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RESEARCH ARTICLE

Socio-Demographic Factors and Livelihood Patterns of Dengue Affected Patients: Insights from Some Selected Hospitals of Bangladesh

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ABSTRACT

The study aims to explore the socio-demographic factors and livelihood patterns associated with dengue-affected patients in several selected hospitals in Dhaka South City (DSC), Bangladesh. It also attempts to examine the relationship between dengue fever and the socio-demographic profiles of the respondents, as well as the impact of lifestyle choices on dengue susceptibility. Several sampling techniques were adopted to select hospitals and study the responses from the participants. Employing a non-probability purposive sampling procedure, the researchers chose ten hospitals from the Dhaka South City corporation. Afterward, the study administered a probability-stratified random sampling to choose 300 respondents from the selected hospitals in Dhaka South City corporation. A structured questionnaire was prepared to conduct the face-to-face interviews of the selected respondents. A range of quantitative methods, including descriptive statistics and chi-square correlation analysis, were administered to analyze and present the collected data. The study reveals that a few socio-demographic factors, for instance, age, living area, gender, and usage of mosquito repellent, have a significant correlation with dengue fever. It demonstrates that a certain living standard can operate as one of the significant catalysts of fever among the respondents in the study area. The study emphasizes the need for evidence-based interventions, including targeted interventions by the Government of Bangladesh (GoB), to mitigate dengue risk factors among the identified population, ensure hygienic surroundings, and maintain health protocols individually, underscoring the importance of your role in public health.

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1. Introduction

Dengue fever, a common viral infection carried by mosquitoes, continues to pose a severe threat to global health. The World Health Organization (WHO) has identified the dengue virus as an alarming public health problem in over 100 countries, with an estimated 390 million diagnoses annually. The number of dengue cases has increased significantly in recent years, endangering about half of the global population. This viral infection may begin with mild flu-like symptoms to severe hemorrhagic fever, or both, frequently requiring hospitalization. Beyond just causing suffering to individuals, dengue has a profound impact on economies, communities, and healthcare systems. The situation in Bangladesh is particularly urgent, with a significant increase in the number of affected people in 2023, which is unusual in terms of seasonality and rapidity, unexpected growth (World Health Organization, [WHO], 2023). It is clear that effective dengue prevention and control strategies are urgently needed. Applying regression analyses, Akter et al. (2017) identified an upward trend in dengue incidence, attributing it to several socio-ecological factors. These include overseas arrivals, households with rainwater tanks, housing types, and land use patterns, particularly intensive uses and dryland agriculture. Their study underscores the complex interplay between human mobility, urban infrastructure, and agricultural practices in influencing the spread of dengue fever. Based on the findings of Haque et al. (2023), age distribution emerges as a significant risk factor for dengue fever ($p < 0.0001$). The authors also observed distinct patterns in the transmission of the dengue virus and the dynamics of the disease, highlighting their correlation with critical spatial dimensions. This suggests that understanding age-related vulnerabilities and spatial factors is crucial for effective dengue prevention and control strategies (Ibid).

The critical review of twenty-two studies (Banu et al. (2011), argued that global climate change is likely to impact the seasonal and geographical distribution of dengue fever (DF) in the region of Asia-Pacific. However, they noted that empirical evidence associated with dengue fever directly to climate change exhibits inconsistency across different geographical settings. Furthermore, in some countries where dengue fever is endemic, such empirical evidence is absent. This underscores the complexity of attributing changes in dengue fever patterns solely to climate change,

indicating a need for further research and consideration of multiple factors influencing disease dynamics. A recent study by Rahman et al. (2023) revealed that half of the respondents demonstrated awareness regarding the severe consequences of dengue fever, its common indications, and its communicable nature. However, many lacked knowledge about asymptomatic cases, the possibility of recurring infections in previously affected individuals, and the potential for the virus to be transmitted to a fetus. The study highlighted that respondents agreed on the importance of monitoring and controlling mosquito breeding sites in their families, communities, and by local authorities to prevent the spread of dengue. Despite this awareness, the researchers found that 60% of the study participants did not implement adequate preventive measures. This suggests a gap between knowledge and practice in dengue prevention, emphasizing the need for targeted educational campaigns and community engagement to improve adherence to preventive measures against dengue fever.

