INTRODUCTION

Dengue is a mosquito-borne viral disease that has rapidly spread in most of the regions of the world in recent years. Female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. albopictus*, transmit dengue virus. Up to 100 million cases of Dengue fever (DF) and 500,000 cases of Dengue Hemorrhagic Fever (DHF) and several thousand deaths are estimated to occur annually worldwide.¹ During the past decades, dengue virus emerged in South Asia and DF/DHF epidemics occurred in Bhutan, India, Maldives, Bangladesh and Pakistan.²,³,⁷,⁹,¹⁰ The principal vector of dengue virus is the mosquito *Aedes aegypti*. Dengue virus is maintained in a cycle between humans and *Aedes aegypti*, domestic day biting mosquitoes.¹

There is limited information available on dengue viral infection in Nepal. In Nepal, the first case of dengue was reported in 2004 from Chitwan district.²⁰ Sporadic cases were reported since 1990’s in a Japanese traveler who visited Nepal and developed DF after returning to Japan. Outbreak of Dengue occurred in Nepal in 2006. From August through November 2006, the number of febrile patients increased in four major hospitals in the Terai region of Nepal: Nepalgunj Medical College, Bheri Zonal Hospital in Nepalgunj, Tribhuvan Hospital in Dang and Narayani subregional hospital in Birgunj. The clinical features in most patients were consistent with the signs of DF.²⁰ *Aedes aegypti* was identified in 5 major urban areas of terai region bordering with India, i.e. Biratnagar (Morang), Birganj (Parsa), Bharatpur (Chitwan), Tulsipur (Dang) and Nepalganj (Banke) during the entomological surveillance in Japnese Encephalities endemic district after the Dengue outbreak in 2006 in Nepal.¹ The larvae of *Aedes aegypti* were also recorded in Kathmandu during June 2009.²⁰ Hence this study was aimed to access the knowledge and practice on prevention and control of Dengue among the people of Mangalpur VDC of Chitwan.

METHODS

A cross-sectional study was conducted among the residents of Mangalpur VDC, Chitwan, Nepal. The study was conducted from Shrawan 2069 to Bhadra 2069. Purposive sampling method was used to collect the data among the respondents. The total sample size taken was 345. A semi-structured questionnaire was used to collect data from the survey population. Face to face interview was conducted. Some enumerators were hired to collect the data from all wards of Mangalpur VDC. Data was analyzed...
by using SPSS program, version 16.0. Descriptive statistics (frequency, percentage, mean and standard deviation) and inferential statistics were used to analyze the data.

RESULTS

Majority of the respondents 167(48.4%) were between age group 25-39 and minority 9(2.6%) age group >70 years. The mean age of the respondents is 40 years with 11 years standard deviation. Out of 345 respondents, 176(51%) were female and 169(49%) were male. Majority of respondents 218(63.2) were literate and 127(36.8%) were illiterate. Among literate 98(45.2%) can only read and write, 44(20%) had primary level education and 76(34.8%) had appeared in SLC examination. Concerning the religion of the respondents 241(69.9%) were Hindu and minority 8(2.3%) Islam. As regards to the occupation of the respondents, majority of the respondents 73(21.2%) were farmer and 70(20.3%) were housewife. There were similar percentage of respondents whom were engaged in other occupation like Gov. job in private sector and in business. As far as the number of the children were concern majority 305(88.4%) respondents had 1-3 children 32(9.3%) had no children and 8 (2.3%) respondents had more than 3 children (Table 1).

