

Original Article**Participation of Community in Prevention and Control of Dengue Fever in Dharan Sub Metropolitan City of Province No 1, Nepal****Dharanidhar Baral^{*1}, Anup Ghimire¹, Samyog Uprety¹, Sailesh Mani Pokharel², Siddhant Baral³**¹School of Public Health & Community Medicine, BP Koirala Institute of Health Sciences, Dharan, Nepal, ² Faculty of Medical and Allied Science, Purbanchal University, ³3rd-year MBBS, BP Koirala Institute of Health Sciences, Dharan, NepalArticle Received: 15th October, 2020; Accepted: 18th December, 2020; Published: 31st December, 2020**DOI: <http://dx.doi.org/10.3126/jonmc.v9i2.33355>****Abstract****Background**

Dengue fever is known as a break-bone fever and its common symptoms are headaches, high grade fever, muscular, bone pains and decrease of platelets count. Community participation involving local government and household participants in controlling breeding areas of dengue mosquitoes is the only cost-effective and sustainable activities of ensuring prevention and control of Dengue fever. This study aimed to assess the perception of the general population regarding community participation in the prevention of dengue and to verify its effectiveness with the control practices observed at the homes in Dharan sub-metropolitan city of Province No 1.

Material and Methods

A cross-sectional study was conducted among 250 households at the Dharan sub-metropolitan city of Province no. 1 in Nepal from August to October 2019. The technique of sample collection was done using purposive sampling and data were collected using a pretested close-ended questionnaire and observational checklists.


Results

Slightly over half of the respondents 129 (51.6%) reported a positive attitude regarding community practice and almost three out of five 157 (62.8%) houses were observed to have good dengue control practices. The univariate results revealed attitude of households regarding community participation were significantly associated with the control practices observed in their homes ($p < 0.001$).

Conclusion

The study concludes that good community participation in collaboration with health volunteers and health institutions can have a positive impact on the dengue control practices at the household level. Hence, the spread of dengue out-break can be controlled by active collaborative community participation.

Keywords: Community participation, Dengue fever, Nepal

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Introduction

Dengue fever is known as a break-bone fever and its common symptoms are headaches, high grade fever, muscular, bone pains and decrease of platelets count [1]. Community participation becomes more successful in countries having stable and strong political systems. Community participation involving local government to household participants in controlling breeding areas of dengue mosquitoes is the only cost-effective and sustainable activities of ensuring prevention and control of Dengue fever [2]. Dengue is an emerging public health challenge and is endemic across most of the provinces in Nepal [3]. The dengue incidence has increased in recent years, largely due to the expansion of the vector *Aedes aegypti* and *Aedes albopictus*, as well as the movement of people and the introduction of imported cases [4]. All 4 dengue serotypes exist in Nepal, with DENV-1 historically contributing the highest burden. An estimation done by a model developed by [5] indicating the burden of 390 million dengue virus infections per year (95% CI: 284–528 million), of which 96 million (95% CI: 67–136 million) manifest any level of clinical or sub-clinical severity. Although, the risk of infection exists in 129 countries [6], 70% of the actual burden are in Asia [5]. An estimated 40% of the global population lives at risk of contracting dengue, which currently is the most important mosquito-borne viral disease and is a serious global public health problem, responsible for 24 000 deaths, 250 000–500 000 hemorrhagic fever cases, and up to 50 million infections annually [7]. The end of the September 2019, about 10000 cases of dengue fever reported at the Epidemiology and Disease Control Division and out of them six deaths were officially reported [8], but the number of deaths were very less for according to the size of the epidemic. A recent report from a tertiary hospital in the Province No 1 (BPKI HS, Dharan, Nepal) in mid-July 2019, revealed that out of 2953 blood samples received, more than 1,400 samples returned positive for dengue fever [9]. The rise in the cases of dengue infection in the community calls for the effective management and control of the disease.

The government has been conducting various activities and programs focusing on prevention and control of the disease such as clinical case management, surveillance, vector control and management and outbreak response through its national health program. Despite all the measures taken by the government why the dengue could not be controlled effectively? How do community people perceive this infection and what are the measures they adopt in practice to

prevent and control the disease? How active does the community participate and collaborate with government authorities to help control this infection?

