

# Public Health Situation Analysis of Hurricane Beryl in Jamaica, Grenada, and Saint Vincent and the Grenadines

## Type of Emergency

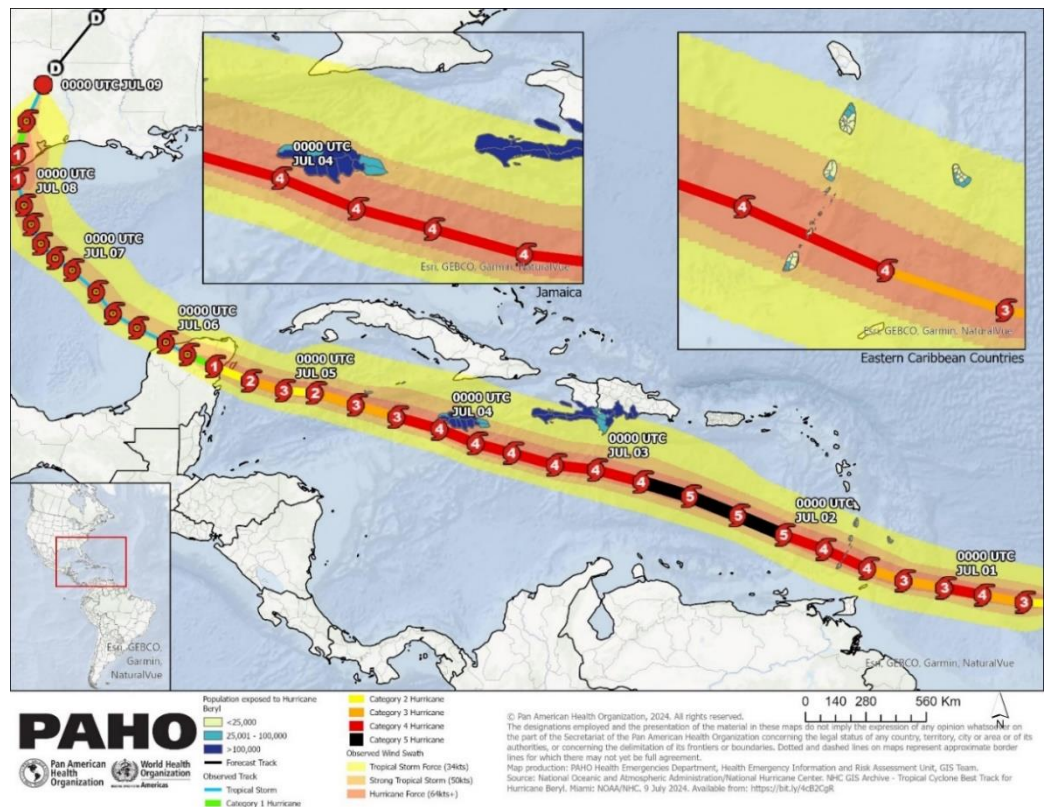


## Main Health Risks

- ✓ Water and foodborne diseases
- ✓ Respiratory diseases
- ✓ Vector-borne diseases
- ✓ Maternal and Neonatal health
- ✓ Immunization and Vaccine-preventable diseases
- ✓ Leptospirosis
- ✓ Non-communicable diseases
- ✓ Psychosocial conditions
- ✓ Trauma

## Context

Hurricane Beryl, the first major hurricane of the 2024 season, formed on 28 June in the Atlantic Ocean and set records as the earliest Category 5 storm recorded in the North Atlantic Ocean (1,2). Beryl made landfall in Grenada and Saint Vincent and the Grenadines as a high-end Category 4 storm, packing sustained winds of over 150 mph (240 km/h), and causing extensive damage to infrastructure, services, and livelihoods (3). On 3 July 2024, Hurricane Beryl, with sustained winds of over 140 mph, moved adjacent to Jamaica's southern coastline, passing 25 miles (40 km) off Alligator Pond, with its eyewall skirting the island (4). More than 3 million people were potentially exposed to the storm in the three countries, including 15 deaths, 102 injuries, and close to 1,770 people displaced in shelters at the height of the storm (2,5). Initial assessments are ongoing, and precise figures are still being determined (2).



## Key Figures – cumulative data from Grenada, Jamaica, and Saint Vincent and the Grenadines as of 11 July 2024<sup>(6,7)</sup>



**15**  
**DEATHS**



**102**  
**INJURIES**



**1,770**  
**SHELTERED**



**1,000**  
**EVACUATED**

### Grenada

The Carriacou and Petite Martinique islands, along with St. Patrick Parish in northern mainland Grenada, experienced significant impacts from the storm. St. Patrick Parish, Carriacou, and Petite Martinique have been declared disaster zones. Approximately 98% of the infrastructure was destroyed in Carriacou and Petite Martinique (1), and all three areas suffered power outages, complicating communication efforts (2). Reports indicate water interruptions in the affected areas as well, but details are still pending confirmation (2). As of 10 July, power has been restored to the majority of the affected populations, with less than 2,000 people still without electricity, mainly in St. Patrick Parish. Efforts are underway to recommission the Mirabeau Dam and the Carriacou desalination plant following damage. The airport terminal in Carriacou is currently destroyed, but both the airstrip and seaport are operational, allowing for the movement of relief goods (7,8).

A total of 278 people remain in 15 active shelters (five official and ten pop-up) in Carriacou and Petite Martinique as of 11 July 2024. To date, three deaths related to the hurricane were reported in Grenada – two in Carriacou and one on mainland Grenada (7).

### Saint Vincent and the Grenadines

Extensive damage has been reported in the Grenadines with residents across these islands facing significant challenges in housing and access to essential services. Union Island, Canouan, and Bequia experienced the brunt of the impact, with 20%-100% of housing and infrastructure destroyed or damaged, including the airport terminal, the power station, sanitation facilities, and rainwater harvesting, water storage, and distribution systems (1). Efforts are ongoing to drain and clean the water storage tank on Union Island due to contamination (1,9).

As of 11 July 2024, 703 people remain in 35 shelters in Saint Vincent. Additionally, 318 people remain in 14 shelters in the Grenadines: Bequia (one shelter with 52 people), Canouan (seven shelters with 130 people), and Union Island (six

shelters with 136 people) (7). There have been a total of 8 deaths reported – one each from Bequia and Canaan islands, two from Mayreau, and four from Union island.

