**Title page**

**Assessment of Perceived Dengue Risk and Prevention Practices Among Youth in Bangladesh: An** **Interview-based Study**

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**Assessment of Perceived Dengue Risk and Prevention Practices Among Youth in Bangladesh: An Interview-based Study**

**Abstract**

Dengue fever is a global public health concern, especially in countries like Bangladesh. This study examines youth perceived dengue risk, and preventive practices, providing valuable insights into their behavior regarding this mosquito-borne disease. A cross-sectional survey was conducted in different regions of Dhaka district in Bangladesh, involving face-to-face interviews with 1,358 participants (mean age of 22.02 ± 1.58 years) between September and October 2023 using convenience sampling. A semi-structured questionnaire covered informed consent, socio-demographic data, and questions about perceived dengue risk scale (12 items), and prevention practice (13 items). Data analysis utilized STATA and SPSS. The average scores for perceived dengue risk, and prevention practices were found to be 51.39±12.01 (out of 96), and 55.57±14.55 (out of 104) respectively.Previous dengue history, history of other vector-borne diseases, gender, educational level, father's educational qualification, employment status, adequate sleep duration, father's occupation, etc. are factors associated with higher risk and prevention practices regarding dengue. The research underscores the importance of tailoring prevention strategies for different demographics, raising awareness, and promoting active engagement in preventive measures. These insights are crucial for developing effective public health policies and campaigns to combat dengue.

**Keywords:** Dengue; Perceived risk; Prevention; Practices; Youth; Bangladesh.

**Introduction**

Public health faces a significant threat from dengue, a well-documented global health issue [1]. The primary vectors of this mosquito-borne disease, which afflicts 129 countries, are Aedes mosquitoes, notably Aedes aegypti and Aedes albopictus, responsible for transmitting dengue through their bites [2], [3]. Dengue, caused by four known DENV serotypes (DEN-1, 2, 3, 4) [4], can lead to four distinct manifestations in humans. According to the World Health Organization (WHO), these include mild, with warning signs, and severe forms, resulting in a wide spectrum of illnesses, ranging from mild flu-like symptoms to subclinical disease [5], [6].

Globally, WHO reports between 50 million and 100 million dengue cases each year, with approximately 20,000 documented deaths [2], [7]. South Asia, including Bangladesh, serves as a hotspot for several infectious diseases, including dengue fever (DF). Asian countries, especially South-East Asia, where the first dengue viral infection was identified, account for nearly 70% of dengue cases [8]. Bangladesh's subtropical, humid climate provides an ideal environment for the dengue vector, promoting its increased transmission [9]. The country's first dengue outbreak was documented in 1964, with a significant surge in cases observed in 2019, particularly in Dhaka, responsible for over half of all national dengue cases [3]. In 2019, Bangladesh experienced its most severe dengue incidence to date, with 112,000 cases and 129 fatalities [10]. Dengue outbreaks continued to rise in 2022, with Bangladesh being among the affected nations [11]. As of August 27, 2023, a total of 119,133 cases and 569 deaths had been reported from 64 districts in Bangladesh this year [12]. This underscores the critical need for dengue prevention and control efforts in the country.

Top of Form

Dengue poses a risk to nearly half of the global population, affecting individuals of all age groups. The primary at-risk groups for contracting the disease are those who reside in or travel to regions where the dengue virus is prevalent. Ensuring personal safety and effectively managing mosquito populations are pivotal in disease prevention, with a primary focus on avoiding mosquito bites [6]. Regrettably, a significant portion of the population remains unaware of these preventive measures and neglects to follow essential guidelines or take proactive steps, contributing to the rising incidence of dengue infections [2]. Consequently, dengue prevention practices are of utmost importance, especially in the context of Bangladesh [13]. Furthermore, the youth of Bangladesh constitute a critical demographic group [8]. With a substantial portion of the nation's population falling within the youth category, the future of the country lies in their hands. These young individuals will assume roles as future decision-makers, scientists, policymakers, and advocates, significantly influencing the nation's response to infectious diseases [14]. Additionally, a study of national surveillance data from 2011 to 2015 revealed that the most vulnerable group was the youth, primarily students [15]. Therefore, it is imperative to understand their perceived dengue risk and current prevention practices.

The aim of this research is to investigate the perception of dengue risk among young people in Bangladesh and to understand their current preventive practices as there is no single study on perceived dengue risk and prevention practices among youth in Bangladesh. The study's findings will not only contribute to our understanding of dengue-related behaviors and attitudes among the youth but also offer practical recommendations for public health authorities, policymakers, and non-governmental organizations working to combat the disease in Bangladesh. Through a comprehensive analysis of the perceived dengue risk and prevention practices among the youth, who often serve as influential agents of behavioral change, this research can contribute to more effective and tailored strategies to combat dengue.

**Materials and Methods**

***Study area***

Data were gathered through face-to-face interviews as part of a cross-sectional survey conducted in various areas of the Dhaka district, Bangladesh, between September and October 2023.

