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Original Article

Rural Residents' Knowledge and Preventive Practices Regarding Dengue Fever: A Community-Based Survey in Sylhet

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Abstract

Background: *Dengue is a mosquito-borne viral infection that poses significant public health challenges in Bangladesh. Understanding community knowledge and preventive practices is essential for effective dengue control. To assess the levels of knowledge and preventive practices regarding dengue infection among the rural residents of Sylhet district.*

Materials and methods: *A community-based cross-sectional study was conducted from September 2023 to February 2024 in Rampasha village, Biswanath Upazila. A total of 200 adults aged ≥ 18 years were purposively selected and data were collected through face-to-face interviews using a semi-structured questionnaire administered by 4th-year MBBS students.*

Results: *Most participants had heard of dengue (86.0%) and knew mosquitoes transmit it (75.0%) but fewer identified Aedes as the vector (39.0%) or its feeding time (46.0%). Knowledge of preventive measures was high (93.0%) though use of repellents (1.0%) and aerosol sprays (8.5%) was low. Fever (79.5%) and fatigue (81.0%) were the most recognized symptoms. Preventive practices included mosquito net use (83.0%) removal of stagnant water (71.0%) covering water containers (67.0%) and neighborhood cleanliness (73.5%). Most respondents (64.5%) shared dengue information and 58.0% recognized paracetamol as the safest antipyretic. The majority of respondents had good knowledge (69.0%) and good preventive practices (60.5%) regarding dengue fever. Education and occupation were significantly associated with both knowledge (p=0.015 and 0.032, respectively) and practice levels (p=0.02 and 0.018, respectively) indicating that higher educational attainment and certain occupations (Homemakers, service holders) positively influence dengue-related knowledge and preventive behaviors.*

Conclusion: *While rural residents of Sylhet show moderate to good knowledge and preventive practices regarding dengue, gaps remain in vector identification, symptom recognition and use of certain preventive measures.*

Key words: Dengue; Knowledge; Preventive practices; Rural community.

INTRODUCTION

Dengue fever, caused primarily by the Aedes mosquito, has over the past two decades evolved from an intermittent health concern into one of Bangladesh's most critical public health crises.[1,2] Although dengue has been endemic in the country, the scale and severity of the 2023 outbreak marked a disturbing escalation in both incidence and mortality.[3,4] According to national data from the Directorate General of Health Services (DGHS) and the Institute of Epidemiology, Disease Control and Research (IEDCR) Bangladesh recorded 321,179 confirmed dengue cases and 1,705 deaths in 2023 corresponding to a Case Fatality Rate (CFR) of approximately

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0.53%, the highest recorded since surveillance began.[3,5] These figures stand in stark contrast to the cumulative caseload of 244,246 cases and 849 deaths reported from 2000 to 2022, signaling that the 2023 outbreak alone exceeded the total dengue burden of the prior 23 years.[6]

Epidemiological analyses reveal notable demographic and spatial patterns. While males comprised nearly 60% of infections in 2023, females experienced a significantly higher CFR (0.75% vs 0.38%, $p < 0.05$).[7,8] Age was also a strong determinant of risk: for each additional decade of life, the CFR rose significantly, highlighting the greater vulnerability of older adults.[7] Spatially, dengue mortality clustered around Dhaka and its southern peripheries, though neighboring districts also contributed substantially to the fatal burden.[2,7] In a troubling finding, more than two-thirds of fatal cases (67%) died within 24 hours of hospital admission, indicating delays in accessing effective care or late-stage presentation.[8] Clinically, a hospital-based study (July–September 2023) involving 450 confirmed dengue patients from Dhaka Medical College and Chittagong Medical College reported that 17% developed severe dengue and 89% of non-severe patients exhibited at least one WHO warning sign.[9,10] Fever was nearly universal, followed by myalgia and headache, while warning signs such as vomiting and abdominal pain affected more than half of patients.[9,11] Such findings further underscore the clinical burden and resource demands of severe dengue during the epidemic.