## Jamaica

Damage was reported across the entirety of the island when Hurricane Beryl moved just south of Jamaica, with the southern coast being the most impacted (Clarendon, Manchester, St. Elizabeth), followed by the western coast (Westmoreland). Both areas reported damages to housing, infrastructure, and crops. The northern areas (Hanover, Portland, Saint Ann, Saint Mary, Trelawny) also suffered damage to hospitals and health infrastructure. The Prime Minister issued the Disaster Risk Management (Enforcement Measures) Order 2024 which declared Jamaica a disaster area from 2 to 6 July. According to initial estimates, approximately 60% of local electricity company customers were without electricity; 70% of National Water Commission customers were without piped water, mainly in Southern and North-East parishes; and communication services were impacted across the entire island (10–12).

As of 10 July 2024, 2.8 million persons in the islands have been potentially exposed to the effects of the hurricane, with four reported deaths along with 72 injured persons. A total of 53 people are currently housed in 7 active shelters, according to the most recent reports (6).

## Health Risks in the Caribbean in the Context of Hurricane Beryl over the next 3 months

Public Health Threat	Likelihood	Public Health Consequences	Level of Risk	Rationale
Water and foodborne diseases	Almost certain	Major	Very High	In the Caribbean subregion, approximately 1 in 49 people acquire foodborne illnesses every year as a result of consuming contaminated food or water. During crowded events/places, this incidence rises to 1 in 11 people. More than 40% of cases occur in children (13). Storm-driven flooding can contaminate water and food. The resulting lack of potable water and damaged infrastructure may lead to poor hygiene and sanitation and affect the ability of health facilities to provide care. Combined with overcrowding, these conditions can facilitate the occurrence of water and foodborne diseases, including diarrheal diseases and intoxications (14).
Psychosocial conditions	Highly likely	Moderate	High	The impact on livelihoods, food insecurity, forced displacement, violence, and other factors can trigger acute stress and exacerbate mental disorders due to reduced access to healthcare services. Symptoms of Post Traumatic Stress Disorder (PTSD), anxiety, and depression are the most reported mental health impacts following a hurricane (15). Socio-environmental disasters and migration contexts cause significant physical, psychological, and social suffering in affected populations. The psychological and social effects of emergencies can be acute in the short term but can also deteriorate the mental health and psychosocial well-being of affected populations in the long term (16). There is a need

				to focus mental health services not only in the immediate term (1-3 months) following the hurricane, but also make efforts for long-term recovery (1 year to several years of follow-up) (17)
Respiratory diseases	Highly likely	Moderate	High	<p>Overcrowding in shelters can increase the spread of pathogens responsible for these diseases. Additionally, infrastructure damage, reduced hand hygiene, and displacement can increase vulnerability to viral respiratory infections (18). Furthermore, increased allergens and air pollutants during debris cleaning may increase severity of respiratory diseases (19). Exposure to damp areas and the demands of reconstruction work are also significant risk factors for respiratory diseases (20).</p> <p>Currently in the Caribbean subregion, influenza-like illness (ILI) cases have increased, associated with a higher proportion of positive cases of SARS-CoV-2 and influenza. In epidemiological week (EW) 26 of 2024 in Jamaica, an increase in severe acute respiratory illness (SARI) cases has been observed above the epidemic threshold, coinciding with a marked increase in SARS-CoV-2 activity (21).</p>
Leptospirosis	Likely	Major	High	<p>Although leptospirosis is not a disease found exclusively in regions with a tropical climate, its prevalence is higher in these areas. The Caribbean subregion, for example, has one of the highest incidence rates of the disease (22). The occurrence of natural disasters, such as floods and hurricanes, can increase the risk of cases of the disease. Contaminated fresh water, including flood sources and rainwater containing animal urine, poses a risk when used for drinking or bathing (23). Direct contact with contaminated soil through wounds and cuts can also lead to exposure. Historically, most cases of leptospirosis in the Caribbean occur during the rainy season (June to December). Most of the serovars identified in Jamaica and Grenada belong to the Icterohaemorrhagiae serogroup (24). The high case-fatality rate of the infection requires timely treatment, which could be difficult when routine health services face disruption (25).</p>
Vaccine-preventable diseases	Likely	Moderate	High	<p>Displaced populations are susceptible to outbreaks of communicable diseases, including vaccine-preventable ones. There is a heightened risk of facilitated transmission of diseases such as meningitis and measles, particularly in shelters and displaced populations due to overcrowding. Populations with historically reduced access to healthcare services and vaccination are especially vulnerable (26). Interruptions to routine immunization services exacerbate the risk to these vulnerable populations.</p>
Vector-borne diseases	Highly likely	Moderate	High	<p>After the occurrence of a natural disaster such as hurricanes or floods, various risk factors for disease transmission arise, such as changes in</p>

				<p>the habitat of vectors, increased reproduction of these vectors and increased exposure to them, displacement of animals and changes in water storage practices (27,28). Usually, vector control activities are often interrupted (29). During natural hazards, the most important vector-borne diseases in the Americas are malaria, dengue fever, and dengue hemorrhagic fever (27). The Caribbean subregion is currently facing a significant increase in dengue cases, surpassing historical records. The subregion shows an increase of 342% compared to the same period in 2023, and an increase of 195% compared to the average of the last 5 years. In 2024, cases of DENV2 were recorded in Jamaica and Saint Vincent and the Grenadines (30).</p>
Non-communicable diseases (NCDs)	Likely	Moderate	High	<p>Morbidity and mortality due to non-communicable chronic diseases, such as diabetes, heart problems, mental and chronic lung disease, tend to be elevated after the occurrence of a natural disaster. Disruptions in health services, the availability of routine medical supplies and damage to health structures can aggravate the condition of vulnerable populations, leading to an exacerbated increase in symptoms. This can result in a significant increase in morbidity and mortality among these populations. The lack of adequate care and treatment, even for a short period, could increase the risk for patients with NCDs (31).</p>
HIV, tuberculosis, and other chronic infections	Likely	Moderate	High	<p>Populations displaced after natural disasters often live in temporary shelters or overcrowded areas, where access to basic health and sanitation services can be limited (32). The continuity of proper treatment for the infectious chronic diseases can be compromised, as disasters often damage health infrastructure and interrupt the provision of medical services. This could aggravate conditions, and results in rebound of HIV viral load or tuberculosis reactivation with the increase of risk of transmission. Also, sexual violence could occur in these closed settings, so proper post exposure prophylaxis programs should be in place.</p>
Neonatal and maternal diseases	Likely	Moderate	High	<p>Pregnant women are particularly vulnerable during disasters. Adverse conditions and limited access to medical treatment can lead to obstetric complications, increasing the risk of neonatal and infant mortality (33). Additionally, maternal stress resulting from exposure to natural disasters can elevate the risk of perinatal complications (34).</p>
Trauma	Highly likely	Minor	High	<p>Hurricane-related traumatic events most reported are tree-related injuries, falls, motor vehicle crashes, and injuries due to power outages. Sharp objects can be present in floodwaters and debris. Injuries caused by these objects and exposed to water can facilitate the emergence of other diseases, such as tetanus. Additionally, some objects can cause fires, explosions, and electric shocks (35). The most</p>

