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Short Communication

Dengue: The Enduring Endemic Challenge in Bangladesh

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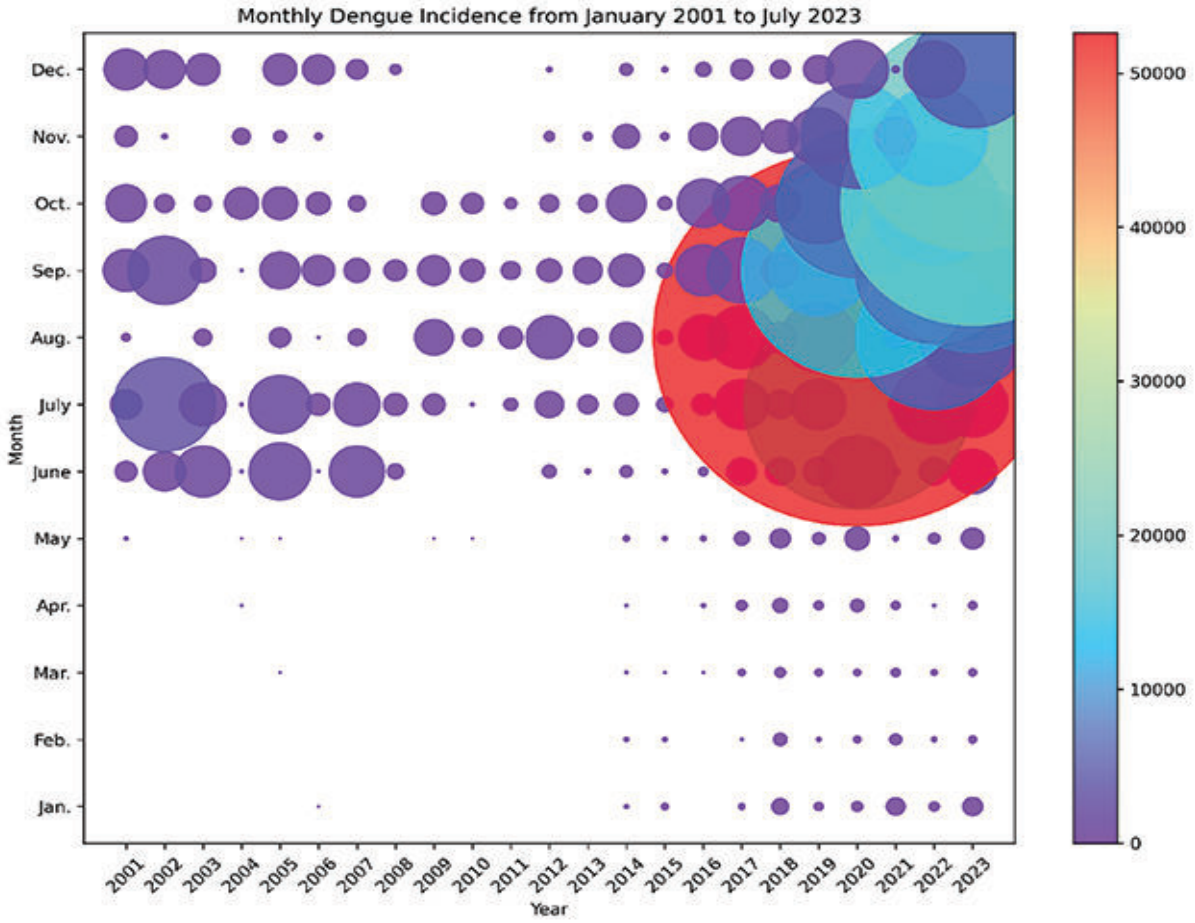
Graphical Abstract:



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In 2019, Bangladesh confronted a severe dengue epidemic; however, the current scenario in 2023 has escalated to a more dire state, as disclosed by the pre-monsoon survey carried out by the Health Department. The data reveals a substantial deterioration in comparison to 2019, with the density of Aedes mosquitoes, the principal vectors of dengue fever, and the number of potential breeding grounds reaching unparalleled levels over the past five years. The data collected during the pre-monsoon season survey in 2023 has

unveiled a disconcerting scenario concerning the dengue situation in Dhaka. Two crucial metrics, namely the gross index and the house index, have exhibited a significant upsurge in mosquito activity when compared to previous years. Among the 98 wards in Dhaka, a staggering 55 now exhibit a gross index surpassing 20, indicating that more than 20 containers out of every 100 in these regions harbor mosquitoes or their larvae. This stands in stark contrast to the preceding year, where merely 3 wards had a gross index exceeding 20. Additionally, the house index, which gauges the percentage of houses infested with Aedes mosquitoes, has experienced a worrying escalation. In 80 out of the 98 wards, the house index exceeds 10, marking a substantial surge when juxtaposed with the prior year when only 19 wards surpassed this threshold[1].

These statistics are cause for concern as they point to an elevated risk of dengue transmission in the affected regions. The survey data further illuminates the distribution of Aedes mosquito larvae across various habitats. A substantial portion, approximately 44 percent, was detected in multi-storied buildings, followed by around 40 percent in single houses and buildings under construction. The prevalence of larvae was particularly pronounced in waterlogged wet floors, plastic drums, pots, and flower pots. Additionally, the findings from the health department reveal a troubling trend, with 4 to 5 percent more Aedes mosquito larvae found in houses compared to the previous monsoon season. This observation is of particular concern as it signifies a notable upswing in mosquito breeding within residential areas, a trend not witnessed in the past four to five years [1].

Discussion:

In the year 2000, there were a total of 5551 reported cases of infection, resulting in 93 fatalities, leading to a CFR of 1.68%. By contrast, in the subsequent year, 2001, the overall number of infected cases dwindled to 2430; however, the number of deaths rose to 44, yielding a slightly higher CFR of 1.81%. These data imply that despite a reduced incidence of infections, the disease exhibited a relatively augmented fatality rate in 2001 compared to the preceding year, thereby warranting a comprehensive inquiry into the potential causes behind the increased mortality. Moving forward to 2002, there was a significant escalation in the total number of infected cases, surging to 6232; nevertheless, the number of deaths remained relatively low at 58, translating to a CFR of 0.93%. This observation indicates that despite the upsurge in infections, the disease manifested as less lethal concerning its impact on mortality in comparison to the preceding years. The year 2003 presents itself as an anomaly, with a relatively high CFR of 2.06% despite a lower number of infected cases, specifically 486. This striking disparity suggests that the disease displayed exceptional severity and fatality in 2003, prompting an exhaustive investigation into potential factors such as the emergence of a more virulent strain, or other underlying causes contributing to the increased mortality rate.

From 2004 to 2013, CFR demonstrated a generally subdued disposition, oscillating between 0.11% to 0.50%. This observation signifies that the affliction, on average, did not exhibit a significantly lethal propensity during this temporal span and could have been effectively managed through judicious healthcare provisions and strategic interventions. In the subsequent years, namely 2014, 2015, and 2016, the absence of reported fatalities resulted in CFR values of 0.00%, which strongly implies the implementation of efficacious disease control measures that effectively curbed mortality during these periods. Throughout the duration spanning from 2017 to 2020, CFR values sustained relatively diminished levels, ranging between 0.25% to 0.37%, demonstrating a consistent low impact on mortality during these years. However, recent years have witnessed an upsurge in CFR, culminating in 2023 with the highest recorded CFR at 0.48%. This increase in CFR in the latter years might signal a transformative shift in the disease's dynamics, the emergence of a novel strain, or other contributing factors necessitating vigilant scrutiny and proactive attention.

