



Community perspectives on dengue transmission in Lugait, Misamis Oriental, Philippines

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ABSTRACT

This study was conducted to determine the current perspectives of the residents in a community in Lugait, Misamis Oriental, Philippines to dengue using the traditional approach of understanding why dengue is, still, a major social, health, economic and ecological issue. As shown by this study, the local residents of the community are still concerned about the recurrence of dengue and is considered one of the major health concerns. Knowledge, beliefs, attitudes and practices of the local community members show a majority are knowledgeable of the nature of dengue through mass media, health centers, and neighbors. The vigilance among the residents has contributed also in the monitoring of cases and the practice of cultural methods in the cure for dengue that is even endorsed by the local health centers. The community also has knowledge on the effect of climate change on the prevalence of dengue from information shown on televisions and radios. Because of the increasing number of dengue cases in the area, the Local Government Unit (LGU) took actions by Information Education Campaign (IEC) but there were still others who have misconceptions and considerable knowledge gaps about dengue. Interventions by the local government are still needed targeting this subgroups in the community. It is argued that poverty and ignorance may have been the major causes of having the disease still uncontrolled in the community thus dengue will still remain a public health issue and represents an important challenge for public health programs.

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INTRODUCTION

Dengue is considered a significant mosquito-borne viral disease in the world affecting both human health and the economy of countries [1, 2]. The Philippines along with Cambodia, Malaysia, and Australia reported high incidence of Dengue Fever in recent year. The country has 55,000 reported cases early in in 2015 higher than the 50,462 recorded cases during the same period in 2014. Dengue fatal cases predominantly occur among children [3, 4] and results to disability-adjusted life years [5, 6].

The vectors of dengue are the females of mosquitoes *Aedes aegypti* and *Aedes albopictus* [7-9]. Humans that are infected with the virus are the main multipliers and carriers spreading the infection for 4 – 12 days once their first symptoms appear [10] (WHO, 2014). Since there is no specific vaccine that can treat Dengue Fever and Dengue Haemorrhagic Fever, preventing the transmission of the disease is by reducing the population of its vector [11].

It is argued that changing climatic conditions affect the dynamics of these mosquitoes and in the epidemiology of the diseases they transmit [12, 13]. Since temperature influences the rate of the development of the vectors affecting their behaviour and mortality and also the replication of the virus inside the infected body [14] (Morin et al, 2013), changes in water temperature will affect the dynamics of the insect especially the time for the larvae to mature thus increasing the temperature means increasing also the number of offsprings that will be produced during the transmission periods [15]. During warmer climates, the adult female *Aedes aegypti* digest blood faster and feed more often which means increasing transmission intensity [16]. The increase in precipitation also increases the availability of the habitat for the two mosquito vectors' larvae and pupae [14]. Since it is also expected that an increase in global mean temperature of as much as 6.4°C by the end of this

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century [17], it is projected that dengue cases will also be increasing. Many studies have shown the relationship between dengue transmission and the variability of climate especially in the tropical region [18-22]. These show that the relationship between Dengue Fever transmission and the varying climatic conditions are closely linked. Adequate knowledge and awareness of the public concerning Dengue Fever, Climate Change and the association between the two would therefore be important in preventing or minimizing Dengue Fever outbreaks.

The Department of Health (DOH) of the country also stated that the regions with high number of reported cases are: Calabarzon (15.2%), Central Luzon (13%), National Capital Region (11.1%), Northern Mindanao (8.7%), and Cagayan Valley (7.5%). Misamis Oriental is one of the provinces of Northern Mindanao and it has the most number of dengue cases recorded with 1,252 cases compared to 570 cases last year resulting to eight deaths.

In spite of this alarming increase of Dengue cases in the country, there are only few researches focused on the community perspective regarding Dengue Fever transmission in the Philippines and there are no known studies that explore the perception of the community about the relationship between the spread of DF and climate change. In line with these, this study aims to investigate the local views of the community concerning Dengue Fever and the possible effects of climate change on the transmission of the disease. This is done by conducting household surveys using modified questionnaires.

MATERIALS AND METHODS

Study Area:

Eight villages of the town of Lugait in Misamis Oriental in the Philippines located on the northern part of Mindanao (Figure 1) were the subject of this study. As of 2010, it has a population of 18,639 people according to the 2010 census [23, 24] which at present may have reached 26,000. The area is mostly agricultural though hundreds of hectares have already been converted not only into industrial and commercial land due to the industrialization of the neighboring city but also more agricultural lands are being converted into residential areas. Its climate is classified as tropical with the temperature range of 27 - 33°C as of February 2015. Over the past few years, an increase of Dengue cases have been reported in the municipality. Preventive measures have been done by the local government such as fogging and conducting Information, Education and Communication (IEC) campaign to the communities.