				reported causes of death are electrocution, drowning, and falls, and occur within a few days of landfall. The largest proportion of reported injuries occur during recovery and rebuilding (15).
Venomous animals	Likely	Moderate	Moderate	The natural tendency of terrestrial animals to seek dry and high ground during floods or when returning home increases people's exposure to venomous animals (36). There is a risk of an increase in the number of accidents involving venomous animals following natural disasters(37).
Violence	Likely	Moderate	Moderate	Lack of access to services and scarcity of essential goods, including food and potable water, increase stress and tensions within communities(38). During these periods of stress, violence against women tends to increase. Women are often affected by the scarcity of food and water, often bearing the brunt of feeding their families. Tensions arising from resource scarcity can lead to violent confrontations among people (39).
Food insecurity	Likely	Moderate	Moderate	Factors associated with food insecurity in the context of a natural disaster include food loss and damage, destruction of infrastructure and livelihoods, affecting food safety and exacerbating deficient nutritional states (40). Initial reports estimate that the agricultural sector in Jamaica is severely affected, impacting about 45,000 farmers, resulting in food shortages and financial strain(10).
Drowning	Unlikely	Minor	Low	Floodwaters can pose a risk of drowning to everyone, regardless of swimming ability. Shallow water that moves quickly can be deadly, and even shallow standing water can pose a danger to young children (35).

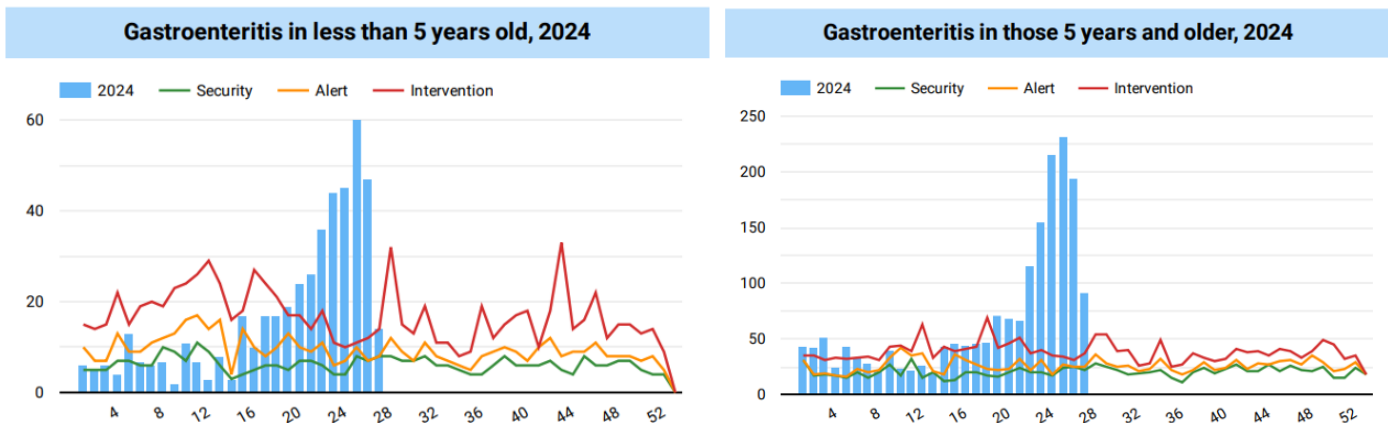
**Red: Very high risk.** Could result in high levels of excess mortality/morbidity.  
**Orange: High risk.** Could result in considerable levels of excess mortality/morbidity.  
**Yellow: Moderate risk.** Could make a minor contribution to excess mortality/morbidity.  
**Green: Low risk.** Unlikely to make a contribution to excess mortality/morbidity.  
**Grey:** No plausible assessment can be made at this time.

## Water and foodborne diseases

According to the most recent estimates, more than 90% of people in **Jamaica, Grenada, and Saint Vincent and the Grenadines** had at least basic access to drinking water from an improved source, with collection time not more than 30 minutes for a round trip (improved sources being piped water, borewells/tubewells, protected dug wells, protected springs, rainwater, or packaged water) (41). At least 85% of people had basic access to improved sanitation facilities not shared between households. According to the 2022 **Jamaica** Multiple Indicator Cluster Survey (MICS), 93% of household members in the country had access to basic sanitation services, 82% had access to basic hygiene services, meaning the availability of a handwashing facility with soap and water present, and only 67% had water source that is available when needed (41). The number of Disability Adjusted Life Years due to diarrheal disease ranges from low in **Saint Vincent and the Grenadines** [137] and **Grenada** [150] to high in **Jamaica** [2,817] (42).

The impact of Hurricane Beryl has led to the loss of electricity and water supply for major portions of the population of the three countries. The lack of availability of potable water has seen households, emergency shelters, and hospitals transition to the use of water stored in containers over the short term until services are restored (2,11). Chances of contamination of stored water increase with time. Storm-driven flooding may also impact and contaminate existing clean water sources(43). Overcrowding in shelters, as well as a lack of clean water and sanitation services, have a high chance of leading to contamination of existing reserves of potable water and of causing outbreaks of water and foodborne diseases, commonly manifesting as diarrheal disease. An outbreak of gastroenteritis was reported in epidemiological weeks (EW) 25 and 26 in **Grenada**, with permissible conditions for similar outbreaks in the other two countries in the next few weeks. The stark decrease in cases observed in EW 27 can be attributed to reduced healthcare visits during and immediately following the hurricane, and a corresponding disruption in routine healthcare service delivery (*Figure 1*).