To answer these pertinent research questions, this study was designed with the objectives to assess the household perception regarding community participation and practices adopted by them in the prevention and control of dengue in Dharan Sub-Metropolitan City of Province No 1 in Nepal.

Materials and Methods

A cross-sectional study was conducted among 250 households in five wards of Dharan sub-metropolitan city of Province no. 1 from August to October 2019. The sampling unit was a household that was selected purposively 50 from each ward. The sample size was 250, calculated using one proportion formula taking 37.6% prevalence [2] of the population involved in the community to control dengue fever. A face-to-face interview was conducted with the senior adult member (preferably head) of the household to collect the information. A pretested structured questionnaire and observational checklists were used to collect the data. The questionnaire consisted of three parts: the first part included socio-demographic information of the respondents, the second part included modified 9 questions [2] regarding community participation in the control and prevention of dengue, and the third part included pre-tested 23 observational checklist regarding dengue prevention and control practices. The 9 community participation items inquired the perception of the respondents regarding whether or not the community was actively involved in dengue prevention and control. The items were positively structured and responses were dichotomized; 1 representing 'yes' meaning community participation and prevention and 0 representing 'no' meaning no community participation. The practices related to dengue control were assessed by 23 observational checklists with a binary response; 'yes= 1' representing the presence of appropriate practice and 'no=0' representing the absence of appropriate practice observed in the prevention and control of dengue infection. The 23 items were added up and dichotomized to get a single score for the analysis purpose; score 60% and above represented appropriate practice and coded 1 and score less than 60% represented not appropriate practice and coded 0. A similar process of dichotomization was also done to 9 community participation scale after summing up the 9 scores into adequate and inadequate community



participation with the similar 60% cutoff, but it was presented descriptively only. The purpose of the study was explained to the respondents and verbal and written consent were obtained from the adult member of the household before the interview. The ethical clearance and research approval were taken from the Institution Review Committee and Institution Research Committee of BP Koirala Institute of Health Sciences, Dharan respectively. Confidentiality and privacy of participants were maintained throughout the study.

The data were entered in Microsoft Excel 2010 and analyzed by statistical software SPSS, version 11.5. The descriptive statistics were presented in frequency and percentage. Chi-Square test was applied to assess the association between 9 items of community participation and overall dengue control practices at the households. The P-value of less than 0.05 was considered statistically significant.

Results

A total of 250 respondents were interviewed. The majority of the study respondents were in their middle age (mean: 45.6 years, SD: 12.3 years) and around one-third of respondents were female (Table 1.). The average family size of the household was 6 (median: 6, IQR: 3 – 8) and had 5 rooms in an average in their house (Median: 5, IQR: 4 – 6 rooms). Four out of five respondents 208 (83.2%) had completed their higher secondary education. The result of dichotomized variables community participation and dengue control practices revealed that half of the respondents 129 (51.6%) had experienced adequate community participation in the prevention and control of dengue and appropriate dengue control practices was observed among almost

Table 1: Attitude towards community participation and household control practice of dengue associated with demographic variables:

Demographic Characteristics	Frequency (%)	Attitude towards Community Participation		p-value	Dengue Control Practices		p-value
		Adequate n = 129 (51.6)	Inadequate n = 121 (49.4)		Appropriate n = 157 (62.8)	Inappropriate n = 93 (37.2)	
Mean age in years (SD)	45.6 (12.3)	43.3 (9.8)	48.5 (16.7)	0.006	44.3 (10.1)	46.3 (15.6)	0.220
Gender							
Male	158 (63.2)	82 (51.9)	76 (48.1)	0.901	88 (55.7)	70 (44.3)	0.023
Female	92 (36.8)	47 (51.1)	45 (48.9)		69 (75.0)	23 (25.0)	
Education							
Higher Secondary completed	208 (83.2)	101 (48.6)	107 (51.4)	0.032	132 (63.5)	76 (36.5%)	0.630
Higher Secondary not completed	42 (16.8)	28 (66.7)	14 (33.3)		25 (59.5)	17 (40.5)	
Family Size (Median IQR)	6(3-8)	6 (4 - 7)	6 (3 - 8)	0.831	5 (4 - 6)	7 (3 - 9)	0.081
Number of rooms (Median IQR)	5(4-6)	5 (3 - 6)	5 (4 - 8)	0.897	5 (3 - 7)	6 (3 - 8)	0.457

