ORIGINAL ARTICLE

Knowledge, Attitude, and Preventive Practices Regarding Dengue and Associated Socio-Demographic Factors among Adults in Dhaka, Bangladesh

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Abstract

Background: Dengue is a mosquito-borne disease that was responsible for over 300,000 cases and 1,700 deaths in 2023 and was considered the deadliest outbreak in Bangladesh's history. Knowledge, Attitudes, and Practices (KAP) are the key factors to mitigating the burden of dengue.

Objective: To evaluate the knowledge, attitudes, and preventive practices regarding dengue and associated socio-demographic factors among adults in Dhaka, Bangladesh.

Methods: An online cross-sectional study was conducted from September 2025 to November 2025 among adults in the Dhaka North and South City Corporations, Bangladesh. A self-designed questionnaire having four sections (sociodemographics, knowledge, attitude, practices) was distributed *via* social media platforms.

Results: A total of 437 responses were analyzed. The frequencies of good knowledge, positive attitude, and good preventive practices were 9.2%, 51.5%, and 20.1%, respectively. Good knowledge was associated with higher education (graduate: aOR=2.81, 95% CI: 1.12-7.89; postgraduate: aOR=3.14, 95% CI: 1.07-9.89). Residence in Dhaka South city was associated with lower odds of holding a positive attitude (aOR=0.47, 95% CI: 0.25-0.85, p=0.015). Knowledge was also associated with attitude. Attitude was an independent associated factor of preventive practices (aOR=1.13, 95% CI: 1.06-1.21; p<0.001). The association between knowledge and practice was borderline and not statistically significant (aOR=1.06, 95% CI: 1.00-1.14, p=0.061). None of the socio-demographic factors was found to be associated with preventive practices.

Conclusion: Despite positive attitudes in over half of the participants, good knowledge and preventive practices remained low. Behavioral adoption is driven more by attitudes than knowledge, indicating a need for behavior-focused dengue control strategies.

Keywords: *Dengue, knowledge, attitude, practice, preventive behavior, urban health systems, cross-sectional study, Bangladesh.*

INTRODUCTION

Dengue fever is a mosquito-borne viral disorder caused by the dengue virus and primarily transmitted by Aedes aegypti and Aedes albopictus mosquitoes [1]. It has become a major public health concern in tropical and subtropical regions, and the World Health Organization (WHO) estimates that 100-400 million dengue infections occur each year, putting nearly half of the global population at risk [2, 3]. Clinical manifestations range from a self-limiting febrile illness to severe forms such as dengue hemorrhagic fever and ultimately dengue shock syndrome, which can be fatal if not managed promptly [4]. Due to rapid urbanization, climate change, population growth, and the expansion of mosquito breeding sites, the situation of widespread dengue incidence and mortality is worsening [5]. Due to the environmental conditions in South Asian countries like India, Pakistan, Sri Lanka, and Bangladesh, they encounter frequent dengue outbreaks every year, which is responsible for an additional burden on their healthcare systems [6]. Factors such as increasing population density, unplanned, rapid urban growth, inadequate waste management, irregular water supply leading to household water storage, and monsoon-driven rainfall create ideal conditions for Aedes mosquito proliferation [6]. Consequently, dengue incidence is increasing every year, placing an additional burden on healthcare systems.

Dengue has become an epidemic in Bangladesh. Due to the previously mentioned factors, Dhaka is emerging as the main hotspot for the dengue outbreak. With over 300,000 reported cases and more than 1,700 deaths, the 2023 dengue outbreak was the deadliest in the country's history, underscoring the need to identify potential causes to prevent future outbreaks and increase community engagement [7]. Recent patterns of dengue outbreaks suggest that the spread of dengue is independent of season and location, underscoring the need for comprehensive, sustainable plans to control these outbreaks [8]. Vector control and personal protective measures are key to dengue prevention, as effective vaccines and antiviral treatments have not yet been fully explored [9]. Overall control measures depend on community involvement and behavior aligned with the prevention strategies.

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Knowledge, attitudes, and practices (KAP) are essential for assessing how individuals perceive dengue risk, respond to symptoms, and adopt measures to reduce mosquito breeding and human-vector contact. Inadequate knowledge, misconceptions, or failure to translate awareness into practice can substantially undermine dengue control efforts, prevention, vector control, and personal protective measures.