In addition to clinical and demographic risk factors, environmental and socioeconomic drivers appear to have exacerbated transmission in 2023. Unplanned urbanization, poor water management, waste accumulation and densely populated settlements created ideal breeding grounds for Aedes mosquitoes.[1,3,12] A systematic review of dengue outbreaks in Bangladesh (2000–2024) documented that the 2023 epidemic disproportionately affected regions previously considered non-endemic, suggesting geographic expansion and changing transmission dynamics.[13] The scale of the 2023 outbreak has therefore exposed significant weaknesses in Bangladesh's dengue response infrastructure. Despite efforts to scale up vector control particularly during monsoon seasons the shifting geographic distribution of cases and the rapid pace of transmission overwhelmed existing systems.[9,10] The standard approaches to dengue prevention and control may no longer suffice in this new context of widespread transmission.

Given the magnitude of the crisis, comprehensive strategies are urgently needed. These include strengthening early detection and triage systems to reduce the high proportion of deaths occurring within a day of admission, improving clinical management protocols especially for high-risk groups (e.g. Older adults) and intensifying vector control measures through community engagement. Moreover, public health planning must incorporate climate and ecological considerations such as rainfall patterns, urban expansion and environmental sanitation to predict and mitigate future outbreaks. Reported dengue data for Bangladesh[14] as reported by the Directorate General of Health Services (DGHS) were:

Year	Cases	Deaths	CFR(%)
2018	10,148	26	0.26
2019	101,354	164	0.16
2020*	-	-	-
2021	28,429	105	0.37
2022	62,382	281	0.45
2023	321,179	1,705	0.53
2024	93,685	504	0.54

*Data for 2020 are missing due to the COVID-19 pandemic.

In summary, the 2023 dengue outbreak in Bangladesh represents a turning point in the country's epidemiological landscape. The unprecedented number of infections, the rise in fatalities and the shifting demographics and geography of disease transmission signal that dengue is no longer confined to traditional "hotspots." Without substantial and sustained investment in prevention, surveillance and clinical care, Bangladesh may face even greater challenges in managing future dengue epidemics.

MATERIALS AND METHODS

This community-based cross-sectional study aimed to assess the knowledge and preventive practices related to dengue infection among rural residents of the Sylhet district. The study was conducted over a six-month period, from September 2023 to February 2024, in Rampasha village of Biswanath Upazila, Sylhet, Bangladesh.

A total of 200 adults aged 18 years and above were included in the study. Participants were purposively selected and were required to be permanent residents of the village. Those who were unwilling to participate, acutely ill at the time of data collection, or mentally unsound were excluded.

Data were collected through face-to-face interviews using a semi-structured questionnaire. As part of the Residential Field Site Training (RFST), 4th-year MBBS students from Sylhet Women's Medical College administered the interviews. The questionnaire included items on sociodemographic characteristics, knowledge of dengue infection, its symptoms and preventive measures, sources of information, and dengue-related preventive practices.

For assessing knowledge and practice, responses were scored as '1' for correct and '0' for incorrect answers. Knowledge and practice levels were categorized as good (≥75% correct responses), average (50–74% correct) and poor (<50% correct). Data were entered and analyzed using IBM SPSS Version 26 (New York, USA). Descriptive statistics were presented as frequencies and percentages for categorical variables and as means with standard deviations for continuous variables. Associations between variables were tested using the Chi-square (χ^2) test, with a p-value <0.05 at a 95% confidence interval considered statistically significant.

Participation was voluntary, confidentiality was ensured through coded identifiers, and informed consent was obtained from all respondents. The study followed the ethical principles of the 2013 revised Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of Sylhet Women's Medical College, Sylhet, Bangladesh (Reference: SWMC/Eth.C/IRB/20240039.