Based on Rahman et al. (2023), the study highlighted several key points regarding public awareness and preventive measures related to dengue fever: (a) Awareness: Approximately 50% of the respondents were aware of the severe effects, common symptoms, and infectious nature of dengue fever. However, there were notable gaps in knowledge: (i) many respondents were unaware that dengue fever could be asymptomatic, (ii) there was also a lack of awareness that a person previously infected could experience dengue fever again, (iii) knowledge about the possibility of transmitting the virus to a fetus was also lacking among respondents. The study also highlighted that while individuals recognized the importance of monitoring and maintaining environments to prevent Aedes mosquito breeding, a significant portion (60% of the study group) did not implement adequate preventive measures: for instance, practices such as cleaning and covering water storage were deficient, there was inadequate monitoring of potential breeding places for Aedes mosquitoes. Teurlai et al. (2015) showed that the spatial distribution of dengue fever cases is highly heterogeneous. The variables most associated with this observed heterogeneity are the mean temperature, the mean number of people per premise, and the mean percentage of unemployed people, all of which are highly correlated with

people's way of life. Rainfall plays a minor role in the spatial distribution of dengue cases during epidemics.

Fauzi et al. (2022) highlighted a significant increase in confirmed dengue incidences in West Java from January to March, with over 70% of regions experiencing their peak infections during this period, aligning with the rainy season's highest precipitation levels. Spatial analysis revealed hot spots primarily in the central, northern, northeastern, and southeastern areas of West Java. Similarly, De Sousa et al. (2021) examined 35 studies in Brazil, identifying correlations between dengue epidemics and various factors, including environmental, socioeconomic, and climatic influences, as well as vector-related aspects. Research initiatives like the current study are essential for addressing the rising dengue crisis in Dhaka city, emphasizing the need for targeted interventions based on localized data.

Previous studies on this phenomenon primarily focused on exploring the various causes of dengue in the country. Few researchers (Rahman et al.,2014; Fauzi et al., 2022) touched upon the family-related historical factors that found a significant relationship with dengue-affected patients. Studies that focused on the socio-demographic factors of the affected patients mainly explained the causal relationship between the patients and the fever (Akter et al.,2017). However, limited attention has been paid to exploring patients' socio-demographic factors and their association with dengue fever in Dhaka South City. Additionally, studies revealing the relationship between the livelihood patterns of the patients and dengue affection have not been widely explored in Bangladesh yet. As a result, the present research aims to fulfil the following specific research objectives: (i) to determine the socio-demographic factors associated with dengue fever among hospitalised patients, (ii) to reveal the existing or current lifestyle that affects the respondents suffering from dengue fever, (iii) to establish the relationship between dengue patients and their socio-demographic profile and also, (iv) to examine the associations between the respondents, lifestyle and dengue fever in the study area.

2. Methods and Procedures

2.1 Study Design and Sampling Technique

A cross-sectional study was conducted from October 30 to December 30, 2023, to evaluate the sociodemographic factors associated with dengue fever among the patients at purposively chosen some selected hospitals in the Dhaka South City Corporation (DSC). The researchers selected ten hospitals in the various parts of Dhaka South City Corporation where the dengue patients were admitted. After getting permission from the hospital authority, we met the patients and shared the objectives of our study. Based on our time suitability and the availability of other resources, the study selected 300 patients followed by purposive sampling as respondents to whom the structured questionnaire was provided. The study included participants who fulfilled the following eligibility requirements: (a) the dengue fever-affected patients were from the DSC, (b) all respondents were well informed about the study details, and (c) the interviewers confirmed the respondents about ensuring confidentiality of the information provided.

The researchers reviewed relevant literature to prepare the structured questionnaire reflecting the study's objectives. Before conducting this survey, the questionnaire was pretested among three patients not part of this research. The main reason for pretesting the questionnaire was to see whether they could understand it quickly or if any amendments were needed. By dint of this process, we found three questions they could not understand clearly, and thus we restructured them accordingly. Finally, the revised questionnaire was administered to survey the 300 dengue fever patients randomly selected from various hospitals to determine the relationship between socio-demographic characteristics, livelihood patterns, and dengue fever (see Table 1).

2.2 Quantitative Method

The study adopted a quantitative method to collect, analyse, and present the data. At first, the researchers utilised descriptive statistics, such as numbers and percentages, to analyse and present the collected data. Afterwards, as part of inferential statistics, we used the chi-square test to explore the relationship between the variables, such as socio-demographic and livelihood patterns as independent variables and

dengue fever as the dependent variable. The study administered SPPS 26 version software to analyse the collected data.

