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Pan American Health Organization | World Health Organization, Regional Office for the Americas

Public Health Risk Assessment related to Oropouche Virus (OROV) in the Region of the Americas

3 August 2024

Risk assessment elaborated with the data available as of 30 July 2024
Date of previous risk assessment: 9 February 2024

Overall Risk
Regional
High

Confidence in available information
Regional
Moderate

General Risk Statement

Due to recent highly concerning changes in the observed clinical and epidemiological characteristics of Oropouche fever, a disease caused by the Oropouche virus (OROV), in countries within the Region of the Americas—including **the recent increase and expansion of cases in newly recorded areas, outside of the regions previously considered to be endemic of OROV, the first-ever reported occurrence of deaths associated with OROV infection, and the identification of potential cases of vertical transmission related to fetal deaths and newborn microcephaly cases**—and acknowledging that these observations are still in the initial stages of investigation and the true trajectory is unknown, **the risk level for the Region has been upgraded to High.** This is based on the current and available information, with a **moderate level of confidence** and out of an abundance of caution. This regional public health rapid risk assessment (RRA) complements and updates the RRA conducted on 9 February 2024 *(1, 2, 3)*.

This RRA aims to update the current regional risk assessment related to OROV, considering the following criteria:

- **Potential risk to human health:** The clinical presentation of OROV in most cases is mild to moderate and generally with self-limiting symptoms which usually resolve within 7 days. Although complications are rare, sporadic cases of aseptic meningitis have been documented *(4)*. More recently, two fatal cases associated with OROV have been reported by Brazil as part of the ongoing outbreak in that country. These deaths would correspond to the first reports of fatal cases associated with the disease. The cases resided in areas of active OROV transmission, during an ongoing outbreak on the southern coast of the state of Bahia *(5, 6)*.
- **OROV vertical transmission (under investigation).** On 12 July 2024, the Brazil International Health Regulations (IHR) National Focal Point (NFP) informed the Pan American Health Organization / World Health Organization (PAHO/WHO) about potential cases of vertical transmission of OROV and its consequences. As of 30 July 2024, five potential cases of vertical transmission have been identified in Brazil: four cases of stillbirth and one case of spontaneous abortion in the state of Pernambuco, as well as four cases of newborns with microcephaly in the states of Acre and Pará *(2)*. The investigation is ongoing.
- **Risk of the event spreading:** As of 30 July 2024, 8,078 confirmed cases of OROV have been reported in five countries in the Region of the Americas: The Plurinational State of Bolivia (n= 356), Brazil (n= 7,284), Colombia (n= 74), Cuba (n= 74), and Peru (n= 290). In Brazil, between epidemiological weeks (EW) 1 and 29 of 2024, 7,284 cases were confirmed, mainly in the Amazon region (76% of cases). Autochthonous transmission has also been documented in ten non-Amazonian states, some without previous cases reported *(2)*. This information suggests that in the last quarter, cases have been reported in new areas and countries, signaling the expansion of Oropouche cases in the Americas. Since its identification in 1955, OROV has caused outbreaks in several countries in South America and the Amazon Basin, mainly due to the vector *Culicoides paraensis (C. paraensis)*, the potential vector *Culex quinquefasciatus (Cx. quinquefasciatus)*, and its jungle reservoirs, such as sloths and non-human primates (*1, 7)*. The risk of vector spread and, consequently, OROV transmission is increasing due to climate change, deforestation, uncontrolled and unplanned urbanization, and other human activities that affect reservoir habitats and favor vector-host interactions. To date, there is no evidence of human-to-human transmission *(4)*.

- **Risk of insufficient capacity for prevention and control with available resources:** Although there has been an improvement in surveillance and diagnosis capacities in countries in the Region, limitations in the interpretations of the different arboviruses can lead to less sensitive surveillance and can hinder the epidemiological characterization of the event in the Region. Given that the clinical presentation of OROV is similar to other arboviral infections (mainly dengue), coupled with most countries not having systematic surveillance of OROV cases and that laboratory diagnosis is not widespread, it is possible that there is an underestimation of the true burden of the disease in the countries of the Region. Outbreaks have generally been identified through retrospective population- or laboratory-based epidemiological studies. If OROV spreads simultaneously with other arbovirus outbreaks, such as dengue, it could overload health services in the affected countries.