**Figure 1: Distribution of gastroenteritis cases by age group and epidemiological week (EW), Grenada, EW1 – EW 27, 2024**



Source: Pan American Health Organization. Hurricane Beryl: Grenada and Saint Vincent and the Grenadines, Situation #9, 12 July 2024. Bridgetown: PAHO; 2024. Available from: <https://www.paho.org/en/documents/situation-report-9-hurricane-beryl-grenada-and-st-vincent-and-grenadines-12-july-2024>

## Respiratory diseases

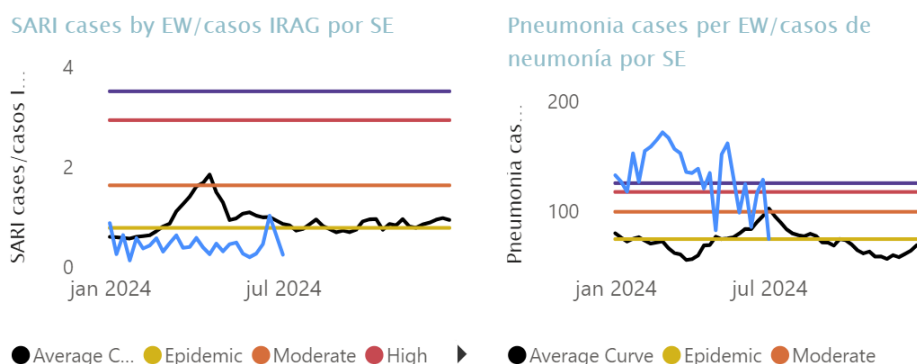
In 2023 in the Caribbean, influenza activity rose to medium activity levels and the respiratory syncytial virus (RSV) activity increased at low levels. Meanwhile, the SARS-CoV-2 activity has increased, circulating at moderate levels (44). During EW 22

to 26 2024, influenza-like illness (ILI) cases increased, associated with a higher proportion of positive cases of SARS-CoV-2 and influenza. During this period, the predominant viruses were influenza A(H3N2), with a simultaneous circulation of influenza A(H1N1)pdm09 (45).

Between 2015 and 2019, the Caribbean countries had an average mortality rate of 19 per 100,000 population of respiratory viruses. In **Saint Vincent and the Grenadines**, in 2019, the mortality rate was 34 per 100,000 population, almost double the average reported for the Caribbean (46). In addition, between December 2023 and January 2024, there was a notable increase in influenza A(H1N1) and COVID-19 cases (47).

**Jamaica** observed an increase in influenza and SARS-CoV-2 activity during this period (21). As of EW 25 of 2024 (week ending 22 June), there was an increase in the percentage of hospital admissions due to severe acute respiratory illness (SARI), surpassing the seasonal trends, average epidemic curve (2011-2021), and 2023 data (12). As of EW 26 of 2024 (week ending 29 June), there was also an observed increase in the number of SARI cases as well as pneumonia cases, both surpassing average curve and epidemic thresholds and with pneumonia cases surpassing moderate thresholds as well (*Figure 2*).

**Figure 2: Distribution of severe acute respiratory illness (SARI) and pneumonia cases by epidemiological week (EW), Jamaica, EW1 – EW 27 of 2024**



Source: Pan American Health Organization. Respiratory Viruses weekly report. Washington, D.C.: PAHO; 2024 Available from: <https://iris.paho.org/bitstream/handle/10665.2/60414/InfluRep21June2024.pdf?sequence=1&isAllowed=y>

Due to the prioritization of emergency management efforts in the countries, the surveillance of diseases caused by respiratory viruses can be compromised, resulting in gaps in monitoring epidemiological changes and viral circulation trends. This hinders the assessment of transmission patterns, clinical severity, and the impact on the health system, as well as making it difficult to identify risk groups susceptible to developing respiratory complications. Additionally, while there are measures in place to prevent the transmission of respiratory viruses, during an emergency many people may be housed in shelters, which hinders the ability for social isolation among symptomatic patients and amplifies the spread of disease.

## Vector-borne diseases

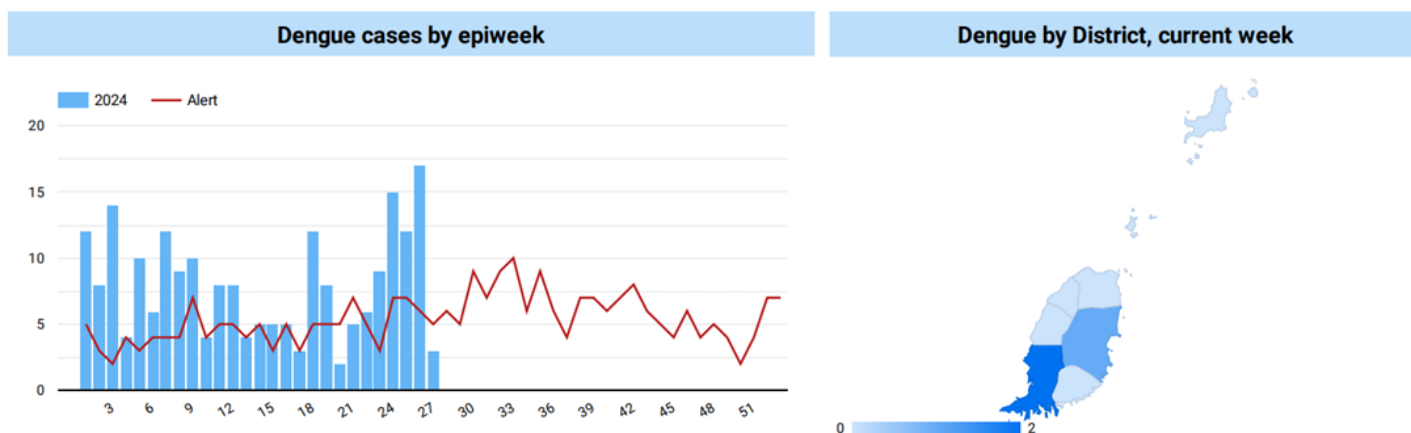
In recent years, malaria has been sporadically reported in non-endemic countries in the Caribbean subregion, most recently in **Jamaica** where there have been imported cases of malaria in 2022 and 2023(48). However, Jamaica’s surveillance system, including the Border Health System at points of entry, monitors malaria-indicative syndromes and tracks high-risk travelers, which national authorities consider adequate for detection and containment (49). Furthermore, national authorities report that Jamaica's institutionalized vector control program, which routinely intensifies activities starting each June, was further



escalated in response to Hurricane Beryl (49). In countries of the subregion with limited capacity for routine surveillance and vector control measures, there remains a risk of the importation of malaria cases.

There has been an increase in the number of reported dengue cases in the Caribbean subregion since late 2023, with a >300% increase in new cases reported in EW 25 of 2024, relative to the same period in the last year, and a 190% increase relative to the last 5-year average (30). **Grenada** has reported a steady increase in new dengue cases since EW 22 of 2024 and has seen a spike in cases in EW 26 of 2024, according to the most recent update (*Figure 3*). The decrease in reported cases in the following week could be attributed to the hurricane adversely affecting dengue breeding sites, as well as the reduction in available healthcare services including surveillance immediately following the impact of the hurricane. However, the use of storage containers for drinking water in the short term, as well as stagnant water in damaged infrastructure, are conducive to the breeding of dengue vector mosquitos in the coming weeks.