2.3 Ethical Considerations

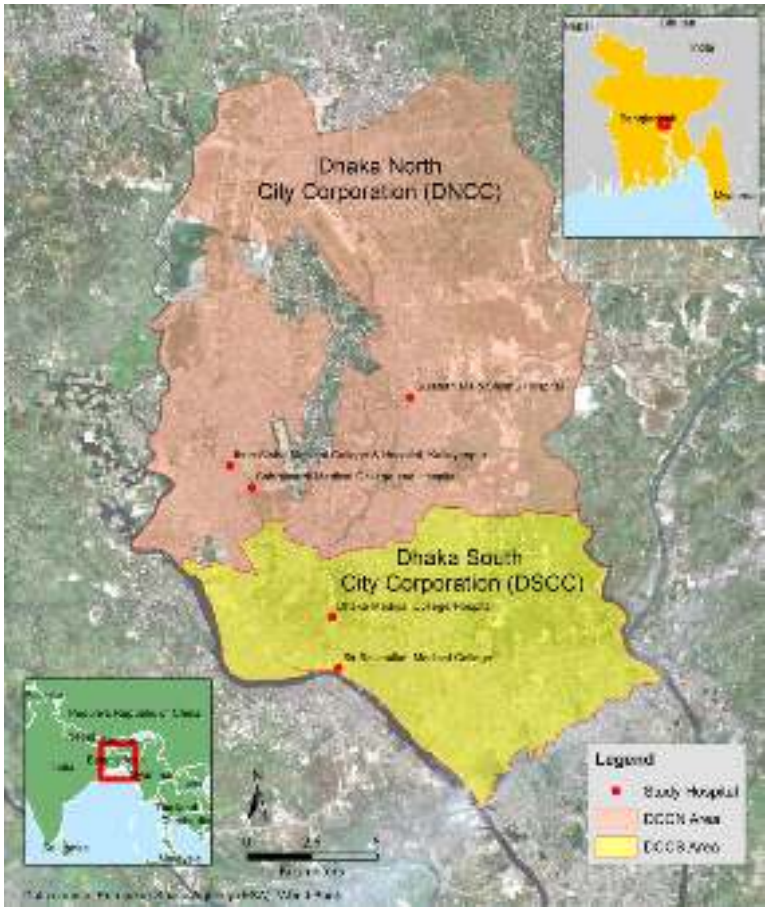
Before approaching the respondents, we took a consent letter from the Center for Research, Development, and Publications (CRDP), International Standard University (ISU) to showcase the essence of the study. This written document helped us to get permission from the selected hospitals and on getting access to the selected hospitals, we met the patients who were samples of our research. They gave us written consent before asking questions relevant to the study objectives. We assured the respondents that neither the information would be disclosed to the public nor they would be used for any non-academic/individual purposes. It took around 30 minutes to retrieve the necessary data using the questionnaire from each participant.

2.4 Limitations of the Study

The constraints faced by the researcher while collecting data from the respondents were mainly two-fold. First, patients' relatives showed their reluctance to help us meet with the respondents, and the respondents often felt sick during the interview. Second, nurses sometimes felt disturbed as we had to sit beside the patients to get the information, which might have interrupted them from doing their duties. To remove these barriers, we promised our utmost patience and sincerity and remained honest and open to answering questions related to this study.
The study area and hospitals from where survey respondents were selected are depicted in the following picture.

3. Data Analysis and Findings

This section illustrates data analysis and interpretation of the results. The primary data were collected from a total of 300 respondents and were coded and analysed with appropriate statistical analysis using SPSS version 26. The statistical tests performed in this study included frequency distribution, descriptive statistics, reliability analysis, and the Chi-square test.



(Source: The DSC Map, GoB, 2024)

Table 1. Socio-demographic characteristics and covariates of hospitalised dengue patients with descriptive statistics (N = 300).