The ongoing outbreak highlights the need to strengthen epidemiological and entomological surveillance and to reinforce preventive measures in the population. This is crucial due to the potential expansion of the virus's transmission area and the growing understanding of the disease spectrum, including possible new transmission routes, and possibles new vectors that could affect both the general population and vulnerable groups, such as pregnant women, their fetuses, and newborns.

Given that OROV is an emerging and poorly identified arbovirus in the Americas, the detection of a positive sample and confirmation of a case requires the use of Annex 2 of the IHR and its consequent notification through the established channels of the IHR *(8)*.

Criteria	Assessment		Risk	Rationale
	Likelihood	Consequences		
Potential risk to human health	Highly likely	Major	Very High	– Although most cases present with mild to moderate symptoms and are self-limiting, the two recent cases of deaths associated with OROV in the state of Bahia in Brazil, could indicate greater severity, not previously documented. – The cases of presumed vertical transmission associated with OROV under investigation could have important public health implications for pregnant women, fetuses, and newborns. – Even though rare, complications such as aseptic meningitis have been described. The presentation of neurological manifestations clinically defined as meningitis has been recorded mainly during large outbreaks. – The clinical presentation of OROV infection is similar to that of other arboviruses (mainly dengue) or malaria, so it is possible that there is low case detection, underestimating the true burden of the disease. – Direct transmission of the virus from person-to-person has not been documented. – There is no specific treatment or vaccine for OROV; medical care focuses on the management and control of signs and symptoms.
Risk of the event spreading	Likely	Major	High	– The OROV outbreaks identified in the last ten years have occurred mainly in the Amazon basin, in rural and urban areas. However, recently in Brazil, autochthonous transmission has been detected in ten non-Amazonian states, including some with no previous cases reported. – Currently, Brazil reports an increase in cases of OROV disease, affecting 15 states. These states share a border with other countries in the Region, mainly in the Amazon basin, where 76% of the cases are concentrated.

Criteria	Assessment		Risk	Rationale
	Likelihood	Consequences		
				– During 2024, countries such as Bolivia and Cuba have reported cases of OROV. Although outbreaks have not historically been recorded in these countries, the recent identification of cases is due to the expansion of OROV. – The risk of spread could increase due to significant population movements both within and between countries, as well as social, entomological, and environmental factors that promote the proliferation of *C. paraensis* and *Cx. quinquefasciatus* in countries within the Region. Additionally, it is important not to rule out the involvement of other vectors in the current event. – Proximity to urban and peri-urban areas where the vector is present is also linked to increased risk, particularly in locations with well-developed transportation connections. – Environmental factors resulting from climate change, such as increased temperatures and shifts in precipitation patterns, could facilitate the growth of vector populations, and the geographical expansion of OROV vectors and other arboviruses.
Risk of insufficient prevention and control capacity with available resources	Likely	Major	High	– OROV is an emerging virus, which means that its prevention, surveillance and control are underfunded and lacks high level of institutional commitment. – Since the symptoms of OROV disease are nonspecific and resemble other febrile infections, such as dengue, chikungunya, Zika, and malaria, among others, the clinical diagnosis of cases is challenging. In addition, a suspected case definition is not established yet. – Insufficient coordination between new partners and sectors involved in the response to the OROV outbreak within the countries, such as with the maternal and child health sector. – Laboratory diagnosis of OROV depends on the availability of tests in the country and is subject to the laboratory algorithms established for arbovirus surveillance. Limitations in the interpretations of the different arboviruses can lead to less sensitive surveillance and can hinder the epidemiological characterization of the event in the Region. – There is much heterogeneity in surveillance and response capacity within the Region against OROV disease outbreaks and outcomes. – Systematic surveillance of cases is lacking in most countries in the Region. Outbreaks and cases have typically been documented through retrospective epidemiological studies in populations or laboratories, often in samples that tested negative for other arboviruses. – Currently, there is no established case definition for vertical transmission and deaths due to OROV, which may further complicate the detection of these cases. – While the documented outbreaks have not led to the saturation or collapse of health services, the simultaneous and widespread circulation of other arboviruses, such as dengue, suggests that growing outbreaks of OROV could place an additional burden on health systems in countries in the Region. – In countries where OROV cases have been documented, irregular migratory phenomena are occurring, leading to limited

Criteria	Assessment		Risk	Rationale
	Likelihood	Consequences		
				access to healthcare services for particularly vulnerable populations. – Lack of participation and mobilization of local communities in vector control activities. The uncertainty regarding the vectors involved limits the ability to design and implement control activities.

