Artikel 5. Impact of Dengue Surveillance Workers - ophrp-10-376

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Submission date: 28-Apr-2020 08:42AM (UTC+0700)
Submission ID: 1309743887
File name: kel_5._Impact_of_Dengue_Surveillance_Workers_-_ophrp-10-376.docx (108.06K)
Word count: 4043
Character count: 21334

Osong Public Health and Research Perspectives

Journal homepage: http://www.kcdcphrp.org

Original Article

Impact of Dengue Surveillance Workers on Community Participation and Satisfaction of Dengue Virus Control Measures in Semarang Municipality, Indonesia: A Policy Breakthrough in Public Health Action

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Article history:
Received: August 20, 2019
Revised: November 23, 2019
Accepted: November 28, 2019

Keywords:
community, Dengue, satisfaction

https://doi.org/10.24171/j.phrp.2019.10.6.0
pISSN 2210-9099 eISSN 2233-6052

ABSTRACT

Objectives: The aim of this study was to assess community participation in Dengue virus control measures, and community satisfaction in the Dengue surveillance workers (DSWs) performance in Semarang municipality after 3 years of empowerment.
Methods: A cross-sectional survey involved 1,018 selected participants from 12 groups of social roles in 141 villages in Semarang municipality, Indonesia. A direct interview was performed using a structured questionnaire to evaluate the acceptance, and satisfaction of the community towards the DSWs. The data were analyzed descriptively.
Results: The majority of the members of the community considered that the DSWs play an important role in reducing Dengue cases, and vectors of the Dengue virus, as well as increasing the community participation in Dengue control measures. The survey showed that DSWs performance, attitudes, and abilities regarding their main tasks were perceived to be good.
Conclusion: Overall, people in Semarang municipality were satisfied with the performance of the DSWs, and considered them important enough to be maintained and strengthened in the future so that Dengue could be controlled. This new policy needs to be disseminated to other regions that may encounter the problems associated with Dengue virus.

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Introduction

Dengue hemorrhagic fever (DHF) is a vector-borne disease carried by female mosquitos that affects nearly 3.97 billion people worldwide, especially in the 128 tropical and subtropical countries at risk [1]. New infections with Dengue virus were estimated in 2013 to be nearly 400 million per year worldwide with various clinical manifestations causing a 3-fold burden of disease occurrence above the estimated burden by the WHO [2,3]. The spread of Dengue virus involves several factors such as climate, socio-economic, and viral evolution [3] and in Indonesia (2017-2018) the incidence rate of DHF reached 78.85 per 100,000 inhabitants, and endemic areas extended to 90.07% of the districts and municipalities [4].

Infection with Dengue virus occurs when infected female *Aedes aegypti* mosquitoes which are the primary vector, (*Aedes albopictus* acts as a secondary vector) transfer the virus to human blood during feeding [5]. Since there are no Dengue

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antiviral drugs or an effective prophylactic vaccine available, programs for vector control measures against Dengue virus are a priority [3]. This program aims to reduce the population density of the mosquito vectors. Vector control measures include biological, physical-mechanical, and chemical, as well as community participation [6]. The main indicators of vector control program achievements are a decline of the main *Aedes* index in residential environments, namely the house index ≤ 5%, as well as decreasing incidence rate and case fatality rate [5].

Unfortunately, people in the Dengue virus endemic areas, including Indonesia, prefer chemical methods of vector control [7]. This practice has caused the emergence of insecticide resistant (mainly pyrethroids and organophosphates) strains of *Aedes* mosquitos [8-11]. However, community participation in the physical control of Dengue vectors has not shown optimum results. It was observed in studies in Indonesia during 2017 and 2018 that the House Index was higher than the prophylactic transmission threshold [12,13].

DHF in Semarang municipality was reported in 1994 and incidence rates have increased over the past 23 years. The highest number of cases of DHF occurred during the period 2002-2010 where the number of Dengue cases increased almost 10-fold from 607 to 5,556 cases. The incidence rate increased from 44.9 to 368.7 per 100,000 inhabitants. A sharp decline of Dengue virus cases occurred in 2011 where there were 1,303 new cases, and the incidence rate dropped to 73.8 per 100,000 populations, rising to 2,364 cases in 2013 where the incidence rate was 134.1 per 100,000 inhabitants [14]. This rise in the number of cases led to the initiation of Governmental Health Office of Semarang municipality (GHOSM) a policy for recruiting and hiring dengue surveillance workers (DSWs) to be stationed in all villages in Semarang in 2014. DSWs with a Bachelor degree in Public Health or a Bachelor degree in Health Nursing, were recruited and trained on basic surveillance skills for DHF. The main task of DSWs is to increase knowledge, skills, and community participation in controlling Dengue virus vectors. Their important activities are to educate, organize, and mobilize community participation in monitoring and implementing Dengue virus vector control measures in settlements, offices, and public places [15].