Table 1: General sociodemographic characteristics of the respondents

| Characteristics          | Frequency(percent) |
|-------------------------|--------------------|
| Sex                     |                    |
| Male                    | 169(49.0)          |
| Female                  | 176 (51.0)         |
| Age                     |                    |
| 25-39                   | 167(48.4)          |
| 40-54                   | 130 (37.7)         |
| ≥55                     | 48 (13.9)          |
| Education status        |                    |
| Illiterate              | 127(36.8)          |
| Literate                | 218 (63.2)         |
| If literate             |                    |
| Can read and write      | 98 (45.2)          |
| Primary                 | 44 (20.0)          |
| SLC appeared            | 76 (34.8)          |
| Religion                |                    |
| Hindu                   | 241(69.9)          |
| Buddhist                | 53(15.4)           |
| Christian               | 43(12.5)           |
| Islam                   | 8(2.3)             |
| Occupation              |                    |
| Government service      | 24 (7.0)           |
| Private service         | 59 (17.1)          |
| Labour/Daily wage       | 47(13.6)           |
| Farmer                  | 73(21.2)           |
| Housewife               | 70(20.3)           |
| Businessman             | 48(13.9)           |
| Others                  | 24 (7.0)           |
| Number of children      |                    |
| No children             | 32 (9.3)           |
| 1-3 children            | 305 (88.4)         |
| ≥3children              | 8 (2.3)            |

Table 2: Distribution of responses on respondent’s knowledge regarding treatment of dengue fever

| Variable                          | Frequency (%) |
|-----------------------------------|---------------|
| Dengue fever treatment            |               |
| Treatable                         | 327 (94.8)    |
| Not treatable                     | 18 (5.2)      |
| DF managed at home                |               |
| Can be managed                    | 29 (8.4)      |
| Cannot be managed                 | 316 (91.6)    |
| If managed at home                |               |
| Bed rest*                         | 15 (26.8)     |
| Paracetamol                       | 11 (19.8)     |
| Fluid replacement                 | 19 (33.9)     |
| Aspirin/Brufen                    | 3 (5.4)       |
| Antibiotic                        | 3 (5.4)       |
| Others                            | 5 (8.9)       |
| Visit health facility*            |               |
| No fall in body temperature       | 328 (28.5)    |
| Persistent vomiting and dehydration| 207 (18.0)   |
| Body rashes                       | 188 (16.3)    |
| Nose or gum bleeding              | 70 (6.1)      |
| Blue spot on the skin             | 120 (10.4)    |
| Tarry stool                       | 122 (10.6)    |
| Diarrhoea                         | 81 (7.0)      |
| Pain abdomen                      | 34 (3.0)      |

Table 3: Distribution of Responses on prevention of dengue fever

| Variables                          | Frequency (%) |
|------------------------------------|---------------|
| Prevention of dengue fever         |               |
| Can be prevented                   | 248 (71.9)    |
| Cannot be prevented                | 97(28.1)      |
| Measures of dengue fever prevention*|           |
| Prevention of mosquito bite        | 265 (14.3)    |
| Use of kerosene oil                | 188 (10.1)    |
| Cover water container              | 230 (12.4)    |
| Avoid/remove stagnant water        | 229 (12.3)    |
| Change water of flower pot         | 187 (10.1)    |
| Cover water tank                   | 197 (10.6)    |
| Clean surrounding                  | 185 (10.0)    |
| Cut/trim bushes                    | 163 (8.8)     |
| Vaccination                        | 20 (1.1)      |
| Avoid dirty stagnant water         | 184 (9.9)     |

*multiple response

Majority of the respondents 248(71.9%) answered that prevention of the dengue fever is possible while 97(28.1%) answered that dengue is not possible to prevent. Regarding the measures of the dengue prevention majority 265(14.3%) answered prevention of mosquito bite as preventive measure and minority 20(1.1%) as vaccination (Table 3).
Table 4: Distribution of responses on respondent’s knowledge regarding various aspects of preventive measure

| Variables                     | Frequency (%) |
|-------------------------------|---------------|
| Prevention of mosquito bite*  |               |
| Use of mosquito net           | 224 (16.3)    |
| Use of coil/mat/liquid        | 268 (19.5)    |
| Use of mosquito repellent    | 232 (16.9)    |
| Spray insecticide             | 71 (5.2)      |
| Screen doors and window       | 180 (13.1)    |
| Wear long sleeve              | 141 (10.2)    |
| Cleaning surrounding          | 118 (8.6)     |
| Remove stagnant water         | 134 (9.7)     |
| Use of Kerosene oil           | 188 (10.1)    |
| Less than 1 spoonful          | 152 (44.1)    |
| 1-2 spoonful                  | 153 (44.3)    |
| 2-3 spoonful                  | 38 (11.0)     |
| More than three spoonful      | 2 (0.6)       |

The highest response seen is 43.5% and lowest response is 0.6% (Table 4).

