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Knowledge, Attitude and Preventive Practices Regarding Dengue among Secondary School Students in Dharan, Nepal

Suresh Kandel[1], **Mahesh Nath**[1], **Dhani Singh**[1], **Krishna Chapagain**[1], **Rakesh Rauniyar**[1], **Sapana Tamang**[1], **Shreejana Banmali**[1]

[1]Department of Public Health, Purbanchal University School of Health Sciences, Gothgaun, Morang, Nepal.

ABSTRACT

Background

Dengue fever, caused by the dengue virus and transmitted primarily by Aedes mosquitoes, is a significant public health concern in tropical and subtropical regions, with rising incidence rates in Nepal in recent years. This study aimed to assess the knowledge, attitude, and preventive practices regarding dengue among secondary school students in Dharan, Nepal.

Methods

A descriptive cross-sectional study was conducted among secondary school students in Dharan. Data were collected using a structured self-administered questionnaire which were analyzed in SPSS version 16 to identify factors influencing knowledge, attitude and practices. The sample consisted of students from both public and private schools. Frequencies and percentages were used for the descriptive statistics while Chi-square test was used to test the association between variables.

Results

The study revealed significant gaps in dengue knowledge among students, despite the high prevalence of dengue within their families, with only 25.50% of the students having adequate knowledge. While most students displayed a positive attitude towards dengue prevention (95.50%), their preventive practices were found to be satisfactory (71.38%). Educational grade, religion and respondent's mother's educational status were found to be significantly associated with knowledge. Sex was found to be significantly associated with attitude and school type and house type were found to be significantly associated with preventive practices.

Conclusions

Secondary school students exhibited considerable gaps in dengue knowledge despite high familial exposure, although attitudes and preventive practices were generally positive. This highlights the need for targeted school-based health education programs to enhance awareness and preventive behaviors among students.

Keywords: attitude; dengue; knowledge; preventive practices; school students; vector borne disease.

Correspondence: Mr. Suresh Kandel, Department of Public Health, Purbanchal University School of Health Sciences, Gothgaun, Morang, Nepal. Email: sureshkandelph@gmail.com, Phone: +977-9861092449. **Article received**: 2025-03-16. **Article accepted**: 2025-08-12. **Article published**: 2025-09-15.

INTRODUCTION

Dengue, a viral illness transmitted by Aedes mosquitoes, poses a global health threat with increasing incidence, including in Nepal, where all provinces have reported cases yearly.[1–3] The WHO estimates 100-400 million infections occur globally each year.[4] In 2022, Nepal experienced its largest outbreak, notably affecting Kathmandu, Lalitpur, and Makwanpur.[3] Transmitted through waterborne mosquito breeding, dengue shares environmental risk factors with diarrheal diseases.[5] The country's efforts, led by the Epidemiology and Disease Control Division (EDCD), include vector control and public awareness campaigns.[6] Despite general awareness, studies reveal persistent knowledge gaps in transmission and prevention, especially in high-risk urban areas like Dharan.[7,8] School-based education has proven effective in dengue prevention elsewhere.[9–11] Given the endemic nature of dengue in Nepal and the vulnerability of urban youth, assessing local knowledge of its risk factors and preventive practices among school students can inform rapid response plans, mitigating the disease's impact. In this context this study aimed to assess the level of knowledge, attitude and preventive practices on dengue among secondary school students in Dharan, Nepal.