Reducing the DHF incidence rate from 92.4 to 18.14 per 100,000 of inhabitants in Semarang municipality occurred in the period from 2014 to 2017 [14], coinciding with 3 years in which DSWs were empowered to work in the Semarang municipality. This phenomenon is interesting for assessing the DSWs existence and performance, to the satisfaction of the members of the community. This study aimed to subjectively assess the community participation to Dengue virus control measures and community satisfaction with the DSWs performance in Semarang municipality 3 years after they have been deployed.

Material and Methods

1. Study sites

This was a cross-sectional survey carried out in 16 sub-districts of the Semarang municipality. The survey covered 37 Public Health Center work-areas, which included 141 of 177 (79.7%) villages in the Semarang municipality.

2. Participants and sampling

The study population were members of the community from various social-role groups who had interacted with DSWs and their activities. There were 1,018 participants selected according to 12 social-roles, namely head of sub-districts, social welfare staff of sub-districts, head of Public Health Centers, staff of diseases prevention and control of Public Health Centers, head of village, social welfare staff to village, Dengue virus vector observer to village, leader of the Family Welfare Community (FWC) of sub-village, Dengue virus vector observer to sub-village, head of the FWC to neighborhood association, Dengue virus vector observer of neighborhood association and headmasters. Participants from these 12 social roles represented various community groups from all sub-districts in the Semarang municipality.

3. Questionnaire design

The questionnaire in this study was modified from a previously published questionnaire and was designed to evaluate the existence, role, and performance of the DSWs [16]. This instrument consisted of participant characteristics, evaluation of perception, acceptance, satisfaction, and expectation of the community regarding the DSWs. Characteristics of participant included gender, age, and social role in the community. The evaluation of perception was focused on the occurrence of DHF, community attention to problems associated with Dengue virus, community activities, participation in the Dengue virus vector monitoring and control, and the achievements of the vector control program for the last 3 years. The evaluation of DSWs and their performance was focused on the understanding of the community towards the DSWs. The DSWs were assessed on their presence, activities and roles, knowledge, attitude, and ability or skill in the management of Dengue virus, Dengue virus vector monitoring and control, and their ability in motivating and implementing public health education. Acceptance, satisfaction, need, and expectation of participants of the survey towards DSWs performance and their role in the future, were represented with an evaluation of perception based on social roles.

4. Data collection

A permission letter from Semarang municipality government, and ethical approval from the Ethics Committee of Faculty of Public Health of Universitas Diponegoro Semarang No.22/EC/FKM/2017 was obtained. This study was conducted from May to June 2017, and informed consent from each participant was given. Before the interview with participants, interview simulations were conducted among enumerators to control the bias of perception. Data from the participants was collected by direct interview, based on a structured questionnaire.

5. Statistical analysis

Data for each variable were analyzed descriptively using SPSS statistical software Version 15.0 (SPSS Inc., Chicago, IL, USA).

Results

There were 1,018 participants interviewed, and the majority were female (79.37%), with the majority of participants aged between 31 to 59 years (Table 1). There were 12 groups of both formal and non-formal social roles related to the "Dengue control" program (Table 2). The majority of participants thought that DHF cases had decreased in the last 3 years (80.6%), and the perception that there was an increasing rate of Dengue virus vector free residential areas (901.3%). These perceptions matched with an increase in community awareness to problems associated with Dengue virus and participation in the Dengue virus vector monitoring and control activities (Table 3).

Almost all participants answered that they understood why DSWs were present (99.2%) and that they played an important role in the community's involvement (98%), and in increasing the attention and participation in "Dengue control" programs. These roles resulted in increasing the perception of Dengue virus vector-free residential areas and reducing DHF

Table 1. Characteristics of the survey respondents.