two-thirds 157 (62.8%) of the households (Table 1). The adequate community participation was significantly associated with lower age ($p=0.006$) and lower education ($p=0.032$). But only gender among the demographic variables was significantly associated with the dengue control practices at their households where the households with female respondents was observed to have appropriate dengue control practices ($p=0.023$).

The assessment of the perception of households regarding community participation in dengue prevention and control done by 9 statements is presented individually in table 2. Responses on these statements were indexed to measure whether or not the respondents had experienced appropriate community participation to prevent and control dengue infection.

Table 2: Frequency and percentage distribution of respondents' attitude towards community participation in dengue prevention: (n=250)

Statement	Yes	%	No	%
People are organizing to eradicate dengue mosquitoes	160	64.0	90	36.0
Community leaders are actively participant in preventing dengue mosquitoes	72	28.8	178	71.2
Household member participates when community /Government is spraying fog	45	18.0	205	82.0
Dengue mosquitoes can be prevented through community efforts	220	88.0	30	12.0
Community participates in spraying insecticides for dengue mosquitoes' control by own cost	105	42.0	145	58.0
Community is involved in the campaign to clean the environment.	134	53.6	116	46.4
Community shares information about sign and symptoms of dengue fever	202	80.8	48	19.2
Community has a associated with health authorities or other health agencies for dengue control activities	197	78.8	53	21.2
Faith healers play important role in awareness about dengue fever	24	9.6	226	90.4

The prevention and control practices by individual households were assessed by 23 observational checklists under six broad headings (Table 3).

The result revealed 8 out of 9 community participation statements were significantly associated with overall dengue control practices. An appropriate dengue control practices were found more among the households whose community organized to eradicate dengue mosquitoes than who had not had this experience ($p<0.001$), but control practices were found to be better among the households who reported their community had no community leaders active in the dengue prevention program ($=<0.001$). No significant difference was observed in the dengue control practices between the households that had and had not participated in government fogging programs ($p=0.351$). The respondents of the household who did not know that dengue can be prevented through community efforts were the



Table 3: Frequency and percentage distribution of respondents' regarding dengue control practices in household on the basis of observation: (N=250)

Observational checklist:	Yes (appropriate practice)	%	No (inappropriate practice)	%
1. General appearance (1)				
a. Cleanliness of house	132	52.8	118	47.2
2. Discarded items not available around the household(4)				
a. Empty cans	92	36.8	158	63.2
b. Broken pots	134	53.6	116	46.4
c. Broken plastic containers	63	25.2	187	74.8
d. Old used tyres	177	70.8	73	29.2
3. Waste and refuse disposal(3)				
a. Collects waste in a dust bin	224	89.6	26	10.4
b. Disposes waste daily.	112	44.8	138	55.2
c. Disposes in the municipal collection bin	88	35.2	162	64.8
4. Sullage water disposal(2)				
a. Closed drain.	161	64.4	89	35.6
b. Kitchen garden	102	40.8	148	59.2
5. Observation of practices related to the storage of water (4)				
a. For drinking purpose				
i. Stores in properly covered water containers	231	92.4	19	7.6
ii. Cleans them regularly.	196	78.4	54	21.6
b. For domestic purpose				
i. Stores in fully covered water containers	169	67.6	81	32.4
ii. Cleans them regularly.	53	21.2	197	78.8
6. Observation of the presence of possible mosquito breeding sites(9)				
a. Mosquito breeding sites not available inside the house (2)				
i. Flower vase.	42	16.8	208	83.2
ii. Open water storage containers	12	4.8	238	95.2
b. Mosquito breeding sites not available around the house (3)				
i. Water collections in discarded items.	7	2.8	243	97.2
ii. Open water storage containers	2	0.8	248	99.2
iii. Pet and animal water containers	139	55.6	111	44.4
c. Observation of practices related to the use of protective measures against mosquito bite. (4)				
i. Uses mosquito net regularly for all the members of the family	203	81.2	47	18.8
ii. Uses mosquito repellants	235	94	15	6
iii. Mesh for windows and doors	163	65.2	87	34.8
iv. Insecticide spraying regularly	22	8.8	228	91.2