Although previous KAP studies on dengue have been conducted in Bangladesh, the epidemiological landscape has changed substantially following recent large-scale outbreaks [10, 11]. Updated evidence is needed to assess current levels of knowledge, prevailing attitudes, and preventive practices among adults in Dhaka, who play a key role in household and community decision-making. This report highlights the updated KAP study conducted in two major city corporation areas after a major dengue outbreak in 2023. This study, therefore, aimed to evaluate the knowledge, attitudes, and preventive practices regarding dengue and its associated socio-demographic risk factors among adults in Dhaka, Bangladesh.

MATERIALS AND METHODS

An online cross-sectional survey was conducted by researchers from the Department of Pharmacy, University of Information Technology and Sciences, Dhaka, from September 2025 to November 2025, among adult residents of Dhaka, specifically the Dhaka North City Corporation and Dhaka South City Corporation, Bangladesh. The study was approved by the Department of Pharmacy Ethical Committee of the University of Information Technology and Sciences (UITS/PHARM/PEC/2025/23). To ensure the overall representation of diverse socioeconomic and environmental conditions, participants were invited from both the Dhaka North City Corporation and the Dhaka South City Corporation. Adults aged 18 years or older living in Dhaka for at least six months were eligible to participate. Individuals who were unwilling to provide informed consent or who were seriously ill at the time of data collection were excluded.

Using a single population proportion formula with a 95% confidence level, a 5% margin of error, and an assumed prevalence of adequate knowledge 50%, the sample size was determined as no robust prior estimates were available [12]. Using the WHO sample size calculator, the calculated sample size was 385. However, considering potential nonrespondents, we also increased the population by 10%, resulting in a final sample size of 425.

Following an extensive review of relevant literature and guidelines on dengue prevention and control, the study instrument was developed [13-16]. The content was extensively evaluated by the three experts in the relevant fields. The final questionnaire is divided into 4 sections, including socio-demographic characteristics (6 items), knowledge (8 items), attitude (12 items), and preventive practices (4 items). Using multiple-choice and yes/no questions, knowledge and practice items were assessed. On the other hand, attitudes were measured using a five-point Likert ("strongly disagree" to "strongly agree"). The study questionnaire is provided in a supplementary file.

The questionnaire was developed in English and pilot-tested among 30 adults (aged 18-65 years) residing in Dhaka to assess clarity, comprehension, and completion time. Cronbach's alpha values calculated from pilot data were knowledge (α=0.815), attitude (α=0.708), and practice (α=0.745). No major modifications were required based on pilot feedback, and pilot participants were excluded from the final analysis.

We shared structured, self-administered online questionnaires using social media platforms. To recruit adult residents of Dhaka, this approach excludes residents from other areas. Later, data were collected from respondents after they completed the questionnaire. Before accessing the questionnaire, participants were directed to a separate informed consent page that contained: (1) study objectives, (2) voluntary nature of participation, (3) confidentiality assurances, (4) right to withdraw at any time, and (5) principal investigator's contact information. Participants were required to click a mandatory 'I agree to participate' button to proceed. Those who clicked 'I do not agree' were automatically redirected to the end of the survey. The consent page was distinct from the data-collection questionnaire, and no data were recorded from participants who did not provide consent.

Using R, data analysis was performed. By using Google Forms' "limit to one response" feature, we avoided duplicate entries and manually checked to ensure none. Incomplete or duplicate responses were removed before the final analysis. Descriptive statistics, including frequencies and percentages, were used to summarize participant characteristics and response distributions. Moreover, composite scores for knowledge, attitude, and practice (KAP) were generated by summing the relevant items. Knowledge and practice were assessed using multiple-choice and yes/no questions, with correct or appropriate responses scored 1 and incorrect or inappropriate responses scored 0. Total scores were calculated by summing the item responses. For the item on mosquito net use, the response "Sometimes" was considered correct, reflecting its partial but context-dependent effectiveness against day-biting Aedes mosquitoes. Domain-specific total scores were calculated and categorized using predefined thresholds: scores≥67% of the maximum possible score were classified as "good," scores <33% as "poor," and scores between these cutoffs as "moderate" [12, 17]. By summing responses to Likert-scale questions, the total attitude score was calculated, ranging from strongly disagree (1) to agree (5) strongly. Scores were categorized as follows: scores below 50% were considered negative,

and scores of 50% or higher were considered positive [18]. Using Pearson's chi-square test or Fisher's exact test, bivariate associations between socio-demographic factors and KAP outcomes were examined. An ordinal logistic regression model was employed to identify independent factors associated with favorable KAP outcomes. Results are reported as adjusted odds ratios with their 95% confidence intervals, and p-values <0.05 were considered statistically significant.