METHODS

A descriptive cross-sectional study was conducted among the secondary schools located in densely populated urban area of Dharan sub metropolitan city, Sunsari, Nepal. Ethical approval was obtained from the Nepal Health Research Council (Ref. No. 1338) and the administrative approval was obtained from the Education Section of Dharan Sub metropolitan Office. The sample size for the study was determined using Cochran's formula for a single proportion [$n_0=(z^2pq)/d^2$], assuming an infinite population, with a 95% confidence interval and 5% margin of error. According to a study conducted in Thailand, 25.9% of students had reported good preventive practices[12], so the estimated prevalence (p) was set at 0.26. Including 10% non response rate, the final required sample size was determined to be 326. Data was collected from 326 students, however 15 responses were excluded from the analysis due to incomplete response, so the final sample size of the study is 311. A multistage probability sampling technique was employed in this study. Initially, a list of all secondary-level government and private schools located in the central area of Dharan Sub-Metropolitan City characterized by high population density and dense residential settlements was prepared (ward no. 1,2,3,7,9,10,11, 12, 14 and 16). From this list, four government and six private schools were selected using simple random sampling. Following school selection, one class was randomly chosen from among Grades 8, 9, or 10 in each selected school. All students from the selected class were included in the study, who were present at the time of data collection and provided the consent. Data was collected on July-September 2024, which involved the distribution of structured and self-administered questionnaires to the selected participants, where the participants were provided with the questionnaires and instructed to independently read and respond to the predefined questions. The questionnaire was developed based on an extensive literature review and adapted from validated KAP surveys on dengue. The questionnaire comprised sections on socio-demographic and family information, Knowledge about dengue transmission, symptoms, and prevention, Attitudes towards dengue and its prevention and Preventive practices adopted by the students. The questionnaire was prepared in English and translated into Nepali, then back-translated to ensure accuracy. A pre-test was conducted with 10% of the sample size (35 students) in a school outside the study area. Feedback from the pre-test was used to refine the questionnaire for clarity and relevance. All completed questionnaires were checked and reviewed for completeness and consistency. The data were entered using EpiData software and subsequently exported to IBM SPSS version 16 for statistical analysis. Descriptive statistics were used to summarize the data. Frequencies and percentages were calculated for categorical variables, whereas means or medians along with minimum and maximum values were computed for continuous

variables. For dependent variables i.e., knowledge, attitude, and practice (KAP), cut-off scores were determined using the formula: (possible minimum score + possible maximum score)/2.

Specifically, knowledge was assessed using 11 multiple-choice questions (score range: 0–11), with a cut-off of 5.5; scores above 5.5 indicating satisfactory knowledge. Attitude was measured using 17 items on a five-point Likert scale (score range: 17–85), with a cut-off of 51; scores below 51 were considered to reflect a positive attitude. Practice was evaluated through 13 yes/no questions (score range: 0–13), with a cut-off of 6.5; scores above 6.5 denoted satisfactory practice. Inferential statistics involved the use of Chi-square test to assess associations between independent variables and levels of knowledge, attitude, and practice (KAP) regarding dengue. Variables found to be statistically significant in the bivariate analysis (p-value <0.05) were included in the multivariate analysis to control for potential confounders. A p-value of less than 0.05 was considered statistically significant for all inferential analyses. Written informed consent/ assent was obtained from all participants only after the school granted the permission to collect data. Participants were assured of confidentiality, and data were anonymized to protect identities. Participation was voluntary, and students could withdraw at any time without any consequences.

RESULTS

A total of 311 secondary school students aged 13-19 years participated in the study and the mean age was 14.68 with standard deviation of 1.12. The gender distribution was nearly equal (50.8% female, 49.2% male). Most participants identified as Janajati (64%), followed by Brahmin/Chhetri (15.4%), Dalit (11.6%), Madheshi (8%), and Muslim (1%). Hinduism was the most commonly reported religion (68.5%), with others adhering to Kirat (12.2%), Buddhism (11.3%), Christianity (7.1%), and Islam (1%). More than half of the students were in grade nine (56.3%), while 22.2% and 21.5% were in grades eight and ten, respectively. A majority (57.6%) attended private schools, with the remainder enrolled in government institutions (Table 1).

Table 1. Respondents' sociodemographic information. (n=311)

Variables	Frequency (%)
Age of the respondent (Mean±SD = 14.68±1.12)	
14 years and less	148(47.59)
Above 14 years	163(52.41)
Sex of the respondent	
Female	158(50.80)
Male	153(49.20)
Ethnicity of the respondent	
Janajati	199(63.99)
Brahmin/Chhetri	48(15.43)
Dalit	36(11.58)
Madheshi	25(8.04)
Muslim	3(0.96)
Religion of the respondent	
Hindu	213(68.49)
Buddhism	35(11.25)
Christian	22(7.07)
Muslim	3(0.96)
Kirat	38(12.22)
Grade of the respondent	
Eight	69(22.19)
Nine	175(56.27)
Ten	67(21.54)
Type of the school	
Government	132(42.44)
Private	179(57.56)

Over half of the respondents (55.6%) resided in nuclear families, and 56.3% reported having more than four family members. The majority of fathers (43.4%) and mothers (37.3%) had attained secondary-level education. Fathers were primarily engaged in job (35.4%) or business (30.9%), while nearly half of the mothers (49.2%) were homemakers (Table 2).

