from the community and local authorities, a site survey was conducted in collaboration with local authorities and the community representatives to determine the severity of dengue in the area. This also enables the identification of other factors that might contribute to making the area a dengue hotspot.

The dengue-free squad was then formed and given training by designated DFC program administrators. The training was divided into two phases; the first on dengue awareness and basic knowledge on the usage of home kit tools, while the second comprised sharing of the issues present in their respective areas that contributed to the high mosquito population and incidence of dengue cases. Members were educated on how to address their mosquito problem effectively by activating their community to join the implementation program and also increase the level of dengue awareness among their community.

Table 2: The multiple factors in a dengue hotspot area which affect the control of dengue vector in the DFC program localities.

Factor	Taman Pulai Flora	Taman Mawar	Taman Cendana
Epicentre factor			
Bus Terminal/LRT	X	/	X
Commercial centre	X	/	/
Industry	X	/	/
Public building	/	/	/
Recreational park	X	X	X
Total factor	1	4	3
Greenery/reserved land	/	X	/
River bank	X	X	X
Construction site	/	X	/
Total factor	2	0	2
Urban area	/	/	/
Immigrant	X	/	/
Total factor	1	2	2
Community commitment	4	5	2
Size area (ha)	22	90	45
Grand total factors	4	6	7
Egg count reduction %	70	-77	18
Dengue cases reduction	91.2	63.24	73.6

The program started with clearing the area of rubbish and objects that provide mosquito breeding sites. In week 1, activities included the search & destroy of mosquito breeding spots including the "community larviciding activity" using Mousticide Rice Husk. ALOT devices were set up by the community around the area's perimeter in clusters to control the mosquito population, while the application of Mousticide Wettable powder using backpack mist blowers and also Mounted truck ULV was carried out by DFC staff. The DFS was then tasked to activate Search & destroy, Mousticide RH (provided by DFC) larviciding and ALOT servicing in their area on a monthly basis.

Monthly activities in the locality were guided and lead by a group of 72 students (the volunteers) from the university. The volunteers were trained by DFC entomologists and public health expert on dengue awareness, communication techniques, and mosquito

control techniques using the DFC program tools. Following training, the volunteers were allocated to each of the localities and lead the community on ground activities. The volunteers acted as the communication channel to spread the dengue awareness among the community and dengue-free squad.

The communities were supplied the tools which were kept with their community residence association. The DFS were encouraged to use the tools, especially the Mousticide Rice Husk and ALOT in their locality. By empowering the community and encouraging them to be involved in the control of mosquitos in their area, dengue awareness among residents in the community had increase. The responsibilities of taking care of their neighbourhoods were shared among the dengue-free squad and residents. The usage of the tools helped the community further understand dengue and the importance of taking the responsibility upon themselves to relieve their neighbourhood from the dengue epidemic.

DISCUSSION

Vector control aimed at reducing the density of the dengue vector, Aedes aegypti to low level is the only currently available measure for preventing dengue transmission as the was no dedicated medication regime to give to the dengue patients. With dengue vaccine is still looming for the public usage, the only solution left is to carry on the existing control measures; larviciding, insecticide spraying, and elimination of Aedes breeding sites. Moreover, there were comments made that the search and destroy activity carried out by the health personel are often labour intensive and often difficult to sustain.[13] With the DFC program using the REAP approach is quite feasible to implement as it is well structured and taking into account all available approach to combat dengue.

The major novelty of this DFC program was to bring different stakeholders together through partnerships between the research team, health authorities, and community groups. The main outcomes of the intervention strategy were based on REAP: reducing the vector density; educating communities for increased understanding of dengue, activating the community, and preventing reproduction and dengue transmission.

We aim to promote community ownership through broader perspectives. With the clean-up campaign, community development issues such as solid waste management and residual management were addressed with the concepts of ‘reduce, reuse, recycle and recover. It was shown that intervention strategies, including community involvement with the dengue-free squad and partnerships with different stakeholders, increased the dynamics of activities against dengue vectors considerably. These findings matched the findings of several other studies.[2,14-16] The most prominent benefit however was the satisfaction created by ‘working together’, which was expressed during FGDs.