RESULTS

Socio-Demographic Characteristics of Participants

Among the respondents (n=437), the majority were young adults aged 18-27 years (42%), female (58%), and residents of Dhaka North City (58%), attained graduate-level education (41%), and 44% were employed at the time of the survey. Notably, 62% of respondents reported having been previously diagnosed with dengue, suggesting a huge prior exposure to the disease within the study population (**Table 1**).

Table 1: Socio-demographic characteristics of the study participants (n=437).

Variables	Frequency (%)
Age groups (years)	
18-27	184 (42)
28-37	129 (30)
38-47	74 (17)
48+	50 (11)
Gender	
Female	253 (58)
Male	180 (41)
Prefer not to say	4 (0.9)
Education Level	
No formal	32 (7.3)
Primary	46 (11)
Secondary	146 (33)
Graduate	177 (41)
Postgraduate or higher	36 (8.2)
Performing Job	
No	246 (56)
Yes	191 (44)
Residence	
Dhaka North City	254 (58)
Dhaka South City	183 (42)
Previous diagnosis of dengue	
No	164 (38)
Yes	273 (62)

Knowledge Regarding Dengue among All the Participants

Approximately 62% correctly identified dengue as a viral disease, while 77% recognized Aedes aegypti as the primary mosquito vector. Seasonal impact was recognized by 80% of respondents. Fewer than half of respondents (49%) correctly reported that dengue-transmitting mosquitoes primarily bite during the daytime. Approximately two-thirds (66%) of participants correctly recognized that dengue is not transmitted from person to person, while 19% held this misconception. About 91% of respondents acknowledged the importance of seeking early medical care for effective disease management. However, only 19% of respondents were aware of vaccines (**Table 2**).

Table 2: Responses to knowledge items related to dengue among participants (n=437).

Variables	Frequency (%)
Dengue is caused by	
Bacteria	28 (6.4)
Don't Know	76 (17)
Parasite	63 (14)
Virus	270 (62)
Vector transmits dengue	
Aedes aegypti	337 (77)
Anopheles	30 (6.9)
Culex	8 (1.8)
Don't Know	62 (14)
Common season for dengue	
All season	63 (14)
Rainy season	348 (80)
Summer	15 (3.4)
Winter	11 (2.5)
Mosquitoes that transmit dengue bite mostly during	
Both	145 (33)
Daytime	215 (49)
Don't know	58 (13)
Nighttime	19 (4.3)
Dengue can be transmitted from one person to another	
Don't know	64 (15)
False	288 (66)
True	85 (19)
Mosquito nets can prevent dengue	
Don't know	26 (5.9)
No	16 (3.7)
Sometimes	175 (40)
Yes	220 (50)
Dengue vaccine is available in Bangladesh	
Don't know	160 (37)
No	192 (44)
Yes	85 (19)
Early medical consultation is important for dengue management	
Don't know	26 (5.9)
False	14 (3.2)
True	397 (91)

Attitudes and Preventive Practices toward Dengue

About 95% respondents agreed or strongly agreed that dengue constitutes a serious public health problem in Dhaka. Moreover, 93% of respondents emphasize the importance of community awareness programs in preventing dengue transmission. In contrast, confidence in existing governmental control measures was comparatively lower. Among the respondents, 59% agree that current initiatives are inadequate. Just over half of the participants (55%) indicated prior involvement in community-based dengue prevention activities. We found that 38% of respondents reported the daily

use of mosquito repellents or bed nets. About 32% of respondents regularly use protective clothing to reduce mosquito exposure. Interestingly, we observed that among people with suspected dengue symptoms, 41% stated they would seek immediate medical attention. However, 27% reported reliance on painkillers or home remedies as an initial response (**Table 3**).

Table 3: Attitude and preventive practice behaviors related to dengue (n=437).