Parameter/Question	Category	Frequency	Percentage (%)
Patient's Age	0-10 years	24	8.0
	11-20 years	71	23.7
	21-30 years	65	21.7
	31-40 years	54	18.0
	41-50 years	46	15.3
	50+ years	40	13.3
Patient's Gender	Male	158	52.7
	Female	142	47.3

Patients' Ethnicity	Bengali	286	95.3
	Others	14	4.7
Patients' Religion	Christianity	42	14.0
	Islam	236	78.7
	Hinduism	22	7.3
Patients' Marital Status	Single	123	41.0
	Married	160	53.3
	Widowed	17	5.7
No. of a family member	≤4	112	37.34
	≥5	188	62.66
Patients' Family Income	Below 5,000 BDT	10	3.3
	5,001 BDT-10,000 BDT	48	16.0
	10,001 BDT-20,000 BDT	57	19.0
	20,001 BDT-30,000 BDT	108	36.0
	30,000 BDT-50,000 BDT	69	23.0
	Above 50,000 BDT	8	2.7
Patients' Dengue History	Yes	41	13.7
	No	259	86.3
Dengue History of Patients' Family Members	Yes	249	83.0
	No	51	17.0
Having a River or Drain in the Patient' Living Area	Yes	270	90.0
	No	30	10.0
Patients' Mosquito Repellent usage status	Yes	85	28.3
	No	215	71.7
Patients' Environmental Status	Very poor	14	4.7
	Poor	75	25.0
	Average	163	54.3
	Good	47	15.7

(Source: Field Work, 2023)

The socio-demographic features associated with the respondents are listed in Table 1. The table reveals that most patients were between 11 and 30 years old, with 23.7% aged between 11 and 20. The gender distribution is almost equal, with 52.7% male and 47.3% female patients. 96% of the patients in the sample were of Bengali ethnicity. Islam was the predominant religion, with 78.7% of patients being identified as Muslims. The majority of patients were either single (41.0%) or married

(53.3%), and most (62.66%) had five or more family members. The income distribution was diverse, with the most significant percentage (36.0%) falling within the 10,001–20,000 BDT range. 86.3% of patients did not have a history of dengue, while 83% reported a history of dengue among family members. In addition, 28.3% of the patients reported using mosquito repellent. Ninety-nine of the patients lived near rivers or drains. Although environmental conditions differed, most patients (54.3%) considered their surrounding environmental status average.

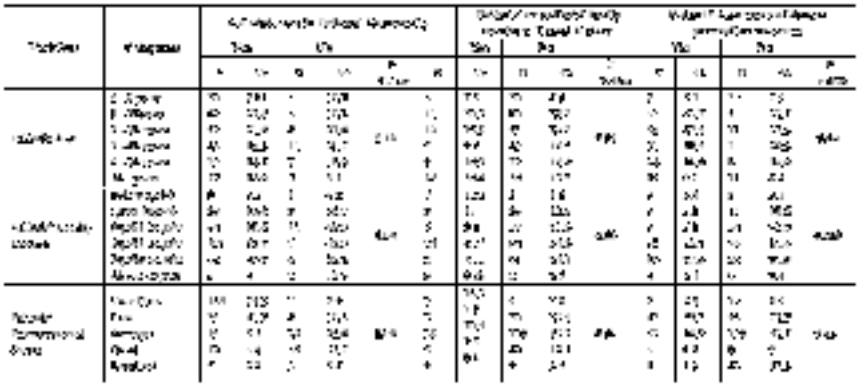
Table 2. Livelihood patterns of hospitalised dengue patients with descriptive statistics (N = 300).

Parameter/Question	Category	Frequency (N)	Percentage (%)
Affected Area in Patients Community	Yes	263	87.7
	No	37	12.3
Patients or patients' family members Travel History	Yes	53	17.7
	No	247	82.3
Factors contributing to dengue outbreak	construction site	28	9.3
	Dirty drain	160	53.33
	Garbage	53	17.7
	Rotten pond	47	15.7
	slum area	12	4.0
Patients' Awareness of dengue prevention measures	Yes	58	19.3
	No	242	80.7

(Source: Fieldwork, 2023)

Significant findings about the dengue outbreak and preventive measures in the interviewed community are displayed in Table 2. 87.7% of the patients reported that the dengue outbreak has seriously affected them. Travel history data shows that 82.3% of patients or their family members did not travel at certain distances recently. Dirty drains (53.33%) and garbage accumulation (17.7%) contributed to the outbreak, as confirmed by the respondents. Only 19.3% of the respondents said they knew about dengue prevention measures, indicating a potential need for focused intervention and awareness-raising campaigns.

le: 3 χ^2 analysis for assessing the association of different sociodemographic factors with the livelihood patterns among hospitalised dengue patients



(Sourse: Chi-square test, 2023)

The crosstab table shows the distribution of patients by age group and the affected areas in their community. The Chi-Square tests indicate that there is no significant association between age group and affected area in the patient's community (Pearson Chi-Square = 7.808, p = 0.167), suggesting that age is not a significant factor in determining whether an area is affected.