RESULTS

A total of 200 respondents participated in the study. The majority were aged 30–64 years (41.0%) followed by 18–29 years (38.5%) and ≥65 years (20.5%) with a mean age of 35.5±13.7 years. Most respondents were female (77.0%) and married (79.5%). Regarding education, 54.0% had below high school education, 31.0% were illiterate and 15.0% had high school or higher education. Homemakers constituted the largest occupational group (65.5%). The mean number of children per respondent was 2.31±1.77, and the mean monthly family income was 24,950 ± 8,565 BDT (Table I).

Respondents' knowledge about dengue was summarized in table II.Most respondents (86.0%) had heard about dengue infection and 75.0% knew that mosquitoes transmit dengue. However, only 39.0% correctly identified the Aedes mosquito as the vector and 46.0% knew its feeding time is morning and afternoon. Knowledge about breeding sites was limited, with only 38.5% recognizing stagnant water as a breeding place. Knowledge regarding prevention varied: 93.0% reported knowing at least one preventive measure, 91.5% knew measures to prevent Aedes breeding, but very few knew about using repellents (1.0%) or mosquito aerosol sprays (8.5%). About 90.5% knew dengue is preventable. In Figure 1, the majority of participants recognized fever (79.5%) and fatigue (81%) as key symptoms of dengue. Awareness of other symptoms was lower, including body ache (29.5%) anorexia (28.5%) vomiting (19%) and diarrhea (12%).

Respondents' dengue-related practices were summarized in Table III. Less than half (40.5%) knew when to seek hospitalization during dengue, but most (81.5%) took appropriate measures after fever. Use of mosquito nets during day and night was common (83.0%) and a similar proportion used nets throughout the day when possible. Sharing information about dengue prevention was reported by 64.5% of respondents. Preventive measures targeting mosquito breeding were widely practiced: 71.0% removed stagnant water, 67.0% covered water containers, 59.5% used mosquito coils, sprays, or repellents and 73.5% maintained neighborhood cleanliness. A majority (58.0%) recognized paracetamol as the safest antipyretic for dengue.

Respondents obtained dengue-related information from multiple sources (Figure 2). Social media was the most common source (83.0%) followed by healthcare workers (71.0%) peer and family members (58.0%) educational institutions (33.0%) and others (6.5%). This indicates that digital platforms and health professionals are key channels for disseminating dengue prevention information.

Respondents' knowledge and practices regarding dengue were shown in figure 3 and 4. For knowledge, 69.0% had good knowledge, 23.5% moderate and 7.5% poor, with a mean score of 0.61±0.28. For practices, 60.5% showed good preventive practices, 29.0% moderate and 10.5% poor, with a mean score of 0.68±0.25.

Table IV shows the association between socio-demographic characteristics and knowledge levels regarding dengue. Knowledge levels were higher among respondents with higher education and those in certain occupations, with statistically significant associations (p=0.015 and p=0.032, respectively). No significant associations were observed for age, gender, marital status or monthly family income (p>0.05).

Table V presents the association between socio-demographic characteristics and dengue-related practice levels. Higher education and certain occupations were significantly associated with better practices (p=0.02 and p=0.018, respectively). No significant associations were found for age, gender, marital status, or monthly family income (p>0.05).

Table I Socio-demographic characteristics of the respondents (n=200)

Traits	Categories	Frequency (n)	Percent (%)
Age groups (Years)	18–29	77	38.5
	30–64	82	41.0
	≥65	41	20.5
	Mean ± SD	35.5 ± 13.7	
Gender	Male	46	23.0
	Female	154	77.0
Marital status	Married	159	79.5
	Unmarried	41	20.5
Education	Illiterate	62	31.0
	Below highersecondary	108	54.0
	Highersecondary& above	30	15.0
Occupation	Homemakers	131	65.5
	Business	22	11.0
	Service holders	16	8.0
	Agricultural workers	11	5.5
	Day laborers	9	4.5
	Others (students, NRB etc.)	11	5.5
Children	No children (0)	46	23.0
	1–2	66	33.0
	3–4	52	26.0
	>4	36	18.0
	Mean ± SD	2.3±1.8	
Monthly family income (BDT)	≤ 20,000	133	66.5
	20,001–40,000	51	25.5
	>40,000	16	8.0
	Mean ± SD	24,950±8,565	

