

# The population flow in the Franco-Amapaense border as an important factor in the reemergence of measles

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**ABSTRACT.** The International Border, which delimits Brazil to other countries in Latin America, is a place of great migration flow, enabling the spread of contagious diseases. Measles, a disease with high degree of transmissibility and public relevance, despite being vaccine-preventable, showed an important peak of incidence in these areas. Thus, the aim of this study is to demonstrate, in the scientific literature currently available, the relationship between population flow and the appearance of measles cases on the Franco-Amapa international border. This is a qualitative study of narrative review based on articles indexed in the BVS, SCIELO and CAPES PERIODICS databases during the month of May 2021, referring to the last 10 years. It was verified by the data presented the influence of borders on the spread of contagious diseases, due to the large flow of people caused by the tourism, the search for better living conditions and employment. On the Franco-Amapa border, this migratory flow is related to the artisanal extraction of ore, such as gold. In addition, low vaccination coverage and anti-vaccination movements have contributed to the resurgence of measles in Brazil.

**Keywords:** Infectious diseases; border area; reemerging diseases

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## INTRODUCTION

Brazil is the largest country in South America, it includes the "Frontier Strip", covering 11 federation's units, 588 municipalities and more than 10 million inhabitants. The territorial extension and the number of countries with which it has a foreign currency make this region a relevant role in international integration with neighboring South American countries, as well as in the development of international relations (Lima, 2020). There are several reasons for the movement of people in several countries: the flight from conflicting regions, or those in economic crisis, as well as the search for better living conditions, employment or leisure opportunities, cause this displacement. This uninterrupted flow associated with the frequency of large-scale international airline flights is a contributing factor in the emergence and re-emergence of diseases (Ishikawa, Gomide, 2019).

Among the areas of the "Frontier Strip", is the municipality of Oiapoque, located in the far north of the state of Amapá, in the northern region of Brazil, which has about 27 thousand inhabitants, bordering French Guiana (Brasil, 2020). In these areas, there is an accentuation of changes in recent decades as a result of globalization and the high exchange in countless services that cause significant changes in the life of human beings. Infectious diseases, globally, also suffered changes in the pattern of involvement, largely due to scientific, technological, economic and social progress (Waldman, Sato, 2016).

Among the infectious diseases, measles showed a change in incidence, with a milestone in 2018 in the European Region, where four countries lost their disease elimination certificate, including Albania, Czech Republic, Greece and the United Kingdom. In 2019, the Region of the Americas recorded 3,328 confirmed measles cases in 14 countries. The United States had 1,241 confirmed cases in 28 states and is on the verge of losing its measles elimination certificate (Brasil, 2019).

In Brazil, the entry of the virus took place through the movement of tourists and susceptible migrants in the border area and who ended up developing the disease. Concomitantly, vaccination coverage was below 95%, especially in the northern

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region of the country. Later, it spread to more populated areas in the southwest region. And by October 2019, 49,613 suspected measles cases were reported in Brazil. Of these, 10,429 (21.0%) were confirmed (Medeiros, 2020).

In the state of Amapa, movement along the Franco-Amapa border (Oiapoque and French Guiana) presents an important role in the spread of contagious diseases, such as measles. In this context, this article aims to highlight, in the scientific literature currently available, the relationship between population flow and the appearance of measles cases on the Franco-Amapa international border.

## MATERIAL AND METHODS

This is a qualitative study of narrative review carried out from literature analysis from 2011 to 2021, making it essential to update knowledge on a specific topic, highlighting new ideas, methods and sub-themes that have received greater or less emphasis on selected literature (Elias et al., 2012). As it is a bibliographical analysis on the question of the Franco-Amapa international border and its contribution to the flow and spread of measles as a re-emerging disease, articles were found indexed in the Virtual Health Library - BVS databases (<https://bvsalud.org/>), Scientific Electronic Library Online - SciELO (<https://scielo.org/pt/>) and Journal Portal of the Coordination for the Improvement of Higher Education Personnel - CAPES ([https://www-periodicos-capes.gov-br.ez1.periodicos.capes.gov.br/index.php?](https://www-periodicos-capes.gov.br.ez1.periodicos.capes.gov.br/index.php?)) during the month of May 2021, having as reference period the last 10 years.

