

## COUNTRY SITUATIONAL ANALYSIS

Panama is on the isthmus that connects Central America with South America. Some of its territories are classified as high risk for yellow fever transmission, mainly areas bordering with Colombia and Panama. The last outbreak of epizootic activity was recorded in 1979. Thanks to the efforts invested in vaccination programs, Panama has been free of yellow fever since 1974, when the vaccine was introduced into routine childhood vaccination schedules in high-risk areas. Vaccination coverage rates have fallen in recent years due to the COVID-19 pandemic.

With the reintroduction of *Aedes aegypti*, dengue has become a primary public health concern, with progressive increases in both its incidence and geographical spread. Two other arboviruses have also emerged in the last decade: chikungunya and Zika. Their dramatic spread and morbidity highlight the extraordinary capacity of these viruses to invade a mainly susceptible population.

## ECOLOGICAL FACTORS AND CLIMATE<sup>1</sup>

The territory of Panama is generally tropical forest. The country conserves only 44.0% (32 714.6 km<sup>2</sup>) of primary forest. It has some elevations with temperate climates (700 and 1500 meters above sea level) mainly on the Pacific coast, and mountains with cold temperatures (1500 meters above sea level) that occupy about 3% of the territory.

Forest areas make up 57% of land cover, of which 30% is used for agricultural activities.

### Vector distribution and incidence

Studies have demonstrated that *Aedes* species infestation levels vary between neighborhoods of contrasting socioeconomic status and increasing *Aedes albopictus* numbers in rural parts of the country.<sup>3,4</sup>

## YELLOW FEVER HIGHLIGHTS

<b>EYE strategy risk categorization</b>	High
<b>Routine immunization introduction (year)</b>	1974
<b>Latest official coverage estimates (2021)</b>	70%
<b>Gavi eligibility</b>	No
<b>International Coordinating Group on vaccine provision requests</b>	No
<b>Last disruptive yellow fever outbreak</b>	1974
<b>Yellow fever vaccination proof for entry/exit</b>	No
<b>Diagnostic capacity</b>	Yes
<b>Fragility, conflict, and violence status</b>	No

## DEMOGRAPHICS<sup>2</sup>

<b>Total population</b>	4 246 240
<b>Annual population growth rate</b>	1.5%
<b>Life expectancy</b>	82 (female), 75 (male)
<b>Percentage population in urban dwellings</b>	68%
<b>Percentage urban population living in slums</b>	22%

<sup>1</sup> World Bank Group. Climate Change Knowledge Portal for Development Practitioners and Policy Makers: Panama. Washington, DC: World Bank; 2021. Available from: <https://climateknowledgeportal.worldbank.org/country/panama>

<sup>3</sup> Whiteman A, et al. *Aedes* mosquito infestation in socioeconomically contrasting neighborhoods of Panama city. *Ecohealth*. 2019 Jun;16(2):210-221.

<sup>4</sup> Miller MJ, Loaiza JR. Geographic expansion of the invasive mosquito *Aedes albopictus* across Panama—implications for control of dengue and Chikungunya viruses. *PLoS Negl Trop Dis*. 2015;9:E0003383.

<sup>2</sup> World Bank Group. Understanding poverty: Open data. Washington, DC: World Bank; 2020. Available from: <https://www.worldbank.org/en/understanding-poverty>

## EPIDEMIOLOGY

The last urban yellow fever outbreak was reported in 1905 and the last epizootics in non-human primates occurred in 1949, 1956, 1965, 1971, and 1979. The last cases of sylvatic-acquired yellow fever was reported in 1974, after the epizootic in non-human primates in 1971. Compulsory vaccination was introduced in 1974 in the enzootic areas in the east, and since then Panama has remained free of human yellow fever cases.

### Endemic areas

The eastern region of Panama is considered at high risk for yellow fever: the provinces of Panama Este and Darién and the territories of Guna Yala and Emberá, near the border with Colombia.