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Table II Knowledge regarding dengue infection and its preventive measures (n = 200)

Questions	Yes n (%)	No n (%)
Heard about dengue infection	172 (86.0)	28 (14.0)
Mosquito causes dengue infection	150 (75.0)	50 (25.0)
Knows Aedes mosquito causes dengue	78 (39.0)	122 (61.0)
Knows feeding time is morning & afternoon	92 (46.0)	108 (54.0)
Knows stagnant water is breeding place	77 (38.5)	123 (61.5)
Knows dengue fever affects all ages	181 (90.5)	19 (9.5)
Knows dengue differs from malaria	159 (79.5)	41 (20.5)
Perceives dengue can be fatal	162 (81.0)	38 (19.0)
Knowledge on preventive measures		
Mosquito aerosol spray	17 (8.5)	183 (91.5)
Mosquito coil	96 (48.0)	104 (52.0)
Using repellents	2 (1.0)	198 (99.0)
Using mosquito nets	146 (73.0)	54 (27.0)
Knowledge of any preventive measure	186 (93.0)	14 (7.0)
Knows dengue is preventable	181 (90.5)	19 (9.5)
Knows measures to prevent Aedes breeding	183 (91.5)	17 (8.5)

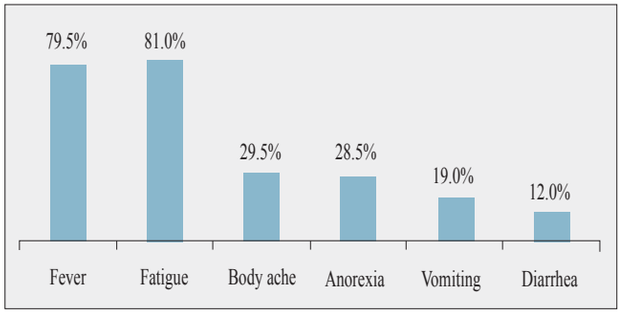

Figure 1 Knowledge regarding symptoms of dengue (n = 200)

Table III Practices related to dengue infection (n = 200)

Questions	Yes n (%)	No n (%)
Knows when to seek hospitalization for dengue	81 (40.5)	119 (59.5)
Takes appropriate measures after developing fever during an outbreak	163 (81.5)	37 (18.5)
Uses a mosquito net during day and night	166 (83.0)	34 (17.0)
Shares information on dengue prevention with others	129 (64.5)	71 (35.5)
Believes paracetamol is the safest antipyretic for dengue	116 (58.0)	84 (42.0)
Regularly removes stagnant water from surroundings	142 (71.0)	58 (29.0)
Covers water containers to prevent mosquito breeding	134 (67.0)	66 (33.0)
Uses mosquito coils, aerosol sprays or repellents	119 (59.5)	81 (40.5)
Maintains cleanliness of the neighborhood environment	147 (73.5)	53 (26.5)
Uses a mosquito net throughout the day, i f possible	166 (83.0)	34 (17.0)