***Sample size***

The sample size was calculated using the following equation:

|  |  |
| --- | --- |
|  | Here,  *n* = number of samples  *z* = 1.96 (95% confidence level)  *p*= prevalence estimate (50% or 0.5), as there is no previous study in Bangladesh.  *q* = (1-*p*)  *d* = Precession of the prevalence estimate (10% of 0.05) |

We expected that the current study's prevalence estimate (p) would be 50%. A sample size of 423 people was estimated based on a 10% non-response rate. This estimate was exceeded by our sample size. However, 1358 participants were recruited to ensure the strength of the study.

***Study design, participants, and procedure***

The current study utilized a cross-sectional survey design based on face-to-face interview, conducted between September and October 2023. The participants were enrolled using a non-probability sampling (convenient sampling) technique [16]. Each participant took approximately 10-15 minutes to complete the interview. Initially, 1410 participants attended the surveys. After removing incomplete responses, the final analysis included 1358 surveys. The data were gathered using a paper-based semi-structured questionnaire written in Bangla (the participant's native language) from participant’s current residents. As this is a sensitive issue, the data was collected only by trained research assistants and strict confidentiality was maintained.

A pilot test was carried out with 30 participants from the same population (target group) to determine the acceptability and transparency of the questionnaire. Following the pilot testing, a few minor adjustments were incorporated into the questionnaire. These data were not included in the final analysis. The first page of the questionnaire had an informed consent statement attached to it that explained the study's objectives, procedures, and the participant's right to decline participation. Before starting the survey, "participants were asked to provide informed consent (i.e., *“Are you willing to participate in this study voluntarily and spontaneously?”*). The inclusion criteria of the participants included: ⅰ) young people (15 to 24 years of age) [17], ⅱ) ability to talk and read Bengali, ⅲ) living in Bangladesh and Bangladeshi residents, and iv) willingness to participate in the study. The participants below 18 years and more than or equal to 25 years were excluded at the time of the interview.

***Measures***

*Socio-demographic measures*

Socio-demographic information was gathered by questions about age, educational qualification (below university/university level), permanent residence (rural/urban/semi-urban), monthly family income (less than 20000 BDT/20000 to 30000 BDT/more than 30000 BDT), gender (male/female), marital status (married/unmarried), family type (nuclear/large), employment status (employed/unemployed), previous history of dengue (yes/no), family history of dengue (yes/no), previous history of vector-borne disease (yes/no), average sleeping time (less than 7 hours/7 to 9 hours/more than 9 hours), daily social media use in hours (less than 2 hour/2 to 4 hour/more than 4 hours), father’s occupation (job holder/business/others/unemployed, father’s educational qualification (primary or below/secondary or higher secondary/university level) & self-perception about own mental health (good/bad).

*Perceived dengue risk*

The Perceived Dengue risk scale is a tool used to measure an individual's perception of their risk to Dengue, consisting of 12 items. For example, questions used in the scale like: ‘‘*I am at risk to get dengue fever, Dengue fever is a seasonal disease, I will be safe from it if the dengue season has passed, I am bitten by mosquitoes every day, but I have never been infected with dengue fever. So, I am not at risk of getting dengue fever, etc*.’’ with eight possible answers. It is used in research and clinical settings to identify individuals with perceived Dengue risk/ threat and inform targeted interventions [18]. The scale is scored on a Likert scale with the possible response of between 1 and 8 (i.e., *1 strongly disagree–8 strongly agree* "]) and helps tailor prevention strategies and increase awareness. The possible total scores range from 12 to 96. Higher scores indicate a stronger perception dengue risk. The overall score is derived by summing the scores of each item. It should be used with other assessments for a comprehensive understanding of risk. In the current investigation, this scale was shown to have extremely good reliability (Cronbach's alpha=0.91).

*Dengue prevention practice*

To document the prevention practices status, the participants were asked thirteen questions (e.g., *“I use mosquito repellent (lotion/spray/coil), I always keep water containers in my house tightly closed, I check for potential mosquito breeding inside the house, I put larvicide into the water storage to kill the mosquito larvae.”* (see details in **Table 5**) with eight-point Likert scale (i.e., *1 strongly disagree–8 strongly agree* "). These questions were taken from a previous validated study [18]. The total score was obtained by summating the scores of all items and ranges from 13-104, with a higher score indicating a higher level of prevention practices. The Cronbach Alpha of attitudes items were 0.84. The skewness and kurtosis of the total scores were between ±2.

***Statistical analysis***

The data were analyzed using Statistical Package for Microsoft Excel (version 2021), SPSS version 26.0 (Chicago, IL, USA), and STATA (version 15.0). Cleaning, coding, and sorting were performed using the help of Microsoft Excel. Then, the Excel file was imported in the SPSS software and the descriptive statistics (i.e., frequencies, percentages, means, and standard deviations) were computed. Finally, bivariate and multivariable linear regression analyses were performed using the STATA including the total scores of knowledge, attitudes, and practices measures. A *p*-value less than 0.05 was regarded as significant for all of the analyses.

***Ethics statement***

The study protocol was reviewed and approved by the Biosafety, Biosecurity and Ethical Clearance Committee, Jahangirnagar University, Savar, Dhaka-1342, Bangladesh [Ref. No: BBEC, JU/M2023/08(59)]. All procedures of the present study were conducted in accordance with human involving research guidelines (e.g., Helsinki declaration). Inform written consent was obtained from each participant where the study's procedures, objectives, and confidentiality about their information, etc. were clearly documented. The data were collected anonymously and analyzed using numerical codes and no identifying numbers or images were taken.