Variables	Frequency (%)
Dengue is a serious public health problem in Dhaka.	
Agree	141 (32)
Disagree	6 (1.4)
Neutral	10 (2.3)
Strongly Agree	277 (63)
Strongly Disagree	3 (0.7)
I am concerned about being infected with dengue.	
Agree	190 (43)
Disagree	14 (3.2)
Neutral	25 (5.7)
Strongly Agree	205 (47)
Strongly Disagree	3 (0.7)
Eliminating mosquito breeding sites at home/community is important.	
Agree	133 (30)
Disagree	6 (1.4)
Neutral	14 (3.2)
Strongly Agree	281 (64)
Strongly Disagree	3 (0.7)
Community awareness programs are essential for dengue prevention.	
Agree	139 (32)
Disagree	15 (3.4)
Neutral	22 (5.0)
Strongly Agree	256 (59)
Strongly Disagree	5 (1.1)
I believe government initiatives are sufficient to control dengue.	
Agree	91 (21)
Disagree	143 (33)
Neutral	65 (15)
Strongly Agree	87 (20)
Strongly Disagree	51 (12)
Dengue prevention is everyone's responsibility, not just health authorities.	
Agree	132 (30)
Disagree	4 (0.9)
Neutral	17 (3.9)
Strongly Agree	280 (64)
Strongly Disagree	4 (0.9)
I would encourage my neighbors to adopt preventive measures against dengue.	
Agree	190 (43)
Disagree	3 (0.7)
Neutral	25 (5.7)
Strongly Agree	215 (49)
Strongly Disagree	4 (0.9)
I would be worried about social stigma or negative reactions from my neighbors if someone in my household got dengue.	
Agree	126 (29)
Disagree	81 (19)
Neutral	65 (15)
Strongly Agree	129 (30)
Strongly Disagree	36 (8.2)
I trust that local hospitals and clinics are well-equipped to diagnose and treat dengue fever effectively.	
Agree	111 (25)
Disagree	116 (27)
Neutral	110 (25)
Strongly Agree	69 (16)
Strongly Disagree	31 (7.1)
Awareness about dengue can reduce the number of cases in the community.	
Agree	200 (46)
Disagree	13 (3.0)
Neutral	29 (6.6)
Strongly Agree	189 (43)
Strongly Disagree	6 (1.4)
I am willing to participate in community clean-up programs to prevent dengue.	
Agree	184 (42)
Disagree	20 (4.6)
Neutral	84 (19)
Strongly Agree	146 (33)
Strongly Disagree	3 (0.7)
I find the information about dengue on social media and in news reports to be reliable and trustworthy.	
Agree	203 (46)
Disagree	24 (5.5)
Neutral	112 (26)
Strongly Agree	13 (3.0)
Strongly Disagree	85 (19)
Have you ever participated in community dengue prevention programs?	
No	94 (22)
Sometimes	101 (23)
Yes	242 (55)
Do you regularly use mosquito repellents or nets at home?	
Daily	167 (38)
Monthly	50 (11)
Never	78 (18)
Weekly	142 (32)
Do you wear full sleeves or protective clothing to avoid mosquito bites?	
No	191 (44)
Sometimes	107 (24)
Yes	139 (32)
When someone in your household shows symptoms of dengue (such as fever, joint pain, or rash), what do you usually do?	
Do nothing / Don't know	26 (5.9)
Give them painkillers or home remedies	117 (27)
Take them to a doctor or hospital immediately	180 (41)
Wait a few days to see if symptoms improve	114 (26)

Distribution of Overall Knowledge, Attitude, and Practice (KAP) Scores

The distribution of participants' dengue-related knowledge and practice levels as poor, moderate, or

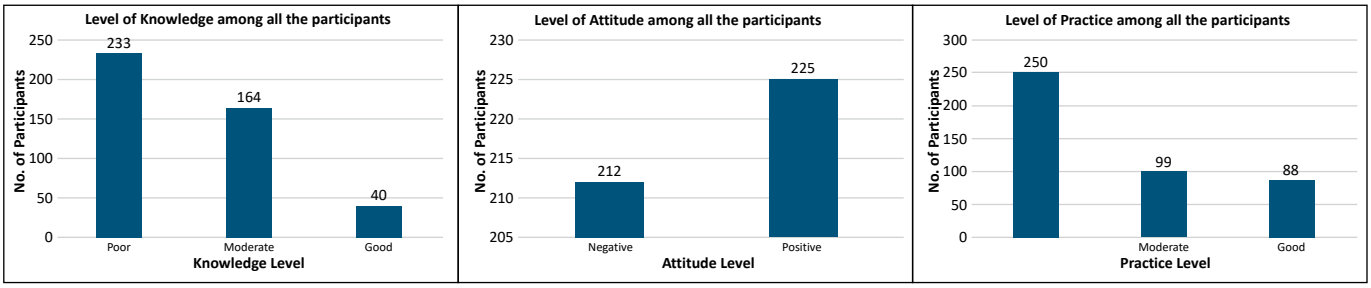


Fig. (1): Distribution of participants' knowledge, attitude, and practices regarding dengue. Knowledge and practice levels were classified as poor, moderate, or good, and attitude levels as negative or positive, based on predefined scoring criteria.

