Travel Medicine and Infectious Disease 67 (2025) 102871

Contents lists available at ScienceDirect

Travel Medicine and Infectious Disease

journal homepage: www.elsevier.com/locate/tmaid

Yellow fever in South America – A plea for action and call for prevention also in travelers from SLAMVI, ESGITM, EVASG, ALEIMC, GEPI-SEIMC, SEMEVI, and CMTZMV-ACIN☆

ARTICLE INFO

Keywords:
Yellow fever
South America
Travelers' health
Vaccination
Surveillance
Vector-borne diseases
One health
Public health
Arboviruses
Infectious diseases

The origin of yellow fever (YF) is believed to be in Africa, with the disease arriving in the Caribbean and Brazil on slave ships during the 1500s. Then, it spread from the Caribbean to the United States of America (USA), reaching the cities of New Orleans and Philadelphia. It was identified on European soil, arriving via conquistador ships and causing major outbreaks in the French port city of Marseille. Since then, the YF virus has easily adapted to naïve vectors and reservoirs in the tropical Americas, where it is endemic [1–4], and intermittently epidemic (https://www.cdc.gov/yellow-book/hcp/travel-associated-infections-diseases/yellow-fever.html). YF, caused by the YF virus (YFV) (Flaviviridae family) (*Orthoflavivirus flavi*) (ICTV 2022/2024) (http://bit.ly/4kTkS9z) [5], a mosquito-borne viral disease and one of the most critical hemorrhagic fevers endemic to tropical and subtropical regions of Africa and South America, continues to pose significant challenges to public health, particularly in low and middle-income countries of the latter [1,6]. Globally, about 1.54 billion individuals live in regions conducive to YF transmission [7]. In recent years, South America has experienced a resurgence in YFV and geographical expansion of transmission in some countries, affecting both human and non-human primate (NHP) populations [8,9]. More than 300 cases of YF have been reported in six South American countries during the outbreaks initiated in 2024 and ongoing in 2025, representing up to July 6 2025 a fourfold increase compared to the cases reported in 2024 (61 in 2024 and 255 in half of 2025) (https://www.who.int/emergencies/disease-outbreak-news/item/2025-DON570), with more than 40% resulting in a fatal outcome (Table 1). Such a staggering case fatality rate, in a vaccine-preventable disease, not only highlights the urgency to improve coverage rates and traveler awareness but also underscores YF's standing as one of the deadliest vaccine-preventable viral infections.

The increasing ecological, epidemiological, and societal complexity of the disease demands renewed attention from local health authorities and international scientific societies in infectious diseases and travel medicine [10]. This editorial highlights the urgent need to enhance prevention strategies, including for international travel. Although no imported cases have been reported from South America to other regions during the 2024/25 outbreak, a preventive approach to risk assessment is necessary [11]. This is highly relevant, especially considering the high case fatality rate among unvaccinated individuals despite management in critical care units (Table 1) [12]. It is worth remembering that in previous outbreaks in the region, imported cases have been reported abroad (e.g., cases from Brazil reported in Europe in 2018), on many occasions, leading to fatal outcomes [13]. Even in South America, Argentina and Chile had also imported YF cases from Brazil.

Over the last decade, Brazil has borne the brunt of YF outbreaks, with significant urban expansion into sylvatic transmission zones [14]. Driven by epizootics among NHPs, this has resulted in the emergence of

☆ SLAMVI, Latin American Society for Travel Medicine; ESGITM, European Society for Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Infections in Travellers and Migrants; EVASG, European Society for Clinical Microbiology and Infectious Diseases (ESCMID) and Vaccine Study Group; ALEIMC, Latin American Alliance of Infectious Diseases and Clinical Microbiology; GEPI-SEIMC, Group of Study of Imported Pathology of the Spanish Society for Infectious Diseases and Clinical Microbiology; SEMEVI, Spanish Society for Travel Medicine; CTMZMV-ACIN, Committee of Tropical Medicine, Zoonoses and Travel Medicine of the Colombian Association of Infectious Diseases.

https://doi.org/10.1016/j.tmaid.2025.102871

Available online 27 June 2025

Table 1
Epidemiological indicators of the yellow fever outbreak in the Americas, from 2024 up to July 11, 2025, according to PAHO (https://shiny.paho-phe.org/yellowfever/).

Country	Cases	Deaths	Population[a]	Incidence[b]	CFR[c]	Mortality[d]
Americas Region	327	136	1,050,000,000	0.31	41.59	0.13
Brazil[e]	119	47	218,803,058	0.54	39.50	0.21
Colombia[f]	119	50	52,610,722	2.26	42.02	0.95
Peru[g]	64	26	35,015,825	1.83	40.63	0.74
Bolivia	11	5	12,746,148	0.86	45.45	0.39
Ecuador	10	8	18,563,370	0.54	80.00	0.43
Guyana	3	0	825,051	3.64	0.00	0.00

[a] Population estimates of 2025 Macrotrends (https://www.macrotrends.net/).
[b] Rate, cases per million pop.
[c] Case fatality rate (%).
[d] Rate, deaths per million pop.
[e] Source: https://www.gov.br/saude/pt-br/composicao/svsa/cnie/painel-febre-amarela.
[f] Source: https://www.ins.gov.co/Noticias/Paginas/fiebre-amarilla-datos-ciencia-prevencion.aspx.
[g] Source: https://www.dge.gob.pe/sala-fiebre-amarilla/tablero.html.