Community mobilization through the work of the Dengue-Free Squad members, activities with Area Monitoring Team members and health authorities, and through distribution of health education materials in the community, achieved a substantial increase in dengue awareness and understanding in the targeted community. Studies in other places also showed that the health education materials have impacted the community, especially if they were distributed by the community members themselves.[17,18] Substantial decreases in the ovitrap index were seen, particularly the egg count, a proxy for dengue vector density. If these methods were adopted by Malaysia Ministry of Health in conjunction with their routine control program, (such as application of abate in large water storage containers), then larval breeding would be reduced and the spread of dengue could be contained.

CONCLUSION

In conclusion, a community-based approach that promoted the REAP methodology and that was targeted at multiple stakeholders within communities, lead to a substantial reduction in dengue cases. The program was developed to ensure and encourage participation of community members, addressing the fundamental need for people to be involved.

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REFERENCES

1. World Health Organization. Global Strategic Framework for Integrated Vector Management. Geneva, Switzerland: WHO, 2004.
2. Arunachalam N, Tyagi BK, Samuel M, Krishnamoorthi R, Manavalan R, Tewari SC, et al.

Community-based control of Aedes aegypti by adoption of eco-health methods in Chennai City, India. Pathog Glob Health. 2012;106(8):488-96.
3. Espino F, Koops V and Manderson L. Community participation and tropical disease control in resource-poor settings. 2004. WHO; 2004:52.
4. Gubler DJ, Clark GG. Community-based integrated control of Aedes aegypti: a brief overview of current programmes. Am J Tropical Med Hygiene. 1994;50(6):50-60.
5. Winch PJ, Kendall C, Gubler DJ. Effectiveness of community participation in vector-borne disease control. Health Policy and Planning. 1992;7(4):342-51.
6. Heintze C, Velasco GM, Kroeger A. What do community-based dengue control programmes achieve? A systematic review of published evaluations. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2007;101:317-25.
7. Whiteford L. Local identity, globalization and health in Cuba and the Dominican Republic. In: Whiteford L and Manderson L, editos. Global health policy, local realities: the fallacy of the level playing field. Boulder, Lynne Rienner Publishers, 2000: 57-101.
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;32(Suppl 1):10-3.
9. Parks W, Lloyd L. Planning Social Mobilization and Communication for Dengue Fever Prevention and Control. A Step-by-Step Guide. Geneva, Switzerland: WHO, 2004.
10. Packierisamy PR, Ng CW, Dahlui M, Inbaraj J, Balan VK, Halasa YA, et al. Cost of Dengue Vector Control Activities in Malaysia. Am J Trop Med Hyg. 2015;93(5):1020–7.
11. Packierisamy PR, Ng CW, Dahlui M, Venugopalan B, Halasa YA, Shepard DS. The Cost of Dengue Vector Control Activities in Malaysia by Different Service Providers. Asia Pac J Public Health. 2015;27(8 Suppl):73S-8S.
12. Baly A, Toledo ME, Boelaert M, Reyes A, Vanlerberghe V, Ceballos E, et al. Cost effectiveness of Aedes aegypti control programmes: participatory versus vertical. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2007;101(6):578-86.
13. Butterfoss FD. Process evaluation for community participation. Annual Reviews of Public Health. 2006;27:323–40.
14. Arunachalam N, Tana S, Espino F, Kittayapong P, Abeyewickreme W, Wai KT, et al. Eco-bio-social determinants of dengue vector breeding: a multicountry study in urban and periurban Asia. Bull World Health Organ. 2010;88:173–84.
15. Kittayapong P, Chansang U, Chansang C, Bhumiratana A. Community participation and appropriate technologies for dengue vector control at transmission foci in Thailand. J Am Mosq Control Assoc. 2006;22:538–46.
16. Sommerfeld J, Kroeger A. Eco-bio-social research on dengue in Asia: a multicountry study on ecosystem and community-based approaches for the control of dengue vectors in urban and peri-urban Asia. Pathogens and Global Health 2012;106(8); 428-35.
17. Khun S, Manderson L. Community and school-based health education for dengue control in rural Cambodia: a process evaluation. Plos Neglected Tropical Disease. 2007;1(3):1-10.
18. Toledo ME, Vanlerberghe V, Perez D, Lefevre P, Ceballos E, Bandera D, et al. Achieving sustainability of community based dengue control in Santiag de Cuba. Social Sci Med. 2007;64(4):976-88.

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