good, and their attitude levels as negative or positive, based on predefined scoring criteria, is represented in Fig. **(1)**. Regarding knowledge, the majority of participants demonstrated poor knowledge (n=233, 53.3%), followed by those with moderate knowledge (n=164, 37.5%), and a smaller proportion with good knowledge (n=40, 9.2%). In terms of attitude, nearly half of the respondents (n=212, 48.5%) held a negative attitude, while the remaining participants (n=225, 51.5%) held a positive attitude. For preventive practices, the majority of participants were classified as having poor practice (n=250, 58.1%), followed by those with moderate practice (n=99, 22.7%), and a smaller proportion with good practice (n=88, 20.1%).

Bivariate Associations between Socio-Demographic Characteristics and Knowledge, Attitude, and Preventive Practices

Age, gender, employment, and residence showed no significant association with knowledge. Education (p=0.049) and prior dengue history (p=0.045) were significantly associated with knowledge (**Table 4A**).

Table 4A: Bivariate association between socio-demographic variables and knowledge levels (n=437).

Variables	Poor n = 233	Moderate n = 164	Good n = 40	p-value
Age groups (years)				
18-27	101 (55)	66 (36)	17 (9.2)	0.800
28-37	68 (53)	51 (40)	10 (7.8)	
38-47	41 (55)	27 (36)	6 (8.1)	
48+	23 (46)	20 (40)	7 (14)	
Gender				
Female	135 (53)	96 (38)	22 (8.7)	0.500
Male	94 (52)	68 (38)	18 (10)	
Prefer not to say	4 (100)	0 (0)	0 (0)	
Education				
No formal	24 (75)	8 (25)	0 (0)	0.049
Primary	27 (59)	14 (30)	5 (11)	
Secondary	81 (55)	56 (38)	9 (6.2)	
Graduate	86 (49)	71 (40)	20 (11)	
Postgraduate or higher	15 (42)	15 (42)	6 (17)	
Job				
No	138 (56)	89 (36)	19 (7.7)	0.300
Yes	95 (50)	75 (39)	21 (11)	
Residence				
Dhaka North City	131 (52)	96 (38)	27 (11)	0.400
Dhaka South City	102 (56)	68 (37)	13 (7.1)	
Dengue Diagnosis				
No	100 (61)	50 (30)	14 (8.5)	*0.045
Yes	133 (49)	114 (42)	26 (9.5)	

Note: Data is expressed as n(%), *Significant at p<0.05

Moreover, age (p<0.001), gender (p=0.019), and education (p<0.001) showed significant associations for attitudes. Positive attitudes were demonstrated among younger, male, and more highly educated groups. Employment status, residence, and history were not significantly associated with attitude (**Table 4B**).

Table 4B: Bivariate association between socio-demographic variables and attitude levels (n=437).

Variables	Negative n = 212	Positive n = 225	p-value
Age groups (years)			
18-27	72 (39)	112 (61)	*<0.001
28-37	57 (44)	72 (56)	
38-47	51 (69)	23 (31)	
48+	32 (64)	18 (36)	
Gender			
Female	131 (52)	122 (48)	*0.019
Male	77 (43)	103 (57)	
Prefer not to say	4 (100)	0 (0)	
Education			
No formal	28 (88)	4 (13)	*<0.001
Primary	36 (78)	10 (22)	
Secondary	66 (45)	80 (55)	
Graduate	68 (38)	109 (62)	
Postgraduate or higher	14 (39)	22 (61)	
Job			
No	119 (48)	127 (52)	0.901
Yes	93 (49)	98 (51)	
Residence			
Dhaka North City	116 (46)	138 (54)	0.200
Dhaka South City	96 (52)	87 (48)	
Dengue Diagnosis			
No	83 (51)	81 (49)	0.600
Yes	129 (47)	144 (53)	

Note: Data is expressed as n(%), *Significant at p<0.05

Gender (p=0.004) and education (p=0.020) significantly influenced practice, with males and higher-educated

individuals showing better practices. No significant association was observed between preventive practices and age, employment status, place of residence, or history of dengue infection (all p>0.05) (**Table 4C**).