Regarding housing, 70.4% of participants lived in concrete and brick houses, and 50.8% reported the presence of dense vegetation nearby. More than one fifth (21.9%) indicated stagnant water sources around their homes. A history of dengue infection within the family was reported by 62.7% of respondents, among them, 27.69% had been infected themselves, 45.64%

Table 2. Respondent's parental socioeconomic and familial information. (n = 311)	
Variables	**Frequency (%)**
Respondent's family type	
Nuclear	173(55.63)
Joint	138(44.37)
Number of members in the respondent's family (minimum=2, maximum=20)	
≤ 4	136(43.73)
> 4	175(56.27)
Education status of the respondent's father	
Illiterate	9(2.89)
Basic level	112(36.01)
Secondary level	135(43.41)
Higher education	55(17.68)
Education status of the respondent's mother	
Illiterate	33(10.61)
Basic level	111(35.69)
Secondary level	116(37.30)
Higher education	51(16.40)
Occupation of the respondent's father	
Unemployed	24(7.70)
Agriculture	25(8.00)
Business	96(30.90)
Job	110(35.40)
Others	21(6.80)
Foreign employment	35(11.30)
Occupation of the respondent's mother	
Unemployed	21(6.75)
Agriculture	20(6.43)
Homemaker	153(49.20)
Business	47(15.11)
Job	55(17.68)
Others	15(4.82)

had an infected family member, and 26.67% who reported both (Table 3).

Among 311 participants, only 25.4% of respondents demonstrated satisfactory knowledge about dengue, while 74.6% had unsatisfactory knowledge. Despite this, the majority (95.5%) exhibited a positive attitude toward dengue prevention. Similarly, 71.4% reported satisfactory preventive practices, whereas 28.6% reported unsatisfactory practices (Table 4).

In the bivariate analysis, grade level was significantly associated with knowledge of dengue. Students in grade nine (COR=3.252, p-value=0.007) and grade ten (COR=5.272, p-value<0.001) had higher odds of having satisfactory knowledge compared to grade eight students. Religion was also a significant factor, with Hindus showing higher odds (COR=1.712, p-value=0.046) of satisfactory knowledge than non-Hindus. In the multivariate analysis, grade level remained a significant predictor, with students in grade nine (AOR=3.493, p-value=0.005) and grade ten (AOR=6.439, p-value<0.001) still exhibiting higher odds of having satisfactory knowledge compared to those in grade eight. However, the association with religion was not significant in the adjusted analysis (AOR=0.314, p-value=0.548) (Table 5).

Table 3. Housing and environmental characteristics, and history of dengue infection. (n=311)	
Variables	**Frequency (%)**
Respondent's house type	
Mud and stone house	31(9.97)
Concrete and brick house	219(70.42)
Wooden/bamboo house	17(5.47)
Apartment of flat	44(14.15)
Dense vegetation around the respondent's house	
Yes	158(50.80)
No	153(49.20)
Pond or water stagnant site around the respondent's house	
Yes	68(21.86)
No	243(78.14)
Dengue infection in the family	
Yes	195(62.70)
No	116(37.30)
Who got infected in the family? (n = 195)	
Self	54(27.69)
Family member	89(45.64)
Both	52(26.67)

Table 4. Knowledge, attitude and practices of respondent regarding dengue prevention. (n=311)	
Variables	**Frequency (%)**
Participants' level of knowledge	
Satisfactory	79(25.40)
Not satisfactory	232(74.60)
Participants' level of attitude	
Positive	297(95.50)
Negative	14(4.50)
Participants' level of practice	
Satisfactory	222(71.38)
Not satisfactory	89(28.62)