YFV in regions that had been free of the virus for many decades. As these periodic epizootics represent the main reservoir of the sylvatic YFV circulation, they serve as essential sentinel events [9]. The 2016–2019 outbreak affected thousands of people, 2.8 times higher than the total number of cases reported over the previous 36 years, resulting in hundreds of deaths [15]. States such as Minas Gerais, São Paulo, and Bahia (NHPs) witnessed rapid viral spread (https://www.saude.ba.gov.br/wp-content/uploads/2017/11/2018-Boletim-epidemiologico-da-Febre-Amarela-n-02.pdf) [16], including in peri-urban and semi-urban areas previously considered no-risk [17,18].

More recently, epizootics and human cases have been reported in Bolivia, Peru [130], and Venezuela [19]. In Colombia [20], regions such as Amazonas, Putumayo [21], and Meta have confirmed cases and continued circulation among NHPs—notably howler monkeys (especially the genus *Alouatta*), which are highly susceptible to YFV and often die within days of infection. A continuously updated risk map of YF in Colombia, by municipalities, is available from its National Institute of Health (https://app.powerbi.com/view?r=eyJrIjoiMzBiOWFlODUtYmVjZC00NTU3LWE4MTYtZDhkZDRjMzI1MTk5IiwidCI6ImJmYjdlMTNhLTdmYjctNDAxNi04MzBjLWQzNzE2ZThkZDhiOCJ9), also including YF vaccination centers in the country. Epizootics in Colombia (Tolima, Huila, Putumayo, Meta) and Brazil (São Paulo, Minas Gerais) during 2025 involved confirmed YF in NHPs, signaling intense sylvatic transmission and heightened risk of human outbreaks (www.paho.org/sites/default/files/2025-05/2025-mayo-31-phe-alerta-epidemiologica-fiebre-amarilla-final.pdf). The occurrence of dead or ill monkeys is a strong epidemiological indicator of viral circulation. They act as sentinels of the disease [22,23]. In contrast to the Americas, African primates are less susceptible to YFV disease, probably because they developed adaptive clinical resistance to the virus centuries ago [24–26]. YFV infections have occurred in unvaccinated travelers visiting regions without human cases (for decades), indicating that the risk (and need to vaccinate) persists despite "epidemiological silence". In these regions, often without sufficient surveillance, travelers are "tragic" sentinels [27].

This sustained viral activity might reflect complex environmental, demographic, and climatic shifts [28]. Deforestation, migration, expansion of human settlements into forested areas, and climate change are associated with an increasing risk of human exposure to sylvatic vectors, primarily *Haemagogus* and *Sabethes* mosquitoes [29,30]. Although YF shows a seasonal pattern in South America, the exact months of highest risk of YF transmission can vary within and between countries. Agricultural activities influence this, intensifying during planting and harvesting times, especially in Brazil, and climate change during periods of high rainfall and warmer temperatures [31–33].

The risk of reurbanization is a growing concern. Although the last major urban YF outbreak in South America was in Brazil in 1928, *Aedes aegypti* remains widely present in Latin America and the Caribbean (LAC). Paraguay experienced its most recent urban outbreak in 2008 in San Lorenzo, which led to mass vaccination and swift public health action [34]. If YFV were to bridge the sylvatic-urban cycle, the consequences could be catastrophic [35–38]. After a long silence, urban YF risk re-emerged in 1997–1998 when six cases were confirmed in Santa Cruz de la Sierra, Bolivia, with five fatalities. Two had not left the city, and one visited only non-sylvatic areas, raising concerns about possible urban transmission and disease reemergence in the region [39].

One of the foremost challenges is the lack of comprehensive and coordinated surveillance systems across borders. While countries such as Brazil have robust syndromic and epizootic monitoring systems, others lag due to underfunded health infrastructure or political instability [40,41]. Hence, entomological and disease surveillance are crucial to understanding and controlling YF and other vector-borne diseases.

As previously mentioned, vaccine coverage remains suboptimal in several at-risk populations (https://www.paho.org/sites/default/files/2025-05/2025-may-23-phe-risk-assessment-yellow-fever-enfinal.pdf), like migrants populations, people with low socioeconomic status, or those living in remote areas or at the borders [42]. Despite the availability of an effective live-attenuated YF vaccine (17D strain), vaccine hesitancy, and misinformation hinder optimal use of this preventive resource [43]. In this changing epidemiological environment, vaccine supplies are insufficient, annual demand is not met, and further decreasing vaccine coverage between 2020 and 2023 poses additional hurdles to effective immunization programs (https://www.paho.org/sites/default/files/2025-05/2025-may-23-phe-risk-assessment-yellow-fever-enfinal.pdf).

In addition to misinformation, pandemic fatigue—a state of demotivation and exhaustion resulting from prolonged public health crises—has emerged as a significant barrier to vaccine acceptance and risk perception following the COVID-19 pandemic. Recent studies have shown that high levels of pandemic fatigue are linked to increased vaccine hesitancy, reduced adherence to preventive measures, and a diminished risk perception [44], particularly among urban populations and travelers who may not have previously considered themselves at risk [45–47]. This phenomenon is compounded by the overwhelming volume of information on social media, including unverified or misleading content, which can further erode trust in public health recommendations and fuel hesitancy [48]. Tailored communication strategies that address both misinformation and pandemic fatigue are urgently needed to restore confidence in vaccination and adapt public health messaging to the current social context [49].

Urban populations outside classical risk zones—previously not targeted for vaccination—are now being exposed without prior protection, as seen in outbreaks in southeastern Brazil and Paraguay [50–52]. Another important consideration is that in some countries, such as Brazil, fractional doses of the vaccine were used in a previous scenario to

rapidly contain transmission in densely populated areas. This raises questions whether people who received a single fractional dose should be revaccinated with a full dose [8,53]. For these individuals, a full-dose booster will likely be necessary within the next decade [54,131,132].