Background information

Hazard assessment

Oropouche

Oropouche fever (ICD-10 A93.0) is a disease transmitted mainly through the bite of *C. paraensis* midge. It resembles other arboviruses such as dengue and chikungunya, with an incubation period of 4 to 8 days and symptoms that include fever, headache, and myalgia. Recovery usually occurs within 7 days, although in some cases it can last for weeks *(1)*. Also, relapse of symptoms has been reported in up to 60% of cases *(7)*.

OROV is an emerging virus first isolated in 1955 in Trinidad and Tobago. It affects people of all ages, especially children and young people in previously exposed areas. Due to its mild and self-limiting symptoms, it often goes unrecognized or is misdiagnosed as dengue, chikungunya, Zika, yellow fever, or malaria. There is no specific antiviral treatment or vaccine available, so prevention is based on vector control and personal protection measures *(4)*.

The OROV virus is suspected to circulate in urban epidemic cycles, where humans are the amplifying host, and jungle cycles, which include non-human primates, sloths, and birds as hosts. The virus is transmitted primarily through the bite of *C. paraensis* in urban areas. *Cx. quinquefasciatus* is considered a potential vector in the urban cycles *(7)*. Midges of the genus *Culicoides*, including *C. paraensis*, along with mosquito species *Coquillettidia venezuelensis*, *Aedes (Ochlerotatus) serratus*, and *Culex quinquefasciatus*, have been identified as infected with OROV. These species are considered sylvatic secondary vectors of the virus, have the potential for natural infection and reproduction, and are commonly found in dense jungle habitats *(4)*. *C. paraensis* larvae thrive in moist habitats such as rainforests, riverbanks, damp soils, and tree holes. Banana stems and cocoa shells, which are common waste materials in cocoa and banana plantations in urban, semi-urban areas, and the Amazon Basin region, provide especially favorable conditions for their proliferation *(9)*.

First report of OROV-associated deaths in the Region of the Americas

On 23 July 2024, Brazil IHR NFP informed PAHO/WHO about two fatal cases of OROV infection in the state of Bahia, detected retrospectively. The first case was a 24-year-old female in the municipality of Valença, Bahia, who presented with symptoms on 23 March 2024, including fever, headache, and vomiting. Despite seeking medical attention, her condition worsened, developing complications such as blurred vision and ultimately passing away on 27 March after cardiorespiratory arrest. The second fatal case is a 21-year-old female in the municipality of Camamú, state of Bahia, with initial symptoms on 5 June 2024. After developing rashes and bleeding, she was admitted to a hospital on 9 June, dying two hours later due to her critical condition. Both patients tested positive for OROV by RT-PCR and serology, but negative for other arboviruses. Epidemiological investigations revealed similar symptoms in nearby residents and a relative of the second case who had shown recent evidence of OROV infection *(5, 6)*.

These two deaths would be the first fatal cases of acute OROV infection in Brazil and in the Region of the Americas, occurring in the midst of an active outbreak on the southern coast of Bahia. Both cases, without a history of chronic diseases, presented with a high OROV viral load and negative results for other pathogens such as dengue and Zika. The cases showed a rapid evolution from the onset of symptoms to death, with severe coagulopathy and liver involvement identified as probable causes of death. Additionally, the Brazilian Ministry of Health is investigating two other fatal cases associated with OROV, in Paraná and Maranhão *(5, 6)*.