In regards to the ‘yes’ majority of the respondent 323(93.6%) change the water of the open container within a week, cover water tank and minority15(4.3%) respondents said they are participated in spraying of insecticide in their community. In regards to No column of statement, the majority 309 (89.6%) of respondent said that they do not clean their roof gutter (Table 5).

Table 5: Distribution of responses on preventive practices of dengue fever

| Variables                                                      | Yes (%)   | No (%)   |
|---------------------------------------------------------------|-----------|----------|
| Use of mosquito coil/mat/liquid                               | 313(90.7) | 32(9.3)  |
| Use mosquito net                                              | 321(93.0) | 24(7.0)  |
| Cover household water container                               | 305(88.4) | 40(11.6) |
| Cover any type of water container immediately after use        | 172(49.9) | 173(50.1)|
| Wear body covering clothes                                    | 157(45.5) | 188(54.5)|
| Change the water of the flower pot twice in a week            | 281(81.4) | 64(18.6) |
| Sleep under the mosquito net even at day time                 | 118(34.2) | 227(65.5)|
| Netted doors and windows                                      | 124(35.9) | 221(64.1)|
| Change the water of the open water container within a week    | 323(93.6) | 22(6.4)  |
| Cover water tank                                              | 323(93.6) | 22(6.4)  |
| Invert the water holding container                            | 79(22.9)  | 266(77.1)|
| Examine discarded things that can hold water                  | 268(77.7) | 77(22.3) |
| Remove stagnant water                                         | 174(50.4) | 171(49.6)|
| Clean the bushes                                              | 275(79.7) | 70(20.3) |
| Clean your roof gutters                                       | 36(10.4)  | 309(89.6)|
| Participate in spray of insecticide in your community          | 15(4.3)   | 330(95.7)|

The level of knowledge was divided into three groups according to the cutoff point 0-40 given poor, 41-75 given Fair and >75 is given Good level. In this case majority of respondents 194(56.2%) have Fair level of knowledge and 151(43.8%) have poor level of knowledge. There was not good level of knowledge.

The level of practice was categorized according to the cutoff point 0-50 as poor practice and 51-100 as good practice. The majority of respondents 253(73.3%) show Good level of practice and minority 92(26.7%) showed poor level of practice (Table 6).

Table 6: Distribution of respondents according to level of knowledge and practice regarding dengue fever

| Level of Knowledge | Frequency (%) |
|--------------------|---------------|
| Poor               | 151 (43.8)    |
| Fair               | 194 (56.2)    |
| Level of Practice  | Frequency (%) |
| Poor               | 92 (26.7)     |
| Good               | 253 (73.3)    |
Table 7: Practice regarding dengue fever with socio-demographic characteristics

| Characteristics  | Good Practice | Poor Practice | p-value |
|------------------|---------------|---------------|---------|
| **Sex**          |               |               |         |
| Male             | 120(71%)      | 49(29%)       | 0.338   |
| Female           | 133(75.6%)    | 43(24.4%)     |         |
| **Age category** |               |               |         |
| 25-39            | 117(70.1%)    | 50(29.9%)     | 0.399   |
| 40-54            | 100(76.9%)    | 30(23.1%)     |         |
| ≥55              | 36(75%)       | 12(25%)       |         |
| **Marital status** |             |               |         |
| Unmarried        | 55(64.7%)     | 30(35.3%)     | 0.038   |
| Married          | 198(76.2%)    | 62(23.8%)     |         |
| **Educational status** |         |               |         |
| Illiterate       | 78(61.4%)     | 49(38.6%)     | <0.001  |
| Literate         | 175(80.3%)    | 43(19.7%)     |         |
| **Religion**     |               |               |         |
| Hindu            | 181(75.1%)    | 60(24.9%)     |         |
| Non-Hindu        | 72(69.2%)     | 32(30.8%)     |         |
| **Occupation**   |               |               |         |
| Government service | 20(83.3%)    | 4(16.7%)      | <0.001  |
| Private          | 44(74.6%)     | 15(25.4%)     |         |
| Labour/Daily wage | 22(46.8%)   | 25(53.2%)     |         |
| Farmer           | 56(76.7%)     | 17(23.3%)     |         |
| Housewife        | 53(75.7%)     | 17(24.3%)     |         |
| Businessman      | 42(46.8%)     | 25(53.2%)     |         |
| Others           | 16(66.7%)     | 8(33.3%)      |         |