**Result**

***General characteristics of the participants***

In **Table 1**, which presents the general characteristics of the population (n=1358), several variables are outlined. the maximum percentage for each category is as follows: educational qualification – below university level (50.2%), permanent residence - urban (47.2%), monthly family income - 20,000 to 50,000 BDT (51.5%), gender - male (50.2%), marital status - unmarried (92.6%), family type - nuclear family (50.5%), employment status - employed (17.3%), unemployed (82.7%), previous history of dengue - yes (24.2%), no (75.8%), family history of dengue - yes (26.1%), no (73.9%), previous history of vector-borne disease except dengue - yes (26.1%), no (76.4%), average sleeping time - less than 7 hours (43.8%), 7 to 9 hours (normal) (49.3%), more than 9 hours (6.9%), daily social media use (hours) - less than 2 hours (2.8%), 2 to 4 hours (45.4%), more than 4 hours (51.8%), father's occupation - job holder (46.5%), business (33.3%), others (16.6%), unemployed (3.6%), father's educational qualification - primary or below (12.1%), secondary/ higher secondary (37.3%), university level (50.6%), self-perception about own mental health - good (78.8%). Mean age or the participants was 22.11±1.72.

***Perceived dengue risk***

The mean score of perceived dengue risk was 51.39±12.01 out of 96, indicating an overall correct percentage of 53.53. As per the multiple linear regression analysis, the positively predicting factors of perceived dengue risk included: ⅰ) participants with an education level below university ((ꞵ= 0.14, *p* < 0.001) in reference to ‘university’, ii) being female (ꞵ= 0.08, *p* < 0.003) in reference to ‘male’, iii) previous history of dengue (ꞵ= 0.03, *p* < 0.029) in reference to ‘no’ previous history of dengue, iv) previous history of vector-borne disease (ꞵ= 0.04, *p* < 0.048) in reference to ‘no’ previous history of vector-borne disease, v) father's occupation-job holder (ꞵ= 0.15, *p* < 0.042 in reference to ‘unemployed’, vi) father’s educational qualification-illiterate/ primary level (ꞵ= 0.07, *p* < 0.020) in reference to ‘university level’ (**Table 2**).

***Dengue prevention practice***

The mean score of dengue prevention practice was 55.57±14.55 out of 104, indicating an overall correct percentage of only 61.06%. As per as multiple linear regression analysis, the positively predicting factors of dengue prevention practice included: ⅰ) participants who are unemployed (ꞵ= 0.06, *p* < 0.025) in reference to ‘employed’, ii) previous history of dengue (ꞵ= 0.07, *p* < 0.042) in reference to ‘no’ previous history of dengue, iii) previous history of vector-borne disease (ꞵ= 0.09, p < 0.003) in reference to ‘no’ previous history of vector-borne disease, iv) sleeping time between 7 to 9 hours (ꞵ= 0.12, *p* < 0.028) in reference to ‘more than 9 hours’. v) father's educational qualification at university level (ꞵ= 0.03, *p* < 0.007) in reference to ‘Illiterate/ primary level’ **(Table 3)**. **Figure 1** illustrates the origins of information related to dengue prevention practices. Among the respondents, 29.41% and 12.24% cited media (including TV, internet, social media, etc.) and books/magazines, respectively, as their sources for information on dengue prevention practices.

***Predicting the association between perceived dengue risk and dengue prevention practice***

As per as multiple linear regression analysis, better dengue prevention practice is positively associated with higher perceived dengue risk: (ꞵ = 0.42, *p* <0.001) (**Table 4**).

**Discussion**

Assessing youth perceptions of dengue risk in Bangladesh is crucial for public health. Dengue, a globally concerning mosquito-borne virus, is on the rise in Bangladesh [11]. Given the substantial youth population, their outlook on dengue risk and preventive measures is of great importance. Their insights facilitate early detection and targeted prevention efforts [2]. This study delves into youth practices in response to perceived dengue risk, potentially guiding effective prevention measures [19]. Involving youth in dengue prevention can have a positive impact on communities [20]. The study's findings inform public health policies, addressing an existing research gap and making a significant contribution to the fight against dengue, shaping evidence-based strategies [21].

This research revealed a significant correlation between the perception of dengue risk and several factors, including educational level, gender, previous dengue experience, history of other vector-borne diseases, fathers' occupational status, and fathers' educational qualifications. Notably, individuals with educational backgrounds below the university level exhibited a higher perceived risk of dengue compared to those with university-level education, a finding consistent with a study in Riohacha, Colombia [22]. This connection can be attributed to the fact that individuals with lower educational levels, particularly among the youth, often possess limited health literacy, making it challenging for them to grasp the risks associated with dengue and how to safeguard themselves [23].

The study's findings indicate that female participants perceive a higher level of dengue risk compared to male, which is consistent with the results of another study [24]. This difference in perception may be attributed to females generally being more susceptible to fear and risk compared to male [25]. Additionally, in certain Asian communities, women tend to delay seeking hospital care until the later stages of the disease[24]. However, it's worth noting that contrasting results were observed in a separate study [26], possibly due to differences in the age groups of the participants. People with a prior history of dengue found to perceive a higher risk of contracting dengue, a finding in alignment with two studies that have suggested an association between previous exposure to different serotypes of the dengue virus and the perception of dengue risk [22], [27]. This connection is likely influenced by personal experiences, as those who have had direct encounters with dengue or have close connections with individuals affected by the disease are more inclined to believe that the risk of dengue is elevated in their area [22], [23].