Data Collection:

A community-based cross-sectional study was conducted among the eight villages of the municipality namely: Poblacion, Biga, Calangahan, Lower and Upper Talacogon, Kaluknayan, Aya-aya and Betahan. Permission was obtained through a courtesy call to the Municipality Mayor and the Municipal Health Officer before the survey was conducted. A total of 300 respondents with ages 18 years or more who lived for at least five years were interviewed from August 2015. The purpose of the study was explained to the respondents and they were guaranteed that the participation was voluntary and information was confidential.

The questionnaire include various Knowledge, Attitudes and Practices (KAP) to Dengue Fever. The questionnaire includes socio-demographic factors, level of understanding of the community regarding dengue, current practices on dengue, the government's response to dengue, perception on Climate Change and the knowledge of the community on the relationship of Dengue transmission and Climate Change. The data that were gathered were entered into Microsoft Excel spreadsheet and then transferred to the software R version 3.1.2 for analysis.

Results:

The socio-demographic data of the respondents are shown in Table 1. The table shows more females participated in answering questions as indicated in the questionnaire. Variability in the ages of the respondents including marital status and educational attainment were observed. Most of them were Catholic Christians and differed in educational attainment. Likewise, the abode of the interviewees also vary from semi-concrete, concrete and nipa/wooden houses. Based on income, the respondents belong to low-income families.

Knowledge on the transmission, prevention and control of Dengue Fever of the respondents show a majority (96%) knew that the mode of transmission of the disease is through the bite of a mosquito carrying the virus although very few knew that the mosquitoes *Aedes Aegypti* and *Ae. Albopictus* are responsible for the disease that usually comes out during late afternoon (4-5 pm) although there are also those who believed these species have no specific biting period and that respondents the most vulnerable group against DF are the children.

Knowledge of the communities on the most common known symptom of Dengue which is fever that lasts for a few days (at least three days) followed by headache, stomach ache, skin rashes, vomiting, bleeding of the nose and gums, muscle pain and diarrheas high. Vomiting and bleeding are also known to be manifested if the dengue is severe.

Mosquitoes responsible for dengue can be found anywhere within the community. A total of 173 (57.67%) respondents answered that water containers with no covers and especially those that have already been stored more than a week can be a breeding site for the mosquitoes within their homes while 65 (21.67%) responded that waters in flower vases and plotted plants can also serve as habitat for these vectors. For the outdoor source of mosquitoes breeding sites, 196 (65.33%) answered that plants such as bananas which are commonly planted within the community are a good habitat for the mosquitoes followed by discarded tires, cans, bottles and other containers (130 or 43.33%), rivers, ponds and water puddles that are formed after raining (78 or 26.00%), coconut shells (71 or 23.67%), no proper drainage (41 or 13.67%) and dirty surroundings (29 or 9.67%).

Table 1: Socio-demographic information of the respondents (N=300).

Variable	No. of Respondents	Percentage (%)
Gender		
Male	71	23.67
Female	229	76.33
Age		
15 – 30	88	29.33
31 – 45	106	35.33
46 – 60	75	25.00
61 – 75	28	9.33
76 – 90	3	1.00
Marital Status		
Married	263	87.67
Single	22	7.33
Widow/Widower	13	4.33
Separated	2	0.67
Educational Attainment		
Elementary Level	33	11.00
Elementary Graduate	51	17.00
High school Level	72	24.00
High school Graduate	81	27.00
College Level	35	11.67
College Graduate	28	9.33
Religion		
Roman Catholic	268	89.33
Iglesia Ni Cristo	14	4.67
Seventh Day Adventist	5	1.67
Assembly of God	5	1.67
Born Again	2	0.67
Others	6	2.00
Type of House		
Semi-concrete	110	36.67
Concrete	102	34.00
Nipa	88	29.33
Occupation		
Housewife	159	53.00
Daily Labour	43	14.33
Vendor	42	14.00
Farmer/Fisherman	26	8.67
Service Holder	15	5.00
None	15	5.00
Income Level per month		
>5,000	140	46.67
5,000 – 9,999	127	42.33
10,000 – 14,999	21	7.00
15,000 – 19,999	9	3.00
20,000 – 24,999	3	1.00
Ethnicity		
Cebuanos	300	100

With regards to the preventive measures against the disease, cleaning the surroundings is the most cited eliminating possible available habitats for mosquitoes. These include throwing away possible breeding sites such as discarded tires, cans, bottles, etc. Using bed nets, mosquito coils and other mosquito repellent were also mentioned followed by covering water containers and not storing water in long period of time. Traditional fogging to drive away mosquitoes especially during the afternoon, wearing long-sleeved and long pants especially by small children and ensuring windows and door have screens to ward off mosquitoes in entering houses were also cited.