**Figure 3: Distribution of dengue cases by epidemiological week (EW), Grenada, EW1 – EW 27 of 2024**



Source: Pan American Health Organization. Hurricane Beryl: Grenada and Saint Vincent and the Grenadines, Situation 9, 12 July 2024. Bridgetown: PAHO; 2024. Available from: <https://www.paho.org/en/documents/situation-report-9-hurricane-beryl-grenada-and-st-vincent-and-grenadines-12-july-2024>

Reports of chikungunya cases have been sporadic in the Caribbean islands in recent years; however, they have been previously reported in **Jamaica** and countries of the Eastern Caribbean Islands. Conducive environmental factors as well as a circulating vector population may lead to a rise in cases in these countries (50).

Recent outbreaks of Oropouche fever have been reported in parts of South America, and most recently in Cuba. The spread of this arbovirus in a new area with an environment conducive for rapid spread, as well as an immunologically naïve population, is a cause for concern. Surrounding islands could be areas susceptible to the spread of the virus, with **Jamaica, Grenada, and Saint Vincent and the Grenadines** being particularly vulnerable (51) due to the impact of Hurricane Beryl.

The breakdown of routine vector control measures in many of the severely affected areas, the temporary suspension of routine medical services in some parts of the countries, and environmental conditions suitable for the breeding of different mosquito species could facilitate outbreaks of various vector-borne diseases. This highlights the need for additional surveillance efforts, as well as for vector control measures, to be prioritized.

## Maternal and neonatal health

Both maternal and neonatal mortality can be significantly affected in emergency situations. Compromised health

infrastructures and the interruption of essential services can reduce the ability to provide adequate obstetric and neonatal care. During a disaster, even in areas where prenatal care was available, the rate of inadequate prenatal care could increase (52). In addition, the physical and psychological stress associated with the experience of a natural disaster can increase complications during pregnancy and childbirth, negatively affecting both mothers and newborns.

The COVID-19 pandemic has significantly impacted health systems and services, resulting in the loss of promising advances made in recent years. The Latin American and Caribbean Region reported one maternal death every hour in 2020, bringing the maternal mortality rate in the Region back to the levels reported 20 years ago (53). In **Grenada** (as of 2021), **Jamaica** (as of 2019), and **Saint Vincent and the Grenadines** (as of 2022), the maternal mortality rate ranged between 77 to 163 deaths per 100,000 live births (44, 51). Jamaica is one of the countries prioritized for the focus of the efforts and resources to improve maternal health (53).

Although there has been a significant reduction in child mortality in the Americas Region, neonatal mortality remains high for many countries (54). In 2019, the neonatal mortality rates in **Jamaica, Grenada, and Saint Vincent and the Grenadines** were 15, 17, and 7 neonatal deaths per 1,000 live births respectively (46).

## Immunization and vaccine-preventable diseases

There is varied coverage of routine immunization among the countries of the Caribbean and Atlantic Ocean Islands subregion. In 2023, **Grenada** reported coverage of about 86% for children who received 3 doses of the oral polio vaccine (OPV), an 86% coverage rate for 3 doses of a diphtheria pertussis tetanus (DPT)-containing vaccine, and an 82% coverage rate for least 1 dose of a measles-containing vaccine (MCV) (53). The 2023 coverage rates in **Saint Vincent and the Grenadines** all fell below the 95% target set for these tracer antigens (53). For the same year, **Jamaica** reported coverage of more than 90% of children receiving 3 doses of OPV and DPT vaccines, while the coverage rate for the first dose of MCV remains subpar (55).

There have been fluctuations in these trends in the last 3 years as a result of the COVID-19 pandemic, with a rebound in routine immunization coverage observed in 2023 (56). However, gaps in coverage remain among multiple cohorts of children who have missed vaccinations and remain susceptible to these vaccine-preventable diseases. Disruptions in routine immunization services can occur due to the closure of health centers, inconsistent supplies of vaccines, unstable cold chain mechanisms because of power outages, and diversion of staff to emergency duties. Consistent disruptions in this coverage with a cohort of susceptible children in the background may lead to outbreaks of vaccine-preventable diseases in the coming months.

## Leptospirosis

The Caribbean and Atlantic Ocean Islands subregion has one of the highest incidences of leptospirosis (22). During extreme weather events, there is an increase in infectious diseases, such as leptospirosis, which is a disease with epidemic potential in scenarios associated with rainy periods. In **Grenada**, a 33% reduction in reported cases was observed over a five-year period from 2018 to 2022 (2018: n = 15, 2022: n = 10) (46). Similarly, in **Saint Vincent and the Grenadines**, there were 27 reported cases of leptospirosis in 2022 (46) and 20 cases in 2023 (47). The high case-fatality rate (6.85%) of leptospirosis requires adequate and timely treatment, which could be difficult in low resource settings, particularly when health services are disrupted in the case of natural disasters (25).

Leptospirosis cases are typically recorded during the rainy season, with studies indicating a positive correlation between flooding events and the incidence of the disease. Flooding often leads to the displacement of rodent populations, thereby increasing human exposure to *Leptospira* bacteria and facilitating its spread in the environment. Consequently, emergency situations experienced by countries following the hurricane can result in an increased occurrence of leptospirosis cases (57).

## Non-communicable diseases (NCDs)

The Caribbean and Atlantic Ocean Islands have a high burden of non-communicable diseases, NCDs accounting for more than 70% of deaths that occur in the subregion. The burden of mortality is particularly high in **Grenada** (82.8%), **Jamaica** (79.3%), and **Saint Vincent and the Grenadines** (79.1%) (46). The morbidity from NCDs in these countries ranges, with **Grenada** (23,020 per 100,000) and **Saint Vincent and the Grenadines** (22,709.4 per 100,000) having some of the highest DALY rates in the Region of the Americas, and **Jamaica** (18,425 per 100,000) in the lower quantiles of rates in the Region (Figure 4)(58). Congenital anomalies, skin and subcutaneous disorders, asthma, and anxiety disorders account for the top causes of DALYs among the young adult population (58). Among older adults, cardiovascular disease, diabetes, and neoplasms contribute to the most common cause of DALYs in these countries (59).