Characteristics	*n*	%
Gender		
Male	210	20.63
Female	808	79.37
Age (y)		
≤ 30	30	2.94
31 – 59	897	88.11
≥ 60	91	8.95

Table 2. The social roles of the survey respondents.

Social roles	*n*	%
- Head of sub-district	15	1.47
- Social welfare staff to sub-district	15	1.47
- Head of PHC	37	3.63
- Staff of diseases prevention and control of PHC	33	3.24
- Head of village	141	13.85
- Social welfare staff to village	140	13.75
- Dengue vector observer to village	28	2.75
- Leader of FWC of sub-village	141	13.85
- Dengue vector observer to sub-village	101	9.92
- Head of FWC to Neighborhood Association	163	16.01
- Dengue vector observer of Neighborhood Association	109	10.71
- Headmaster	95	9.33
Total	1,018	100.00

The participants of the survey were representatively recruited from 12 community social roles in Semarang municipality.
FWC = Family Welfare Community; PHC = Public Health Center.

Table 3. The evaluation of the community perception to Dengue virus control in the Semarang municipality.

Evaluated-aspects	*n*	%
Dengue cases in the last 3 years		
- Decreasing	821	80.6
- Stable	156	15.3
- Increasing	22	2.2
- Do not know	19	1.9
Community attention to the problems associated with Dengue virus		
- Increasing	955	93.8
- Stable	58	5.7
- Decreasing	3	0.3
- Do not know	2	0.2
Existence of Dengue control activities by community		
- Exist	1,015	99.7
- Not exist	3	0.3
Community participation to Dengue virus control activities		
- Better	976	95.9
- Stable	39	3.8
- Do not know	3	0.3
Dengue virus vector monitoring by community (last 3 years)		
- Consistent	1,015	99.7
- Inconsistent	3	0.3
Dengue virus vector monitoring activities (last 3 years)		
- Being done routinely	997	98.2
- Being done intermittently	16	1.6
- Do not know	2	0.2
Rate of Dengue virus vector free residential areas (last 3 years)		
- Increasing	929	91.3
- Stable	68	6.7
- Decreasing	12	1.1
- Do not know	9	0.9

The majority of respondents had a good perception of the 7 of key performance indicators of Dengue control measures in Semarang municipality.

Table 4. The evaluation of perception by the community to DSWs and their activities.

Evaluated-aspects of DSWs and their activities	*n*	%
Understand the presence of DSWs in institution or residential		
- Yes	1,010	99.2
- No	2	0.2
- Do not know	6	0.6
DSWs play a role in increasing the community attention to Dengue		
- Yes	990	98.0
- No	16	1.6
- Do not know	4	0.4
DSWs play a role in community participation to Dengue control program		
- Yes	980	97.0
- No	27	2.7
- Do not know	3	0.3
DSWs play a role in increasing the rate of Dengue-vector free residential		
- Yes	994	98.4
- No	15	1.5
- Do not know	1	0.1
DSWs play a role in reduction the Dengue occurrence		
- Yes	985	97.5
- No	20	2.0
- Do not know	5	0.5
DSWs are needed in the years ahead		
- Yes	995	98.5
- No	9	0.9
- Do not know	6	0.6

The existence and activities of the DSWs were well known by the members of the community and were perceived as very good in all 6 evaluated aspects.
DSWs = Dengue surveillance workers.

Table 5. The Communities' expectations of the DSWs in the years ahead in the Semarang municipality.

Social role of respondent	DSWs are needed in the years ahead					
	Yes		No		Abstain	
	n	%	*n*	%	*n*	%
Government officers	372	98.9	4	1.1	0	0.0
General members of the community	623	98.3	5	0.8	6	0.9
Total	995	98.5	9	0.9	6	0.6

There was no significant difference between the respondent role and the expectations of the DSWs empowerment for the years ahead in Semarang municipality.
DSWs = Dengue surveillance workers.

Table 6. The community perception towards DSWs knowledge, attitude, and abilities in implementing tasks.