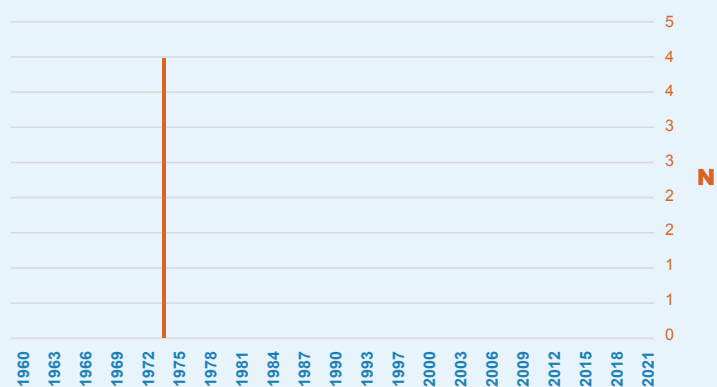
## PAST OUTBREAKS<sup>5</sup>

Year	Number	Region	Comments
1974	5	Bayana de Chepo	There were five cases, of which three were fatal. The cases occurred in the rural area of Bayano in the towns of Trapiche, Jesús María and Las Piraguas, Maje Arriba, and Altos del Maje.

### Trends of previous outbreaks<sup>5</sup>

Eastern Panama is considered at high-risk for yellow fever because it presents conditions for enzootic transmission. It has been case-free since 1974.

Yellow fever cases in Panama, 1960-2021



## ARBOVIRAL ACTIVITY

**Dengue.** Dengue was first observed in Panama in 1990. Since then, there have been annual epidemics of varying magnitudes, with cocirculation of serotypes. The country notified the Pan American Health Organization (PAHO) of 115 272 cases between 1990 and 2021.<sup>6</sup>

**Chikungunya.** Chikungunya affected Panama in 2015. By 2017, the country had reported 2658 cases to PAHO.<sup>7</sup>

**Zika.** The Zika outbreak began in Panama in late 2015. The country notified PAHO of 5646 suspected cases, 1250 confirmed cases, and 16 congenital syndromes associated with the Zika virus.<sup>8</sup>

<sup>5</sup> Pan American Health Organization. Epidemiological alerts and updates: Yellow fever. Washington, DC: PAHO; n.d. Available from: <https://www.paho.org/en/epidemiological-alerts-and-updates>

<sup>6</sup> Pan American Health Organization. Health Information Platform for the Americas (PLISA). Dengue and severe dengue: Cases and deaths for the countries and territories of the Americas. Washington, DC: PAHO; n.d. Available from: <https://www3.paho.org/data/index.php/en/mnu-topics/indicadores-dengue-en/dengue-nacional-en/257-dengue-casos-muertes-pais-ano-en.html>

<sup>7</sup> Pan American Health Organization. Chikungunya. Data and statistics. Cumulative number of confirmed cases of Chikungunya in South America from 2013 to 2017. Washington, DC: PAHO; n.d. Available from: <https://www.paho.org/en/topics/chikungunya>

<sup>8</sup> Pan American Health Organization. Zika cases and congenital syndrome associated with Zika virus reported by countries and territories in the Americas, 2015-2018. Cumulative cases. Washington, DC: PAHO; 2018. Available from: <https://www.paho.org/en/node/60231>

