



## Consequences of Venezuela's massive migration crisis on imported malaria in Colombia, 2016–2018



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## Letter to the Editor

According to the World Health Organization (WHO), Colombia is one of the countries in the Americas that has significantly exhibited a decrease in malaria incidence and mortality throughout the last decade [1]. During 2010, 163,874 cases were reported nationally, with a constant decreasing trend that to a total of 62,141 in 2018, representing a 62.6% reduction in the total number of cases. Recognized as a country in which approximately 78% of its population inhabits malaria-free areas (2017) [1], the advent of imported cases from neighboring countries poses a significant threat for disease control and prevention, particularly in vulnerable areas suitable for malaria transmission.

In light of the ongoing humanitarian and political crisis in Venezuela, massive migration to other countries in the region has marked what to date is considered the most significant population mobilization in its entire [2,3] history, with some 3-to-4 million Venezuelans, forced to leave their homeland over the past couple of years. For many, this is considered the biggest refugee crisis ever recorded in the hemisphere thus far. Shortages of food and medicines along with a crippled public health system have precipitated the reemergence of vaccine-preventable diseases such as measles, diphtheria, mumps, tetanus and other communicable diseases such as Human Immunodeficiency Virus (HIV) infection [4] and tuberculosis, which are on the rise and spiraling out of control [3]. As for the case of malaria, the number of confirmed cases increased [5] to a point where they are now approaching close to half a million cases per year (414,527 for 2017, according Pan American Health Organization (PAHO) - [http://www.paho.org/hq/index.php?option=com\\_content&view=article&id=2632:2010-interactive-malaria-statistics&Itemid=2130&lang=en](http://www.paho.org/hq/index.php?option=com_content&view=article&id=2632:2010-interactive-malaria-statistics&Itemid=2130&lang=en)) while continuing to rise at rates exceeding those previously reported elsewhere in the world [1–3].

Venezuela's mounting crisis has prompted an unprecedented exodus to Colombia, particularly in the last three years were the bulk of refugees have crossed into the country or in transit to other South American nations. In a recent study carried out by the World Bank, from approximately 1.2 million well-recorded cases of Venezuelan migrants to Colombia, 76% were native Venezuelans and 24% were returning Colombian migrants. Among these refugees are malaria-infected displaced persons coming from disease-endemic areas of Venezuela.

Herein, we take a close look into the epidemiological trend of imported cases of malaria from Venezuela to Colombia, during the period 2016–2018.

During 2016–2018, a total of 257,623 malaria cases were reported in Colombia, decreasing from 115,125 in 2016 to 62,141 in 2018 (Table 1). From that total, 3395 cases were imported from other countries (1.3%), primarily from Venezuela (3,124) who contributed 92% of the cases (Table 1), thus exhibiting a threefold increase from the 508 cases reported in 2016 (84% of imported cases) to 1,734 in 2018 (95%) For 2017–2018, 2049 of the imported cases from Venezuela were due to *Plasmodium vivax* (79.85%), 400 due to *P. falciparum* (15.59%) and 117 due to mixed infections, *P. falciparum*/*P. vivax* (4.56%) (Table 1).

As in the case of Colombia, other South American countries have also felt the impact of mass migration from Venezuela and the spread of imported malaria throughout the region. Such is the case of the current cross border outbreaks taking place at the Ecuadorian-Peruvian border [6]. Similar to our observations, most of the cases (96%) recorded to date in the Pacific Ocean coastal region have followed the influx of infected Venezuelan migrants [6]. In countries like Ecuador with an effective nationwide elimination program in place [1], the arrival of malaria-infected refugees poses a risk for malaria reemergence, with imported cases exhibiting the capacity to trigger autochthonous malaria transmission in disease-free areas as has been reported previously [6]. In other malaria-endemic countries such as Brazil and Colombia, the burden of imported cases may also influence a shift in malaria endemicity.

As we had previously alerted [5,7], Venezuela's humanitarian crisis and state of civil unrest have favored malaria resurgence and uncontrolled transmission, resulting in one of the worst malaria epidemics ever witnessed in the history of the Americas. Spillover to neighboring countries such as Colombia and its sequential spread to other countries in the region such as Ecuador, Panama, and Peru highlight the intimate relation between population movements and how these can ignite and/or increase malaria transmission in neighboring vulnerable areas. Bordering departments such as Norte de Santander, Cesar, La Guajira, Arauca, Vichada and Guainía are at particular risk because of population pressure due to the vast number of displaced migrants entering daily from Venezuela through these regions, which is increasing. During the first six epidemiological weeks of 2019, there have been 295

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**Table 1**

Imported cases of malaria in Colombia, total and from Venezuela, 2016–2018 and etiological distribution by *Plasmodium* species. Sources: National Institute of Health ([www.ins.gov.co](http://www.ins.gov.co)), Colombia and WHO.

		2016	2017	2018	2016–2018
Total cases reported in Colombia	N	115,125	80,357	62,141	257,623
Total imported cases	N	605	965	1825	3395
From Venezuela	n	508	882	1734	3124
	%	<b>84.0</b>	<b>91.4</b>	<b>95.0</b>	<b>92.0</b>
<b>2017–2018</b>					
Total imported cases of <i>P. vivax</i>	N	N/A	738	1481	2219
Total imported cases of <i>P. vivax</i> from Venezuela	n	N/A	678	1371	2049
	%	N/A	<b>91.9</b>	<b>92.6</b>	<b>92.3</b>
Total imported cases of <i>P. falciparum</i>	N	N/A	173	276	449
Total imported cases of <i>P. falciparum</i> from Venezuela	n	N/A	151	249	400
	%	N/A	<b>87.3</b>	<b>90.2</b>	<b>89.1</b>
Total imported cases of <i>P. falciparum/P. vivax</i>	N	N/A	54	68	122
Total imported cases of <i>P. falciparum/P. vivax</i> from Venezuela	n	N/A	53	64	117
	%	N/A	<b>98.1</b>	<b>94.1</b>	<b>95.9</b>

Bold indicates proportion from Venezuela.

N/A: Not available.

imported cases of malaria in Colombia, 98.3% (254) from Venezuela (87.6% due to *P. vivax*).

This scenario, also negatively impacts on the Global Malaria Action Plan and the actions towards disease elimination in the continent [7]. Pan American Health Organization (PAHO) faces an enormous task in addressing, without delay [2], this complex scenario contributing to the reemergence of malaria in the region and its potential global impact. Efforts to address this situation should not only include strengthening surveillance and migrant health information systems across borders, as well as properly diagnosing and treating malaria-infected refugees in an organized way, but also urging regional and global authorities to implement a humanitarian mission to effectively restore malaria control, containment, and elimination programs in Venezuela.

## Conflicts of interest

None.

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## CRedit authorship contribution statement

**Alfonso J. Rodríguez-Morales:** Conceptualization, Data curation, Formal analysis, Methodology, Writing - original draft, Writing - review & editing. **José Antonio Suárez:** Writing - review & editing. **Alejandro Risquez:** Writing - review & editing. **Wilmer E. Villamil-Gómez:** Writing - review & editing. **Alberto Paniz-Mondolfi:** Data curation, Methodology, Writing - review & editing.

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