Evaluated-aspects	*n*	%
DSWs' Knowledge of Dengue Hemorrhagic Fever		
- Very good	26	2.6
- Good	977	96.7
- Poor	7	0.7
Understanding of DSWs to the service areas		
- Very good	35	3.5
- Good	964	95.4
- Poor	11	1.1
Maturation of DSWs attitude in related their works		
- Mature	1,000	99.0
- Less mature	10	1.0
Confidentiality of DSWs in community service		
- Confidence	996	98.6
- Less confidence	14	1.4
DSWs Dexterousness in larval surveys		
- Skillful	999	98.9
- Less skillful	11	1.1
Presenting of DSWs in Dengue virus control activities by communities		
- Always	967	95.8
- Frequent	31	3.1
- Rare	12	1.1
Ability of DSWs in Dengue virus control campaign		
- Very good	21	2.1
- Good	974	96.4
- Poor	15	1.5
Ability of DSWs in community approach		
- Very good	30	3.0
- Good	970	95.9
- Poor	11	1.1
Motivating ability of DSWs to community		
- Very good	22	2.7
- Good	801	96.0
- Poor	11	1.3
DSWs attention to Dengue problem in community		
- Very good	987	97.8
- Good	20	2.0
- Poor	3	0.2
Seriousness of DSWs in advocating community		
- Very good	823	98.7
- Good	9	1.1
- Poor	2	0.2
Presenting of invited people to the Dengue forum held by DSWs		
- Almost 100%	24	2.4
- More than 50%	955	94.6
- Less than 50%	31	3.0

Members of the community valued knowledge, attitude, and ability of the DSWs as good/very good at implementing tasks in various Dengue control measure activities.
DSWs = Dengue surveillance workers.

Table 7. Community acceptance and satisfaction in the performance of the DSWs.

Evaluated-aspects	*n*	%
Community acceptability to DSWs		
- Very good	60	5.9
- Good	943	93.4
- Poor	7	0.7
Satisfaction of participant to DSWs performance		
- High	111	10.9
- Medium	886	87.0
- Low	21	2.1

Community members of Semarang Municipality have a good acceptance and satisfaction in DSWs and their implementation of Dengue control measures.
DSWs = Dengue surveillance workers.

occurrence in the community. The majority of the participants also answered that the DSWs were needed in the future (Tables 4 and 5).

Almost all the participants perceived that DSWs had a good knowledge about DHF and understanding of the service areas. The perception of the community was that DSWs also had a mature attitude, were confident, and skillful at implementing their tasks and also always accompanied the community during "Dengue control" program activities. More than 95% of participants answered that DSWs ability was good and were serious in their approach at increasing the motivation of the community, and advocating in the community, and campaigning for the "Dengue control" program. These conditions drive increased attendance of the community to Dengue forums held by the DSWs (Table 6). The majority of participants answered that the community has a good acceptance and satisfaction of the DSWs roles and performance (Table 7).

Discussion

Empowerment of DSWs by GHOSM in the context of Dengue virus control efforts, is a form of policy reform that enhances public health services [15]. This strategic policy resulted in a significant impact on the key performance indicators of the "Dengue control" program. It was perceived by the public to decrease new cases of DHF in the last 3 years and increase the level of community participation in the efforts to control this endemic disease. This finding showed that the majority of survey participants from the community responded positively to this strategic policy. The majority of members of the community in the study perceived that this policy had a positive impact on the key performance indicators of the "Dengue control" program, mainly increasing community attention to and participation in the efforts for control measures of Dengue virus. This finding supports a previous study reporting that changes in the health service system resulted in an increase in community satisfaction with public health services [17]. The strategic policy of GHOSM is in line with the Ministry of Health's policy on the Movement of One House One Larvae Controller. This movement invites the active participation of each family to eradicate breeding places for mosquitoes simultaneously in their respective homes, under the coordination of local community leaders. In this case, DSWs had a strategic role in building effective communication in the community, providing knowledge and vector survey skills, and directly providing support to the communities [18].

In comparison, this current study was more comprehensive than the previous study, which was limited to 1 sub-district, namely the Tembalang sub-district and was conducted qualitatively with the Head of Tembalang sub-district, therefore, the results were very locally specific [19]. This current study covered all of the sub-districts and involved participants from 12 social groups in the Semarang municipality region to produce a more representative set of data. This current evaluation survey assessed community satisfaction to the strategic flagship program of GHOSM in DHF control, namely empowerment of DSWs after the program ran for 3 years. The perception-based comprehensive evaluation of public health programs has not been performed before on prevention policies for Dengue virus, especially in Central Java Province, Indonesia. The strength of this evaluative survey was the large number of participants who represented all of the geographical areas of Semarang municipality who had direct involvement with the DSWs activities and were representative

of various community groups.