Top of Form

The study finding illuminated that there is a positive correlation between a prior history of vector-borne diseases and the perception of heightened dengue risk. This observation is consistent with findings from other studies [23] [28]. The rationale behind this connection is that individuals who have encountered other vector-borne diseases may recognize the shared transmission method, often via mosquito bites, which subsequently leads them to believe there is a greater risk of contracting dengue [23]. Interestingly positive association was found between father's occupation level with perceived dengue risk. Individuals whose fathers were employed were found to have a significantly higher risk compared to those whose fathers were unemployed. This findings aligns with another study [2].The reasons behind the result of this association could be that occupational status can impact access to healthcare services, including early diagnosis and treatment of dengue cases which ultimate make them aware about dengue [29].

This is evident from this study that, individuals whose fathers have only completed primary education or are entirely illiterate show a stronger correlation with perceived dengue risk and prevention practice compared to those with educated fathers. A similar outcome was observed in a Nepalian study [30]. Illiterate parents may possess limited knowledge regarding the significance of measures like using mosquito nets, repellents, or maintaining a clean environment to prevent dengue [31], [32]. Additionally, the lack of education can act as a hindrance to accessing healthcare services, potentially resulting in delayed diagnosis and treatment of dengue cases [2].

Key factors affecting dengue prevention practices encompass employment status, previous dengue or vector-borne disease history, sleep duration, and fathers' educational qualifications. Notably, individuals who are unemployed tend to exhibit more robust dengue prevention practices, a pattern corroborated by previous studies [32], [33]. This might be attributed to the fact that individuals without jobs often spend more time at home, where they are more inclined to engage in cleaning and maintaining their living environments [34], [35].

Study findings demonstrates that who had previously contracted dengue fever tended to engage in more extensive dengue prevention practices. This discovery aligns with findings from other studies [36][37]. People who have experienced dengue in the past are typically more conscious of the disease's severity and the discomfort it brings. Those who have previously endured dengue may have an increased fear of experiencing the disease again, which in turn drives them to adopt preventive practices to lower their risk of reinfection [36] [33]. There was a significant link between prior experience with vector-borne diseases and dengue prevention practices in this study, as seen in another studies [37] [23]. Having had a previous illness can make individuals more inclined to use mosquito nets, repellents, and eliminate breeding sites, underlining the importance of prevention [28].

A significant correlation was observed between the average duration of sleep and engagement in dengue prevention practices. Those who consistently get a recommended 7 to 9 hours of sound sleep appear to be more conscious of dengue prevention measures, and this pattern was similarly identified in another study [38]. This connection may be attributed to the fact that individuals who enjoy better sleep tend to have improved overall health, which in turn enhances their ability to participate in activities such as eliminating stagnant water or using mosquito nets to guard against dengue [39]. Additionally, the study highlights a positive association between the perception of dengue risk and the adoption of dengue prevention practices. This outcome aligns with a separate study [22]. It's natural for people who perceive a dengue risk to take preventive measures. This correlation can be explained by the fact that heightened awareness of the disease and its potential consequences motivates individuals to actively engage in dengue prevention [28].

In summary, this study provides valuable insights into the dynamics of perceived dengue risk and prevention practices among the youth in Bangladesh. The findings corroborate some earlier research while presenting novel insights into the association between perceived risk and preventive actions. These results can inform targeted public health interventions and campaigns aimed at increasing awareness and motivating individuals to take proactive steps in dengue prevention. Further research in this area is essential to strengthen the evidence base and refine strategies to combat the dengue virus effectively.

***Limitations******of this study***

The study has several limitations that should be acknowledged. Firstly, the use of convenience sampling may introduce selection bias and limit the generalizability of the findings to the broader population of other areas. Secondly, collected data can be subject to recall bias/response and social desirability bias, potentially affecting the accuracy of responses because of self-reported measures. Additionally, the cross-sectional design of the study prevents establishing causal relationships and understanding changes over time. A longitudinal or prospective study will be helpful in this context. Moreover, the lack of a comparison group and limited generalizability to other regions or countries restricts the applicability of the findings. It is important to consider these limitations when interpreting the results and drawing conclusions.

**Conclusion**

In conclusion, this study has provided a comprehensive analysis of perceived dengue risk and prevention practices among the youth in Bangladesh. The research has revealed significant correlations between various demographic and personal factors and both the perception of dengue risk and the engagement in dengue prevention practices. Key factors include previous dengue history, history of other vector-borne diseases, gender, educational level, father's educational qualification, employment status, adequate sleep duration, father's occupation, etc. These findings can serve as a foundation for targeted public health initiatives, campaigns, and educational endeavors aimed at enhancing awareness and encouraging proactive dengue prevention measures. Given the persistent dengue threat in Bangladesh and similar regions, this research constitutes a valuable addition to the knowledge base, supporting the development of effective strategies against the dengue virus.