In light of these challenges, dose-sparing strategies, such as fractional-dose YF vaccination, have become increasingly relevant [55–60]. During periods of constrained vaccine supply, the World Health Organization (WHO) and the Pan American Health Organization (PAHO) recommend using fractional doses (0.1 mL, or one-fifth of the standard dose) to extend vaccine coverage in outbreak settings. Recent studies have demonstrated that fractional-dose vaccination induces comparable immunogenicity and long-term protection to the standard dose in healthy adults, with protective antibody responses persisting for at least 10 years and no increase in serious adverse events (https://www.paho.org/sites/default/files/2025-05/2025-may-23-phe-risk-assessment-yellow-fever-enfinal.pdf). This approach has been successfully implemented in emergency campaigns and is considered a key tool to mitigate stock limitations and rapidly increase population immunity in at-risk areas [61].

The 17D YF vaccine is widely regarded as both safe and effective, with an established track record of immunogenicity and long-lasting protection [43]. The vaccine is a priority in the control of YF (Fig. 1). Serious adverse events are extremely rare, and the vast majority of recipients experience only mild, transient symptoms such as low-grade fever or injection site reactions [1]. As a live-attenuated vaccine, it has been used globally for decades in both routine immunization programmes and outbreak responses with a well-established safety profile [62].

However, rare cases have shown that the YF vaccine virus (YFV 17D strain) can be transmitted through non-vector routes (in addition to the YFV). These include breastfeeding, where the vaccine virus has been found in breast milk and linked to adverse events in breastfeeding infants (usually <1 year), and mother-to-child congenital infection [63], as well as through blood transfusion and solid organ transplantation. Such cases underscore the importance of screening and considering recent vaccination history in donors, particularly in regions where YF vaccination is prevalent [64–66]. During Argentina's 2008–2009 YF vaccination campaign, 165 adverse events were reported (84.9/million doses), including 35 serious cases (18/million), 12 viscerotropic and 12 neurologic events, highlighting rare but significant vaccine-associated risks [67]. The risk of serious adverse events after YF vaccination is about three times higher for individuals aged 60 years and older compared to those under 60. For individuals older than 70 years, this risk increases to five times that of the population under 60 years of age [43,68].

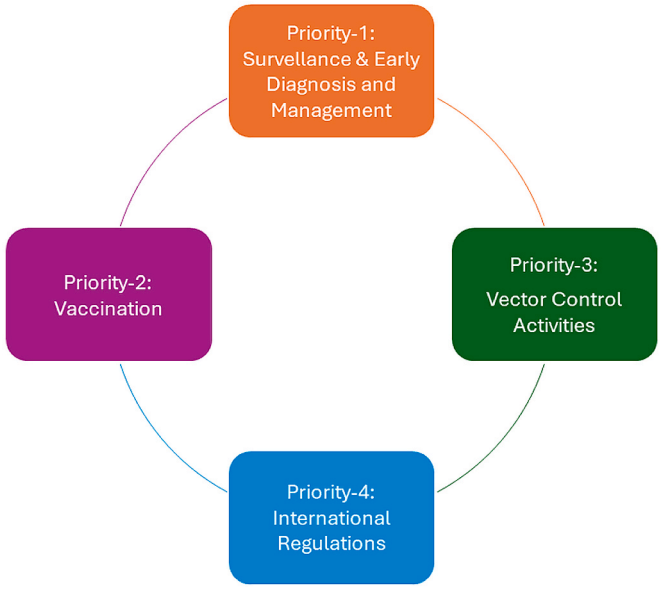

Fig. 1. Core Priorities for Yellow Fever Prevention and Control.
Priority 1 highlights the need for epizootic surveillance in NHPs, early clinical recognition, improved diagnostics, and identification of sentinel events, such as monkey die-offs. Priority 2 focuses on vaccination as the cornerstone of YF prevention, covering both full- and fractional-dose strategies, addressing gaps in coverage and hesitancy, and reinforcing the need for valid documentation, especially among travelers. Priority 3 emphasizes integrated mosquito control (*Haemagogus, Sabethes, Aedes aegypti*) to reduce the risk of sylvatic and urban transmission. Priority 4 emphasizes the importance of aligning international vaccination policies and increasing awareness of the International Certificate of Vaccination, as countries like Ecuador now require proof of immunization, reflecting a growing global concern over the spread of YFV.

During the first 10 days after symptom onset—the viremic phase—and sometimes longer in severe cases, the etiological diagnosis of yellow fever can be effectively achieved by detecting viral RNA in serum samples using molecular methods, such as conventional (end-point) or real-time reverse transcriptase polymerase chain reaction (RT-PCR) (https://www.paho.org/sites/default/files/2020-07/Diagnostico-laboratorio-yellow-fever-septiembre%20-2018_0.pdf). In recent years, advances have led to the development of specific RT-PCR assays capable of distinguishing the yellow fever vaccine virus (YFV-17D) from wild-type strains. These assays provide a rapid and straightforward alternative to genomic sequencing, which remains the gold standard for strain differentiation [135,136]. However, diagnostic capacity is often delayed or limited, particularly in rural or frontier regions [69,70]. The lack of validated, commercially available diagnostic reagents complicates access to etiological diagnosis in low-complexity laboratories. In cases of acute febrile illness, YF can be clinically indistinguishable from other arboviruses, such as dengue, Zika, chikungunya, and Oropouche [71,72], further complicating timely identification and containment [73,74]. Additionally, other tropical diseases should be considered in the differential diagnosis, e.g., leptospirosis, malaria, South American viral hemorrhagic fevers [75–77]. In addition, flaviviruses are endemic in most LAC countries, cross-serological reactions are common, and the tests could be inefficient. Because there is no antiviral therapy available, only supportive care, decentralizing diagnosis should be a priority in LAC countries, as this would contribute to rapid clinical intervention to reduce the case fatality rate from YF.