Cases of possible vertical transmission of OROV under investigation

On 12 July 2024, the Brazil IHR NFP informed PAHO/WHO about a case of possible vertical transmission of OROV in a pregnant woman from Rio Formoso, Pernambuco. During the 30th week of gestation, she presented with symptoms compatible with OROV and, after serological tests and RT-PCR, the presence of OROV was confirmed in serum and placenta. Subsequently, after noticing a lack of fetal mobility, fetal death was confirmed, and additional tests detected OROV genetic material in fetal tissues, suggesting vertical transmission. A second suspected case was reported in Jaqueira, Pernambuco, where a 33-year-old woman exhibited symptoms of OROV and experienced a miscarriage at eight weeks of gestation. Serological tests for OROV were positive *(2)*.

Furthermore, in June 2024, a retrospective analysis by the Evandro Chagas Institute (IEC per its acronym in Portuguese) revealed IgM antibodies against OROV in newborns with microcephaly, although a causal relationship with neurological malformations was not established.

As of 30 July 2024, five cases of vertical transmission have been identified in Brazil: four cases of stillbirth and one case of spontaneous abortion in the state of Pernambuco, as well as four cases of newborns with microcephaly in the states of Acre and Pará *(2)*. The investigation is ongoing. Historically, in 1982, nine cases of OROV infection in pregnant women in the Amazon were reported, two of which resulted in spontaneous abortion, suggesting vertical transmission *(2)*.

Recent OROV-related deaths in Brazil, along with suspected cases of vertical transmission leading to stillbirths, have heightened the risk level in the Region. These incidents highlight the urgent need to enhance epidemiological surveillance and preventive measures, as they suggest a potential expansion of the virus and new transmission routes that could impact both the general population and vulnerable groups, including pregnant women, their fetuses, and newborns *(2, 5, 6)*.

Exposure Assessment

Table 1. Summary of ongoing and/or reported Oropouche outbreaks as of July 2024

Region of the Americas	
As of 30 July 2024, 8,078 confirmed cases of OROV have been reported in five countries in the Region of the Americas: Bolivia (n= 356), Brazil (n= 7,284), Colombia (n= 74), Cuba (n= 74), and Peru (n= 290). During the last quarter, cases of OROV have been reported in areas and countries where no autochthonous cases had previously been recorded.	
Country / Territories	**Context**
Brazil	In **Brazil**, between EW 1 and 29 of 2024, 7,284 confirmed cases of OROV have been reported. Most cases are likely to have been infected in municipalities in northern states. The Amazon region, considered endemic, accounts for 76% of the recorded cases in the country: Amazonas (n= 3,224), Rondônia (n= 1,709), Acre (n= 265), Roraima (n= 239), Pará (n= 74), and Tocantins (n= 2). Autochthonous transmission has been documented in ten non-Amazonian states, some of which had not previously reported cases: Bahía (n= 831), Espírito Santo (n= 420), Santa Catarina (n= 165), Pernambuco (n= 92), Minas Gerais (n= 83), Rio de Janeiro (n= 64), Ceará (n= 39), Piauí (n= 28), Maranhão (n= 19), and Mato Grosso (n=17). Additionally, cases reported in the states of Amapá (n=7), Paraná (n= 3), Sergipe (n=2), and Paraíba (n= 1) are being investigated to determine the probable location of infection. Regarding the distribution of cases by sex and age group, 52% (n= 3,779) are male, and the most represented age range is the 30 to 39 years group, representing 21% (n= 1,541) of the cases. On 23 July 2024, Brazil IHR NFP informed PAHO/WHO about two fatal cases of OROV infection in the state of Bahia, detected retrospectively. As of 30 July 2024, five cases of vertical transmission have been