ones that did not follow appropriate practices of dengue control at their houses ($p=0.004$). Similarly, appropriate dengue control practices were observed at the houses of respondents who reported that their community participated in spraying insecticides ($p=0.007$), the community involves in the campaign to clean the environment ($p<0.001$), community shares information about dengue ($p<0.001$), communities has links with health authorities and agencies ($p<0.001$) and had a belief that faith healers do not have an important role in the awareness about dengue ($p<0.001$). This indicates that the community participation in the dengue prevention program is associated with appropriate dengue control practices at home. The result also revealed that appropriate dengue control practices were observed less among the households who

The households' experience of community participation in dengue prevention based on their responses was cross verified with the actual control practices observed in their households during the study with the help of cross-tabulation between 9 statements of community participation and dichotomized dengue control practice (Table 4).

Table 4: Association between household practices and statements of attitude towards community participation

Statements	Adequately Done	Household Practices Yes (%)	No (%)	P-Value
People are organizing to eradicate dengue mosquitoes	Yes	131 (81.86)	29 (18.14)	<0.001
	No	26 (28.89)	64 (71.11)	
Community leaders are actively participant in preventing dengue mosquitoes	Yes	53 (73.61)	19 (26.39)	<0.001
	No	104 (58.43)	74 (41.57)	
Household member participates when community /Government is spraying fog	Yes	31 (68.89)	14 (31.11)	0.351
	No	126 (61.46)	79 (38.54)	
Dengue mosquitoes can be prevented through community efforts	Yes	144 (65.45)	76 (34.55)	0.004
	No	13 (43.33)	17 (56.67)	
Community participates in spraying insecticides for dengue mosquitoes' control by own cost	Yes	76 (72.38)	29 (27.62)	0.007
	No	81 (55.86)	64 (44.14)	
Community is involved in the campaign to clean the environment.	Yes	99 (73.88)	35 (26.12)	<0.001
	No	58 (50.00)	58 (50.00)	
Community shares information about sign and symptoms of dengue fever	Yes	141 (69.80)	61 (30.20)	<0.001
	No	16 (33.33)	32 (66.67)	
Community has a associated with health authorities or other health agencies for dengue control activities	Yes	141 (71.57)	56 (28.43)	<0.001
	No	16 (30.19)	37 (69.81)	
Faith healers play important role in awareness about dengue fever	Yes	3 (12.50)	21 (87.50)	<0.001
	No	154 (68.14)	72 (31.86)	

Table 5: Association between overall attitude towards community participation and household practices:

Community participation	Dengue control practices n (%)		Total	P-value
	Appropriate	Inappropriate		
Adequate	109 (84.5)	20 (15.5)	129 (51.6)	<0.001
Inadequate	48 (39.7)	73 (60.3)	121 (49.4)	
Total	157 (62.8)	93 (37.2)	250 (100.0)	

Finally, overall attitude towards community participation (dichotomized) and household practices (dichotomized) showed that there was positive statistically significant ($p<0.001$).

Discussion

The results of this study reported that there is a lack of adequate community participation in the control and prevention of dengue infection, indicating a lack of proper management and initiation to coordinate the community people by the concerned health authorities in the control and prevention programs. This might be one of the reasons for the lack of appropriate dengue control practices among the households during the study in the Dharan Sub Metropolitan City. This study findings revealed that almost half (49.4%) of the respondents admitted that the



community did not participate adequately in the dengue prevention program, the consequence of which was reflected in the dengue control practices observed at their households. A substantial proportion of the households (37.2%) did not follow appropriate measures to control the disease. A recent rise in the cases of dengue in the area [9] further supports this finding. This indicates that dengue prevention and control practice programs can be hindered owing to low community participation in the dengue prevention, management and consequently lack of appropriate control practice of the disease.