**Figure 4: Trend of Disability-Adjusted Life Years from 2000 to 2019 – Rates per 100,000 population by sex, in Grenada, Jamaica, Saint Vincent and the Grenadines**



Source: Adapted from World Health Organization. Global Health Estimates 2019: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2019. Geneva: WHO: 2020. Available from: <https://www.paho.org/en/enlace/burden-noncommunicable-diseases>

This situation is compounded by the simultaneous prevalence of the risk factors for NCDs. **Grenada** (46.6%) and **Jamaica** (46.3%) have some of the highest prevalence of hypertension in the Region, followed by **Saint Vincent and the Grenadines** (39.3%), accompanied by a low prevalence of treatment for hypertension (ranging from 51.4% in **Jamaica** to 45.4% in **Saint Vincent and the Grenadines**)(60). The prevalence of obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) was lower in men (13.9% in **Grenada**, 15.9% in **Jamaica**, and 17.2% in **Saint Vincent and the Grenadines**), relative to women (30.2% in **Grenada**, 32.2% in **Saint Vincent and the Grenadines**, and 34.7% in **Jamaica**)(61). Tobacco use estimates among adolescents show a low prevalence of use in **Saint Vincent and the Grenadines** (9.3%) and **Grenada** (9.7%), and a higher-than-average prevalence in **Jamaica** (15.6%) (62).

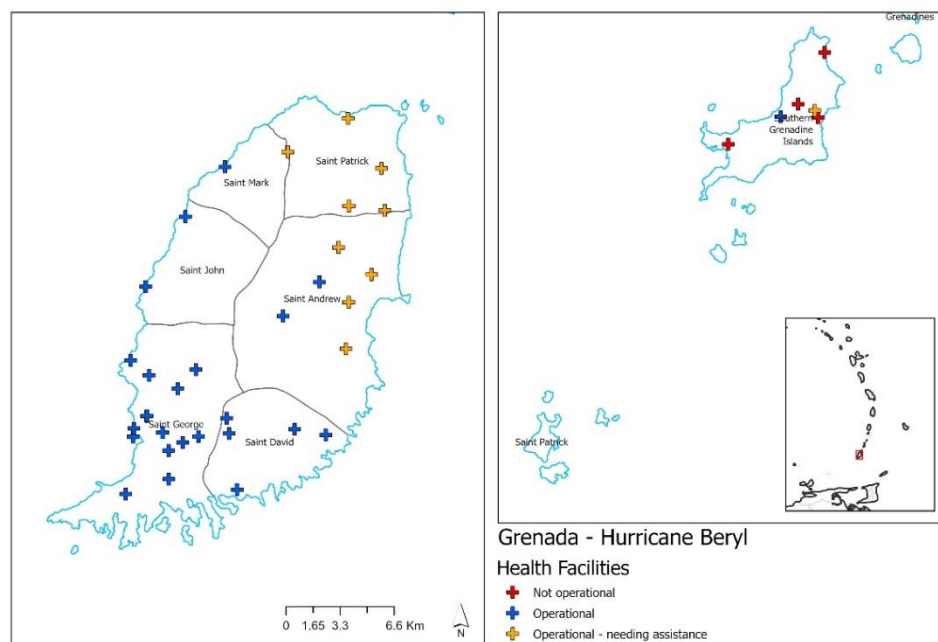
This combination of the existing burden of disease and risk factors, while only a limited population has access to treatment,

means that any disruptions in the routine supply of drugs and services in the context of heightened stress due to displacements and lack of shelter could have a greater-than-expected impact on NCD morbidity and mortality (63).

## Health Systems Impact

**Grenada** has a total of 41 health facilities, including hospitals and medical stations, 35 of which are located in Grenada, 5 are in Carriacou island, and 1 is in Petite Martinique island. According to initial estimates, 26 health facilities were operational after Hurricane Beryl made landfall, 11 reported damage to electricity and /or water supply, and 4 were not operational. The greatest impact was felt in the islands of Carriacou, where four of the five health facilities were non-operational, and Petite Martinique, where the lone health facility had no electricity and running water. On the island of Grenada, the parishes of St. Andrew and St. Patrick were the most severely affected, where all the health facilities in these parishes had problems with electricity or water supply. As of 11 July, restoration of the power supply in the Hillsborough SMART Health Center in Carriacou has seen a full resumption of services (7,64) (*Map 1*).

**Map 1: Health facilities by parish and status. Grenada. 8 July 2024.**



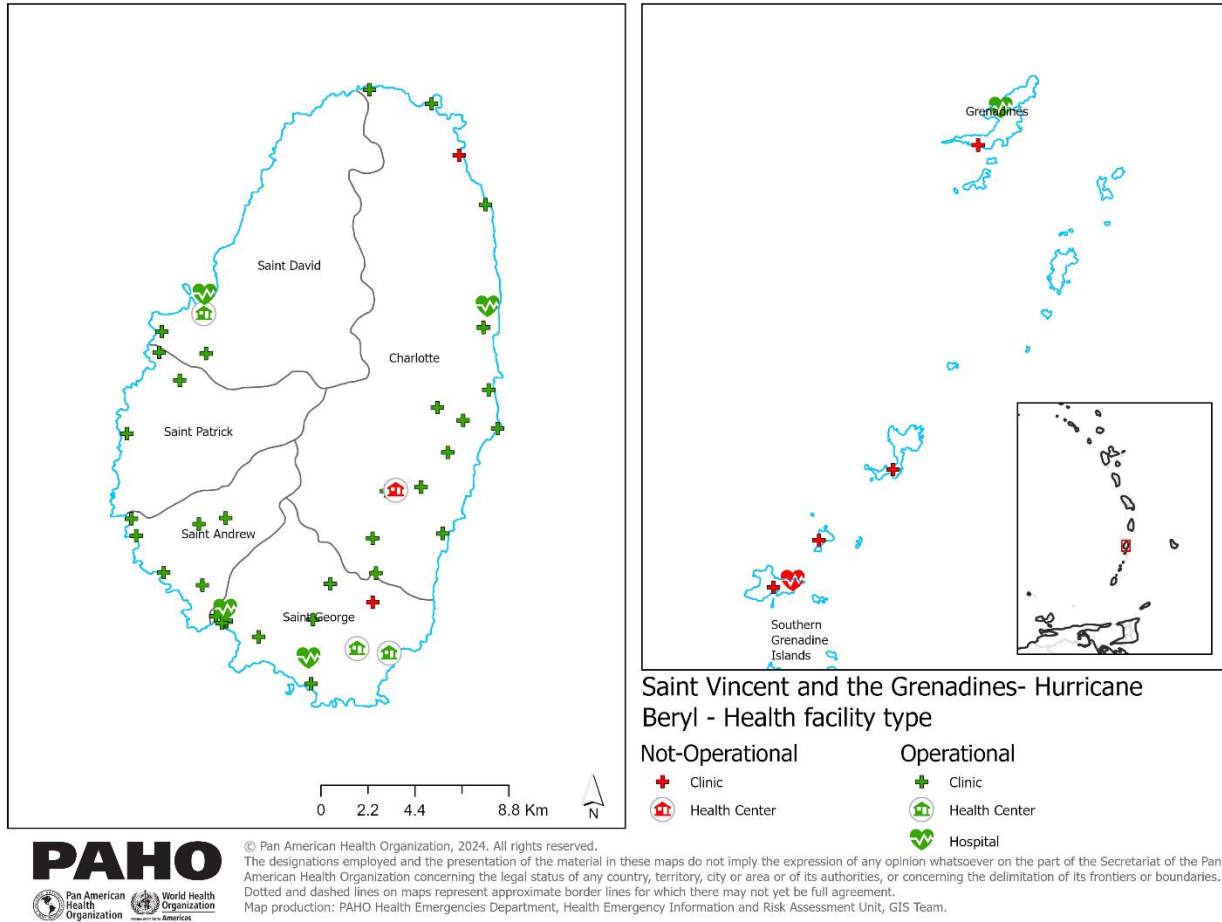
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 Map production: PAHO Health Emergencies Department, Health Emergency Information and Risk Assessment Unit, GIS Team.