Table 2: Community's Knowledge on Dengue Fever

Variable	No. of Respondents	Percentage (%)
Source/s of Information		
Family/Neighbors	283	94.33
Television/Radio	275	91.67
Medical Team	241	80.33
School	102	34.00
Internet	29	9.67
Posters	10	3.33
Newspaper/Magazine	7	2.33
Symptoms of Dengue		
Fever	272	90.67
Headache	244	81.33
Stomach-ache	177	59.00
Skin Rashes	167	55.67
Vomiting	151	50.33
Bleeding	135	45.00
Muscle pain	120	40.00
Diarrhea	14	4.67
Biting time of mosquitoes		
Late afternoon	113	37.67
All Day	108	36.00
Early Afternoon	68	22.67
Early Morning	51	17.00
Night	9	3.00
I Don't Know	27	9.00
Breeding sites/ Habitat		
Indoors:		
Water containers with no cover	173	57.67
Flower vases/ Potted plants	65	21.67
Clothes that are hang	29	9.67
Outdoors:		
Plants that can store water (bananas)	196	65.33
Discarded tires, cans, bottles and other containers	130	43.33
Rivers, ponds and water puddles that are formed after raining.	78	26.00
Coconut Shells	71	23.67
No proper drainage	41	13.67
Dirty surroundings	29	9.67
Preventive measures against mosquitoes		
Clean the surroundings	175	58.33
Use bed nets, mosquito coils, etc.	103	34.33
Safely cover water containers and store water not more than a week	102	34.00
Make fire to shoo away mosquitoes and to destroy possible breeding sites of mosquitoes.	100	33.33
Wear long-sleeved, long pants and hats to cover exposed skin	62	20.67
Ensure windows and door screens are in good condition	26	8.67
All of the above	12	4.00

It can be seen from the results in Table 3 that the people in the community have varied response to dengue. The response can be immediate or until four days before they seek treatment for the patient. Treatment can also vary from the use of herbal plants, in the health center or in the hospital. There resident's reactions to the storage of water was mixed. Those who did either have them covered or none at all.

Table 3: Current Dengue Fever Practices

Variable	No. of Respondents	Percentage
Have you heard about Dengue Fever?		
Yes	259	86.33
No	41	13.67
How long until the patient receive any medical treatment?		
immediately after the first symptom was first observed	92	30.67
1-3 day after the first symptom was first observed	171	57.00
4 < day after the first symptom was first observed	37	12.33
Attitude of respondents with Dengue Fever		
Herbal Medicine	118	39.33
Go to the health center	103	34.33
Buy medicine (over- the-counter drugs)	54	18.00
Go to the hospital	25	8.33
Do you practice storing water at home?		

Yes	167	55.67
No	106	35.33
Sometimes	27	9.00
Do you cover it?		
Yes	136	81.44
No	12	7.19
Sometimes	19	11.38

The community's opinions on the Government's actions are described on Table 4. Since the Government plays an important role on the community, the actions that they have taken regarding DF are also essential. Results show the residents in the community are well-informed through IEC/Awareness/Orientation/Seminar from the Government. Fogging was also conducted followed by larval survey and there were also distributions of free medicine, vaccines, and vitamins from health centers. Even if government services were provided, the residents still were not contented.

Table 4: Government's Response on Dengue Fever

Variable	No. of Respondents	Percentage
Have you received any assistance from the government regarding DF?		
Yes	187	62.33
No	78	26.00
I Don't Know	35	11.67
What are these?		
IEC/Awareness/Orientation/Seminar	187	62.33
Fogging	174	58.00
Larvae Survey	73	24.33
Clinic (Medicine, vaccines, vitamins)	55	18.33
Are you contented by this assistance?		
Yes	179	59.67
No	121	40.33

Majority of the respondents are also knowledgeable of climate change and its possible impacts through the availability of information on television and radio which are the main source of their information. Their knowledge while varied show air pollution coming from cars and factories are the main cause of climate change including deforestation. The unpredictable weather pattern is a result of the warming climate followed by the increasing temperature, occurrences of flood and typhoons with increasing intensity, drought and heavy rainfall. A majority thinks climate change is happening now and experiencing it.