Table 4C: Bivariate association between socio-demographic variables and preventive practice levels (n=437)

Variables	Poor n = 250	Moderate n = 99	Good n = 88	p-value
Age groups (years)				
18-27	115 (63)	37 (20)	32 (17)	0.500
28-37	69 (53)	31 (24)	29 (22)	
38-47	42 (57)	18 (24)	14 (19)	
48+	24 (48)	13 (26)	13 (26)	
Gender				
Female	159 (63)	56 (22)	38 (15)	0.004
Male	89 (49)	41 (23)	50 (28)	
Prefer not to say	2 (50)	2 (50)	0 (0)	
Education				
No formal	25 (78)	5 (16)	2 (6.3)	0.020
Primary	26 (57)	15 (33)	5 (11)	
Secondary	91 (62)	26 (18)	29 (20)	
Graduate	92 (52)	45 (25)	40 (23)	
Postgraduate or higher	16 (44)	8 (22)	12 (33)	
Job				
No	147 (60)	52 (21)	47 (19)	0.500
Yes	103 (54)	47 (25)	41 (21)	
Residence				
Dhaka North City	150 (59)	53 (21)	51 (20)	0.500
Dhaka South City	100 (55)	46 (25)	37 (20)	
Dengue Diagnosis				
No	101 (62)	34 (21)	29 (18)	0.400
Yes	149 (55)	65 (24)	59 (22)	

Note: Data is expressed as n(%).

Multivariable Logistic Regression Analysis of Factors Associated with Dengue-Related Knowledge, Attitude, and Preventive Practices

After adjusting for potential confounders, higher educational attainment remained the sole significant factor associated with good knowledge of dengue. Except for education, none of the other socio-demographic variables (age, gender, employment status, residence, or prior dengue diagnosis) showed a statistically significant association with knowledge in the adjusted model. Compared to participants with no formal education, graduates had 2.81 times higher odds of good knowledge (aOR=2.81, 95% CI: 1.12-7.89, p=0.036), and postgraduates had 3.14 times higher odds (aOR=3.14, 95% CI: 1.07-9.89, p=0.042) (**Table 5**).

In the adjusted model, residence in Dhaka South City was independently associated with lower odds of holding a positive attitude (aOR=0.47, 95% CI: 0.25-0.85, p=0.015). Furthermore, each unit increase in knowledge score was associated with an 11% increase in the odds of having a positive attitude (aOR=1.11, 95% CI: 1.02-1.20, p=0.013). No other socio-demographic variables (age, gender, education, employment status, or prior dengue diagnosis) were significantly associated with positive attitude in the adjusted model (**Table 6**).

Table 5: Multivariable logistic regression analysis of factors associated with good knowledge of dengue (n=437).

Variables	aOR	95% CI	p-value
Age groups (years)			
18-27	Reference category		
28-37	1.00	0.60, 1.67	0.901
38-47	1.06	0.56, 1.98	0.800
48+	1.52	0.70, 3.28	0.300
Gender			
Female	Reference category		
Male	0.96	0.62, 1.49	0.900
Prefer not to say	0.00	-	0.900
Education			
No formal	Reference category		
Primary	1.91	0.67, 5.90	0.200
Secondary	2.01	0.80, 5.61	0.200
Graduate	2.81	1.12, 7.89	*0.036
Postgraduate or higher	3.14	1.07, 9.89	*0.042
Job			
No	Reference category		
Yes	0.92	0.59, 1.43	0.700
Residence			
Dhaka North City	Reference category		
Dhaka South City	0.91	0.60, 1.36	0.600
Previous Diagnosis			
No	Reference category		
Yes	1.36	0.90, 2.09	0.150

aOR: Adjusted odds ratio, CI: Confidence interval, *Significant at p<0.05

Table 6: Multivariable logistic regression analysis of factors associated with positive attitude toward dengue (n = 437).