The table shows information about factors affecting dengue cases in a community. It highlights that people aged 21-30 and those with family incomes between Taka 20,001 and Taka 30,000 are more likely to be affected by dengue. It also demonstrates that living in areas with average environmental conditions and having a family income below Taka 5,000 can increase the risk. These findings help us understand who might be more at risk of getting dengue in the community so that focus on preventing it in those groups can be emphasised.

4. Discussion

The current study pointed out that the age group and the affected area (known as the independent variable) in their community did play a vital role in being affected by dengue fever. However, recent studies (Prattay et al., 2022; Rahman et al., 2018) demonstrated a significant positive association between a patient's age and the number of manifested symptoms (p = 0.013). They also showed that the average duration of

stay in the hospital and the patient's recovery time were positively correlated ($p < 0.01$) (Prattay et al.,2022). Mosabbir et al. (2023) utilized logistic regression and machine learning models to analyze the complex relationships between demographic characteristics and severe dengue outcomes. Their findings revealed that age emerged as the most significant predictor of severe dengue, with other important factors including education level, plasma leakage, platelet counts, and the presence of dyspnea. This study underscores the importance of demographic variables in understanding severe dengue risk and highlights the potential for using advanced modeling techniques to inform prevention and treatment strategies. According to Rokeya et al. (2017), their research identified several critical factors that influence both the risk of contracting dengue fever and the adoption of preventive practices: history of dengue fever, gender, educational level and qualification of parents, employment status, and sleeping duration. The study emphasized the importance of tailored strategies for different demographic groups to mitigate dengue risk effectively: (i) raising awareness about dengue symptoms, transmission routes, and preventive measures was highlighted as crucial, (ii) promoting active engagement in preventive measures, such as eliminating mosquito breeding sites and using mosquito repellents, was deemed essential, (iii) implications for public health policies. The findings underscored the necessity of developing targeted public health policies and campaigns that account for demographic variations in risk factors and the adoption of preventive behaviours.

The study by Rahman et al. (2022) revealed that the number of family members in a household plays a critical role in being affected by dengue fever. The findings showed that staying together in tiny places resulted in being affected by dengue fever. Many recent studies support the findings. For instance, a survey conducted by Rahman et al. (2022) found that living history, especially travelling behaviour to the incidence area, staying most of the daytime in an office (AOR = 18.10), living in 21–40 years old houses (AOR = 9.74). The temporary residency in the city (AOR = 10.20) was a statistically significant risk factor for getting a dengue infection. In addition, in the chi-square test result, daytime sleep, house type and structure, number of family members, morning and

evening walks, plants in residence, and junk yard around 250 m of the house also showed a significant effect (Ibid).

One of the socio-demographic factors, such as the income level of the respondents, is of significant relationship ($P<0.01$) with the fever. The result showed that respondents' income level significantly impacted the spread of dengue. Also, it demonstrated that respondents' higher income could help them to take appropriate measures, such as using mosquito nets, mosquito coils or candles and so on.

The study's results are supported by a study carried out by Ahmed et al. (2007). They revealed that dengue in high-income locals than that in slum areas is less common. About half of the city dwellers took no measures to combat the vector mosquitoes. Many of them did not know the exact types of Aedes breeding containers. They also found that each family spent about Tk. 233.4 (US $ 3.7) on an average in one month during peak dengue season. City dwellers thought they were willing to allow City Corporation people to check their premises for Aedes breeding, but 33.5% were unwilling to pay a fine if Aedes breeding was detected. Similarly, research conducted by Siddique et al. (2024) revealed that marital status, living in a nuclear family, being a non-smoker, having awareness about physical health, regular sleep patterns, moderate social media usage, older age, unemployment, and regular media influence are factors associated with higher knowledge and perception regarding the Dengue-climate change link. Moreover, a positive association was observed between the understanding of climate change and favourable attitudes toward the Dengue-climate connection. Watts et al. (2020) conducted a study in Australia that identified specific household characteristics associated with an increasing trend in dengue incidence. They found that economically disadvantaged households (42.8%) were particularly vulnerable, along with those with rainwater tanks (33.9%). Additionally, the study noted an increase in dengue cases among terrace houses (26.9%) and separate houses (26.5%). These findings suggest that certain socioeconomic and structural factors may contribute to the risk of dengue transmission, highlighting the need for targeted public health interventions in these at-risk communities.The current study pinpointed that respondents' living and environmental conditions are significantly associated with the dependent variable, meaning that dengue fever is likely to spread more by poor living