Underdiagnosis can also be responsible for the high level of mortality observed during this and recent outbreaks. If the diagnostic process is primarily conducted in higher-resource settings, among highly symptomatic patients, and in those accessing hospitals, we may miss a significant number of patients with milder forms of the disease in the community [78].

International travelers—particularly those from non-endemic countries visiting forested or rural regions in South America—face a significant, yet often underestimated, risk of YF exposure. This issue is exacerbated by inadequate risk perception, the absence of pre-travel consultations, and a lack of mandatory vaccination policies at points of entry [11,79–90]. Visiting friends and relatives (VFR) travelers face higher risks and are less likely to accept vaccinations, making them a crucial target for targeted public health interventions [91].

Furthermore, domestic travelers from non-endemic areas face an increased risk of YF when visiting endemic regions without prior vaccination or proper preventive measures [92,93]. Alternatively, the methodology of "microplanning of high-quality vaccination activities" has been implemented in the vaccination programs of the region's countries [94]. YF should be suspected in travelers from endemic areas presenting with acute febrile illness, hepatic dysfunction, renal impairment, or hemorrhagic signs. Early recognition based on clinical and laboratory findings—especially elevated AST, leukopenia, and thrombocytopenia—is crucial, as prompt supportive care during severe phases significantly reduces mortality [95].

Cases of YF among unvaccinated travelers from Europe, North

America, and Asia have been reported in recent years, some with fatal outcomes. The 2018 deaths of European tourists in Brazil underscored the critical need for traveler awareness and pre-departure vaccination [13,96–98]. In 2016, China reported its first imported cases of YF, linked to travelers returning from Angola, highlighting the role of global travel in the international spread of vector-borne diseases [99–104]. Unvaccinated travelers may facilitate the introduction of YFV into non-endemic regions where competent mosquito vectors, such as *Aedes aegypti*, are present or have historically circulated. This includes areas outside Africa and South America, notably parts of the southern USA and southern Europe, which have experienced *Aedes aegypti*-mediated transmission of other arboviruses such as dengue, chikungunya, and Zika.

A positive observation from Spain is that, according to the Deputy Directorate-General for Foreign Health of the Ministry of Health of Spain, there has been a 25% increase in YF vaccination appointments (compared to 2024) among individuals planning to visit countries where cases are currently being reported, with 36% in travelers to Colombia and 57% to Ecuador, but just 8% of increase in those traveling to Brazil and 4.6% in those traveling to Peru (https://www.sanidad.gob.es/areas/sanidadExterior/home.htm).

The potential for YFV introduction and local transmission in these settings is a growing concern, especially in the context of global travel and climate change expanding vector habitats [105]. Additionally, studies suggest that European populations of *Aedes albopictus* may be competent for transmitting YFV [106,107]. While *Aedes albopictus* is a less efficient YF vector, studies have shown that it potentially poses a transmission risk [35,106,108,109]. With climate change and global warming, the global distribution of mosquito species is shifting [110], increasing the risk of expansion of invasive species, such as *Aedes aegypti*. Many potentially affected regions still lack adequate research and vector surveillance systems [111].

Currently, vaccination against YFV is mandatory primarily for travelers departing from endemic areas when entering certain countries that are free from YFV. However, this requirement does not uniformly apply to individuals transiting through risk zones or to travelers from non-endemic areas who may nonetheless visit high-transmission regions. This gap in preventive policy could permit silent importation and onward transmission of the virus in areas with suitable ecological conditions, reinforcing the need to reassess international travel regulations and strengthen pre-travel vaccination recommendations [112].

Even in non-endemic regions, awareness among healthcare professionals remains essential. Clinicians in these areas should proactively consider YF in the differential diagnosis of returning travelers with undifferentiated febrile illnesses. They should emphasize the importance of vaccination during pre-travel consultations (made at least 10 days before travel). Despite geographic distance, the global movement of families, eco-tourism, and international mobility continue to expose individuals to preventable risks [113,114].

In addition, eco-tourism and adventure travel trends are increasingly drawing visitors to endemic zones, including the Amazon Basin, the Andean foothills, and national parks. Many of these travelers do not seek or receive pre-travel medical advice or vaccine requirements, leaving them vulnerable to infection and potential secondary transmission upon return to their home countries [92,115–118].

The cornerstone of YF prevention is vaccination. A single dose of the 17D vaccine provides long-term protection for most individuals and is highly effective, conferring immunity (as demonstrated by seroconversion) in more than 98% of recipients [62]. In fact, YF breakthrough infections after YF vaccination in patients are rarely reported [119].

Travelers should be vaccinated at least 10 days before entering endemic regions. The duration of protection, however, is a matter of controversy, and some countries recommend a second dose, depending on the age of the first vaccination and the itinerary (e.g., Germany). Recent studies in Brazil support the need for a second dose in children [120]. Vaccine guidelines from other countries, such as the USA (https://www.cdc.gov/yellow-fever/vaccine/index.html), Canada (https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-4-active-vaccines/page-25-yellow-fever-vaccine.html), and Australia (https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/yellow-fever), recommend a one-time booster dose after 10 years for travelers visiting regions with ongoing outbreaks.