	identified in Brazil: four cases of stillbirth and one case of spontaneous abortion in the state of Pernambuco, as well as four cases of newborns with microcephaly in the states of Acre and Pará *(2, 5, 6, 10)*.
Bolivia	In **Bolivia**, up to EW 29 of 2024, a total of 4,094 suspected cases of OROV have been reported, of which 356 cases were confirmed by RT-PCR laboratory testing. Transmission has been recorded in three departments: La Paz with 75% (n= 268), followed by Beni with 21% (n= 76), and Pando with 3% (n= 12). There are 16 endemic municipalities for this disease, with the highest number of reported cases in the municipality of Irupana, La Paz, (33%), followed by La Asunta, La Paz, (13%), Chulumani, La Paz, and Guayaramerin, Beni, (12%), and others below 10%. Regarding the distribution by sex and age group, 50% (n= 179) were female, and the most represented age group is the 30 to 39 years group with 20% (n= 70). No deaths or suspected cases of vertical transmission, associated with OROV infection have been recorded to date *(11)*.
Colombia	In **Colombia**, between EW 1 and EW 29 of 2024, 74 confirmed OROV cases were detected in three departments of the country: Amazonas (n= 70), Caquetá (n= 1), and Meta (n= 1), additionally two cases were identified from Tabatinga, Brazil. The cases were identified through a retrospective laboratory case-finding strategy implemented by the National Institute of Health of Colombia (INS, per its acronym in Spanish) based on dengue surveillance. Regarding the distribution of cases by sex and age group, 51% (n= 38) are female and the most represented age range is the 10 to 19 years with 36.5% (n= 27) of cases. No deaths or suspected cases of vertical transmission, associated with OROV infection have been recorded to date *(12)*.
Cuba	In **Cuba**, since 27 May 2024, when the first cases of OROV disease were reported in the country, until EW 29 of 2024, 74 confirmed cases have been reported *(13, 14)*. As of 24 June 2024, cases have been reported in 9 of the 15 provinces: Cienfuegos, Ciego de Ávila, Guantánamo, Holguín, Matanzas, Mayabeque, Sancti Spíritus, Santiago de Cuba, and Villa Clara *(15)*. No deaths or suspected cases of vertical transmission, associated with OROV infection have been recorded to date.
Peru	In **Peru**, between EW 1 and EW 29 of 2024, 290 confirmed OROV cases have been reported in five departments; this is the highest number of cases reported to date in this country. The departments with confirmed cases reported are: Loreto (n= 193), Madre de Dios (n= 47), Ucayali (n= 41), Huánuco (n= 8), and Tumbes (n= 1). Regarding the distribution of cases by sex and age group, 52% (n= 150) are male, and the most represented age range is the group of 30 to 39 years with 40% (n= 115) of the cases. No deaths or suspected cases of vertical transmission, associated with OROV infection have been recorded to date *(16, 17)*.

Context Assessment

Due to it being an emerging and partially understood arbovirus in the Americas, OROV lacks systematic active surveillance in most countries within the Region. Outbreaks are typically identified through retrospective population-based or laboratory-based epidemiological studies. Moreover, OROV disease is frequently undiagnosed or misidentified as other endemic diseases in these areas, such as dengue, Zika, chikungunya, or malaria, due to the similarity of their symptoms.

The outbreaks of OROV recorded in the last ten years have taken place mainly in the Amazon Basin region, where the presence of the vector has been identified. The abundant presence of *C. paraensis* in areas where decaying banana stems and cocoa husks are found suggests a direct correlation between vector proliferation and the availability of these waste materials. This raises the probability of greater exposure of these products in urban and rural populations with an agricultural vocation *(9)*.

Given the current situation related to climatic phenomena, unusual increases in temperature and/or precipitation can lead to increased vector density and viral transmission, which would facilitate potential epidemics of vector-borne diseases *(18).*

There is no specific treatment for OROV and without a vaccine, prevention focuses on vector control and taking personal protective measures.

The prevention and control of OROV continue to pose significant challenges due to the underestimation of the burden of this disease in the countries of the Region. Responding to outbreaks requires an integrated, multidisciplinary, multisectoral approach to achieve its goal of reducing the impact of this event on public health.

Increased migration, the effect of climate change (such as drought, rising temperatures, and floods), political instability and insufficient development mean that an increasing number of people are at risk of contracting this and other arboviruses in countries where the vector has been identified. These factors, along with others such as financial crises and migration, have left large populations without access to adequate health care, and thereby putting them at risk of contracting OROV disease.