conditions and environmental conditions. The results signify that a significant portion of respondents live in unhealthy slum areas where the standard of living is largely overlooked. The poor living condition also affects the environment, as the drainage and other places remain dirty and uncleaned. Based on the findings from Hossain et al. (2023) and Rahman et al. (2023), several key points regarding dengue awareness, prevention practices, and socio-economic factors emerge (i) awareness and knowledge: a high percentage of urban residents are aware of dengue (99%) and understand that it is transmitted by mosquito bites (95%). This indicates a widespread recognition of the disease and its transmission mode among the urban population. (ii) challenges in preventive measures: despite awareness, many slum-dwellers face barriers in purchasing commercially available aerosols or coils for mosquito control. Only 40% of slum dwellers could afford these products, highlighting financial constraints, (iv) breeding sites and housing conditions: in slum areas and semi-permanent houses (semi-pucca), earthen jars and drums are commonly used for water storage, which are frequent breeding sites for Aedes aegypti mosquitoes, (v) responsibility for mosquito control: the majority of city-dwellers believe that both the government and citizens bear responsibility for mosquito control. This indicates a shared understanding of collective action in combating dengue transmission.

5. Conclusions, Limitations, and Recommendations

The study attempted to comprehensively understand perceived dengue risk and its causes among the people living in Dhaka south city in Bangladesh. The survey results underscored high perceived risk associated with several socio-demographic factors and a few factors of living standards of the respondents. It showed that respondents' income level, living place, environmental status of the locals, previous dengue history, educational level, and employment status have a significant association with dengue. The research recommends an urgent need for targeted public health interventions to enhance awareness and motivate proactive engagement in dengue prevention, especially among people living in poor urban areas. The evidenced-based suggestions revealed that the relevant officials of the government of Bangladesh (GoB) play a significant role in shaping the relevant government’s response to

infectious diseases. The study emphasised the importance of developing effective plans by policymakers and non-governmental organisations to reduce the escalating incidence of dengue in many parts of the country. The study's findings contribute valuable insights to inform evidence-based strategies for effectively combating the dengue virus and safeguarding public health in the country, specifically focusing on the youth population. The study gives the importance of tailoring prevention strategies for the various demographics, raising awareness, and encouraging active involvement in preventive measures. These insights are vital in developing effective public health strategies and campaigns to tackle the fever.

However, the study has a few limitations as it primarily relied on quantitative methods throughout the data collection analysis and presentation process. Following the procedures, the study collected quantitative data and presented them using descriptive and inferential statistical techniques. The quantittive method used in the study inherently limited the ability to gain comprehensive insights into the aims and objectives. Additionally, the sample size of 300 respondents may not be sufficient to capture a complete picture or provide valuable insights relevant to the research goals. This limitation underscores the need for larger and more diverse samples in future studies to enhance the reliability and applicability of the findings.

The study offers the evidence-based recommendations considered as follows:

(i) The relevant officials of the Government of Bangladesh (GoB) should adopt an effective strategy to protect the socio-economically disadvantaged people so that they can get the necessary dengue protective measures to tackle the disease successfully.

(ii) To address the country's current challenges, implementing social awareness strategies is crucial. Relevant officials of the Government of Bangladesh (GoB) should consider distributing insect-repellent creams or sprays, such as Odomos, to impoverished communities. Providing these products will help protect individuals from mosquito bites, especially on exposed skin areas like arms, legs, and neck. This initiative could significantly reduce the risk of dengue transmission and improve

public health outcomes among vulnerable populations.The people of the affected areas should wear long-sleeved shirts/tops and pants. During the fever outbreak, wearing socks can also help.

(iii) The government officials and locals should work together to control mosquitoes inside and outside their homes. They must be advised to keep window net screens closed and repair holes in screens, if any, to keep the mosquitoes outside.

(iv) The government must prioritise purchasing necessary protective measures and medicines to tackle the dengue epidemic. Also, relevant government policies are required to protect the affected people and ensure that these are enforced.

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Declaration of Interests

We, the authors of this research manuscript, declare that we have no financial interest. We have provided written consent to publish the paper in this journal.

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