In individuals living with HIV and in children under 2 years of age, booster doses may still be necessary due to lower levels of seroprotection observed 10 or more years after vaccination [54]. The WHO recommends vaccination for all individuals over nine months of age who live in or travel to endemic areas. However, the implementation of this recommendation varies widely between countries and regions [79,89,121,122]. In Brazil, if the first dose is given before the age of 5, a new dose (the 2nd) is recommended (it is recommended starting at 9 months and later at 4 years) (https://www.gov.br/saude/pt-br/vacinacao/calendario-tecnico/calendario-tecnico-nacional-de-vacinacao-crianca). Achieving high and homogeneous vaccination coverage rates is a significant challenge to be faced. Additionally, production capacity and available vaccine stocks still pose a barrier to intensifying vaccination efforts in the short term, through routine immunization or preventive and reactive immunization campaigns, even for populations residing in high-risk areas globally [44].

In addition to vaccination, personal protective measures such as using insect repellent, wearing long-sleeved clothing, and avoiding mosquito exposure remain essential to prevent YF and other arboviral diseases [1,123,124].

International health authorities, national ministries of health, and travel medicine providers must collaborate on various activities (Table 2). Given the re-emergence of YF and its high case fatality rate, the undersigned societies urge governments, international agencies, and

Table 2
Collaborative activities between international health authorities, national ministries of health, and travel medicine providers around yellow fever.

Activity	Description
Expand Vaccination Campaigns	Implement catch-up campaigns targeting at-risk populations, especially in previously non-endemic urban and border areas.
Enhance Pre-travel Advice	Ensure that travel clinics and medical units provide timely, risk-based information and confirm vaccination at least 10 days before travel, as well as consider a booster shot for some travelers.
	The importance of investing in awareness programs aimed at the general traveling public should be emphasized, encouraging them to seek appropriate travel medicine advice well in advance of any high-risk trip, allowing sufficient time for effective preventive measures to be implemented.
Improve Access to YF Vaccine in Non-Endemic Settings	Ensure equitable access to yellow fever vaccination in non-endemic regions by increasing vaccine availability in travel clinics and lowering cost barriers.
Strengthen Surveillance	Develop integrated systems that connect human, animal, and entomological data using a One Health framework to enable early detection of outbreaks.
Increase Health Professional Education and Training	Train front-line clinicians to recognize symptoms of yellow fever and report suspected cases promptly to health authorities.
	Efforts to update health personnel through publications, virtual meetings, and conferences.
Promote Inter-Institutional Collaboration	Encourage active involvement of scientific societies in raising awareness, developing guidelines, and advocating for policies and investments to provide better tools for disease containment.
Address Vaccine Supply Issues	Secure adequate national and global vaccine stockpiles and improve distribution strategies amid production limitations.

the global health community to take concerted, multisectoral action. The recent events in multiple South American countries serve as a stark reminder that YF remains a significant public health threat in the 21st century. However, existing strategies such as the Eliminate YF Epidemics (EYE) initiative aim to end YF outbreaks by addressing three key global health priorities: the International Health Regulations (IHR), the Global Health Security Agenda (GHSA), and Universal Health Coverage (UHC) (https://www.who.int/initiatives/eye-strategy).

Prevention through vaccination, education (Fig. 2), human, wildlife, and entomological surveillance, as well as sustained investment, must be the foundation of regional strategies (Table 2) (Fig. 1). For travelers, awareness and preemptive measures can mean the difference between life and death. The current YF outbreak in South America also presents a critical opportunity to advance research on the virological and clinical aspects of YFV infection. Notably, recent studies have suggested the presence of YFV RNA in non-blood specimens such as urine and semen, offering new avenues for diagnostic innovation and a deeper understanding of viral persistence. Detection in these fluids could expand diagnostic windows beyond the brief period of viremia, aiding in the identification of cases where blood testing may be inconclusive. Moreover, the potential for alternative transmission routes—particularly sexual or via organ donation—warrants further investigation to inform public health strategies and update clinical guidelines for surveillance and patient management [125,126]. Future research and investment should also consider advancing targeted therapies and strengthening the limited but promising evidence supporting the repurposing of existing drugs, such as sofosbuvir, which has demonstrated antiviral activity against YF in recent experimental studies [127–129].

The ongoing YF outbreak in South America is strongly linked to non-human primates (NHPs), notably howler monkeys, which are not responsible for disease outbreaks; instead, they serve as critical sentinels due to their high susceptibility to YFV. Unfortunately, public fear and misinformation have led to their persecution, as seen during the monkeypox outbreak, underscoring the need for education. Epizootics in NHPs often precede human cases and must prompt immediate surveillance and intervention. According to the WHO, individuals who have

Fig. 2. Educational campaigns by the Latin American Society for Travel Medicine about Yellow Fever in travelers in the region used on social media.
Upper left: Starting May 1, 2025, all visitors to Colombia's National Natural Parks will be required to present a valid yellow fever vaccination certificate. The vaccine must have been administered at least 10 days before entry. This requirement is part of national health regulations issued by the Colombian Ministry of Health on April 16, 2025, through Resolution 0060081, and applies to both domestic and international travelers. **Upper right**: Beginning May 12, 2025, Ecuador will implement a mandatory requirement for the International Certificate of Vaccination against Yellow Fever. This will apply to travelers of any nationality arriving from or having spent more than 10 days in countries considered at risk, specifically Peru, Colombia, Bolivia, and Brazil. Travelers must present a certificate indicating that they received the vaccine at least 10 days before entering Ecuador. This measure aims to protect public health and prevent the importation of yellow fever. **Lower left**: As of April 24, 2025, all public transport companies in Colombia, including those providing overland and fluvial services, must ensure that passengers present a valid yellow fever vaccination certificate. The vaccine must have been administered at least 10 days before travel. This regulation applies to passenger transport by road (special, mixed, and cargo services) as well as river-based public transport, as mandated by the Colombian Ministry of Health in Resolution 0060081. **Lower right**: During the San Juan and San Pedro holiday festivities in Colombia, travelers are advised to take preventive measures against mosquito-borne diseases, including dengue, Oropouche virus, and yellow fever. These measures include receiving vaccination against dengue and yellow fever, using insect repellent, sleeping under mosquito nets, wearing protective clothing, and covering water storage containers to eliminate mosquito breeding sites. This public health campaign is promoted by the Latin American Society for Travel Medicine (SLAMVI) in collaboration with ACIN. X and Instagram of SLAMVI: @SLAMVI.