The descriptors were used: Neglected Diseases; Health at the Border; Border Disease; Measles; Brazil and French Guiana with different forms of combination. The criterion used for inclusion of publications was having the expressions used in the searches in the title or keywords, or having explicit in the abstract that the text is related to the association of Measles and the border of French Guiana with Brazil.

The excluded articles did not meet the established inclusion criteria and/or were duplicated, that is, publications found in more than one of the databases. Dissertations and theses were also excluded. After having retrieved the target information, the titles and abstracts of 539 studies were initially read, excluding 527 publications at this stage. Afterwards, the 12 texts were completely read. As axes of analysis, we initially sought to classify the studies regarding the re-emergence of measles, grouping them into categories. Specifically, to analyze the identified scientific production, no specific qualitative and/or quantitative data processing techniques were used, with the analysis of each text being carried out.

## RESULTS AND DISCUSSION

After searching the databases and applying filters to refine the results, a total of 12 articles were obtained for reading the pertinent information, systematization and inclusion in the final writing of this study. The emerging discussion categories were: 1) Health in Latin America and the resurgence of measles; 2) Measles re-emergence; 3) Health in border areas; and 4) International cooperation between Brazil and French Guiana and the measles situation.

### Health in Latin America and the resurgence of measles

Before the COVID-19 pandemic swept the world, Latin America was experiencing low economic growth, reduced investments in the public sector, political instability and weakened regional ties. Beyond that:

A juxtaposition of weaknesses is presented in several countries in the region, in which the scarcity of resources and national conflicts are exacerbated by the weaknesses of the regional governance instruments - which in turn were already suffering from the effects of the weakening of the global governance instruments, including its own World Health Organization (WHO) (Buss, Fonseca, 2020).

It is important to highlight that the countries of Latin America and the Caribbean do not have a satisfactory model for serving the population, which leads to high incidences of diseases. Brazil, along with Cuba, are exceptions in health model for population. The Brazilian Constitution of 1988 guarantees that health is everyone's right and the State's duty, guaranteed through social and economic policies aimed at reducing the risk of diseases and other injuries and universal and equal access to actions and services for its promotion, protection and recovery. The achievement of the Unified Health System (SUS) enabled tools to minimize dependencies and vulnerability (Buss, Fonseca, 2020).

It is important to pay attention to the process of transformations in the Health Services Subsystem, such as the epidemiological behavior and particularity of populations, which permanently present unique configurations, especially in border areas. Furthermore, public policies are the responsibility of the State in this social sphere (Gadelha, 2012).

In these places, it is important to note that the reduction in mortality rates may not accompany the reduction in health problems incidence, which can lead to an increase in the additional health problems occurrence (Padula, Noronha, Mitidieri, 2017). Thus, it is extremely important to monitor the disease parameters

from more than one point of view and not only by mortality rates.

In this context, there is the resurgence of measles in Brazil, as it came through the tourist and migration movement, finding the country with a fragile vaccine coverage, below 95%, reducing its collective effectiveness, made possible by the emergence of anti-vaccination movements with diffusion of misinformation (Medeiros, 2020). This raises a state of alert for the strengthening of immunization systems for other endemic diseases that were once eradicated by the public health system. Hence the importance of mandatory notification, in addition to planning and management of activities to quickly control these endemics (Hanvoravongchai et al., 2011).

