



# Vector-borne diseases in Haiti: A review



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**Summary** Haiti lies on the western third of the island of Hispaniola in the Caribbean, and is one of the poorest nations in the Western hemisphere. Haiti attracts a lot of medical attention and support due to severe natural disasters followed by disastrous health consequences. Vector-borne infections are still prevalent there with some unique aspects comparing it to Latin American countries and other Caribbean islands. Although vector-borne viral diseases such as dengue and recently chikungunya can be found in many of the Caribbean islands, including Haiti, there is an apparent distinction of the vector-borne parasitic diseases. Contrary to neighboring Caribbean islands, Haiti is highly endemic for malaria, lymphatic filariasis and mansonellosis. Affected by repeat natural disasters, poverty and lack of adequate infrastructure, control of transmission within Haiti and prevention of dissemination of vector-borne pathogens to other regions is challenging. In this review we summarize some aspects concerning diseases caused by vector-borne pathogens in Haiti.

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## 1. Introduction

Haiti lies on the western third of the island of Hispaniola (Fig. 1) and is one of the poorest nations in the Western hemisphere. The estimated population of Haiti as of 2014 is

9.9 million. Over 50% of the population lives in urban regions. Haiti is graded at the 209th place in its gross domestic product compared to the rest of the world, next to South Sudan, Sierra Leone, and Eritrea [1]. Accordingly, public health care performance is poor. Haiti has repeatedly suffered numerous natural disasters such as hurricanes, torrential rains, floods and earthquakes, including a magnitude-7 earthquake in January 2010 and hurricane Tomas in November 2010. A dense population, a weak health care system, the lack of vital infrastructure and recurring natural disasters undoubtedly affect the prevalence and epidemiology of several diseases caused by

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**Figure 1** Map of the Caribbean islands. Source: “Caribbean general map” by Knusser – Own work, all data from Vector Map. Licensed under CC BY-SA 3.0 via Wikimedia Commons – [http://commons.wikimedia.org/wiki/File:Caribbean\\_general\\_map.png#mediaviewer/File:Caribbean\\_general\\_map.png](http://commons.wikimedia.org/wiki/File:Caribbean_general_map.png#mediaviewer/File:Caribbean_general_map.png).

arthropod-transmitted pathogens. Contrary to most neighboring Caribbean islands, Haiti remains endemic to vector-borne parasitic diseases such as malaria and lymphatic filariasis (LF).

In this review we summarize some of the unique aspects concerning vector-borne pathogens in Haiti.

## 2. Vector-borne viral diseases

### 2.1. Dengue Fever

Dengue virus, a flavivirus that belongs to the *Flaviviridae* family, is the most common arthropod-borne viral (Arboviral) illness in humans globally. Dengue Fever (DF), caused by one of four serotypes (1–4) is transmitted principally by *Aedes (Ae.) aegypti*, but also by other species. Haiti is known to be an endemic area of dengue.

Dengue was first reported in Haiti in 1964 [2] although it probably had been circulating there at least a century before [3]. According to the Pan American Health Organization (PAHO) the lab-confirmed, incidence rate of dengue in Haiti as of 2014 is 0.94 per 100,000 population [4], yet seroprevalence of dengue antibodies was reported to be above 40% as early as 40 years ago among coastal populations of Haiti [5]. Antibodies to both serotypes 2 and 3 were detected in Haitians and the incidence of dengue antibodies increased with age. In a later study conducted in Port-au-Prince in 1994–1996, antibodies to all four serotypes of dengue viruses were first documented in children aged 6–13 years [6]. This was also demonstrated in a more recent report in 2007 [7]. A study in Leogane, a coastal

town south-west of Port-au-Prince, showed that 33% of randomly selected adults had IgM antibodies against dengue virus [8]. Transmission of dengue was repeatedly reported in coastal cities such as Anse Rouge, Gonaïves, Port-au-Prince, Leogane and Jeremie [5,8–13]. However, despite the fact that both *Ae. aegypti* and *Ae. albopictus* mosquitoes were observed throughout Haiti [5,14], it seems that the inland regions of Haiti, are less affected by dengue. Currently, there is no reported information with regard to the seasonality of dengue in Haiti. The rainy season in Haiti (optimal for breeding of *Ae. mosquitos*) is April through October. A previous study among travelers from the Caribbean islands reported peak dengue seasonality from August through December [15].

Altogether the true incidence or transmission rate of dengue in Haiti is unknown, and it is not clear whether there was a change after 2010 natural disasters. In a recent sero-survey study conducted in 2012 at Leogane and Port-au-Prince, the rate of IgG seropositivity in 121 Haitians was 100% [13]. Although this was a small study conducted in only two urban areas, it provides additional evidence that dengue is highly endemic in Haiti. Table 1 summarizes dengue virus seropositivity prevalence among the local population of Haiti.

DF was first described in Haiti in 1964 [2]. A few years later dengue virus (serotype 2) was isolated from symptomatic patients, mainly visitors to Haiti between 1969 and 1971 [5]. Several outbreaks of DF in Haiti during the last two decades were reported among visitors, travelers, military personnel and relief workers. In 1994, United States (US) military forces were positioned in Port-au-Prince. During the first 6 weeks, 30 of 103 patients hospitalized with

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