received a full dose of the YF vaccine do not require revaccination. However, those vaccinated with fractional doses during past campaigns should receive a full dose for sustained protection. Lastly, more countries, such as Ecuador, are implementing mandatory international vaccination certificates, highlighting a renewed global effort to prevent YF transmission. In this context, coordinated public health messaging, scientific engagement, and equitable vaccine policies remain imperative to protect both human and animal populations.

One Health strategies should enhance local surveillance, boost vaccination in high-risk groups, improve vector control, and assess transmission risks in animals and humans. Involved sectors include health, environment, wildlife, immunization, and immigration, with actions targeting reservoir contact, wild meat avoidance, deforestation, migrant health, georeferencing, and primary care [133,134].

SLAMVI, ESGITM, EVASG, ALEIMC, GEPI-SEIMC, SEMEVI, and CMTZMV-ACIN remain committed to supporting evidence-based approaches to YF prevention, control, and call for renewed international collaboration to mitigate the impact of this preventable yet persistent, highly lethal vaccine-preventable tropical disease.

Funding

The authors received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors to develop this Editorial.

Declaration of competing interest

Alfonso J. Rodriguez-Morales has been a speaker and consultant for the following industries involved in dengue and arbovirus vaccines over the last decade: Sanofi Pasteur, Takeda, Abbott, MSD, Moderna, Valneva, and Bavarian Nordic. Manuel Krone receives honoraria for consulting from Abbott, GSK, Pfizer, and Sanofi. Zitta Barrella Harboe received research grants from Independent Research Fund Denmark (Inge Lehmanns grant number 3162-00031B), Helen Rudes Foundation, the Danish Cancer Society (Grant number KBVU-MS R327-A19137), Novo Nordisk Foundation (grant nr. NNF24SA0090556), and the Danish National Research Foundation (grant number DNRF170). ZBH is also affiliated as a medical advisor to the Pneumococcal laboratory at Statens Serum Institut, Copenhagen, Denmark. ZBH is a member of the Danish Vaccination Council, out of this work. Rest, none.

Acknowledgements

This Editorial was presented and discussed at the Symposium-Round Table of the Latin American Alliance of Infectious Diseases and Clinical Microbiology (ALEIMC) on Yellow Fever in Latin America, Session S07.03, Friday July 5, 2025, at the XXII Congress Pan American Association of Infectious Diseases (API) and XIX Congress Peruvian Society of Infectious and Tropical Diseases (SPEIT), Lima, Peru, July 3-5, 2025. Dr. Rodriguez-Morales thanks the support of the Faculty of Medicine of Institución Universitaria Visión de las Américas, the Pan American Association of Infectious Diseases (API), the Peruvian Society of Infectious and Tropical Diseases (SPEIT), Takeda, and *Pathogens*-MDPI, for his participation at the API Congress 2025. Some of the authors would like to dedicate this publication to the memory of Prof. George H. McCracken Jr., MD (1936–2025), a legend in the field of pediatric infectious diseases (PID) globally, considered a "founding architect" of PID, who passed away at the age of 89 a few days ago, July 2, 2025, R.I.P. Also, to the memory of Prof. Larry K. Pickering, MD (1944-2025), another prominent figure in PID with a distinguished career in the field, that passed away too, recently at the age of 81 on July 1, 2025, R.I.P. This article has been registered in the Research Proposal Registration of the Coordination of Scientific Integrity and Surveillance of Universidad Cientifica del Sur, Lima, Peru, under the number PI-50-2025-0515.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tmaid.2025.102871.

