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**Dengue Epidemic Worsens with Record 14 million Cases and 10,000 Deaths Reported in 2024**

**Authors:** Najmul Haider1\*, Mohammad Nayeem Hasan2, Joshua Onyango3, Masum Billah4, Danai Papakonstantinou 5, Priyamvada Paudyal 6, Md Asaduzzaman 7

1School of Life Sciences, Faculty of Natural Sciences, Keele University, Keele, Staffordshire, United Kingdom, ST5 5BG (NH: [n.haider@keele.ac.uk](mailto:n.haider@keele.ac.uk))

2Department of Statistics, Shahjalal University of Science and Technology, Sylhet 3114, Bangladesh (MNH: [nayeem5847@gmail.com](mailto:nayeem5847@gmail.com))

3The Harper and Keele Veterinary School, Keele University, Keele, Staffordshire, United Kingdom, ST5 5BG (j.o.onyango@hkvets.ac.uk)

4Department of Engineering, Staffordshire University, Stoke-on-Trent ST4 2DE, UK (MA: [md.asaduzzaman@staffs.ac.uk](mailto:md.asaduzzaman@staffs.ac.uk))

5School of Medicine, Keele University, Keele, Staffordshire, UK (DP: [d.papakonstantinou@keele.ac.uk](mailto:d.papakonstantinou@keele.ac.uk))

6Institute for Global Health and Wellbeing, School of Medicine, Keele University, Keele, Staffordshire, UK (PP: [p.paudyal@keele.ac.uk](mailto:p.paudyal@keele.ac.uk) )

**\*Correspondence:** [n.haider@keele.ac.uk](mailto:n.haider@keele.ac.uk)

**Abstract:**

Dengue virus (DENV) is the fastest-growing mosquito-borne disease worldwide. This article critically examines the global burden of dengue cases and fatalities in 2024 by analysing their distribution and identifying factors influencing dengue-related mortality.

We utilised monthly data on dengue cases and deaths reported through the World Health Organisation's (WHO) global surveillance system for dengue fever. We then performed a generalised linear regression model to understand country-level determinants of dengue-related mortality in 2024.

In 2024, a total of 14.28 million dengue cases were reported globally, surpassing the historic milestone of 7 million observed in 2023. This figure represents a twofold increase compared to 2023 and a staggering 27-fold rise compared to the year 2000 (n ~ 500,000). In 2024, over 10,000 dengue-related deaths were recorded, resulting in a global case-fatality rate of 0.07% with South America accounting for more than 6,800 deaths. Countries with higher temperatures (Incidence Rate Ratio [IRR]: 1.19, 95% Confidence Interval [CI]: 1.15–1.24), high rainfall (IRR: 1.01, 95% CI: 1.01–1.02), and those in the Southern hemisphere (IRR: 3.97, 95% CI: 2.90–5.42) were significantly associated with higher dengue-related mortality per million population.

The ongoing dengue outbreak underscores the urgent need for global investment in DENV research, vaccine development, vector control, and therapeutic strategies. We advocate for the inclusion of DENV in the WHO's Research and Development Priority Disease list to address the escalating global health threat posed by the disease.

**Introduction**

Dengue virus (DENV) is currently the world’s fastest-spreading mosquito-borne disease (1). In 2023, the world witnessed its first landmark of 6.5 million cases and 7000 deaths due to DENV. The record of cases and deaths by DENV is continuing to increase with new records continuing to emerge each year since 2021. While the number of cases and deaths is increasing, more geographical areas or countries are also reporting dengue cases. Since 2021, dengue cases have been recorded in mainland Europe and the USA (2). DENV is a member of the Flaviviridae family transmitted by *Aedes aegypti* and *Aedes albopictus*, mosquitoes of the genus *Aedes*.

Several factors are likely contributing to the global increase of dengue cases, including globalisation, rapid urbanization, and climate change (1). In 1950, approximately 31 million passengers travelled by air; however, in the post-Covid period, nearly 4.5 billion passengers are traveling globally each year (1). The rapid urbanisation since the 1980s has created ideal breeding sites for *Aedes* mosquitoes. Warmer temperatures enable mosquitoes to grow and spread more rapidly, bite humans more frequently, and shorten the extrinsic incubation period of the virus (3). Additionally, changes in rainfall patterns have extended vector seasons. In recent years, *A. albopictus* has spread to every continent except Antarctica. While the exact number of countries where *A. albopictus* is endemic remains uncertain, the mosquito has been identified in at least 20 countries across Europe (4). The spread and adaptability of *A. albopictus* is an increasing concern for dengue and other arboviruses, including Zika and chikungunya viruses.