Table 5: Climate Change

Variable	No. Of Respondents	Percentage (%)
Have you heard about Climate Change?		
Yes	172	57.33
No	128	42.67
Source/s of Information		
Television/Radio	149	49.67
School	94	31.33
Internet	61	20.33
Government	56	18.67
Family/Neighbors	42	14.00
Newspaper/Magazine	20	6.67
Effects of Climate Change		
Unpredictable weather pattern	163	54.33
Increase in temperature	118	39.33
Occurrence of floods and typhoons with increasing intensity	112	37.33
Drought	110	36.67
Heavy rainfall	90	30.00
I Don't Know	69	23.00
Causes of Climate Change		
Air Pollution	135	45.00
Deforestation	122	40.67
Overpopulation	108	36.00
All of the above	28	9.33
I Don't Know	128	42.67
Is climate change happening now?		
Yes	156	52.00
No	123	41.00
I Don't Know	21	7.00

The residents also have varied knowledge of the relationship of dengue with climate change. Majority observed an increase in dengue occurrence and they believed it is due to climate change. Many residents claim that the heavy rainfall increases the number of habitats or breeding sites for the mosquito vectors while the others believe the longer dry season and increased temperature provided favorable conditions to the mosquitoes. Also typhoons may favor migration of mosquitoes and other vectors. It was also known from the responses of the residents that dengue cases happen all throughout the year due to the unpredictable weather pattern.

Table 6: Knowledge of the Community on Dengue Fever Transmission and Climate Change

Variable	No. Of Respondents	Percentage (%)
Have you observe any increase in the number of Dengue Fever cases for the last 10 years?		
Yes	210	70
No	80	24.67
I Don't Know	16	5.33
Does the changing climate have an effect on the increase?		
Yes	135	64.29
No	58	27.62
I Don't Know	17	8.10
In what manner?		
Increase number of habitat for mosquitoes	46	34.07
Increase number of mosquitoes due to more favorable conditions	23	17.04
Decrease of immune system which makes them more susceptible to diseases	12	8.89
Increase number of typhoons that may carry mosquitoes and other vectors	25	18.52
I Don't Know	29	21.48
Season suitable for Dengue Fever		
All-year round	139	46.33
Rainy	92	30.67
Dry	55	18.33
I Don't Know	14	4.67

Discussion:

This current community study on the perspectives of the residents to dengue is basically a traditional approach to understand why dengue is, still, a major social, health, economic and ecological issue [25-27]. This was to place the community as a key element in crafting of policies for disease prevention and vector control programs [28] and to legitimate and validate health intervention programs [29] of the concerned community but also the region and the country as well.

As shown by this study, the local residents of the community are still concerned about the recurrence of dengue and is considered one of the major health concerns. Knowledge, beliefs, attitudes and practices of the local community members show a majority are knowledgeable of the nature of dengue though mass media, health centers, and neighbors. A majority of the respondents knew the disease is caused by a virus and is transmitted through bites by the mosquitoes *Aedes Aegypti* and *Ae. Albopictus*, including their habitat of laying eggs in water containers including plant parts that has water in them. It is for this reason that the most common preventive measure adopted by the community is by cleaning the surroundings which include throwing away discarded tires, bottles, cans and other water containers that possibly host the mosquitoes. The knowledge on the different breeding sites of the mosquitoes is vital in their planning of preventive measures against Dengue fever. Likewise, vigilance among the residents has contributed also in the monitoring of cases. It is important to note here that the community practices cultural methods in the cure for dengue. The utilization of herbal plants and other cultural methods are also practiced by the residents based on the belief that these also offer cure to the disease and this is even endorsed by the local health centers.

The community also has knowledge on the effect of climate change on the prevalence of dengue the information of which were televisions and radios. The respondents have observed an increase of the number dengue cases in the community especially in the last five years which is almost non-existent in the past. They associate their observations to changes in climate even though the manner of which it can affect the transmission have been provided with varied answers. The increase of mosquito habitat due to increase rainfall and provided more suitable conditions for mosquitoes to reproduce. Because of the increasing number of dengue cases in the area, the Local Government Unit (LGU) took actions by Information Education Campaign (IEC). While the actions has played a key role to the community in further understanding dengue, there were still others who are apathetic to the program and are still ignorant of the nature of the disease. There are still misconceptions and considerable knowledge gaps about dengue. Interventions by the local government are still needed targeting this subgroups in the community. It is argued that poverty and ignorance may have been the major causes of having the disease still uncontrolled in the community. This may be linked to social conditions [30, 31] of some members of the community thus dengue will still remain a public health issue and represents an important challenge for public health programs [27]. More studies should be done especially taking into account the

interaction between biological, epidemiological, social and cultural data in order to clarify how they are linked. The influence of social and cultural aspects in dengue transmission should not be overlooked in all of the health programs of the government in order to develop competent control and prevention programs [32-36].

Conclusion:

Based on the results, most of the respondents have general knowledge on dengue and the factors affecting the surge in cases. However, there are also those who have poor knowledge which may require more educational campaign by the Local Government Unit. Understanding the interaction between biological, epidemiological, social and cultural data to clarify how they are linked are still needed to achieve a clearer understanding of the influence of social and cultural aspects in dengue transmission in order to develop competent control and prevention programs of the government.

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