Overall, the data presented above showcases a dynamic and oscillating pattern in the incidence of infections and fatalities caused by the ailment across the years, devoid of any discernible linear trend. Certain years exhibit a substantial rise in infection cases, whereas others witness a decline. A noteworthy disparity is evident between the years 2000 and 2001, where the disease's fatality rate was proportionally higher in 2001, despite a lower number of infections, prompting the need for further investigation into potential factors influencing mortality. In 2002, despite a significant surge in infections, the disease's lethality remained relatively low, signifying variable impacts on mortality. However, the standout year of 2003 displayed a notably high CFR, necessitating a thorough examination of potential contributing factors. During the subsequent years from 2004 to 2013, the CFR remained consistently low, implying effective disease management. The absence of reported deaths in 2014, 2015, and 2016 denotes successful disease control measures. Nonetheless, recent years have exhibited an upward trend in the CFR, demanding attention to potential shifts in disease dynamics or emerging factors influencing disease severity. Details are presented in Table 1.

Table 1: *Dengue Incidence in Bangladesh* [2]

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	CFR
2000	Not Available												1.68
2001	0	0	0	0	5	152	310	24	655	514	159	611	1.81
2002	0	0	0	0	0	566	3281	0	1713	121	10	541	0.93
2003	0	0	0	2	1	4	4	0	3	372	100	0	2.06
2004	0	0	1	0	1	1209	1261	143	511	395	51	362	0.36
2005	1	0	0	0	0	3	174	2	337	187	19	325	0.38
2006	0	0	0	0	0	972	680	100	211	92	0	145	0.50
2007	0	0	0	0	0	85	179	0	163	0	0	39	0.00
2008	0	0	0	0	0	0	160	473	334	186	0	0	0.00
2009	0	0	0	0	1	0	4	125	188	156	0	0	0.00
2010	0	0	0	0	0	0	61	183	120	45	0	0	0.00
2011	0	0	0	0	0	61	255	691	193	114	36	9	0.44
2012	0	0	0	0	0	10	129	122	266	117	27	0	0.15
2013	6	7	3	3	12	50	172	339	385	501	218	53	0.11
2014	15	7	2	0	8	9	82	80	76	63	22	11	0.00
2015	0	0	2	6	10	28	171	765	965	869	271	75	0.19
2016	13	3	17	38	71	274	926	1461	1564	1097	542	154	0.23
2017	92	58	36	73	134	267	286	346	430	512	409	126	0.29
2018	26	7	19	29	52	295	946	1796	3087	2406	1192	293	0.26
2019	38	18	17	58	193	1884	16253	52636	16856	8143	4011	1247	0.18
2020	111	45	27	25	10	23	68	163	47	109	546	19	0.25
2021	32	9	13	3	43	272	2286	7698	7841	5458	3567	1207	0.37
2022	126	20	20	23	163	737	1571	3521	9911	21932	19334	5024	0.45
2023	566	166	111	143	1036	5956	43854	Not Available					0.48

In the context of Bangladesh, the data exhibits a disquieting trend concerning Dengue infections and fatalities, characterized by conspicuous gender disparities. Table 2 indicates a higher prevalence of Dengue cases among males compared to females. Specifically, the data reveals that the incidence of Dengue among males stands at a significantly elevated 63.9%, in contrast to the comparatively lower rate of 36.1% among females. This discrepancy suggests a greater susceptibility of Bangladeshi males to contract Dengue. Despite the heightened occurrence of Dengue cases among males, the data unveils a contrasting observation when it comes to fatalities, as the number of male deaths (111) is relatively fewer than female deaths (140). It implies that, despite a higher likelihood of contracting Dengue, males may experience more favorable survival outcomes compared to their female counterparts following infection.