Table 5. Factors associated with respondents' knowledge on dengue in bivariate and multivariate analysis. (n=311)						
Variables	**Bivariate analysis**			**Multivariate analysis**		
	COR	**95% CI**	**p-value**	**COR**	**95% CI**	**p-value**
Grade of the respondent						
Eight	1		0.002	1		0.001
Nine	3.252	1.390-7.609	0.007	3.493	1.473-8.283	0.005
Ten	5.272	2.090-13.297	<0.001	6.439	2.485-16.685	<0.001
Religion of the respondent						
Non-Hindu	1		0.046	1		0.034
Hindu	1.712	1.006-2.915		0.548	0.314-0.956	
Education status of the respondent's mother						
Secondary level and above	1		0.048	1		0.006
Illiterate/Basic level	1.695	1.003-2.865		0.46	0.264-0.803	

In the bivariate analysis, only the sex of the respondent was found to be significantly associated with attitude toward dengue prevention. Male respondents had significantly higher odds of having a positive attitude compared to females (COR=4.002, 95% CI: 1.094-14.638; p-value=0.024). As no other variables were statistically significant, multivariate analysis was not performed (Table 6).

Table 6. Factors associated with respondents' attitude toward dengue prevention. (n=311)			
Variables	**COR**	**95% CI**	**p-value**
Sex of the respondent			
Female	1		0.024
Male	4.002	1.094-14.638	

In the bivariate analysis, type of school and house type were significantly associated with dengue prevention practices. Students from government schools were more likely to have satisfactory preventive practices than those from private schools (COR=2.214; 95% CI: 1.307–3.752; p-value=0.003). Similarly, respondents living in wooden/bamboo houses had significantly lower odds of satisfactory practices compared to those living in mud and stone houses (COR=0.135; 95% CI: 0.035-0.524; p-value=0.004). In the multivariate analysis, both variables remained significant. Students from government schools had 2.31 times higher odds of practicing satisfactory dengue prevention compared to those from private schools (AOR=2.312; 95% CI: 1.330-4.017; p-value=0.003). Likewise, respondents living in wooden/bamboo houses had significantly lower odds of satisfactory practice (AOR=0.124; 95% CI: 0.031-0.496; p-value=0.003). Other housing types did not show significant associations after adjustment (Table 7).

Table 7. Factors associated with respondents' practices toward dengue prevention in bivariate and multivariate analysis. (n=311)						
Variables	**Bivariate analysis**			**Multivariate analysis**		
	COR	**95% CI**	**p-value**	**AOR**	**95% CI**	**p-value**
Type of the school						
Private	1		0.003	1		0.003
Government	2.214	1.307-3.752		2.312	1.330-4.017	
Respondent's house type						
Mud and stone house	1		0.014	1		0.012
Concrete and brick house	0.534	0.196-1.456	0.22	0.598	0.216-1.654	0.322
Wooden/bamboo house	0.135	0.035-0.524	0.004	0.124	0.031-0.496	0.003
Apartment of flat	0.337	0.108-1.049	0.061	0.428	0.134-1.364	0.151

DISCUSSION

The study was conducted among the 311 secondary school students aged 13–19 years in Dharan, Nepal, to assess the knowledge, attitudes, and preventive practices (KAP) regarding dengue fever. The results demonstrated that only 25% of the students possessed satisfactory knowledge about dengue, indicating a substantial gap in understanding related to its causes, transmission modes, symptoms, and preventive measures. Despite the limited knowledge, a notable majority i.e., 95.5% of students exhibited a positive attitude toward dengue prevention, expressing concern about the disease and a willingness to engage in control efforts. However, gaps were observed between attitudes and actual behaviors (71.38% students having satisfactory preventive practices).