The risk factors for severe dengue and/or fatalities due to DENV are similar to the risk of other infectious diseases including diabetes mellitus, obesity, and hypertension (5). We thus hypothesised that countries with higher urbanisation rates and population density, higher temperatures, and rainfall might experience a higher burden of dengue cases while those with higher prevalence of co-morbidities (diabetes, hypertension, obesity, and elderly population) might experience a higher fatality rate (6). To explore these hypotheses, this article examines the global burden of dengue cases and fatalities in 2024 by analysing their distribution and identifying factors influencing dengue-related mortality.

**Methods**

**Data sources:** We collected daily reports of new dengue cases and deaths, monthly reported cases and deaths, and cases and deaths per million inhabitants worldwide from the WHO Global Dengue Surveillance system for the period from January 01, 2024 to December 31, 2024 (7). We also explored the nation-level factors affecting dengue-related deaths.

We considered cases and deaths per million population as the outcome variable, while predictor variables included population density (8), the percentage of the population aged 65 years or older (9), the percentage of the urban population (10), the prevalence of obesity (11), Diabetes (12) and hypertension (13), as well as environmental factors such as average temperature and total rainfall (14). These data were gathered from the World Bank, other United Nations sources, and ‘Our World in Data’.

**Statistical analysis**

We performed summary statistics for dengue cases and deaths and calculated the incidence by continent, and for the northern and southern hemispheres, using monthly and yearly data. We used line graphs for monthly cases and death records for the northern and southern hemispheres in 2024. To identify independent predictors of dengue cases and deaths, a generalised linear regression model with a Poisson distribution was employed. Statistical analyses were performed using R Version 3.5.2.2 (15).

**Results**

Between 01 January and 31 December 2024, a staggering 14,284,310 dengue cases were recorded worldwide. This is the highest-ever recorded dengue cases since the global dengue recording system was introduced in xx. This figure is more than double compared to the previous record of 6.8 million detected by the WHO in 2023. Compared to the cases recorded in 2014 (*n*=1,206,644), global dengue fever has increased by 12 fold in 2024 **(Fig 1)**.

The year 2024 also recorded the highest number of deaths since the recording system was available, with 10,554 fatalities resulting in a case-fatality ratio of 0.07%. The death toll in 2024 was 15 times higher compared to the deaths recorded in 2014 (*n*=683) **(Fig 1)**.



**Figure 1. Global monthly dengue cases by year (2014-2024). Data collected from the WHO’s global dengue surveillance system (**[**https://worldhealthorg.shinyapps.io/dengue\_global/**](https://worldhealthorg.shinyapps.io/dengue_global/) **)**

The dengue seasonality varied in the Southern and Northern hemispheres due to the variation in weather patterns in the two opposite hemispheres of the globe. In the Northern Hemisphere, the highest number of dengue cases occurred in October, with 1,350,467 cases **(Fig 2),** despite the temperature peaking in July-August. In the Southern Hemisphere, the highest number of cases was recorded in April with 6,127,208 dengue cases **(Fig 2)**. The temperature reached a peak in January in the Southern Hemisphere. The country with the highest number of dengue cases in the Southern Hemisphere includes Brazil (*n*=10,223,107), Argentina (*n*=581,559), and Paraguay (*n*=295,785).



**Figure 2: Monthly Global dengue cases by hemisphere (Northern as red, Southern as green, and total as blue) for 2024. Data were collected from the WHO’s global dengue surveillance system (**[**https://worldhealthorg.shinyapps.io/dengue\_global/**](https://worldhealthorg.shinyapps.io/dengue_global/) **)**

Country-wise, Brazil reported the highest burden of dengue cases and fatalities; a total of 10,223,107 cases resulting in 47,698.82 cases per million were recorded in the country. The country also recorded the highest number of deaths for DENV with 6,068 deaths, contributing to the highest deaths per million population (28.31 death/M), followed by French Guiana (26.90 deaths/M) (Fig 3). In Europe, in 2024, a total of 213 dengue cases were reported in Italy, 85 cases in France, and 10 cases in Spain. In Africa, Niger reported a very high case fatality rate (20.70%, 12 deaths out of 58 Dengue cases), indicating a substantial underreporting of the cases.