Table 2: *Gender-wise Dengue incidence and death in January to July 2023*[2]

Female		Male		Total	
Infected	Death	Infected	Death	Infected	Death
18713	140	33119	111	51832	251

The data presented in Fig. 1 furnishes invaluable insights into the ramifications of dengue on distinct age cohorts during the inaugural months of 2023. Broadly, it becomes apparent that dengue exerts its influence across a wide spectrum of age groups, with the 11-40 years bracket evincing the highest number of documented incidents, totaling 34,838 infections. Within this age range, the toll is most pronounced, with 109 fatalities recorded. Furthermore, the data underscores the susceptibility of younger cohorts, as youngsters aged 0 to 5 years and those between 6 and 10 years collectively account for 6,685 cases and 23 deaths. Moreover, the elderly populace, aged 61 years and above, is also profoundly impacted, encompassing a total of 2,261 cases and 45 fatalities across the 61-80 years and above 80 years age cohorts. These parallels are also discernible in previous years' outbreaks of dengue. Specifically, in 2000, the vast majority, surpassing 80%, of reported instances predominantly affected the adult demographic. Similarly, in subsequent outbreaks transpiring in 2002, 2016, 2018, and 2019, a conspicuous majority of confirmed cases were concentrated in the age bracket ranging from 16 to 40 years[3-7].

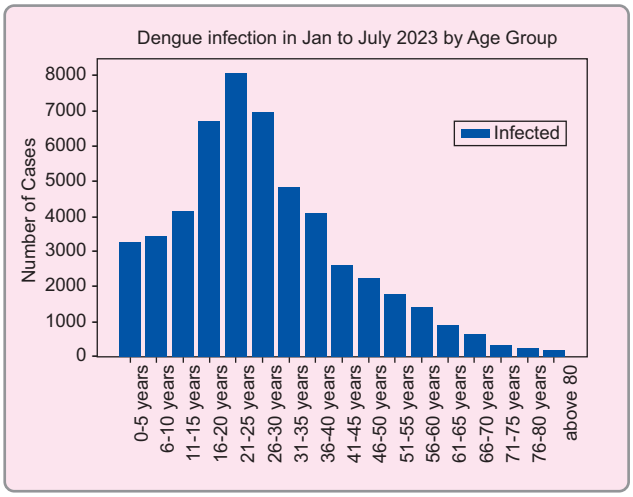

Figure 1: *Age-wise dengue incidence in January to July 2023*[2]

Table 3. *The descriptive statistics of dengue incidence for the months of January to July in the years 2022 and 2023.*

Descriptive statistics	2022	2023
Mean	12.55	244.49
Median	2	13
Standard Deviation	20.09	575.85
Coefficient of Variation	1.60	2.355
Minimum	0	0
Maximum	99	2731
25th percentile	0	4
50th percentile	2	13
75th percentile	77	98

The dengue incidence data for the months of January to July in the years 2022 and 2023 presents a compelling and concerning picture of the disease's prevalence and its alarming escalation over time as shown in Table 3. In 2022, the mean dengue incidence was relatively low at 12.55 cases, with a median of 2, indicating a distribution skewed towards lower values. However, in just a single year, the landscape drastically transformed as 2023 saw a staggering increase in dengue cases, with the mean soaring to 244.49 cases and the median spiking to 13. The standard deviation also expanded from 20.09 in 2022 to a remarkable 575.85 in 2023, revealing a significantly wider dispersion of data points around the respective means. The maximum number of recorded cases skyrocketed to 2731 in 2023, signifying a startling surge in the highest reported daily incidence. Moreover, in 2023 (January to July), there are several spikes in dengue incidence, with some days reporting more than 100 cases. These spikes may indicate outbreaks or clusters of dengue infections on specific days. In contrast, 2022 seems to have a more consistent pattern of lower daily dengue cases, with only a few days reporting higher numbers. There is a notable difference in the overall magnitude of the dengue incidence between 2023 and 2022. The analysis suggests that there might have been a higher prevalence of dengue cases in 2023 compared to 2022, with more sporadic and pronounced spikes in incidence.