***Abbreviations***

DENV: Dengue Virus, DF: Dengue Fever, BDT: Bangladeshi Taka (currency), WHO: World Health Organization, SPSS: Statistical Package for the Social Sciences, STATA: Software for Statistics and Data Science, Likert scale: A psychometric scale commonly involved in research surveys, Cronbach's alpha: A measure of internal consistency reliability, IRB: Institutional Review Board, SD: Standard Deviation, CI: Confidence Interval

***Authors’ contribution***

All listed authors have reviewed and endorsed the manuscript, with no other individuals meeting the authorship criteria left unmentioned. The specific contributions of each author are detailed below:

**ABS**: Conceptualization; Methodology; Investigation; Data collection; Formal analysis; Writing- original draft, Writing- review and editing; **NTO**: Data collection, Formal analysis; Writing- original draft; **SMR**:Data collection, Formal analysis; Writing- original draft; **SSBH:** Data collection, Writing- original draft; **NR:** Data collection, Writing- original draft; **SS:** Data collection, Writing- original draft; **AG:** Data collection, Writing- original draft; **IA:** Data collection, Writing- original draft; **YA:** Data collection, Writing- original draft; **AA:** Writing- original draft, Writing- review and editing; **MTS:** Conceptualization; Methodology; Supervision; Writing- review and editing.

***Data Availability Statement***

The data underlying this article will be shared on reasonable request to the corresponding author.

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**Declaration**

***Ethics approval and consent to participate***

The Bio-Safety, Bio-Security, and Ethical Committee at Jahangirnagar University thoroughly examined and approved the study protocol [Ref. No: BBEC, JU/M2023/08(59)]. All of the study's procedures conformed to standards for human involvement research (e.g., the Helsinki Declaration). Data were collected anonymously, and numerical codes were employed for analysis. Inform written consent was obtained from each participant where the study's procedures, objectives, and confidentiality about their information, etc. were clearly documented. The data were collected anonymously and analyzed using numerical codes and no identifying numbers or images were taken.

***Consent for publication***

All participants have given their consent regarding publishing their statement and data.

***Competing interests***

The authors state that they have no potential conflicts of interest in publishing the results of their research.

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Table 1: General characteristics of the population (N=1358)

|  |  |
| --- | --- |
| **Variables** | **n (%)** |
| **Age (Mean±SD)** | 22.11±1.72 |
| **Educational qualification** |  |
| Below university | 682 (50.2) |
| University level | 676 (49.8) |
| **Permanent residence** |  |
| Rural | 467 (34.4) |
| Urban | 641 (47.2) |
| Semi-urban | 250 (18.4) |
| **Monthly family income** |  |
| Less than 20,000 BDT | 404 (29.8) |
| 20,000 to 50,000 BDT | 700 (51.5) |
| More than 50,000 BDT | 254 (18.7) |
| **Gender** |  |
| Male | 682 (50.2) |
| Female | 676 (49.8) |
| **Marital status** |  |
| Unmarried | 1257 (92.6) |
| Married | 101 (7.4) |
| **Family type** |  |
| Nuclear family | 686 (50.5) |
| Large family | 672 (49.5) |
| **Employment status** |  |
| Employed | 235 (17.3) |
| Unemployed | 1123 (82.7) |
| **Previous history of Dengue** |  |
| Yes | 328 (24.2) |
| No | 1030 (75.8) |
| **Family history of dengue** |  |
| Yes | 354 (26.1) |
| No | 1004 (73.9) |
| **Previous history of vector-borne disease except Dengue (Malaria, Filaria, West Lime virus, Lime disease, etc.)** | |
| Yes | 320 (26.1) |
| No | 1038 (76.4) |
| **Average sleeping time** |  |
| Less than 7 hours | 595 (43.8) |
| 7 to 9 hours (normal) | 669 (49.3) |
| More than 9 hours | 94 (6.9) |
| **Daily social media use (hours)** |  |
| Less than 2 hours | 38 (2.8) |
| 2 to 4 hours | 616 (45.4) |
| More than 4 hours | 704 (51.8) |
| **Father’s occupation** |  |
| Job holder | 632 (46.5) |
| Business | 452 (33.3) |
| Others | 225 (16.6) |
| Unemployed | 49 (3.6) |
| **Father’s educational qualification** |  |
| Primary or below | 164 (12.1) |
| Secondary/ higher secondary | 506 (37.3) |
| University level | 688 (50.6) |
| **Self-perception about own mental health** |  |
| Good | 1070 (78.8) |
| Bad | 288 (21.2) |

*Note: BDT Bangladeshi Taka*, *1 BDT 0.0091 U$$ in 4 November, 2023, SD= Standard Deviation.*

