

# Assessment of Known Risk Factors for Dengue Transmission in Haraincha Village Development Committee of Eastern Nepal

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## ABSTRACT

### Introduction

Currently dengue is a worldwide public health problem. Almost half of world's populations are at risk of dengue. The first case was reported from Nepal in 2004, since then major outbreaks occurred in the year 2006, 2010, 2012 and 2013. As Jhapa district had outbreak in 2012 and 2013, there is a high chance of outbreak in Morang district also. There might be presence of many known risk factor for dengue transmission at Haraincha Village Development Committee (VDC).

### Objective

To assess the known risk factor associated with dengue transmission in Haraincha Village Development Committee of Morang district of Eastern Nepal.

### Methodology

Community based cross-sectional study was conducted from 15<sup>th</sup> October 2013 to 30<sup>th</sup> November 2013 in Haraincha VDC of Morang district. The data was collected from 122 households by means of interview using a semi structured questionnaires and direct observation after taking informed consent. We observed the known risk factor of possible dengue transmission. Data were entered into Microsoft excel and analyzed by using SPSS.

### Results

The mean age of the respondent was 38 years with male predominance (61.5%). Only 7.4% were illiterate. The major occupation was agriculture (45.9%). Fifty four percent were above the poverty line. Two percent had history of dengue contracted outside the country. Common risk factors observed were poor drainage system (79%), poor natural light (75%), paddy field nearby household (51%), water filled open containers (44%), big plant near household (31%) and flower vases (26%) etc.

### Conclusion

The known risk factors for dengue transmission were present in Haraincha Village Development Committee.

### KEYWORDS

Dengue, eastern Nepal, risk factors, transmission



## INTRODUCTION

Dengue, a viral disease transmitted by mosquito has rapidly spreading in all regions of World Health Organization (WHO) in recent years. Dengue virus is transmitted by female *Aedes aegypti* and to a lesser extent *Aedes albopictus* mosquitoes species. *Aedes* also transmits yellow fever, chikungunya, and Zika infection. Dengue is widespread in tropical region with local variations which is influenced by rainfall, temperature and unplanned rapid urbanization.<sup>1</sup> In 1635 AD first epidemic was recorded in the French West Indies. Scientist Rush was probably describing dengue first time when he wrote of “break-bone fever” occurring in Philadelphia in 1780.<sup>2</sup> Recent decades, the incidence of dengue has grown dramatically around the world. Due to under-reporting and misclassification the actual numbers of dengue were low. One recent estimate indicates that, there were 390 million dengue infections every year of which 96 million manifest with clinical features having few severities.<sup>3</sup> Another study reported that, about 3.9 billion people, in 128 countries, are at risk of infection with dengue viruses.<sup>4</sup> About 2.5 billion people around the world living in dengue endemic countries 1.3 billion live in 10 countries of the South-East Asia region of WHO. Nepal reported its first case in November 2004 from Chitwan district in Japanese volunteer. Since then Nepal had reported 32 cases (2006), 27 cases (2007), 10 cases (2008), 30 cases (2009), 917 cases with 5 deaths (2010), 79 cases (2011), 183 cases (2012), 700 cases (2013). At Jhapa district alone 72 confirmed cases were reported in 2012.<sup>5</sup> There are four distinct, but closely related, serotypes of the dengue virus namely DEN-1, DEN-2, DEN-3 and DEN-4. Recovery from dengue infection by one serotype of dengue virus provides immunity for life time against that particular serotype but no cross immunity to the other serotypes of dengue virus. Subsequent infections by other serotypes may increase the risk of severe dengue.<sup>6</sup> The two major vectors of dengue transmission are peri-domestic and day biter, breeds mainly on clean stagnated water collected in water tanks, pools, coolers, flower vases, coconut shells, construction sites, overhead uncovered or partially covered water tanks, discarded buckets, artificial ponds, cans, bottles and automobile tires which are not emptied and cleaned periodically. In indoors the mosquitoes rest on various objects such as in closets and other dark places. Outside, they rest in shady and cool places. *Aedes* mosquito can fly up to a limited distance of 400 meters but can spread over long