The study by Pinto et al. (2021) shows that the advancement of the measles vaccine strategy is inversely proportional to the number of cases and hospital admissions, in agreement with other national and international studies. In the survey, after the vaccination intensification campaign, there was a 47.1% reduction in the number of admissions to a pediatric hospital in Minas Gerais and, consequently, a reduction in measles mortality. Added to this, studies point to a trend towards a progressive reduction in the prevalence and incidence of vaccine-preventable diseases, and advance towards possible global eradication. However, is necessary to intensify surveillance and control actions at the international level, since in Brazil the autochthonous transmission of measles had already been interrupted (Mello et al., 2014).

The Pan American Health Organization (PAHO) in 2021 suggested a sequence of strategies for greater measles surveillance: immediate capture; early detection with the aim of interrupting the virus transmission chains; routine vaccination, raising the maximum possible coverage of new generations; avoid the accumulation of a susceptible population and follow-up campaigns, reinforcing the doses. All these measures must be intensified to prevent new measles outbreaks, especially in the event of large scheduled events or areas of high population movement (Mello et al., 2014).

### Reemergence of measles

Measles is among the leading causes of mortality among children under the age of five, especially in countries with low per capita income and a precarious health system. It is a highly transmissible and infectious disease caused by the virus of the Paramyxoviridae family of the Morbillivirus genus. Its transmission occurs directly from person to person through droplets that are expelled during speech, coughing, sneezing or breathing (Xavier et al., 2019).

The onset of symptoms appears between the 10th and 14th day after contact with the virus, they are: malaise, cough, runny eye and nose, conjunctivitis, rising fever up to 40° C (104°F), sore throat and irritation in the skin with red spots. Depending on the viral load and degree of immunity of the infected individual, complications may occur such as: diarrhea, pneumonia, blindness, otitis, encephalitis, acute disseminated encephalomyelitis and subacute sclerosing panencephalitis (Xavier et al., 2019).

For many years, measles showed endemic behaviors and was responsible for the death of more than 2 million people a year worldwide. In Brazil, through government initiatives, the antiviral vaccine was introduced in 1963, which, together with the creation of the National Immunization Program (PNI) in 1973 and the implementation of the National Plan for the Elimination of Measles in 1992, resulted in significant results. In relation to the autochthonous cases notified, the last in the year 2000 (Mello et al., 2014).

In 2016, Brazil received the Measles Eradication Certificate, but soon lost it, as in 2018 new cases of the disease were reported in the country. According to WHO, currently all continents are facing measles outbreaks and not just in children. Data from a scientific survey on the epidemiological profile of measles carried out in 2020 indicate that in 2018 in Brazil, there was a prevalence of infected individuals between 20 and 29 years of age (Brasil, 2019, Costa et al., 2020).

This increase in the incidence of cases is the result of several aspects, such as: social determinants; low levels of immunization (especially due to hard-to-reach places); application of only one dose (the recommended by the Ministry of Health is two doses); anti-vaccination movements; religious, cultural and migration aspects (Costa et al., 2020, Gomes et al., 2020).

In relation to social determinants, the following stand out: living conditions, work, habits and behaviors, which directly and indirectly influence the health-disease process of population groups, as well as the emergence of social and health inequalities, generating a heterogeneous distribution of diseases in which it is observed that the most affected populations are commonly those exposed to precarious working and housing conditions (Gomes et al., 2020).

These inequities are often related to intense population mobility unaccompanied by advances in basic living conditions, such as infrastructure, sanitation and work, due to disorderly occupation of land, agrarian colonization, settlement projects and artisanal mineral exploration. However, in general, one of the main drivers of intense migratory flows is related to economic processes (Gomes et al., 2020).

## Health in border areas

Border areas promote exchange between different cultures, legal and illegal trade, contact between people, commuting and permanent migration, which facilitates the transmission of diseases. These environments present a higher degree of social violence, which leads to social inequality and hence to low economic development, which consequently disrupts health services (Gomes et al., 2020, Rodrigues-junior, Castilho, 2010).