Table 2: Regression analysis predicting perceived Dengue risk

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Overall** | ***Bivariate regression analysis*** | | | | | ***Multivariable regression analysis*** | | | | |
| **Mean (SD)** | **B** | **SE** | **t** | **ꞵ** | ***p*-value** | **B** | **SE** | **t** | **ꞵ** | ***p*-value** | |
| **Age** |  | 0.39 | 0.20 | 1.91 | 0.05 | 0.057 | 0.31 | 0.21 | 1.49 | 0.04 | 0.136 | |
| **Education level** |  |  |  |  |  |  |  |  |  |  |  | |
| Below university | 53.07 (11.54) | 3.36 | 0.64 | 5.20 | 0.13 | **<0.001** | 3.49 | 0.68 | 5.11 | 0.14 | **<0.001** | |
| University | 49.71 (12.25) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Permanent Residence** |  |  |  |  |  |  |  |  |  |  |  | |
| Rural | 50.82 (12.61) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| Urban | 52.04 (11.31) | 1.22 | 0.73 | 1.68 | 0.05 | 0.094 | 1.01 | 0.79 | 1.27 | 0.04 | 0.203 | |
| Semi-urban | 50.83 (12.59) | 0.01 | 0.94 | 0.01 | <0.01 | 0.990 | 0.09 | 0.95 | 0.10 | <0.01 | 0.918 | |
| **Monthly family income** |  |  |  |  |  |  |  |  |  |  |  | |
| > 20,000 BDT | 50.66 (13.09) |  |  |  |  |  | Ref. |  |  |  |  | |
| 20,000-30,000 BDT | 51.71 (11.86) | 1.05 | 0.75 | 1.40 | 0.05 | 0.161 | -.08 | 0.81 | -0.11 | <0.01 | 0.914 | |
| > 30,000 BDT | 51.70 (10.85) | 1.03 | 0.96 | 1.08 | 0.03 | 0.282 | 0.02 | 1.08 | 0.02 | <0.01 | 0.982 | |
| **Gender** |  |  |  |  |  |  |  |  |  |  |  | |
| Male | 52.46 (12.10) |  |  |  |  |  | Ref. |  |  |  |  | |
| Female | 50.33 (11.85) | 2.12 | 0.64 | 3.27 | 0.08 | **0.001** | 1.97 | 0.66 | 2.96 | 0.08 | **0.003** | |
| **Marital status** |  |  |  |  |  |  |  |  |  |  |  | |
| Unmarried | 51.40 (11.86) | Ref. |  |  |  |  |  |  |  |  |  | |
| Married | 51.41 (13.85) | 0.00 | 1.24 | 0.01 | 0.08 | 0.994 | 0.84 | 1.27 | 0.66 | 0.01 | 0.509 | |
| **Family type** | | | | | | | | | | | | |
| Nuclear | 51.31 (12.77) | Ref. |  |  |  |  |  |  |  |  |  | |
| Large | 51.49 (11.20) | 0.18 | 0.65 | 0.28 | 0.08 | 0.782 | 0.80 | 0.67 | 1.20 | 0.03 | 0.231 | |
| **Employment status** | | | | | | | | | | | | |
| Employed | 50.63 (13.39) | Ref. |  |  |  |  |  |  |  |  |  | |
| Unemployed | 51.56 (11.71) | 0.92 | 0.86 | 1.08 | 0.02 | 0.282 | 1.39 | 0.89 | 1.56 | 0.04 | 0.119 | |
| **Previous history of Dengue** |  |  |  |  |  |  |  |  |  |  |  | |
| Yes | 52.76(12.43) | 1.16 | 0.74 | 1.57 | 0.04 | **0.018** | 1.01 | 0.65 | 0.64 | 0.03 | **0.029** | |
| No | 50.96(11.85) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Family history of dengue** |  |  |  |  |  |  |  |  |  |  |  | |
| Yes | 52.26(11.57) | 1.16 | 0.74 | 1.57 | 0.01 | 0.117 | **-0.02** | 0.80 | -0.03 | <0.01 | 0.980 | |
| No | 51.09(12.16) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Previous history of vector-borne disease** | | | | | | | | | | | | |
| Yes | 52.73(11.01) | 1.73 | 0.74 | 2.26 | 0.07 | **0.024** | 0.96 | 0.82 | 1.69 | 0.04 | **0.048** | |
| No | 50.99(12.29) | Ref. |  |  |  |  |  |  |  |  |  | |
| **Average sleeping time** | | | | | | | | | | |  | |
| Less than 7 hours | 51.29(11.41) | 0.45 | 1.33 | 0.34 | 0.01 | 0.731 | 1.23 | 1.33 | 0.92 | 0.05 | 0.356 | |
| 7 to 9 hours | 51.57(12.19) | 0.74 | 1.32 | 0.56 | 0.03 | 0.575 | 1.11 | 1.32 | 0.84 | 0.04 | 0.399 | |
| More than 9 hours | 50.83(14.39) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Daily social media usage** | | | | | | | | | | | | |
| Less than 2 hours | 52.08 (10.77) | 0.71 | 2.00 | 0.36 | <0.01 | 0.720 | 0.57 | 1.98 | 0.29 | <0.01 | 0.773 | |
| 2 to 4 hours | 51.39 (12.37) | 0.03 | 0.66 | 0.05 | <0.01 | 0.961 | -0.02 | 0.66 | 0.04 | <0.01 | 0.965 | |
| More than 4 hours | 51.36 (11.78) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Father’s occupation** |  |  |  |  |  |  |  |  |  |  |  | |
| Job holder | 51.75 (12.46) | 4.77 | 1.77 | 2.68 | 0.19 | **0.007** | 3.69 | 1.81 | 2.03 | 0.15 | **0.042** | |
| Businessman | 51.58 (11.33) | 4.60 | 1.80 | 2.55 | 0.18 | **0.011** | 3.75 | 1.79 | 2.09 | 0.14 | **0.037** | |
| Others | 50.99 (11.90) | 4.00 | 1.89 | 2.12 | 0.12 | **0.034** | 4.32 | 1.89 | 2.29 | 0.13 | **0.022** | |
| Unemployed | 46.98 (12.18) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Father’s Educational qualification** | | | | | | | | | | | | |
| Illiterate/ primary level | 48.52 (14.81) | 3.53 | 1.07 | 3.29 | 0.14 | **0.001** | 2.74 | 1.17 | 2.33 | 0.07 | **0.020** | |
| Secondary/Higher Secondary | 52.06 (11.57) | 3.08 | 1.04 | 2.96 | 0.12 | **0.003** | 0.37 | 0.77 | 0.49 | 0.01 | 0.626 | |
| University level | 51.60 (11.57) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| **Self-perception about own mental health** | | | | | | | | | | | | |
| Good | 51.35 (12.37) | Ref. |  |  |  |  | Ref. |  |  |  |  | |
| Bad | 51.56 (10.61) | 0.20 | 0.79 | 0.26 | <0.01 | 0.797 | -0.67 | 0.96 | -0.70 | -0.01 | 0.485 | |