The study results further revealed a substantial percentage of the people in the community were not involved in the effort to destroy the dengue breeding sites from their surroundings and this result was similar to the findings of a study done in Pakistan [2]. Further, the cross-tabulation with dengue control practice revealed that poor practice was evident among the households which reported no community participation in the destruction of dengue breeding sites indicating the influential role of community organizing in the control of vector. One of the reasons for inadequate dengue control practices at home could be because of the message communicated by authorities under sanitation and prevention of several infectious diseases where it is emphasized the need to keep domestic water supplies clean and to avoid contamination and infections, but the fact that clean water reservoirs located in the households pose a hazard for dengue is ignored [10]. Our findings result showed that households that came from the community that shared the information regarding dengue fever had better control practices at their homes. So, the role of health authority to organize community participation is pivotal in conveying a clear message regarding vector and its dynamics.

The role of social leaders and health professionals is crucial in the prevention and control of dengue [11]. They are the key players in convincing people to involve in community prevention programs, thereby inspiring them to take appropriate measures at their homesteads to keep out of the dengue infection. This study highlighted the bleak role of leaders and health professionals in developing community participation regarding health issues. The result revealed the respondents from the household who reported that leaders were effective were the ones to have inappropriate dengue control measures practiced at home compared to those who reported their leaders were active, suggesting the role of leaders were ineffective in developing community

participation and motivating the residents to adopt control measures. Similarly, the role of faith healers was found to be negative in adopting the control measures of dengue infection. Hence, the result indicates that the faith healers and local leaders were ineffective in encouraging the people to adopt the appropriate dengue control practice measures at their homes.

This study reveals those households had opted for better dengue control measures whose respondents reported that their community has a connection with dengue control authorities revealing the fact that communication and link with the health authorities have a positive impact on the dengue prevention and control measures practiced at households. The problems regarding the low levels of community participation in the prevention strategies arise due to the conflict between community peoples/leaders and health authorities consequently leading to other problems in controlling larval infestation in household containers, especially when faced with continuing community sanitation difficulties. These findings were reported in the research studies done in America [12] and Portugal [13] corroborates our study findings.

The most rewarding experiences in dengue control practice are those where the community and its different social actors such as health institutions and NGO's effectively involve in community prevention programs. On the other hand, it is also clear that community participation is not sufficient to control the disease when general sanitation status is not satisfactory. The regular water supply and garbage collection services, periodic fogging and spraying to kill the vector and destroy the breeding sites given by the municipality are integral to dengue control. Our study results found better dengue control practices observed in homes of respondents who reported that their community participates in spraying insecticides to control the dengue mosquitoes highlighting the role of the important role of community participation.

Furthermore, in underprivileged areas and slums, due to low water supply residents are obliged to store water in domestic containers which, as expected, are vulnerable to contamination by several bio-agents, as well as to infestation by mosquito larvae [14]. In addition to it, the habit of hoarding unmanaged disposable containers at home contributes to the build-up of trash and mosquito breeding sites [15].

For achieving sustainable results for dengue control, interventions must fit the ground realities of daily life and must be based on a thorough



understanding of the community's problems, especially in settlements on the periphery of large cities. Likewise, far more investment must be made to build up the community participation in the control and prevention programs. Controlling mosquito infestation in households and commercial and industrial areas requires action from all inter-sectoral agencies and not just the resident population. Strengthening the bonds between communities and health services should be an ongoing effort, rather than reserved for dealing with dengue epidemics. Through such ongoing partnerships, health agencies and communities can together decide upon and implement more feasible and effective measures for dengue prevention and control.

Conclusion

This study concludes community participation is an important aspect in the effective prevention and control of dengue infection at the household level. The role of community leaders and health professionals is important in encouraging and involving the community people in the prevention and control program, although the role of leaders was not found satisfactory. The local resources, especially leaders, teachers, even faith healers could be trained and utilized in building the community participation in prevention and control programs. The study adds to the growing support in favor of multisectoral vector control, wherein the fight against dengue goes beyond routine larvicide and spraying and involves close interaction with the community to prevent vector control.

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Conflicts of interests: None

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