Although 62.7% of students reporting a family history of dengue infection, only 25.4% demonstrated satisfactory knowledge. This finding is consistent with a study conducted among community members in Chitwan, where only 21.8% had good knowledge of dengue.[13] Similarly, another study among non-health undergraduates reported that just 15.2% possessed good knowledge about dengue. That study further reported a significant association between educational level and knowledge, with students in their third and fourth university years having significantly higher knowledge levels compared to first-year students (AOR: 3.59, 95% CI: 1.34-9.57; AOR: 4.93, 95% CI: 1.88-12.94, respectively).[14] Similarly, our study found that students in grades nine and ten had significantly higher knowledge levels compared to grade eight students (AOR: 6.439, 95% CI: 2.485-16.685; AOR: 3.493, 95% CI: 1.473-8.283, respectively), suggesting that advancing educational grade is positively associated with better knowledge levels. Additionally, a study conducted among community members also reported low levels of dengue knowledge, [8] which further supports our findings. Likewise, research among primary school students revealed that only 12.3% had good knowledge about dengue,[12] similar to our observation. However, contrasting findings were noted in a study among adolescents in Nepal's Terai region, where only 3.8% demonstrated sufficient knowledge. Despite this variation, that study also highlighted a significant association between educational level and knowledge, reinforcing our finding that academic grade is a critical determinant of dengue knowledge.[15] Similarly, a study conducted among high-risk populations in the Terai region also reported a low level of knowledge (6.8%).[14] In contrast, higher knowledge levels were reported in studies conducted among community people in Chitwan (56.2%),[15] and people attending tertiary hospitals (56.3%).[16] These variations could be attributed to differences in study populations, geographical settings, and access to health information.

Regarding attitudes, 95.5% of students in our study exhibited a positive attitude toward dengue prevention. This finding is consistent with previous research conducted among high-risk populations in Nepal, where 90.4% of participants demonstrated a positive attitude.[17] However, our results contrast with a study among non-health undergraduates, where only 25.9% showed good attitudes,[14] and among primary school students, where 41.6% had positive attitudes.[12] Interestingly, studies by Phuyal et al.[8] and Suwanbamrung et al.[12] reported that attitudes were not significantly associated with knowledge, supporting our findings that no correlation was found between knowledge and attitude in our study. Furthermore, Phuyal et al. also found that none of the socioeconomic variables were significantly associated with attitude toward dengue fever in multivariate analysis,[8] which aligns with our observation that only sex was associated with attitude toward dengue in our study among all sociodemographic variables.

In terms of preventive practices, 71.4% of students reported engaging in satisfactory dengue preventive behaviors. This result is comparable to previous studies conducted among community members in Chitwan (73.3%)[18] and among tertiary hospital attendees (70.3%).[16] Similarly, moderate preventive practice levels were observed among high-risk populations in the Terai region[17] and among non-health undergraduates, where 68.3% reported good practices.[14] Our findings also correspond with a study

by Singh et al., which reported no association between preventive practices and respondents' sex and age.[15] Moreover, consistent with the findings of Phuyal et al., our study did not observe significant associations between knowledge, attitude, and practice domains.[8] Furthermore, our study found that students' history of dengue infection, either personal or family-related, was not significantly associated with their knowledge, attitude, or practices regarding dengue. This is supported by a study among primary school students, which also found no significant differences in KAP scores between children with and without dengue experience.[12]

Limitations

In light of these findings, this study adds valuable evidence by focusing specifically on secondary school students a critical group for health education and using a robust methodology with a good sample size and appropriate analytical approaches. However, the self-reported data may be subject to recall and social desirability biases. Furthermore, the study was conducted in a single municipality and specific population, which may limit the generalizability of the findings to other regions and setting.

CONCLUSIONS

This study reveals significant knowledge gaps about dengue fever among secondary school students in Dharan, despite a high level of exposure within their families. However, most students demonstrated a positive attitude and satisfactory preventive practices. Higher educational grade, type of school, and housing conditions were significant factors influencing knowledge and practices. Strengthening school-based awareness programs and community mobilization efforts could enhance students' understanding and promote consistent preventive practices.

Recommendations

Based on these findings, it is recommended that future research should focus on longitudinal and interventional studies to track changes in students' knowledge, attitudes, and practices over time. Experimental and qualitative studies are recommended to evaluate educational interventions and explore barriers to dengue prevention. Comparative studies between different school settings could also help tailor more effective public health strategies.

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