References

[1] Srivastava S, Dhoundiyal S, Kumar S, Kaur A, Khatib MN, Gaidhane S, et al. Yellow fever: global impact, epidemiology, pathogenesis, and integrated prevention approaches. Infez Med 2024;32:434–50.
[2] Rodhain F. Yellow fever: a brief history of a tropical virosis. Presse Med 2022;51:104132.
[3] Selden Whitehead. A short history of the yellow fever which prevailed at Norfolk in the months of August, September, and October, 1801; with some account of the diseases that preceded and followed its appearance. Med Phys J 1803;10:266–72.
[4] Musgrave A. History of the progress, and inquiry into the causes of the yellow fever, as it appeared in the island of antigua in the year 1816. Med Chir Trans 1818;9:93–142.
[5] Simmonds P, Becher P, Bukh J, Gould EA, Meyers G, Monath T, et al. ICTV virus taxonomy profile: flaviviridae. J Gen Virol 2017;98:2–3.
[6] Monath TP, Vasconcelos PF. Yellow fever. J Clin Virol 2015;64:160–73.
[7] Lim A, Shearer FM, Sewalk K, Pigott DM, Clarke J, Ghouse A, et al. The overlapping global distribution of dengue, chikungunya, zika and yellow fever. Nat Commun 2025;16:3418.
[8] Angerami RN, Socorro Souza Chaves TD, Rodríguez-Morales AJ. Yellow fever outbreaks in South America: current epidemiology, legacies of the recent past and perspectives for the near future. New Microbes New Infect 2025;65:101580.
[9] Bonilla-Aldana DK, Bonilla-Aldana JL, Castellanos JE, Rodriguez-Morales AJ. Importance of epizootic surveillance in the epidemiology of yellow fever in South America. Curr Trop Med Rep 2025;12:16.
[10] Mattar S, López Y, Arrieta G, Mattar AS, Bandeira AC, Paniz-Mondolfi A, et al. The next arbovirus epidemic in Latin America and beyond: a question of when, not if - mayaro, oropouche, usutu or disease X? Trav Med Infect Dis 2025;64:102818.
[11] Charoensakulchai S, Chantapinya P, Prapaso S, Onwan M. Potential risk of yellow fever outbreak in southeast Asia due to importation amidst outbreaks in South America. J Trav Med 2025. https://doi.org/10.1093/jtm/taaf045.
[12] Forero-Delgadillo AJ, Morales-Olivera JA, Celis-Guzmán JF, Zapata-Díaz OE, González-Varona GA, Acevedo-Bedoya CA, et al. Colombian consensus on the care of critically ill patients with suspected or confirmed severe yellow fever, vol. 48. The Lancet Regional Health - Americas; 2025, 101144.
[13] Hamer DH, Angelo K, Caumes E, van Genderen PJJ, Florescu SA, Popescu CP, et al. Fatal yellow fever in travelers to Brazil, 2018. MMWR Morb Mortal Wkly Rep 2018;67:340–1.
[14] Chaves T, Orduna T, Lepetic A, Macchi A, Verbanaz S, Risquez A, et al. Yellow fever in Brazil: epidemiological aspects and implications for travelers. Trav Med Infect Dis 2018;23:1–3.
[15] Trindade GF, de Lima SMB, Britto C, Fernandes-Monteiro AG. Detection of yellow fever virus by quantitative real-time PCR (qPCR). Methods Mol Biol 2020;2065:65–77.
[16] Ribeiro AF, Cavalin RF, Abdul Hamid Suleiman JM, Alves da Costa J, Januaria de Vasconcelos M, Sant'Ana Malaque CM, et al. Yellow fever: factors associated with death in a hospital of reference in infectious diseases, Sao Paulo, Brazil, 2018. Am J Trop Med Hyg 2019;101:180–8.
[17] Sacchetto L, Silva NIO, Rezende IM, Arruda MS, Costa TA, de Mello ÉM, et al. Neighbor danger: yellow fever virus epizootics in urban and urban-rural transition areas of Minas Gerais state, during 2017-2018 yellow fever outbreaks in Brazil. PLoS Neglected Trop Dis 2020;14:e0008658.
[18] Cunha MDP, Duarte-Neto AN, Pour SZ, Ortiz-Baez AS, Černý J, Pereira BBS, et al. Origin of the São Paulo yellow fever epidemic of 2017-2018 revealed through molecular epidemiological analysis of fatal cases. Sci Rep 2019;9:20418.
[19] Rodríguez-Morales AJ, Bonilla-Aldana DK, Suárez JA, Franco-Paredes C, Forero-Peña DA, Mattar S, et al. Yellow fever reemergence in Venezuela - implications for international travelers and Latin American countries during the COVID-19 pandemic. Trav Med Infect Dis 2021;44:102192.
[20] Alvarez-Moreno CA, Rodriguez-Morales AJ. Challenges of the current yellow fever outbreak in Colombia. Lancet 2025;405(10497):2273. https://doi.org/10.1016/S0140-6736(25)01175-4.
[21] Sanchez-Rojas IC, Solarte-Jimenez CL, Chamorro-Velazco EC, Diaz-Llerena GE, Arevalo CD, Cuasquer-Posos OL, et al. Yellow fever in Putumayo, Colombia, 2024. New Microbes New Infect 2025;64:101572.
[22] Mares-Guia M, Horta MA, Romano A, Rodrigues CDS, Mendonça MCL, Dos Santos CC, et al. Yellow fever epizootics in non-human Primates, southeast and northeast Brazil (2017 and 2018). Parasites Vectors 2020;13:90.
[23] Leal SG, Romano AP, Monteiro RV, Melo CB, Vasconcelos PF, Castro MB. Frequency of histopathological changes in howler monkeys (alouatta sp.) naturally infected with yellow fever virus in Brazil. Rev Soc Bras Med Trop 2016;49:29–33.
[24] Chippaux JP, Chippaux A. Yellow fever in Africa and the americas: a historical and epidemiological perspective. J Venom Anim Toxins Incl Trop Dis 2018;24:20.
[25] Simpson DI. Resistance of Galagoides demidovii thomasi (elliot, 1907) to infection with yellow fever virus. Ann Trop Med Parasitol 1965;59:387–9.
[26] Woodall JP, Dykes JR, Williams MC. The reaction of a species of colobus monkey to inoculation with yellow fever virus. Ann Trop Med Parasitol 1968;62:528–35.