In Franco-Amapa context, there is an expressive international cross-border movement between the municipality of Oiapoque, in the far north of Amapa, Saint-Georges-de-l'Oyapock and Camopi, which are cities belonging to French Guiana. In this scenario, there are legal (and illegal) migratory flows caused especially by trade activities, mineral extraction, mainly gold mining, and low-skilled, generally manual jobs (domestic activities, agriculture, livestock, hunting and fishing). The group of Brazilians who work in French Guiana in clandestine mines is estimated at around 10 thousand people, who carry out this movement in both directions (French Guiana and Amapa); however, the search for health care takes place in Brazil (Gomes et al., 2020, Padula, Noronha, Mitidieri, 2017).

According to the Epidemiological Update of Measles, dated March 1, 2021, both Brazil and French Guiana recorded cases of measles among children and adults, with a significant rate in Amapá (34 cases per 100,000 inhabitants), while in Guyana they were two cases were reported. The mobility of the population between Oiapoque and Saint-Georges-de-l'Oyapock becomes a target of concern for health authorities in relation to the spread of measles.

In the study by Gomes et al. (2020), in which the issue of malaria in the Oiapoque-French Guiana border area is addressed, almost half of the population studied (44.27%) comes from the state of Amapa, with emphasis on the municipality of Oiapoque (23.72%), as well as Para (30.83%) and Maranhão (24.90%). The study also highlights that the activities carried out on the other side of the border are related to the low level of formal education of certain migrant groups, as around 84.6% of the population studied did not have completed high school, which demonstrates a strong social indicator in the region.

Brazil identified these difficulties and, in order to minimize the problem of health care, it promoted the Integrated Health System along the Brazilian border (SIS-frontier), which aims to improve and organize health services. The Border Laboratories Network was implemented, seeking greater speed in the diagnosis of diseases, to which the municipality of Oiapoque-AP is an agreement. However, the geographical distribution of the Laboratories and the logistical difficulty contribute to the service not being

accessible to municipalities in border areas (Guimarães, 2015, Rodrigues-Júnior, Castilho, 2010).

## International cooperation between Brazil and French Guiana and the measles situation

Is extremely important that countries adopt networking, that is, planning together with actions in each country, as it allows for openness, horizontality, fluidity of relations in order to solve common problems through strategies such as resources, practices and knowledge among institutions in order to maximize the effectiveness and efficiency of actions (Tobar et al., 2020).

The formation of networks is already taking place, however this situation is not observed in all countries that Brazil borders, such as French Guiana, a French overseas territory that includes strategic military bases. Both share the Amazonian space, which is underdeveloped and lacks integration in terms of infrastructure with the main economic and demographic centers of South America (Padula, Noronha, Mitidieri, 2017).

Despite being part of Latin America, French Guiana does not seem to be part of macroeconomic and political blocs and integrations with Brazil, for example it is not present in the Union of South American Nations (Unasul), in the Southern Common Market (Mercosul), Community of Latin American and Caribbean States (CELAC) or the International Association of National Institutes of Public Health (IANPHI) which was created with the emergence of the COVID-19 pandemic, which hinders the process of implementing networks and health policies aimed at solving common problems (Buss, 2020, Tobar et al., 2020).

Thus, international planning in the field of health to combat measles is of paramount importance, as both countries have problems related to health promotion.

The border areas between Brazil and Guyana, as they are favorable places for manual labor with gold extraction, high migratory flow and mutual contact with several people, must be carefully assisted by the public authorities, given that in these spaces the transmission of infectious diseases, like measles, it has the highest incidence in the population. It is noteworthy that Brazil must be governed with attention to actions aimed at immunization of the child population, dissemination of information on preventive and control measures for measles, in addition to the compulsory notification of cases for epidemiological investigation.

Although no direct relationship was found between neglected diseases and measles in the reading of the articles, the imminent risk of this pathology becoming characterized as such is highlighted, due to the increase in the number of cases due to the

flexibilization of political actions in these areas and the lack of access to information about the vaccination schedule by the target population.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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