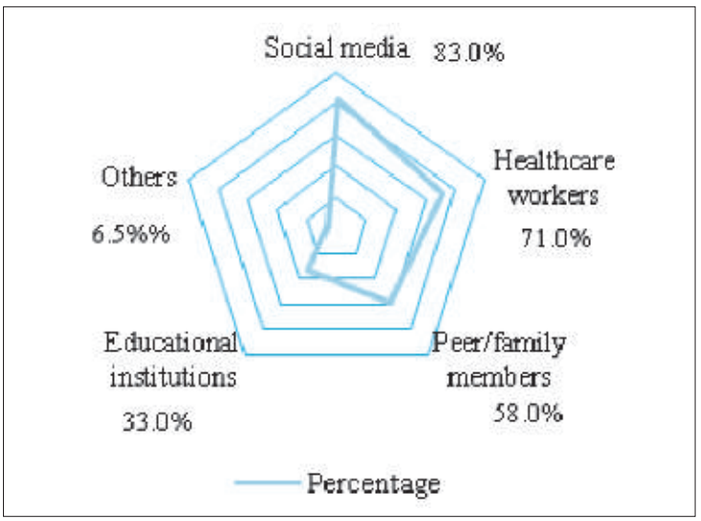

Figure 2 Sources of information on dengue fever

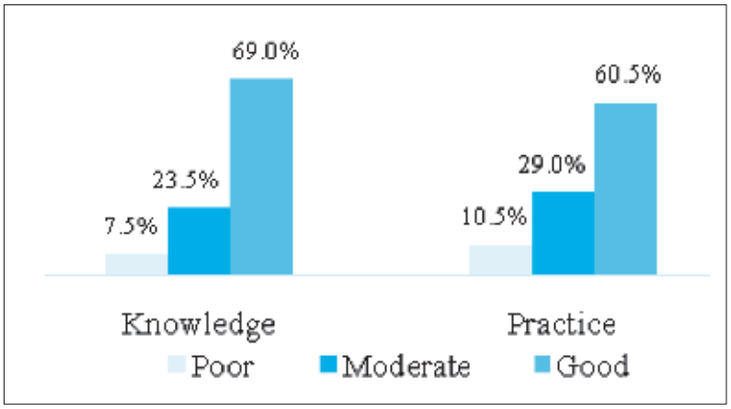

Figure 3 Levels of knowledge and practice towards dengue infection(n= 200)

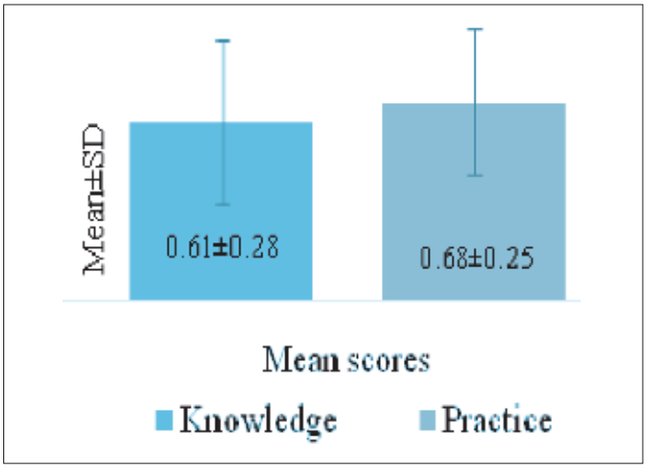

Figure 4 Mean scores of knowledge and practice towards dengue infection (n=200)

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Table IV Association of the levels of knowledge with socio-demographic variables (n=200)

