**Abstract**

This article critically assesses the global burden of dengue cases and fatalities in 2024, analysing their distribution and key factors influencing the case-fatality rate. A record 14.1 million cases were reported worldwide, doubling the 7 million recorded in 2023. Dengue-related deaths exceeded 9,000, with a global case-fatality rate of 0.07%. We urge the inclusion of DENV in the WHO’s Research and Development Priority Disease list to address this growing global health threat.

**Global rise of dengue cases**

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 [2]. The record of cases and deaths by DENV is continuing to increase, with new records continuing to emerge each year since 2021. Since 2021, indigenous 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 in dengue cases, including globalisation, rapid urbanisation, and climate change [1]. Rapid urbanisation worldwide since the 1980s has created ideal breeding sites for *Aedes* *aegypti* 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.

Individuals infected for the second time with a different dengue serotype can develop severe secondary dengue infection. Previous studies have demonstrated that individuals who are suffering from chronic diseases, such as diabetes, obesity, and hypertension, are at greater risk of progressing to severe disease [4]. This article examines the global burden of dengue cases and fatalities in 2024 by analysing their distribution and identifying factors influencing dengue-related fatalities.

**Data sources, study design and Statistical analysis**

We collected and analysed data from 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 from January 01, 2014, to December 01, 2024 [5]. We also explored the nation-level factors affecting dengue-related cases and deaths per million population.

We considered cases and deaths per million population as the outcome variable, while predictor variables included population density, the percentage of the population aged 65 years or older, the percentage of the urban population, the prevalence of obesity, diabetes and hypertension, and environmental factors such as average temperature and total rainfall. These data were gathered from the World Bank, other United Nations sources, and ‘Our World in Data’ [6–12].

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. A generalised linear regression model with Poisson distribution was employed to identify independent predictors of dengue cases and deaths. Statistical analyses were performed using R Version 3.5.2.2 [13].

**Global dengue cases and deaths in 2024**

Between 1 January and 1 December 2024, a staggering 14,098,279 dengue cases were recorded worldwide. This is the highest-ever recorded number of dengue cases since the global dengue recording system was introduced in 2010. This figure is more than double compared to the previous record of 6.8 million reported by the WHO in 2023. Compared to the cases recorded in 2014 (*n*=1,206,644), global dengue fever increased 12-fold in 2024 **(Figure 1)**. The year 2024 also recorded the highest number of deaths since the recording system was available, with 9,404 fatalities resulting in a case-fatality rate of 0.07%. The death toll in 2024 was 15 times higher compared to the deaths recorded in 2014 (*n*=683) **(Figure 1)**.

The dengue seasonality varied in the Southern and Northern hemispheres due to the variation in weather patterns in the two opposite hemispheres. The highest number of dengue cases in the Northern Hemisphere occurred in October, with 410,157 cases **(Figure S1)**. In the Southern Hemisphere, the highest number of cases was recorded in March, with 2,661,833 dengue cases **(Figure S1)**.

Country-wise, Brazil reported the highest burden of dengue cases and fatalities, with a total of 10,239,883 cases—equating to 47,777.09 cases per million. The country also recorded the highest number of dengue-related deaths, with 6,161 fatalities, resulting in the highest death rate per million (28.75 deaths/M), followed closely by French Guiana (26.90 deaths/M) **(Figure 2)**. In Europe, in 2024, 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).

By continent, South America reported the highest dengue case count, with 11,892,175 cases and 7,310 deaths, translating to 238,479.58 cases per million (Cases/M) and 118.00 deaths per million (Deaths/M). North America recorded 1,142,666 cases and 934 deaths, corresponding to 203,129.99 cases and 60.93 deaths per million population with a relatively lower CFR of 0.08%, while in Asia, 884,639 cases and 1,008 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 (0.11%) **(Table 1).**

In the generalized linear regression, several factors were associated with dengue's increased case and death rate. The countries located in the Southern Hemisphere (Incidence Rate Ratio [IRR]: 2.51, 95% Confidence Interval [CI]: 2.49-2.52), a high mean annual temperature (IRR: 1.19, 95% CI: 1.19-1.20), high rainfall (IRR: 1.01, 95% CI: 1.01-1.02) demonstrated a significant association for country’s dengue cases/M **(Table 2)**. For dengue-related deaths/M population by country, countries with higher prevalence of obesity (IRR: 1.03, 95% CI: 1.01–1.06), and those in the Southern hemisphere (IRR: 4.00, 95% CI: 2.92–5.46) were significantly associated with higher dengue-related mortality per million population **(Table 2).**

**Discussion**

The unprecedented global burden of dengue in 2024 highlights the alarming growth trajectory of this mosquito-borne disease. With over 14.1 million reported cases worldwide, dengue has exceeded the historic milestone of 7 million cases reported in 2023 [2]. This twofold increase within a year and a staggering 12-fold rise since 2014 highlight the escalating public health crisis. The significant mortality toll of over 9,000 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.