Control Measure and Awareness:

The collective consciousness, or the shared awareness of many people, plays a crucial role in preventing dengue. It's important for all of us to understand how serious this matter is and take active steps to protect ourselves from this dangerous disease. The mosquitoes that carry dengue, called Aedes mosquitoes, are very clever in laying their eggs in various places, like flower tubs, cooling appliances, hidden spots under refrigerators, and abandoned objects like car tires, water bottles, and cans. They can adapt to different environments, which makes it easy for them to multiply in many places. To effectively fight against these sneaky mosquitoes, we need to regularly and thoroughly clean our surroundings. By getting rid of potential places where they breed, we can slow down their reproduction and reduce their numbers. We should also protect ourselves personally from these mosquitoes. When we sleep, it's essential to use mosquito nets to create a barrier between us and the disease-carrying insects. We should also install mosquito nets on doors and windows to keep them from entering our homes. Applying mosquito repellent cream on exposed areas of our bodies is another important way to shield ourselves from mosquito bites and lower our chances of getting infected. To eliminate mosquitoes in our living spaces, we need to use sprays or coils designed to kill them regularly. By doing this, we create a strong defense within our homes and keep these pests away from us. Lastly, it's crucial to be constantly aware and careful in protecting ourselves from mosquito-borne diseases. Making these preventive measures a part of our daily routine ensures that we stay prepared and protected from potential outbreaks. Taking these proactive steps is essential in the fight against dengue and other mosquito-related illnesses. It shows that we care not only about ourselves but also about the well-being of our communities.

References:

1. "*Dengue may turn alarming this year*", Newspaper: Daily Prothom Alo. Writer: Staff Correspondent, Dhaka, Published date: 5/7/2023. Link: https://en.prothomalo.com/bangladesh/4zh6qlza9r

2. Management Information System (MIS), Directorate General of Health Services (DGHS). Link: https://old.dghs.gov.bd/index.php/bd/home/5200-daily-dengue-status-report

3. Islam, M. A., Ahmed, M. U., Begum, N., Chowdhury, N. A., Khan, A. H., Parquet, M. del C., Bipolo, S., Inoue, S., Hasebe, F., Suzuki, Y., & Morita, K. (2006). Molecular characterization and clinical evaluation of dengue outbreak in 2002 in Bangladesh. Japanese Journal of Infectious Diseases, 59(2), 85–91.

4. Rahman, M., Rahman, K., Siddque, A. K., Shoma, S., Kamal, A. H. M., Ali, K. S., Nisaluk, A., & Breiman, R. F. (2002). First outbreak of dengue hemorrhagic fever, Bangladesh. Emerging Infectious Diseases, 8(7), 738–740.

5. Sultana, N., Fatema, N., Hossain, M. Z., Rahman, M. A., Nehar, N., Yeasmin, M. M., Sharmin, R., Sweety, A. A., & Pervin, M. (2020). Frequency of dengue infection in febrile patients attended Dhaka Medical College Hospital during January to December, 2018. Journal of Dhaka Medical College, 28(1), 105–111.

6. Hasan, M. J., Tabassum, T., Sharif, M., Khan, M. A. S., Bipasha, A. R., Basher, A., Islam, M. R., Amin, M. R., & Gozal, D. (2021). Clinico-epidemiologic characteristics of the 2019 dengue outbreak in Bangladesh. Transactions of the Royal Society of Tropical Medicine and Hygiene, 115(7), 733–740.

7. Pervin, M., Sweety, A. A., Hossain, M. Z., Sharmin, R., Fatema, N., Rahman, M. A., Nehar, N., Yasmin, M., Khoda, M. M. E., Rahman, K. M., & Azad, K. A. K. (2018). Sera-epidemiology of Dengue virus infection in clinically suspected patients attended in Dhaka medical college hospital during January to December 2016. Journal of Dhaka Medical College, 26(2), 111–116.