Variables	n	Levels of knowledge			p-value
		Poor	Average	Good	
		n (%)	n (%)	n (%)	
Age groups (Years)					
18–29	77	5 (6.5)	20 (26.0)	52 (67.5)	0.35
30–64	82	7 (8.5)	18 (22.0)	57 (69.5)	
≥65	41	3 (7.3)	9 (22.0)	29 (70.7)	
Gender					
Male	46	4 (8.7)	12 (26.1)	30 (65.2)	0.12
Female	154	11 (7.1)	35 (22.7)	108 (70.1)	
Marital status					
Married	159	10 (6.3)	38 (23.9)	111 (69.8)	0.24
Unmarried	41	5 (12.2)	9 (22.0)	27 (65.9)	
Education					
Illiterate	62	8 (12.9)	20 (32.3)	34 (54.8)	0.015*
Below highersecondary	108	6 (5.6)	25 (23.1)	77 (71.3)	
Highersecondary& above	30	1 (3.3)	2 (6.7)	27 (90.0)	
Occupation					
Homemakers	131	7 (5.3)	22 (16.8)	102 (77.9)	0.032*
Business	22	2 (9.1)	6 (27.3)	14 (63.6)	
Service holders	16	1 (6.3)	3 (18.8)	12 (75.0)	
Agricultural workers	11	2 (18.2)	6 (54.5)	3 (27.3)	
Day laborers	9	2 (22.2)	2 (22.2)	5 (55.6)	
Others	11	1 (9.1)	8 (72.7)	2 (18.2)	
Monthly family income (BDT)					
≤ 20,000	133	10 (7.5)	35 (26.3)	88 (66.2)	0.60
20,001-40,000	51	3 (5.9)	10 (19.6)	38 (74.5)	
>40,000	16	2 (12.5)	2 (12.5)	12 (75.0)	

Chi-square (χ^2) test done, $p<0.05$ considered as significant value.

Table V Association of the levels of practice with socio-demographic variables (n=200)

Variables	n	Levels of practice			p-value
		Poor	Average	Good	
		n (%)	n (%)	n (%)	
Age groups (Years)					
18–29	77	6 (7.8)	25 (32.5)	46 (59.7)	0.34
30–64	82	8 (9.8)	20 (24.4)	54 (65.9)	
≥65	41	7 (17.1)	13 (31.7)	21 (51.2)	
Gender					
Male	46	5 (10.9)	12 (26.1)	29 (63.0)	0.52
Female	154	16 (10.4)	46 (29.9)	92 (59.7)	
Marital status					
Married	159	15 (9.4)	48 (30.2)	96 (60.4)	0.42
Unmarried	41	6 (14.6)	10 (24.4)	25 (61.0)	
Education					
Illiterate	62	8 (12.9)	20 (32.3)	34 (54.8)	0.02*
Below higher secondary	108	10 (9.3)	28 (25.9)	70 (64.8)	
Higher secondary & above	30	3 (10.0)	10 (33.3)	17 (56.7)	
Occupation					
Homemakers	131	8 (6.1)	30 (22.9)	93 (71.0)	0.018*
Business	22	3 (13.6)	6 (27.3)	13 (59.1)	
Service holders	16	2 (12.5)	4 (25.0)	10 (62.5)	
Agricultural workers	11	3 (27.3)	5 (45.5)	3 (27.3)	
Day laborers	9	2 (22.2)	2 (22.2)	5 (55.6)	
Others	11	0 (0.0)	11 (100)	0 (0.0)	
Monthly family income (BDT)					
≤20,000	133	6 (13.0)	15 (32.6)	25 (54.3%)	0.42
20,001-40,000	51	5 (7.6)	20 (30.3)	41 (62.1%)	
>40,000	16	6 (11.5)	12 (23.1)	34 (65.4%)	

Chi-square (χ^2) test done, $p<0.05$ considered as significant value.

DISCUSSION

In this rural Sylhet community, our survey revealed moderate-to-good knowledge of dengue, but also notable limitations in vector specific knowledge and in the use of certain preventive tools. While 86% of participants had heard of dengue and 75% knew that mosquitoes transmit it, only 39% identified Aedes as the vector and 46% knew its peak feeding times. Despite 93% reporting knowledge of some preventive measures, very few used repellents (1%) or aerosol sprays (8.5%). These findings reflect a persistent "Knowledge–practice gap" in dengue control.