**Figure 3: Global map of dengue cases and deaths in 2024 by country: (Per million population) Data were collected from the WHO’s global dengue surveillance system (**[**https://worldhealthorg.shinyapps.io/dengue\_global/**](https://worldhealthorg.shinyapps.io/dengue_global/) **)**

By continent, South America reported the highest dengue case count, with 11,875,396 cases and 7,217 deaths, translating to 238,373.15 cases per million (Cases/M) and 117.57 deaths per million (Deaths/M). The continent also exhibited a case fatality rate (CFR) of 0.06%. North America recorded 1,141,716 cases and 934 deaths, corresponding to 201,087.36 cases and 60.93 deaths per million population with a relatively lower CFR of 0.08%, while in Asia, 877,704 cases and 1,006 deaths, with a CFR of 0.11% were recorded. A lower number of cases and deaths was reported in Africa, although it recorded the second highest case-fatality rate at 0.09%, after Asia (Table 1). Globally, in 2024, there were a record of 14,073,666 cases and 9,316 deaths resulting to a CFR of 0.07%. The WHO region for Pan American Health Organization (PAHO) reported a total of 13,017,112 cases and 8,151 deaths while the South-East Asian region reported 505,487 cases and 854 deaths. The African region reported 156,966 cases and 140 deaths, with the Eastern Mediterranean region reported 81,375 cases and 17 deaths, while the Western Pacific region reported 311,093 cases and 150 deaths.

**Table 1: Comparing the dengue cases, deaths, and case fatality ratio (CFR) of dengue in 2024 by continent. Data were collected from the WHO’s global dengue surveillance system (**[**https://worldhealthorg.shinyapps.io/dengue\_global/**](https://worldhealthorg.shinyapps.io/dengue_global/) **)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Continents** | **Cases** | **Deaths** | **Cases/M** | **Deaths/M** | **CFR (%)** |
| Africa | 168,962 | 159 | 85,884.45 | 16.12 | 0.09 |
| Antarctica | 0 | 0 | -- | -- | -- |
| Asia | 877,704 | 1,006 | 22,946.79 | 15.71 | 0.11 |
| Europe | 308 | 0 | 5.12 | 0.00 | 0.00 |
| North America | 1,141,716 | 934 | 201,087.36 | 60.93 | 0.08 |
| Oceania | 9,580 | 0 | 19,860.92 | 0.00 | 0.00 |
| South America | 11,875,396 | 7,217 | 238,373.15 | 117.57 | 0.06 |
| **Total** | **14,073,666** | **9,316** | **568,157.79** | **210.33** | 0.07 |

We identified that several factors were associated with the increased case and death rate for dengue. The countries located in the Southern Hemisphere (IRR: 4.11, 95% CI: 4.08-4.14), a high mean annual temperature (IRR: 1.25, 95% CI: 1.20-1.28), high rainfall (IRR: 1.01, 95% CI: 1.01-1.02), and a high proportion of the urban population (IRR: 1.01, 95% CI: 0.98–1.01) demonstrated a significant association for country’s dengue cases/M **(Table 2)**. For dengue-related deaths/M population by country, high temperatures (Incidence Rate Ratio [IRR]: 1.19, 95% Confidence Interval [CI]: 1.15–1.24), high rainfall (IRR: 1.01, 95% CI: 1.01–1.02), and countries of Southern hemisphere (IRR: 3.97, 95% CI: 2.90–5.42) were with the contributing factors **(Table 2).**