Dengue patients in the Southern Hemisphere experience four times higher deaths compared to their northern counterparts, primarily because of higher recorded deaths in Brazil and other South American countries [2,14]. Countries with higher aged population and obesity had a higher CFR due to DENV. Our findings confirm previous studies that have shown a higher fatality rate of severe dengue in older people [14]. The reasons behind that are not well established, but older individuals also have multiple co-morbidities, which may independently increase the risk of severe disease. Earlier studies showed that obesity increases the intrinsic permeability of the endothelial surface of hosts who have been previously infected by another serotype, thus permitting the occurrence of fluid shift [15].

Given the escalating global health threat posed by dengue, we advocate that WHO should include the DENV in its ‘Prioritising diseases for research and development (R&D) in emergency contexts’ list [16]. This designation would catalyse investment in critical areas such as vaccine development, therapeutic innovations, and enhanced vector control strategies. The lack of a universally accessible and effective dengue vaccine leaves millions vulnerable to severe disease outcomes [17]. 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. Including 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.

We collected data from the WHO’s global dengue surveillance platform, which is relatively new and updated from 1st January to 1st December 2024. As a result, our dataset does not fully cover the year 2024. Additionally, the WHO relies on dengue reports from various countries, each of which may use different definitions for dengue cases and dengue-related deaths. These variations between countries necessitate caution when interpreting and generalising the data.

The current dengue control programme is heavily reliant on vector control strategies [18]. While vector control remains essential in managing mosquito-borne diseases, its limited success has raised concerns about whether additional alternative approaches should be prioritized for controlling dengue and other arboviruses [18]. Greater emphasis must be placed on developing effective vaccines, novel therapeutics, improved patient management strategies, and early detection systems for secondary/severe dengue cases [17]. A coordinated global priority-setting effort is urgently required to tackle dengue more effectively, with the WHO taking a leading role in these initiatives [19]. The Inclusion of dengue on the WHO priority disease list would facilitate action and drive investment and innovation in research and public health interventions. Dengue was previously identified as an important disease by the WHO’s nominated expert member for listing Priority Diseases, such as in 2017 [20]. Strengthening international collaboration and resource allocation is critical to address the rising global dengue burden.

**Conclusion**

The sharp rise in global dengue cases and deaths in 2024 highlights the need for improved vector control, early detection, and effective vaccines. Prioritizing dengue in the WHO's research agenda, alongside global collaboration and investment, is crucial for reducing its burden and preventing future outbreaks.

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**Tables**

**Table 1: Comparing the dengue cases, deaths, and case fatality ratio (CFR) of dengue in 2024 by continent. Data were collected from 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 | 168,851 | 152 | 85,882.02 | 15.96 | 0.09 |
| Antarctica | 0 | 0 | -- | -- | -- |
| Asia | 884,639 | 1,008 | 23,010.63 | 15.78 | 0.11 |
| Europe | 308 | 0 | 5.12 | 0.00 | 0.00 |
| North America | 1,142,666 | 934 | 203,129.99 | 60.93 | 0.08 |
| Oceania | 9,640 | 0 | 19,863.24 | 0.00 | 0.00 |
| South America | 11,892,175 | 7,310 | 238,479.58 | 118.00 | 0.06 |
| **Total/ average**a | **14,098,279** | **9,404** | **5,432.10** | **4.79** | **0.07** |

Cases/M: cases per million people; Deaths/M: deaths per million people; CFR: case fatality ratio.

a The total number of cases and deaths is presented, with the case fatality rate (CFR) calculated as total deaths divided by total cases, expressed as a percentage. The averages are provided for Cases/M and Deaths/M.

**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 (%) | 1.04 (1.04 - 1.05) | ***<0.001*** | **1.04 (1.02 - 1.07)** | ***<0.001*** |
| Urban population (%) | 1.01 (1.01 - 1.02) | ***<0.001*** | 1.01 (0.99 - 1.02) | *0.123* |
| Population density | 1.01 (1.01 - 1.02) | ***<0.001*** | 1.01 (0.99 - 1.01) | *0.096* |
| Obesity (%) |  |  | **1.03 (1.01 - 1.06)** | ***0.003*** |
| Average annual temperature | 1.19 (1.19 - 1.20) | ***<0.001*** |  |  |
| Total Rainfall | 1.01 (1.01 - 1.02) | ***<0.001*** |  |  |
| Hemisphere (Southern) | 2.51 (2.49 – 2.52) | ***<0.001*** | 4.00 (2.92 – 5.46) | ***<0.001*** |

CI: confidence interval; IRR: incidence risk ratio; Cases/M: cases per million people; Deaths/M: deaths per million people.

**Figures**

**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/) **)**



**Figure 2: 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/) **)**