Source: Data from Grenada Ministry of Health, Wellness and Religious Affairs. Health facilities coordinates report as of 10 July 2024. St. George's: MoH; 2024. Unpublished.

In **Saint Vincent and the Grenadines**, of the 49 health facilities in the country, 38 (78%) are operational; however most have suffered some form of damage that requires immediate attention and/or repair, such as roof damage, roof leak, no power, issues with water and electricity, or damage to doors and windows. All health facilities in the Southern Grenadines (Canouan Clinic, Mayreau Clinic, Ashton Clinic, Clifton Smart Hospital and Clinic) are currently closed due to damage or providing very limited services from comprised facilities (*Map 2*). According to initial reports, 9 facilities were non-operational immediately after the impact of the hurricane: 5 in Saint Vincent, 2 in Union Island, and 1 each in Canouan and Bequia. Assessments indicate that roof structures of 'Smart' hospitals were intact in the aftermath, with minimal

damage and services restored by using tarpaulin coverings. Other non-smart hospitals reported severe structural damage to roofs that is not easily repaired (7,64) (Map 2).

**Map 2: Health facilities by parish and status. Saint Vincent and the Grenadines. 8 July 2024.**



Source: Data from Saint Vincent and the Grenadines Ministry of Health Wellness and the Environment. Health facilities coordinate report as of 10 July 2024. Kingstown: MoH; 2024. Unpublished.

Of the 24 government-run hospitals in **Jamaica**, the worst affected by the impact of Hurricane Beryl were the 5 hospitals in the Southern region (Clarendon, Manchester, St. Elizabeth parishes), as well as the 4 hospitals in the Western region (Westmoreland, Hanover, St. James, Trelawny parishes). Damage to infrastructure as well as the loss of electricity supply were reported after the initial impact. In addition, 64 health facilities reported infrastructural damage on their premises. All 24 hospitals continued to provide in-patient as well as emergency care services, assisted by backup power generators and stored water supplies in the Southern and Western regions. As of 10 July, all hospitals in Jamaica were operational, with 19 offering full services, and 5 offering only emergency services (6,12).

## Surveillance

Surveillance continues to be an area of concern, with limited information available on the situation in shelters in the most affected areas. According to anecdotal information from first responders in the field, there are reported increases in respiratory illnesses in all three countries after the hurricane, though formal surveillance data is currently lacking (2). National authorities in **Jamaica** have stated that there have been no reported illnesses or outbreaks in any shelters, and a surveillance system is actively in place.

In **Grenada and Saint Vincent and the Grenadines**, shelter surveillance coordination has begun, with some reports being shared from shelters. Specifically, Grenada has 6 official shelters and 13 pop-up shelters in Carriacou and Petite Martinique. The Epi Unit has received and shared reports from 4 official shelters and 2 pop-up shelters, with no significant disease trends or outbreaks noted. In Saint Vincent and the Grenadines, there are 75 active shelters, including 29 informal shelters, spread across St. Vincent, Bequia, Union Island, Mayreau, and Canouan. Despite communication challenges, daily surveillance is reportedly being conducted in all shelters, including the heavily impacted Union Island. Similar to Grenada and Jamaica, no significant disease trends or outbreaks have been reported.

All three countries have deployed public health nurses and environmental health officers to the shelters daily to address the immediate health needs of the population.

## PAHO/WHO Response (2,3,65)

	Management & Coordination	Logistics and supplies
<b>Grenada</b>	<ul style="list-style-type: none"> <li>• Coordination with the Ministry of Health to support emergency management.</li> <li>• Established an Incident Management Team (IMST) for response coordination with the country and partners (64).</li> <li>• Deployed a health facility damage assessment expert with the Rapid Needs Assessment Team (RNAT) (8).</li> <li>• Activated the Regional Emergency Medical Team network (EMT)(8).</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilized and delivered vital supplies, including water testing kits, purification tablets, jerrycans, generators, and cleaning supplies to health facilities on 8 July.</li> <li>• Supported the purchase of rat traps, rat baits and other repellents(7).</li> </ul>
<b>Saint Vincent &amp; the Grenadines</b>	<ul style="list-style-type: none"> <li>• Established an Incident Management Team (IMST) for response coordination with the country and partners.</li> <li>• Deployed a WASH expert with the Rapid Needs Assessment Team (RNAT)</li> <li>• PAHO Regional Response Team (RRT) members deploying for health facility and services assessment, environmental health, and MHPSS.</li> <li>• Activated the Regional Emergency Medical Team network (EMT)(8).</li> <li>• PAHO and Saint Vincent and the Grenadines Ministry of Health briefed the Cabinet on the country's health assessment.</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilized and delivered vital supplies, including water testing kits, purification tablets, jerrycans, generators, and cleaning supplies to health facilities on 7 July.</li> <li>• Procured chemicals, cleaning materials, chlorine for water disinfection, and water pumps locally.</li> <li>• Procured essential health emergency supplies for the Ministry of Health.</li> <li>• Deployed a logistical and operational support expert with the Regional Response Team (RRT) (67).</li> </ul>