Significance level at 0.05

Table 8: Logistic analysis on level of knowledge with socio demographic characteristics

| Independent variables | Unadjusted OR | 95% CI (Lower –Upper) |
|-----------------------|---------------|-----------------------|
| **Marital status**    |               |                       |
| Unmarried             | 1             | 0.595-1.395           |
| Married               | 1.347         |                       |
| **Age category**      |               |                       |
| 24-54                 | 1             | 0.857-2.234           |
| ≥55                   | 1.384         |                       |
| **Education status**  |               |                       |
| Illiterate            | 1             | 1.144-2.773           |
| Literate              | 1.781         |                       |
| **Religion**          |               |                       |
| Hindu                 | 1             | 0.449-1.240           |
| Non Hindu             | 0.746         |                       |
| **Occupation**        |               |                       |
| Gov./private job      | 1             | 0.151-0.478           |
| Others                | 0.269         |                       |
| **Can read and write**|               |                       |
| Primary               | 1             | 0.549-1.851           |
| SLC appeared          | 1.008         | 1.312-4.238           |
| Religions             |               |                       |
| Hindu                 | 1             | 0.449-1.240           |
| Non Hindu             | 0.746         |                       |

In case of association of socio demographic variables with level of knowledge, age category was divided into two like (24-54) and >55, Adjusted OR= 0.669 at 95% CI=0.425-1.053. Occupation is divided into two category Gov/private job holders and others job holders, Adjusted OR= 0.315 at 95% CI=0.172-0.579, Education status Adjusted OR= 1.281at 95%CI=0.791-2.076 and Religion Adjusted OR= 2.006 at 95% CI=1.214-3.314

Table 9: Logistic analysis on level of practice with socio demographic characteristics

| Independent variables | Unadjusted OR | 95% CI (Lower –Upper) |
|-----------------------|---------------|-----------------------|
| **Sex**               |               |                       |
| Male                  | 1             | 0.783-2.037           |
| Female                | 1.263         |                       |
| **Marital status**    |               |                       |
| Unmarried             | 1             | 1.027-2.955           |
| Married               | 1.742         |                       |
| **Age category**      |               |                       |
| 24-54                 | 1             | 0.384-0.908           |
| ≥55                   | 0.590         |                       |
| **Education status**  |               |                       |
| Illiterate            | 1             | 1.568-4.168           |
| Literate              | 2.557         |                       |
| **Religion**          |               |                       |
| Hindu                 | 1             | 0.449-1.240           |
| Non Hindu             | 0.746         |                       |
| **Occupation**        |               |                       |
| Gov./private job      | 1             | 0.151-0.478           |
| Others                | 0.269         |                       |

In case of association of socio demographic variables with level of practice, education status was Adjusted OR=3.121 at 95% CI=1.803-5.404, In Marital status Adjusted OR=2.275 at 95%CI=1.294-4.000 and about Occupation adjusted OR=1.133 at 95% CI=0.601-2.137 (Table 10).
Table 10: Association of socio demographic variables with level of knowledge and practice

| Variables          | Adjusted OR (Lower – Upper) | 95% CI |
|-------------------|-----------------------------|--------|
| Level of knowledge |                             |        |
| Age category      | 0.669                       | 0.425 - 1.053 |
| Occupation        | 0.315                       | 0.172 - 0.579 |
| Education         | 1.281                       | 0.791 - 2.076 |
| Religion          | 2.006                       | 1.214 - 3.314 |
| Level of practice  |                             |        |
| Education Status  | 3.121                       | 1.803 - 5.404 |
| Marital Status    | 2.275                       | 1.294 - 4.000 |
| Occupation        | 1.133                       | 0.601 - 2.137 |