distances in various types of vehicles used by man. The outbreaks of dengue fever are most likely to occur in post-monsoon season when the breeding of the mosquitoes is highest.<sup>2</sup> Monkeys and humans both are amplifying hosts and the virus is maintained by mosquitoes transovarially via eggs. The spread of infection occurs through the movement of the host (man) as the vectors, although movements of *Aedes* are very restricted.<sup>5</sup> Regarding knowledge about preventive measures, majority (70.3%) knew about mosquito repellents like mat, liquid vaporizers and coils.<sup>7</sup> As the clinical pattern of dengue remains asymptomatic in more than 50% cases and also people often get confused with viral illness, it is vital to recognize at the earliest the signs and symptoms, multi-system involvement pattern in dengue to reduce the mortality. The best way to control dengue outbreak is to find possible risk factor for dengue transmission and its better management. Furthermore, studies on this topic are deficient in Nepal and work need to be done to find the present status regarding known risk factor for transmission of dengue and make efforts to make it worthwhile task. The objective of the study was to assess the existing known factors in Haraincha Village Development Committee of eastern Nepal.

## METHODOLOGY

From 15<sup>th</sup> October 2013 to 30<sup>th</sup> November 2013 in Haraincha Village Development Committee of Morang District, a community based cross-sectional study was conducted. Data was collected from 122 households by means of interview using a pretested semi structured questionnaires and direct observation of known risk factors of dengue transmission. The sample size was calculated based on the similar research conducted in Chitwan district of central Nepal.<sup>8</sup> Data was collected for socio-demographic characteristics and by direct observation of presence of known risk factor of dengue transmission in their household. Age more than 15 years and willing to participate was included. The informed consent was obtained prior to data collection. The confidentiality was maintained by coding the respondents' name in the questionnaire, without disclosing the respondents' information to others and using this for the study only. The collected data was checked thoroughly for completeness and coded first then it was entered in Microsoft excel. The entered data was checked, verified and was transferred to Statistical Package for Social Sciences (SPSS) 17 for analysis.

## RESULTS

A community based cross sectional study was conducted in Haraincha village development Committee of Morang District of Eastern Nepal. Data was collected from 122 households

As shown in table 1, the study finding revealed that the male respondents were more (61.5%) than female.

Every three in 10 belonged to age group of 31- 40 years. The majority were Brahmin/Chhetri (36.9%) followed by Terai caste (36.1%). Every four in five were married. Every 3 in 10 had completed their secondary level of education having major occupation as agriculture (45.9%). Almost half were from nuclear family having average family size of 5.76. Fifty four percent were above the poverty line.

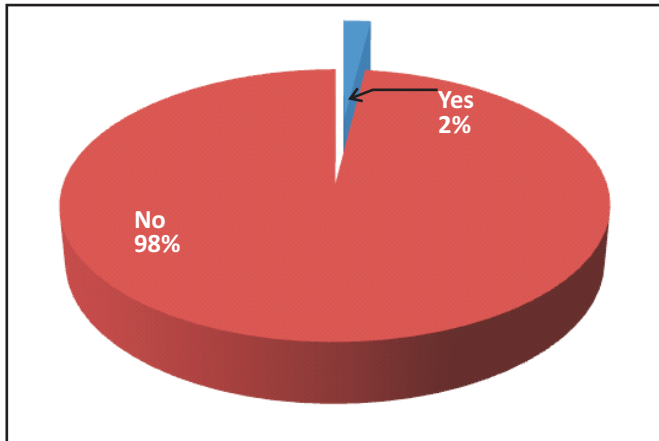
**Table 1: Distribution of respondents by socio-demographic characteristics (n=122)**