# YELLOW FEVER VACCINATION

Routine childhood immunization		Vaccine coverage <sup>9</sup>																										
Yellow fever vaccine introduced	Yes	<p style="text-align: center;"><b>Childhood yellow fever vaccination coverage in Panama, 2010-2021 (%)</b></p> <table border="1"> <caption>Childhood yellow fever vaccination coverage in Panama, 2010-2021 (%)</caption> <thead> <tr> <th>Year</th> <th>Coverage (%)</th> </tr> </thead> <tbody> <tr><td>2010</td><td>65</td></tr> <tr><td>2011</td><td>85</td></tr> <tr><td>2012</td><td>85</td></tr> <tr><td>2013</td><td>85</td></tr> <tr><td>2014</td><td>75</td></tr> <tr><td>2015</td><td>85</td></tr> <tr><td>2016</td><td>95</td></tr> <tr><td>2017</td><td>85</td></tr> <tr><td>2018</td><td>85</td></tr> <tr><td>2019</td><td>80</td></tr> <tr><td>2020</td><td>75</td></tr> <tr><td>2021</td><td>75</td></tr> </tbody> </table> <p>The yellow fever vaccine has been included in routine vaccination schedules for children 12 months of age in high-risk areas since 1974, with vaccination coverages reaching over 80%.</p> <p>The vaccination age recommendation changed from 12 to 15 months of age in 2015. This was followed by a drop in coverage rates that subsequently recovered. Afterward, another significant drop was observed associated with the COVID-19 pandemic.</p>	Year	Coverage (%)	2010	65	2011	85	2012	85	2013	85	2014	75	2015	85	2016	95	2017	85	2018	85	2019	80	2020	75	2021	75
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2019	80																											
2020	75																											
2021	75																											
Level	Sub-National																											
Year of introduction	1974																											
Age vaccine is administered (months)	15																											
Vaccine schedule	Single dose																											
Integration with first does of measles, mumps, rubella vaccine (MMR-1)	No																											
Gap MMR-1/ yellow fever vaccine to monitor program	Yes																											
<b>Vaccination campaigns</b>																												
Catch-up campaigns implemented during the last 20 years	Yes																											
Preventive mass campaigns implemented during the last 20 years	No																											
Reactive vaccination campaigns implemented during the last 20 years	No																											
<b>Vaccination in international travelers</b>		Yes																										
<b>Vaccination in internal travelers (when traveling to high-risk areas)</b>		Yes																										
Registration system to record vaccination data	Nominal electronic immunization registry																											
<b>Vaccine program funding</b>																												
Sources of funding	Government																											
Gaps in financing during the past 5 years	No																											
Does the country require financial support?	No																											

<sup>9</sup> World Health Organization. Data compiled from WHO vaccine-preventable diseases: monitoring system reported through the Joint Reporting Form. Washington, DC; Geneva: WHO; 2022. Available from: <https://immunizationdata.who.int/pages/coverage/yfv.html>

## INTERNATIONAL HEALTH REGULATIONS

Does the country request proof of YF vaccination at points of entry?			No
LABORATORY DIAGNOSTIC CAPACITY		SURVEILLANCE	
<b>Member of the Arbovirus Diagnosis Laboratory Network of the Americas</b>	Yes	National guidelines for surveillance	Yes
<b>National Reference Laboratories</b>	Gorgas Memorial Institute of Health Studies (ICGES)	Type of surveillance for human cases	Syndromic and case-based
<b>Reports to PAHO</b>	Yes	Type of YF surveillance for non-human primates	Yes (passive/active)
TESTING CAPACITY FOR YELLOW FEVER		Entomological surveillance	Yes
IgM antibody capture enzyme-linked immunosorbent assay (MAC-ELISA)	Yes	Entomovirological surveillance	Yes
Plaque reduction neutralization test (PRNT)	Yes	Case investigation (reactive)	Yes
Reverse transcription polymerase chain reaction (RT-PCR) blood specimens	Yes	YELLOW FEVER CONTROL STRATEGIES	
RT-PCR tissue specimens	Yes	Multi-annual immunization plan	Yes
RT-PCR wild type virus versus vaccine	No	Risk assessment methodology	Yes
Immunohistochemistry	No	Vector control activities	Yes
Virus isolation	Yes	Diagnosis	Yes
External quality assessment compliance	Yes	Surveillance	Yes
Shortages of diagnostic supplies in the past 5 years	No	Request for proof of YF vaccination at points of entry	Yes

## POPULATION MOVEMENTS<sup>10</sup>

There are around 16 000 refugees living in Panama, mainly from Colombia, Nicaragua, Venezuela, El Salvador, and Cuba. Temperature controls are carried out as part of syndromic arboviruses surveillance along the border with Colombia.

<sup>10</sup> Office of the United Nations High Commissioner for Refugees (UNHCR). UNHCR Data. Geneva: UNHCR; n.d. Available from: <https://www.unhcr.org/en-us/data.html>