	<ul style="list-style-type: none"> <li>• Led health sector coordination meetings.</li> <li>• First MHPSS coordination meeting by PAHO with Ministries from Saint Vincent and the Grenadines and Grenada, and UN agencies (UN Women, UNICEF, UNFPA).</li> </ul>	<ul style="list-style-type: none"> <li>• Supported the purchase of rat traps, rat baits and other repellents (7).</li> </ul>
<p><b>Jamaica</b></p>	<ul style="list-style-type: none"> <li>• Activated the PAHO/WHO Jamaica Country Office Incident Management System.</li> <li>• Provided technical guidance to the Ministry of Health and Wellness including for the Health Promotion and Communication Plan for Dengue.</li> <li>• Designated team to prepare the health aspect of the proposal for the CERF, with US\$2.5 million allocated to Jamaica and Flash Appeal.</li> <li>• Reassignment of an epidemiologist from Infectious Hazards Management (IHM) to support the PAHO/WHO Jamaica Country Office (68)</li> </ul>	<ul style="list-style-type: none"> <li>• Procured essential health emergency supplies for the Ministry of Health and Wellness.</li> </ul>
<p><b>Overall</b></p>	<ul style="list-style-type: none"> <li>• Activated the PAHO Eastern Caribbean Countries (ECC) Crisis Management team to coordinate the emergency response.</li> <li>• Facilitated the Health Sector Coordination Meetings with UN agencies, regional partners, and donors</li> <li>• Supported the Regional Overview and Rapid Appeals for Saint Vincent and the Grenadines, Grenada, and Jamaica.</li> <li>• Maintained close coordination with the Caribbean Disaster Emergency Management Agency (CDEMA), International Organization for Migration (IOM), and other regional and UN agencies.</li> </ul>	

## Priority needs (2,3,5,19,65)

	Needs	Jamaica	Grenada	Saint Vincent & the Grenadines
<b>Shelter</b>	<ul style="list-style-type: none"> <li>• Temporary housing solutions</li> <li>• Tarpaulins and roofing materials</li> <li>• Essential household items</li> </ul>	<ul style="list-style-type: none"> <li>• South-central Jamaica hardest hit</li> </ul>	<ul style="list-style-type: none"> <li>• 95% of homes in Carriacou and Petit Martinique damaged</li> <li>• Approximately 10,000 persons with significant damage to homes (7)</li> </ul>	<ul style="list-style-type: none"> <li>• Significant damage in Mayreau, Union Island, and Bequia</li> </ul>
<b>WASH</b>	<ul style="list-style-type: none"> <li>• Drinking water</li> <li>• Water purification systems</li> <li>• Rehabilitation of toilets</li> <li>• Repair of water storage capacity in affected health facilities</li> </ul>	<ul style="list-style-type: none"> <li>• 70% of National Water Commission customers without water</li> </ul>	<ul style="list-style-type: none"> <li>• Severe disruption in Carriacou, Petite Martinique</li> <li>• 52% of the country's water systems operational</li> </ul>	<ul style="list-style-type: none"> <li>• No running water and toilet facilities are non-functional on Union Island</li> <li>• Unconfirmed reports of water disruptions in other areas</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>• Complete damage assessment</li> <li>• Repair damaged health facilities</li> <li>• Restoration healthcare services</li> <li>• Replenish critical medicines, medical supplies, and other health commodities</li> <li>• Generators and radios for some health facilities</li> <li>• Ensure surveillance systems are in place, especially in the shelters</li> <li>• Psychosocial support for those affected, either directly or indirectly by the hurricane with a special focus on healthcare workers (7)</li> <li>• Safe shelter, food, and water rations for health care workers</li> </ul>	<ul style="list-style-type: none"> <li>• Majority of health facilities are operational, with those in the Southern Region offering mainly partial services</li> <li>• 18% of health care facilities suffered damage</li> <li>• 38% of hospitals were damaged</li> <li>• 82 health facilities have suffered major damage</li> <li>• 64 facilities have roof damage</li> </ul>	<ul style="list-style-type: none"> <li>• 4 of 6 health facilities in Carriacou were significantly damaged and remain closed</li> </ul>	<ul style="list-style-type: none"> <li>• All health facilities in the Southern Grenadines (n= 5) currently closed</li> <li>• 78% of 49 facilities assessed operational but all with some damage</li> <li>• Vaccine cold chain operations compromised in the Grenadines</li> <li>• At least 100 health care workers reported damage to their homes</li> </ul>



## Hurricane Season 2024

United States National Oceanic and Atmospheric Administration (NOAA) forecasters at the Climate Prediction Center predict an above-normal hurricane season in the Atlantic this year, with an 85% chance of heightened activity, including 4 to 7 major hurricanes (categories 3, 4, or 5), and a 70% confidence in these ranges. Hurricane Beryl, arriving early in the season, seems to support these predictions (69).

The impact on Jamaica, Grenada, and Saint Vincent and the Grenadines highlights the urgent need for robust public health and health system responses. These island nations face significant challenges in recovering quickly from such natural disasters, underscoring their vulnerability throughout the rest of the hurricane season.

The health risks identified in the aftermath of Hurricane Beryl—such as water and foodborne diseases, respiratory diseases, vector-borne diseases, and the strain on maternal and neonatal health services—demonstrate the critical need for immediate and sustained intervention. Overcrowding in shelters, compromised water and sanitation systems, and the potential for increased transmission of infectious diseases pose severe public health threats.

To bolster their resilience, it is imperative to strengthen their public health infrastructure and enhance their capacity to respond to and recover from such events. Additional resources are crucial not only for immediate recovery efforts from Hurricane Beryl but also to prepare these countries for the anticipated storms of the 2024 hurricane season. Investments in disaster preparedness, improved healthcare facilities, and community health initiatives will play a vital role in reducing the long-term impact of hurricanes.

## Appendix 1. Risk Assessment Methodology

Table 2. Risk matrix

Risk Matrix							Risk levels
Likelihood	Almost certain	Green	Yellow	Orange	Red	Red	<p><b>Red:</b> Very high risk. Could result in high levels of excess mortality/morbidity.</p> <p><b>Orange:</b> High risk. Could result in considerable levels of excess mortality/morbidity.</p> <p><b>Yellow:</b> Moderate risk. Could make a minor contribution to excess mortality/morbidity.</p> <p><b>Green:</b> Low risk. Unlikely to make a contribution to excess mortality/morbidity*</p> <p><b>Grey:</b> No plausible assessment can be made at this time.</p>
	Highly likely	Green	Yellow	Orange	Red	Red	
	Likely	Green	Yellow	Orange	Orange	Red	
	Unlikely	Green	Green	Yellow	Orange	Orange	
	Very unlikely	Green	Green	Yellow	Orange	Orange	
		Minimal	Minor	Moderate	Major	Severe	
		Magnitude					
	Likelihood**	Magnitude			Risk		
	What is the likelihood that there will be an outbreak or substantial increase in the number of cases/issues*** in the coming three months?	What is the potential magnitude of the impact of an outbreak or substantial increase in the number of cases/issues on the population?			Considering the likelihood and magnitude of the impact, what is the risk in terms of excess morbidity/mortality to the population over the next three months?		

**Source:** World Health Organization. Public Health Information Services. Geneva: WHO; 2018. Available from: <https://healthcluster.who.int/publications/m/item/public-health-situation-analysis-standard-operating-procedures>

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