The results of the study represented the community responses to the DSWs performance because participants of this study were considered by social roles in various community groups of each sub-district of Semarang municipality including head of government offices, head of work units in the health or health-related sectors, various social groups, households, and heads of educational institutions. This evaluation used an approach which was different from other previous studies in Palopo City, South Sulawesi, Indonesia, which evaluated the performance of health cadres and larvae monitors in South Sulawesi [20]. Cadres were recruited from local members of the community and empowered to support the local government in the "Dengue control" program as additional work that was voluntary and noble for citizens to participate in. Duties and responsibilities of cadres were different from DSWs, who are specifically recruited by the GHOSM and given the main task of implementing DHF control programs in their respective work areas. DSWs play an important role in educating, organizing, and mobilizing members of the community to be involved in monitoring the Dengue virus vector control measures in settlements, offices, and public places [15]. Thus, evaluation of community satisfaction of the performance of DSWs is necessary.

This evaluative survey was had a majority of female participants and the majority of participants were 31 to 59 years this finding was in line with the previous studies and showed that Dengue virus vector control program had good leadership [21,22]. Women were the main driving force for community efforts in eradicating Dengue virus vectors in the Semarang municipality. "Dengue control" programs rely on activities to maintain sanitation in the home, especially by maintenance of clean water reservoirs. In daily activities in the Javanese community, sanitation in the home is typically performed by women, and supported by the FWC organization. This survey showed the good results of DSWs empowerment impact on the achievements of the "Dengue control" program indicators in the Semarang municipality. The key performance indicators were increasing the public attention to the problems associated with Dengue virus, the existence of the Dengue virus control measures by the community, and the consistency and continuity of the Dengue virus vector monitoring activities [18] that impact the decline in the numbers of new DHF cases. Convincingly, the members of the community very positively valued all of the assessed-aspects. Some aspects of public health services that satisfied the community included accuracy, simplicity of procedures, product quality, and human aspects such as competency, capability, and service behavior [23]. This study showed that in the last 3 years, DHF control programs worked, and the community were fully aware of the positive impacts of the programs.

The findings of this study indicated that DSWs and their activities are known and recognized by the members of the community. DSWs were considered to have an important role involving the members of the community, and reducing the House Index. This achievement was in line with the Ministry of Health of the Republic of Indonesia standard for House Index which was set at 5% as a prophylactic indicator of transmission of Dengue virus [24]. This should raise public awareness of government and non-government bodies who consider it important to maintain and strengthen DSWs in the future. The community recognizes that DSWs have a good level of knowledge about DHF and work areas. They also have mature attitudes and a high self-esteem, are skilled at work, and are serious about approaching and motivating people in the "Dengue control" programs. The community assessment of the DSWs performance was very positive and this impacted highly on communities acceptance and satisfaction of the DSWs presence and performance. Satisfaction is the impact of the involvement [25] of all social groups in the community, initiated by DSWs in various Dengue virus control activities, in the community from the planning and implementation, to the evaluation stages. This evaluation was provided by the members of the community from various social roles and ages. This has significant implications in developing policies for the "Dengue control" program. However, this study did not empirically measure the increase in community knowledge and skills regarding DHF, vectors, mode of transmission, prevention, and control. On the other hand, the trend of Dengue virus vector density (*Aedes* indices) as a result of DSWs performance and community involvement in the "Dengue control" program organized by DSWs needs to be evaluated.

Conclusion

Communities in the Semarang municipality have positive perceptions and a high level of satisfaction with DSWs capability, and impact of empowerment, and propose that this policy continues in the future. Members of the community believe that DSW have an important contribution in increasing public awareness and participation in Dengue virus control measures, as well as reducing the density of dengue virus vectors in residential areas which ultimately have an impact on reducing the number of DHF cases. Furthermore, for developing the tasks and functions of DSWs in a broader scope, an in-depth study of job satisfaction and their welfare is needed.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Acknowledgments

The authors wish to thank the government of the Semarang municipality for the research grant, the staff of the municipality Department of Health, and the staff of the Epidemiology and Tropical Diseases Laboratory of Public Health Faculty of Universitas Muhammadiyah Semarang for their support in data collection.

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