Our results are broadly consonant with the rural KAP survey in Bangladesh and found that community members correctly answered only about 66% of knowledge items, and engaged in approximately 53.7% of possible dengue prevention practices.[15] In these study, higher education and self-efficacy were independent predictors of better knowledge and knowledge in turn significantly influenced practices.[12,17-20] This mirrors our finding that education and occupation were significantly associated with both knowledge (p= 0.015, p= 0.032) and practice (p= 0.02; p= 0.018). The discrepancy between general dengue awareness and detailed knowledge such as breeding sites and mosquito behavior is not unique to rural settings. In Dhaka, urban residents also demonstrated high general awareness (96% having heard of dengue) but many lacked knowledge of breeding ecology and vector biology.[21] That study also found that education level and occupation significantly correlated with preventive behaviors.[21] Similarly, Dhar-Chowdhury et al. found in community-based qualitative work in Dhaka that while many knew that mosquitoes transmit dengue, few understood that Aedes lay eggs in clean water containers.[22] These parallels suggest that both rural and urban Bangladeshi communities suffer from similar gaps in vector-specific knowledge.

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Importantly, knowledge alone may not drive behavior. Our study's low uptake of repellents and aerosols despite high reported knowledge echoes the broader literature. The phenomenon of "knowing but not doing" has been documented in longitudinal and seroprevalence-linked research. For instance, a study linking household knowledge and Health Belief Model constructs with IgGseropositivity found only weak correlations between self-reported preventive practices and community-level seroprevalence.[23] In that study, high perceived severity and susceptibility (HBM constructs) were correlated with seropositivity, but preventive practices did not strongly correlate, emphasising that merely increasing knowledge may not guarantee behavior change.[23]

Given these insights, interventions in rural Sylhet (And similar communities) should not solely focus on awareness-raising. They must be designed to translate knowledge into action, leveraging behavior-change frameworks: strengthening self-efficacy, addressing perceived barriers and providing actionable cues to mobilize preventive practices. The Health Belief Model offers a useful conceptual base for such efforts, as already shown in prior rural KAP work in Bangladesh.[15,24-28]

Importantly, a majority of respondents (64.5%) shared dengue-related information with neighbors, indicating an existing community network that could be leveraged for health promotion. Community participation has been shown to improve preventive practices, where engagement in neighborhood clean-ups and mobilization campaigns correlated with higher adoption of vector control measures.[29-32]

Our findings have several programmatic implications. Health education should emphasize correct Aedes identification, breeding habits, and peak activity times, using simple visual aids to reinforce learning. Behavior-change strategies must extend beyond knowledge to enhance self-efficacy, address barriers such as cost and accessibility of repellents, and provide actionable cues. Community mobilization can leverage existing information-sharing networks and local leadership to promote neighborhood clean-ups, container coverage, and larval source management. Additionally, public health programs should consider providing or subsidizing low-cost repellents, larvicides, and container covers.

LIMITATION

This study's strengths include its focus on a rural, under-researched area, structured data collection and face-to-face interviews. Limitations include purposive sampling, potential social desirability bias in self-reported practices, and the cross-sectional design, which precludes causal inference.

CONCLUSION

This study demonstrates that rural residents of Sylhet possess moderate-to-good general knowledge and preventive practices regarding dengue, yet critical gaps remain in vector-specific knowledge, recognition of symptoms and adoption of certain preventive measures such as repellents and aerosol sprays. Education and occupation were significant determinants of both knowledge and practices, highlighting the importance of socio-demographic factors in shaping dengue-related behaviors. To enhance dengue prevention in rural communities, interventions should combine targeted health education, behavior-change strategies, community mobilization and resource support, ensuring that knowledge is effectively translated into sustained preventive action. Strengthening these multidimensional approaches can reduce vulnerability to future outbreaks and support more resilient community-based dengue control programs in endemic areas.

RECOMMENDATION

Future research should employ longitudinal or interventional designs to evaluate the impact of targeted education on behavior, explore barriers to preventive practices, and examine structural determinants such as water storage, waste management and service provision that influence sustained dengue prevention.

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DISCLOSURE

The authors declared no competing interests.

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