**Table 2: Country-level factors associated with dengue cases, deaths, case–fatality ratio and other explanatory variables in different counties using a multiple linear regression model between 1 January 2024 and 31 December 2024. Data were collected from the WHO’s global dengue surveillance system (**[**https://worldhealthorg.shinyapps.io/dengue\_global/**](https://worldhealthorg.shinyapps.io/dengue_global/) **)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Country-level factors | Cases/M |  | Deaths/M | |
|  | IRR (95% CI) | *p*-value | IRR (95% CI) | *p*-value |
| Aged 65 and above (%) | 1.06 (1.06 - 1.07) | **<0.001** | 1.04 (1.02 - 1.07) | <0.001 |
| Urban population (%) | 1.01 (1.01 - 1.02) | **<0.001** | 1.01 (0.98 - 1.01) | **0.132** |
| Population density | 1.01 (1.01 - 1.02) | **<0.001** | 1.01 (0.99 - 1.02) | **0.098** |
| Obesity (%) |  | **<0.001** | 1.03 (1.01 - 1.06) | 0.003 |
| Average annual temperature | 1.25 (1.20 - 1.28) | **<0.001** |  |  |
| Total Rainfall | 1.01 (1.01 - 1.02) | **<0.001** |  |  |
| Hemisphere (Southern) | 4.11 (4.08 - 4.14) | **<0.001** | 3.97 (2.90 – 5.42) | **<0.001** |

**Discussion:**

The unprecedented global burden of dengue in 2024 underscores the alarming growth trajectory of this mosquito-borne disease. With over 14.28 million reported cases worldwide, dengue has exceeded the historic milestone of 7 million cases reported in 2023. This twofold increase within a year and a staggering 27-fold rise since 2014 highlight the escalating public health crisis. The significant mortality toll of over 10,500 deaths, with South America alone accounting for nearly 70% of these fatalities, emphasises the disproportionate regional impact of dengue. Such figures reveal the pressing need to address the multifactorial challenges driving the outbreak, including climate change, urbanisation, and resource disparities in healthcare and vector control. Without immediate action, the global trajectory of dengue may continue to worsen, further straining health systems and disproportionately affecting vulnerable populations.

The remarkable increase in dengue cases and deaths also underscores the critical importance of robust global data-sharing mechanisms. Surveillance systems such as the WHO’s global dengue surveillance could play a pivotal role in identifying trends, tracking outbreaks, and informing timely interventions(16). Comprehensive, real-time data collection enables accurate analysis of determinants such as temperature, population density, and urbanization, as demonstrated in this study. However, gaps in reporting persist, with a current delay of nearly two months on the WHO dashboard. The COVID-19 pandemic highlighted the importance of real-time data sharing, a practice that must be replicated for other diseases, including dengue. Countries that are not currently reporting dengue cases to the WHO platform including European countries should be encouraged and supported to participate in this global effort to enhance data transparency and collaboration. Addressing these challenges through investments in digital health infrastructure, standardised reporting protocols, and international collaboration is essential to improving the global response to dengue. Transparent and accessible data sharing will be vital for forecasting outbreaks, tailoring interventions, and evaluating the effectiveness of existing control measures

Given the escalating global health threat posed by dengue, the WHO should include the DENV in its ‘Prioritising diseases for research and development (R&D) in emergency contexts’ list (17). This designation would catalyse investment in critical areas such as vaccine development, therapeutic innovations, and enhanced vector control strategies. The current lack of a universally accessible and effective dengue vaccine leaves millions vulnerable to severe disease outcomes. Furthermore, this study highlights how climate and demographic factors exacerbate dengue-related mortality, underlining the need for tailored, multidisciplinary approaches to prevention and treatment. Prioritising DENV on the global R&D agenda would ensure coordinated efforts to address the growing burden of dengue and prevent future outbreaks of this magnitude. The inclusion of dengue as a priority disease is not just a scientific necessity—it is a moral imperative to protect global health and reduce the inequities associated with this preventable and treatable disease.

The current dengue control programme is heavily reliant on vector control strategies. While vector control remains an essential component in managing mosquito-borne diseases, its limited success has raised concerns about whether alternative approaches should be prioritised for controlling dengue and other arboviruses. Greater emphasis must be placed on the development of effective vaccines, novel therapeutics, improved patient management strategies, and early detection systems for secondary/severe dengue cases. A coordinated global priority-setting effort is urgently required to tackle dengue more effectively, with the WHO taking a leading role in these initiatives. The inclusion of dengue on the WHO priority disease list would not only facilitate action, but also drive investment and innovation in research and public health interventions. Strengthening international collaboration and resource allocation is critical to address the rising global dengue burden.

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**Conflicts of interest**

The authors declare no conflict of interest.

**Ethics statement**

There is no identifiable individual-level data, and ethical approval is not required.

**Author´s Contributions**

Conceptualization: NH, Data curation: MNH, writing original draft: NH, MNH, JO, Writing, review, and editing: MA, MNH, JO, MB, DP, PP

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