Characteristics	Number (n = 122)	Percentage (%)
<b>Gender</b>		
Male	75	61.5
Female	47	38.5
<b>Age (years)</b>		
16-20	11	9.0
1-30	32	26.2
31-40	37	30.3
41-50	15	12.3
51-60	16	14.2
61+	11	9.0
Mean $\pm$ SD : 37.93 $\pm$ 14.28 Minimum 16 Maximum 7		
<b>Caste / Ethnicity</b>		
Brahmin/Chhetri	45	36.9
Kirat	11	9.0
Newar	17	13.9
Dalit	5	4.1
Terai caste	44	36.1
<b>Marital status</b>		
Married		
Never married		
<b>Educational Status</b>		
Illiterate	9	7.4
Primary	30	24.6
Lower Secondary	18	14.8
Secondary	37	30.3
Higher Secondary	21	17.2
Bachelor and above	7	5.7
<b>Occupational Status</b>		
Agriculture	56	45.9
Service	13	10.7
Business	13	10.7
Labour	6	4.8
Teaching	9	7.4
Health Care Provider	5	4.1
Student	10	8.2
Unemployed	10	8.2
<b>Family Types</b>		
Nuclear	57	46.7
Joint/Extended	37	30.3
Three Generation	28	23.0
<b>Per Capita Income*</b>		
Above poverty line	66	54.0
Below poverty line	56	46.0

\* poverty line = < 1.25 \$ /person/day

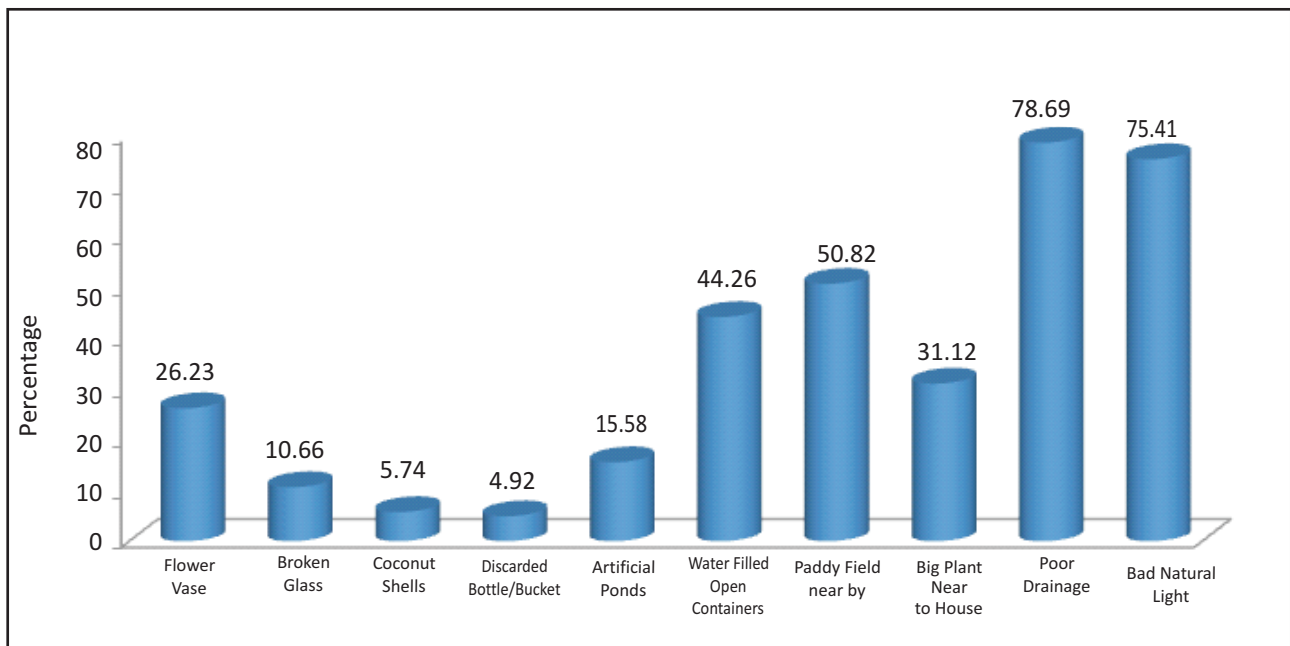
As shown in figure 1, two percent had history of dengue contracted outside the country. No history of death due to dengue was noticed. Almost 25% had history of travel outside the country during last 1 year. Majority travelled to Malaysia, where dengue was known epidemic.