Strengths	**Vulnerabilities**
Coordination • Enhanced coordination between health areas/sectors because of the experience is most countries with other arboviral diseases, especially dengue.	**Coordination** • Insufficient coordination among new partners and sectors involved in the response to Oropouche outbreak within the countries. • Low level of coordination between the health sector and other public and private sector in vector control. • Insufficiently developed and coordinated One Health approach among human, animal, and environmental sectors.
Surveillance • Epidemiological alerts and updates have been issued to alert Member States and recommend actions to be implemented. • Member States have experience in other arbovirosis, thus the Oropouche surveillance is being implemented based on this experience. • The capacity in information systems and data management that was developed as part of the response to the COVID-19 pandemic and the recent dengue outbreak are being leveraged for OROV surveillance. • Virtual Cooperation Spaces (VCS) have been created in the Region as a collaborative surveillance initiative between PAHO/WHO and Member States that allow the automated generation of different epidemiological analyses, situation rooms, and epidemiological bulletins, strengthening epidemiological surveillance of arboviruses.	**Surveillance** • National public health surveillance and emergency response teams are exhausted and overwhelmed by numerous large-scale, high-risk parallel outbreaks and other public health emergencies, reducing the ability to provide support. • Limited use of vector and climate data prediction and integration tools. • Inadequate infrastructure for data presentation in many areas and insufficient connectivity in others. • Although work is underway, there is no established standardized regional case definition for vertical transmission and death due to OROV, which may further complicate the detection of these cases. • Limited follow up specific programs for newborns from women infected during pregnancy.

Strengths	Vulnerabilities
Laboratory • Algorithms for laboratory testing has been developed and disseminated. • RT-PCR and genomic sequencing platforms installed in many countries of the Region and ready to be expanded as necessary. • Distribution of key (or critical) reagents for molecular diagnostics to national public health laboratories in the Region. • Improved genomic surveillance capacity at regional level including countries with confirmed cases.	**Laboratory** • Resources are limited in many countries due to the simultaneous response to outbreaks of dengue and other viruses. • Insufficient supplies of general laboratory reagents and consumables. • Restricted number of reference laboratories able to carry out specific serological methods such as IgM ELISA or neutralization tests, as well as whole genome sequencing and metagenomics. • In general, laboratory algorithms for arbovirus diagnosis do not include testing for OROV.
Case Management • Some countries have national networks of clinical experts in arboviral diseases under the direction of each country's Ministries of Health, which are responsible for providing clinical training at the local level. • The Region has an international technical group of experts on arboviral diseases that supports technical cooperation activities in the countries.	**Case Management** • No definition of a suspected case has been established, nor are there protocols that standardize the treatment and management of these cases. • Limited information systematically collected regarding signs and symptoms. • Limited number of health professionals trained in detecting and managing OROV or unusual clinical presentations, such as possible vertical transmission events, severe or fatal cases.
Entomological surveillance and vector control • Strengthening vector control activities in affected countries. • Support in the implementation of effective interactive vector monitoring and control by Member States through the issuance of guidelines. • The capacities surveillance and vector control that were developed as part of the response to the dengue, Zika and chikungunya outbreaks are being leveraged for the surveillance of OROV diseases by some countries in the Region. • Strengthening the capacity of Member States to monitor insecticide resistance.	**Entomological surveillance and vector control** • Suboptimal residue control practices leading to more vector breeding sites. • Suboptimal entomological surveillance and vector control activities. • The uncertainty regarding the vectors involved limits the ability to design and implement control activities. • Countries have few formally trained entomologists working in ministries of health. • Vector control programs have been underfunded for decades, and their limited resources were frequently redirected to other response activities during the COVID-19 pandemic.

Strengths	Vulnerabilities
Risk Communication & Community Engagement • Coordination of partners has been strengthened. • Risk communication and community engagement have been improved to strengthen community engagement in vector control and knowledge of the signs/symptoms OROV disease and recommended actions.	**Risk Communication & Community Engagement** • Limited resources. • Lack of targeted and effective risk communication, community engagement, and community wastewater management, with effective community feedback mechanisms. • Limited understanding of risk perception and health-seeking behaviours of affected populations. • Limited evidence on vertical transmission mechanism and risk.
Logistics • PAHO/WHO experts are providing support in countries that are experiencing outbreaks.	**Logistics** • Insufficient financial resources to respond in a timely and effective manner at the national level. • In some countries, there are insufficient staff with expertise in OROV and resources for vector control.

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