**DISCUSSION**

Majority of the respondents 167(48.4%) were between age group 25-39 and minority 9(2.6%) age group >70 years. The mean age of the respondents is 40 years ±11 years standard deviation. Similar findings were present in study conducted by Naik et al. The mean age of the respondents was 40 years±11. Majority of respondents 218 (63.2) were literate and 127 (36.8%) were illiterate. Among literate 98 (45.2%) could only read and write, 44 (20%) had primary level education and 76 (34.8%) had appeared in SLC examination. In contrast to our study, Koenraadt et al reported that 10% of the respondents were unschooled and almost 60% of them had education levels of primary school grade four or less. In another study, Kumar et al. observed 75% of the respondents belonged to educated group.

Concerning the religion of the respondents 241(69.9%) were Hindu and minority 8 (2.3%) Islam. As regards to the occupation of the respondents, majority of the respondents 73 (21.2%) were farmer and 70(20.3%) were housewife. There were similar percentage of respondents whom were engaged in other occupation like Gov. job in private sector and in business. This study was also supported by Kumar et al. which revealed that 44% of the surveyed were housewives. Majority of respondents 202 (99%) had not suffered from dengue fever. Concerning the family history of dengue fever, the majority of respondents 203 (95.5%) had no family history.

Majority 255(46.4%) respondents had received information about Dengue Fever from TV/Radio and minority 9 (1.6%) from Radio and minority 9 (1.6%), 7(1.3%), 3 (0.5%) had received from family, Health personnel and others. A study done by Syed et al. revealed similar findings that television was identified as the major source of public information. Another study done by Shuaib et al., Itrat, et al., Haire et al., also revealed similar findings. The total knowledge score of the respondents was 24.58 (48.2%) with 16.28 of standard deviation. However, a study done by Shuaib et al. revealed that 54.4% of participants achieved at least 80% on the knowledge score. Similarly, a study done by Haire, et al. revealed that 68.5% of the respondents had a good level of knowledge of dengue. 194(56.2%) have fair level of knowledge and 151(43.8%) have poor level of knowledge. There is not good level of knowledge.

The level of practice regarding dengue fever was statistically significant with marital status (p=0.003), educational status (p=0.000) and occupation (p=0.000). This finding was supported by research conducted by Koenraadt et al. which reported that sub district, sex, age and education were significantly related with overall knowledge of dengue in both univariate and multivariate analysis. Another study supporting this finding was conducted by Syed et al. stating that knowledge scores were found to have significant associated.

The majority of the respondents 191 (93.6%) remove stagnant water around their house and only 13 (6.4%) don’t remove. The majority of the respondents 188 (92.2%) clean the bushes around their house and only 16 (7.8%) don’t clean. The majority of the respondents 87 (65.4%) clean roof gutters/ceiling water in the rainy season and 46 (34.6%) don’t clean. The majority of the respondents 48 (73.8%) haven’t participated in spray of insecticides in their community and only 17 (26.2%) have participated.

Other supporting finding was the study done by Naik et al. which revealed that common preventive practices that were prevalent in the community were use of mosquito repellents (46.57%), prevent water stagnation (31.01%), cleaning the house (34.93%). Very few of them practiced weekly emptying of containers (9.58%) and use of mosquito nets (11.64%).

**CONCLUSION**

The respondents’ knowledge regarding dengue fever was poor. The level of overall knowledge was statistically significant with age, sex, marital status and education status of the respondents. The half of the respondents knew about prevention of DF and around three fourth of respondents did not know about treatment of DF. Those socio demographic characteristics which are more significant with level of knowledge is seen deficit in preventive practices of dengue fever. More than two third of the respondents had good preventive practices such as use of mosquito net, covering household containers, covering water tank, invert the water holding containers, examine discarded things that can hold water, remove stagnant water around house and clean the bushes, clean roof gutters/ceiling water in rainy season. More two third of the respondents had poor preventive practices such as put kerosene oil in the air cooler water once a week, wear body covering clothing, sleeping under mosquito net at daytime and participate in insecticide spray.

**CONFLICT OF INTEREST:** None

**FINANCIAL DISCLOSURE:** None
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