*Note:* B=unstandardized regression coefficient; SE=Standard error; β=standardized regression coefficient; Bold indicates significant; †F(16,1341)= 3.36; p<0.001, R2Adj=0.027.

Table 3: Regression analysis Predicting Dengue prevention practice

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Overall** | ***Bivariate regression analysis*** | | | | | ***Multivariable regression analysis*** | | | | |
| **Mean (SD)** | **B** | **SE** | **t** | **ꞵ** | ***p*-value** | **B** | **SE** | **t** | **ꞵ** | ***p*-value** |
| **Age** |  | 0.26 | 0.24 | 1.05 | 0.02 | 0.292 | 0.22 | 0.26 | 0.86 | 0.02 | 0.392 |
| **Education level** |  |  |  |  |  |  |  |  |  |  |  |
| Below university | 56.10 (14.70) | 1.06 | 0.78 | 1.34 | 0.03 | 0.179 | 1.52 | 0.83 | 1.83 | 0.05 | 0.068 |
| University | 55.04 (15.01) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Permanent Residence** |  |  |  |  |  |  |  |  |  |  |  |
| Rural | 54.79 (15.25) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| Urban | 56.23 (13.80) | 1.22 | 0.73 | 1.62 | 0.04 | 0.105 | 1.32 | 0.97 | 1.37 | 0.04 | 0.172 |
| Semi-urban | 55.34 (15.08) | .55 | 1.14 | 0.48 | 0.01 | 0.629 | 0.45 | 1.16 | 0.39 | 0.01 | 0.696 |
| **Monthly family income** |  |  |  |  |  |  |  |  |  |  |  |
| > 20,000 BDT | 54.70 (15.55) |  |  |  |  |  | Ref. |  |  |  |  |
| 20,000-30,000 BDT | 56.12 (14.46) | 1.41 | .90 | 1.56 | 0.04 | 0.119 | 0.24 | 1.00 | 0.25 | <0.01 | 0.804 |
| > 30,000 BDT | 55.43 (13.08) | 0.73 | 1.16 | 0.63 | 0.01 | 0.531 | -0.83 | 1.32 | -0.63 | -0.02 | 0.528 |
| **Gender** |  |  |  |  |  |  |  |  |  |  |  |
| Male | 55.54 (14.95) |  |  |  |  |  | Ref. |  |  |  |  |
| Female | 55.61 (14.15) | 0.06 | 0.79 | 0.09 | <0.01 | 0.930 | -0.14 | 0.81 | -0.18 | <0.01 | 0.858 |
| **Marital status** |  |  |  |  |  |  |  |  |  |  |  |
| Unmarried | 55.47 (14.41) | Ref. |  |  |  |  |  |  |  |  |  |
| Married | 56.77 (16.27) | 1.29 | 1.50 | 0.86 | 0.02 | 0.389 | 2.21 | 1.55 | 1.42 | 0.03 | 0.155 |
| **Family type** | | | | | | | | | | | |
| Nuclear | 55.61 (14.98) | 0.07 | 0.79 | 0.09 | <0.01 | 0.929 | -.13 | .82 | -0.17 | <0.01 | 0.867 |
| Large | 55.54 (14.11) | Ref. |  |  |  |  |  |  |  |  |  |
| **Employment status** | | | | | | | | | | | |
| Employed | 53.80 (15.59) | Ref. |  |  |  |  |  |  |  |  |  |
| Unemployed | 55.94 (14.31) | 2.13 | 1.04 | 2.05 | 0.05 | **0.041** | 2.44 | 1.09 | 2.24 | 0.06 | **0.025** |
| **Previous history of Dengue** |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 55.29 (14.42) | 0.36 | 0.89 | 0.40 | 0.01 | 0.691 | 2.38 | 1.17 | 2.04 | 0.07 | **0.042** |
| No | 55.66 (14.60) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Family history of dengue** |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 55.63 (14.06) | 0.07 | 0.74 | 0.09 | <0.01 | 0.930 | -0.11 | 0.98 | 0.26 | <0.01 | 0.909 |
| No | 55.55 (14.73) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Previous history of vector-borne disease** | | | | | | | | | | | |
| Yes | 57.21 (12.97) | 2.13 | 0.92 | 2.30 | 0.06 | **0.021** | 3.42 | 1.13 | 3.01 | 0.09 | **0.003** |
| No | 55.07 (14.98) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Average sleeping time** | | | | | | | | | | |  |
| Less than 7 hours | 55.31 (14.67) | 2.72 | 1.61 | 1.69 | 0.09 | 0.091 | 2.79 | 1.63 | 1.71 | 0.09 | 0.087 |
| 7 to 9 hours | 56.22 (14.19) | 3.63 | 1.60 | 2.27 | 0.12 | **0.023** | 3.56 | 1.61 | 2.21 | 0.12 | **0.028** |
| More than 9 hours | 52.59 (16.05) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Daily social media usage** | | | | | | | | | | | |
| Less than 2 hours | 56.76 (15.05) | 1.10 | 2.42 | 0.46 | 0.01 | 0.648 | 1.01 | 2.42 | 0.42 | 0.01 | 0.676 |
| 2 to 4 hours | 55.40 (15.25) | -0.25 | 0.80 | -0.32 | <0.01 | 0.751 | -0.15 | 0.81 | -0.19 | <0.01 | 0.849 |
| More than 4 hours | 55.66 (13.91) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| **Father’s occupation** |  |  |  |  |  |  |  |  |  |  |  |
| Job holder | 55.58 (14.50) | 1.39 | 2.15 | 0.65 | 0.19 | 0.518 | -0.49 | 2.21 | -0.22 | -0.01 | 0.822 |
| Businessman | 55.06 (13.85) | 0.87 | 2.18 | 0.40 | 0.18 | 0.689 | -0.39 | 2.19 | -0.18 | -0.01 | 0.859 |
| Others | 56.88 (15.81) | 2.69 | 2.29 | 1.17 | 0.12 | 0.241 | 2.35 | 2.31 | 1.02 | 0.06 | 0.308 |
| Unemployed | 54.18 (15.52) | Ref. |  |  |  |  |  |  |  |  |  |
| **Father’s Educational qualification** | | | | | | | | | | | |
| Illiterate/ primary level | 52.76 (16.61) | Ref. |  |  |  |  | Ref. |  |  |  |  |
| Secondary/Higher Secondary | 55.42 (14.46) | 2.65 | 1.30 | 2.04 | 0.08 | **0.042** | 2.86 | 1.37 | 2.09 | 0.08 | **0.037** |
| University level | 56.36 (14.02) | 3.60 | 0.26 | 2.85 | 0.12 | **0.004** | 3.89 | 1.44 | 2.70 | 0.03 | **0.007** |
| **Self-perception about own mental health** | | | | | | | | | | | |
| Good | 55.67 (14.85) | 0.47 | 0.96 | 0.49 | 0.01 | 0.624 | 0.31 | 1.18 | 0.27 | <0.01 | 0.789 |
| Bad | 55.20 (13.42) | Ref. |  |  |  |  | Ref. |  |  |  |  |