**Figure 1: History of dengue in respondent (n=122)**



As shown in figure 2, common risk factors observed in their household were poor drainage system (79%), bad natural light (75%), paddy field nearby household (51%), water filled open containers (44%), big plant near household (31%), and flower vases that collect stagnant water (26%) etc.

**Figure 2: Assessment of risk factors for dengue in respondent household (n=122)**



**DISCUSSION**

In the present study, we found that male respondents were more (61.5%) than female having the mean age of 38 years whereas study by Kamath R et al in Udupi Taluk, Karnataka found that majority of the respondents were females (70.6%) with median age of the respondents 42 years.<sup>9</sup> In the present study 7.4% were illiterate where as in a study by Kamath R et al where illiterate is more than double (15%).<sup>9</sup> In the present study, majority had agriculture as their occupation (45.9%) having average family size of 5.76. In the present study, fifty four percent were above the poverty line.

In the present study, poor drainage (79%), poor natural light (75%), paddy field nearby (51%) water filled open containers (44%) were observed as known risk factors for dengue transmission where a study by Kamath R et al found that 26% of total respondents had open drainage system and water container without cover around the houses was 50.8%, which is more than the present study.<sup>9</sup> In Vietnam, people living in homes with gardens or water tanks had a threefold higher risk.<sup>10</sup> Vehicle tires have played a major role in the international spread of dengue.<sup>11</sup>

In the Present study, big plant nearby household was found in 31% of the observed household. Kamath R et al, in Udupi Taluk reported that half of the houses had water containers

without covers around the house and 20% inside the house, which were not used in the past 1 week. Similarly trash was also found to be discarded indiscriminately around most homes (67%).<sup>9</sup> In Pakistan, poor condition of the house, such as uncovered latrine water tank or leaked water pipes, was a highly significant risk factor for the presence of *Aedes foci*.<sup>12</sup> D. T. T. Toan et al found that environmental factors have a powerful influence on the appearance of dengue. Simple interventions could help; in our study, people living in houses with uncovered water tanks were 7-9 times more likely to get dengue fever. Those in houses discharging sewage directly into ponds had a 5-9 times higher risk than those in houses with sanitary sewage systems.<sup>13</sup> In the present study, flower vases were noted in 26% of the observed household where as a study by Kamath R et al found flower pots filled with water in or around houses (15%).<sup>9</sup> A study by Fulmali et al in Maharashtra found that water in plastic containers was one of the risk factor of dengue transmission.<sup>14</sup> According to Gupta P. unused and unprotected outdoor containers were the highest contributors to mosquito breeding.<sup>15</sup> Similarly Kamath R et al, in Udupi Taluk, reported that foremost factor for dengue transmission was coconut shells abundance around houses (73%), which are not properly disposed and forming constructive environment for breeding of mosquitoes.<sup>9</sup>

## CONCLUSION

The known risk factors for dengue transmission were present. As few people had contracted dengue outside the country and Haraincha Village Development Committee is near to Jhapa district favours a very conducive environment of dengue outbreak anytime. Transmission of dengue virus

can be prevented through control of the vectors, prevention of stagnation of water, control of breeding of mosquitoes through proper environmental management and prevention of man and *Aedes* mosquito's contact.

## RECOMMENDATIONS

The known risk factors for potential dengue transmission were found. Awareness regarding prevention of dengue transmission must be provided to the local people through advocacy, social mobilization and legislation. The possible environmental risk factors should be managed properly through the involvement of grass root level workers in advocating behavior change at the level of individual, family and the community.

## LIMITATION OF THE STUDY

The search for vector *Aedes* mosquitoes and its larva is better to know about the potential transmission of dengue in that area but we are unable to collect those information due to technical constraints.

## ACKNOWLEDGEMENT

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## CONFLICT OF INTEREST

We declare no conflict of interest.

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