Variables	aOR	95% CI	p-value
Age groups (years)			
18-27	Reference category		
28-37	0.67	0.32, 1.36	0.300
38-47	0.63	0.24, 1.51	0.300
48+	1.22	0.44, 3.22	0.700
Gender			
Female	Reference category		
Male	1.76	0.98, 3.19	0.059
Prefer not to say	0.00	-	0.901
Education			
No formal	Reference category		
Primary	2.15	0.28, 44.5	0.500
Secondary	4.03	0.72, 75.9	0.200
Graduate	4.07	0.72, 77.0	0.200
Postgraduate or higher	6.93	1.12, 135	0.081
Job			
No	Reference category		
Yes	1.07	0.57, 1.99	0.800
Residence			
Dhaka North City	Reference category		
Dhaka South City	0.47	0.25, 0.85	0.015
Score Knowledge	1.11	1.02, 1.20	0.013

aOR: Adjusted odds ratio, CI: Confidence interval

The final regression model for good preventive practices identified a positive attitude score as the strongest and most significant factor. Each unit increase in attitude score raised the odds of good preventive practices by 13% (aOR=1.13, 95% CI: 1.06-1.21, p<0.001). Notably, after controlling for knowledge and attitude scores, none of the included socio-demographic variables remained statistically significant in the model (**Table 7**).

Table 7: Multivariable logistic regression analysis of factors associated with good preventive practices against dengue (n=437).

Variables	aOR	95% CI	p-value
Age groups (years)			
18-27	Reference category		
28-37	1.54	0.86, 2.76	0.140
38-47	1.50	0.69, 3.17	0.300
48+	2.36	0.96, 5.71	0.058
Gender			
Female	Reference category		
Male	1.44	0.88, 2.35	0.150
Prefer not to say	0.00		0.901
Education			
No formal	Reference category		
Primary	1.30	0.29, 7.03	0.700
Secondary	2.63	0.77, 12.3	0.200
Graduate	3.37	0.98, 15.8	0.078
Postgraduate or higher	2.75	0.69, 14.1	0.200
Job			
No	Reference category		
Yes	0.92	0.55, 1.55	0.800
Residence			
Dhaka North City	Reference category		
Dhaka South City	1.25	0.78, 2.01	0.400
Knowledge score	1.06	1.00, 1.14	0.061
Attitude score	1.13	1.06, 1.21	*<0.001

aOR: Adjusted odds ratio, CI: Confidence interval, *Significant at p<0.05

DISCUSSION

The increasing burden of dengue is making our healthcare system vulnerable. Favorable environmental factors are fueling incident rates at an exponential rate in the South Asian region. Mass awareness, preparedness, and behavioral attitude are key to mitigating the spread of this disease.

In this regard, our study provides important KAP that are crucial for formulating a comprehensive strategy at both the local and regional levels.

We observed low levels of adequate knowledge and mixed attitudes toward dengue prevention. However, the adoption of basic preventive measures remained limited. This finding identifies a substantial gap between awareness, attitude, and behavior. A similar pattern has been observed in other neighboring countries of Bangladesh [19].

Disease awareness shows a similar trend in the South Asian region, driven by attention from print and electronic media [20-23]. Interestingly, our study revealed that the respondents had adequate knowledge of dengue vectors, transmission, and seasonal impact. However, ambiguity was observed in the results related to transmission pathways and preventive interventions. This can be compared with the similar pattern of India and Pakistan [24, 25]. These findings suggest that broad awareness campaigns have improved general knowledge, but they may be less effective in communicating more detailed or updated information.

Overall, attitudes toward dengue were divided, with just over half of respondents (51.5%) holding a positive attitude. Nevertheless, many acknowledged the seriousness of the disease and the importance of shared responsibility in preventing its spread, a pattern observed in urban communities across this region [26]. However, doubts about the adequacy of government-led control measures were also expressed [27, 28]. Such skepticism may undermine community participation if not addressed through transparent communication and visible public health action. Dengue severity can range from dengue fever to dengue hemorrhagic fever to dengue shock syndrome. Cytokines play a vital role, and their dysregulation, characterized by elevated TNF-α, IL-6, and IL-17 levels and reduced IL-10 levels, contributes to progression toward severe dengue [29]. Moreover, reliance on self-medication and ignorance increases the risk of dengue severity.

The knowledge-practice gap had been widely documented in Bangladesh, India, and Sri Lanka [30-32]. Our study demonstrates adequate knowledge and positive attitudes; however, preventive behaviors were practiced inconsistently. Although many participants reported using bed nets, Aedes mosquitoes are primarily day-biting, which limits the effectiveness of bed nets for dengue prevention [33]. This may indicate a gap between knowledge and appropriate preventive practices, or a reliance on general mosquito control measures rather than vector-specific strategies. The observed disconnect is likely driven by structural and contextual barriers, including overcrowded housing, irregular water supply, inadequate waste management, and limited coordinated community engagement [34]. Interestingly, observation in Nepal and Pakistan similarly emphasizes that awareness alone does not guarantee sustained behavioral change [35-37]. The importance of moving beyond information dissemination toward interventions targeting environmental and behavioral determinants is underscored by these findings.