*Note:* B=unstandardized regression coefficient; SE=Standard error; β=standardized regression coefficient; Bold indicates significant; †F(18,1341)= 1.98; p<0.001, R2Adj=0.011.

Table 4: Regression analysis Predicting perceived Dengue risk and Dengue prevention practice

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Dengue risk** | | | | |
| **B** | **SE** | **t** | **ꞵ** | ***p*-value** |
| **Dengue prevention practice** | 0.34 | 0.02 | 17.18 | 0.42 | **<0.001** |

*Note:* B=unstandardized regression coefficient; SE=Standard error; β=standardized regression coefficient; Bold indicates significant; †F(1,1356)= 295.04; p<0.001, R2Adj=0.178.

Table 5: Dengue-prevention practice-related question

|  |  |
| --- | --- |
| **Items** | **Mean±Sd** |
| 1. I use mosquito repellent (lotion/spray/coil). | 4.50±2.12 |
| 1. I always keep water containers in my house tightly closed. | 4.78±1.80 |
| 1. I check for potential mosquito breeding inside the house. | 3.97±1.72 |
| 1. I put larvicide into the water storage to kill the mosquito larvae. | 3.60±1.68 |
| 1. I only dispose rubbish at the designated place. | 5.04±1.69 |
| 1. I made complaint to the authority when I found an illegal dumping site. | 4.05±1.72 |
| 1. I keep my drainage system properly maintained. | 4.63±1.72 |
| 1. I do not keep unused items that can store water. | 4.85±1.71 |
| 1. I made complaint to the authority when there is damaged vehicle idling in my neighborhood. | 4.00±1.67 |
| 1. I check for potential mosquito breeding place around the neighborhood. | 4.21±1.68 |
| 1. I participate in gotong royong activities to prevent dengue. | 4.03±1.70 |
| 1. I made complaint to the authority when I found illegal garden. | 3.96±1.68 |
| 1. I made complaint to the authority when I found illegal building structure. | 3.95±1.75 |