A less straightforward relationship between education and actual preventive practices was observed, suggesting that knowledge enhancement alone may not translate into consistent behavioral adoption. Therefore, greater importance is placed on behavior-

centered strategies, including practical skill-building and community mobilization.

A positive association between attitudes and preventive practices has been reported in South Asian contexts, where individuals perceiving dengue as a serious threat were more likely to adopt protective behaviors [37]. These results demonstrate the value of risk communication strategies that frame dengue not only as a public health issue but also as a tangible household-level risk.

In densely populated cities, personal preventive efforts are often limited by shared environmental risks and restricted control over mosquito breeding sites [38]. This emphasizes that effective dengue control in urban settings requires coordinated action at the community level. Mobilization, vector surveillance, and education improve dengue prevention practices are the most important community-based interventions. At the same time, motivation-centered strategies are essential for sustaining long-term behavioral change beyond knowledge alone [39].

Finally, sustainable progress is essential to formulating strategies based on accurate, up-to-date information. Steps are needed to reshape targeted behavioral-change communication, strengthen community participation, and improve urban infrastructure.

STRENGTHS AND LIMITATIONS

A significant number of people responded to the survey, highlighting its broad representation of the population. This enables us to evaluate the risks based on KAP scores. Validated questionnaires allow us to compare the current scenario with the regional studies. Of special note, independent factors of KAP behaviors also help identify knowledge gaps and behavioral limitations.

In contrast, this study has several limitations. First, the cross-sectional design precludes causal inference; only associations can be reported. Second, the urban focus on Dhaka limits generalizability to rural Bangladesh. Third, online-only recruitment *via* social media introduced selection bias, excluding adults without internet access, non-social-media users (*e.g.*, older adults, lower-income groups), and individuals with limited literacy. These excluded populations may represent higher-risk groups; thus, our findings are likely to overestimate true levels of dengue knowledge and preventive practices in Dhaka's general population. Fourth, social desirability bias may have inflated positive attitudes and practices. Fifth, self-reported data are subject to recall bias. Sixth, the four-item practice scale may not fully capture all dengue preventive behaviors. Despite these limitations, this study provides timely evidence from a large post-outbreak sample and identifies attitude as a key modifiable driver of preventive behavior. Although it has some limitations, the study provides valuable evidence to inform the formulation of a comprehensive dengue prevention strategy in Bangladesh.

CONCLUSION

This study highlights that although over half of the participants demonstrated positive attitudes toward dengue, the prevalence of good knowledge and good preventive practices remained notably low. This persistent gap, despite ongoing public health campaigns and repeated exposure to seasonal outbreaks, underscores a critical behavioral shortfall that contributes to major dengue outbreaks. Overall, the results emphasize the importance of integrated, community-based dengue prevention approaches that draw on both local realities and regional experiences to reduce disease outbreaks and improve long-term public health outcomes.

LIST OF ABBREVIATIONS

AOR : Adjusted Odds Ratio
CI : Confidence Interval
KAP : Knowledge, Attitudes, and Preventive Practices

ETHICS APPROVAL

The study was approved by the Department of Pharmacy Ethical Committee of the University of Information Technology and Sciences (UITS/PHARM/PEC/2025/23). All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and the Declaration of Helsinki.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants who agreed to participate in the study. Confidentiality was maintained, and data was used solely for research purposes.

AVAILABILITY OF DATA

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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The study did not receive any grants or funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Declared none.

AUTHORS' CONTRIBUTION

MA: Conceptualization, Methodology, Manuscript drafting, Data collection and validation, Responsible for all aspects.

SMTT: Study design, Data visualization, Data analysis, Manuscript drafting, Responsible for all aspects.

NJM, MAM, SAT, MNC: Data acquisition and handling, Data analysis, Responsible for all aspects.

MSH: Critical review, Responsible for all aspects, Final approval.

All authors have read and approved the final version.

GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used ChatGPT (GPT-4, OpenAI) only to obtain language suggestions and to perform minor proofreading in some parts of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the available article.

SUPPLEMENTARY MATERIAL

Supplementary material is available on the journal's website.

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