[27] CDC. Fatal yellow fever in a traveler returning from Venezuela, 1999. MMWR Morb Mortal Wkly Rep 2000;49:303–5.
[28] Kaye AR, Obolski U, Sun L, Hart WS, Hurrell JW, Tildesley MJ, et al. The impact of natural climate variability on the global distribution of aedes aegypti: a mathematical modelling study. Lancet Planet Health 2024;8:e1079–87.
[29] Cano ME, Marti GA, Balsalobre A, Muttis E, Bruno EA, Rossi G, et al. Database of sabethes and haemagogus (diptera: culicidae) in Argentina: sylvatic vectors of the yellow fever virus. J Med Entomol 2021;58:1762–70.
[30] Abreu FVS, de Andreazzi CS, Neves M, Meneguete PS, Ribeiro MS, Dias CMG, et al. Ecological and environmental factors affecting transmission of sylvatic yellow fever in the 2017-2019 outbreak in the Atlantic forest, Brazil. Parasites Vectors 2022;15:23.
[31] Gaythorpe KA, Hamlet A, Jean K, Garkauskas Ramos D, Cibrelus L, Garske T, et al. The global burden of yellow fever. eLife 2021;10.
[32] Hamlet A, Ramos DG, Gaythorpe KAM, Romano APM, Garske T, Ferguson NM. Seasonality of agricultural exposure as an important predictor of seasonal yellow fever spillover in Brazil. Nat Commun 2021;12:3647.
[33] Hamlet A, Gaythorpe KAM, Garske T, Ferguson NM. Seasonal and inter-annual drivers of yellow fever transmission in South America. PLoS Neglected Trop Dis 2021;15:e0008974.
[34] Johansson MA, Arana-Vizcarrondo N, Biggerstaff BJ, Gallagher N, Marano N, Staples JE. Assessing the risk of international spread of yellow fever virus: a mathematical analysis of an urban outbreak in Asuncion, 2008. Am J Trop Med Hyg 2012;86:349–58.
[35] Kamgang B, Vazeille M, Yougang AP, Tedjou AN, Wilson-Bahun TA, Mousson L, et al. Potential of Aedes albopictus and Aedes aegypti (diptera: culicidae) to transmit yellow fever virus in urban areas in Central Africa. Emerg Microb Infect 2019;8:1636–41.
[36] Figueiredo LTM. Human urban arboviruses can infect wild animals and jump to sylvatic maintenance cycles in South America. Front Cell Infect Microbiol 2019;9:259.
[37] Abreu FVS, Ferreira-de-Brito A, Azevedo AS, Linhares JHR, de Oliveira Santos V, Hime Miranda E, et al. Survey on non-human Primates and mosquitoes does not provide evidences of spillover/spillback between the urban and sylvatic cycles of yellow fever and zika viruses following severe outbreaks in southeast Brazil. Viruses 2020;12.
[38] Fraser K, Hamlet A, Jean K, Ramos DG, Romano A, Horton J, et al. Assessing yellow fever outbreak potential and implications for vaccine strategy. PLOS Glob Public Health 2024;4:e0003781.
[39] Van der Stuyft P, Gianella A, Pirard M, Cespedes J, Lora J, Peredo C, et al. Urbanisation of yellow fever in Santa Cruz, Bolivia. Lancet 1999;353:1558–62.
[40] Fernandes N, Guerra JM, Cunha MS, Beraldo KRF, Ressio RA, Cirqueira CDS, et al. Yellow fever surveillance challenge: investigation of a marmoset non-autochthonous case. Acta Trop 2020;212:105702.
[41] Baba MM, Ikusemoran M. Is the absence or intermittent YF vaccination the major contributor to its persistent outbreaks in eastern Africa? Biochem Biophys Res Commun 2017;492:548–57.
[42] Flamand C, Bailly S, Fritzell C, Fernandes Pellerin S, Toure A, Chateau N, et al. Vaccination coverage in the context of the emerging Yellow Fever threat in French Guiana. PLoS Neglected Trop Dis 2019;13:e0007661.
[43] Reno E, Quan NG, Franco-Paredes C, Chastain DB, Chauhan L, Rodriguez-Morales AJ, et al. Prevention of yellow fever in travellers: an update. Lancet Infect Dis 2020;20:e129–37.
[44] Mendes-Sousa AF, Barros VC, Ibiapina AB, Silva MCM, Mendonça VJ, Aguiar BGA, et al. Evidence map of strategies for preventing and controlling Aedes aegypti infestation and related viral infections. Rev Panam Salud Públic 2025;49:e63.
[45] Agurto-Ramirez A, Pino-Roson C, Ayala A, Falcon M, Rodriguez-Blazquez C, Forjaz MJ, et al. Association between pandemic fatigue and disease knowledge, attitudes, concerns, and vaccination intention at two key moments of the COVID-19 pandemic. Int J Publ Health 2023;68:1606049.
[46] Qin C, Deng J, Du M, Liu Q, Wang Y, Yan W, et al. Pandemic fatigue and vaccine hesitancy among people who have recovered from COVID-19 infection in the post-pandemic era: cross-sectional study in China. Vaccines (Basel) 2023;11.
[47] Chen R, Tan Q, Su B, Wang S, Du Z. A systematic review of the definition, measurement, and associated factors of pandemic fatigue. China CDC Wkly 2024;6:924–33.
[48] Islam A, Laato S, Talukder S, Sutinen E. Misinformation sharing and social media fatigue during COVID-19: an affordance and cognitive load perspective. Technol Forecast Soc Change 2020;159:120201.
[49] Lazarus JV, White TM, Wyka K, Ratzan SC, Rabin K, Larson HJ, et al. Influence of COVID-19 on trust in routine immunization, health information sources and pandemic preparedness in 23 countries in 2023. Nat Med 2024;30:1559–63.
[50] Domingo C, Charrel RN, Schmidt-Chanasit J, Zeller H, Reusken C. Yellow fever in the diagnostics laboratory. Emerg Microb Infect 2018;7:129.
[51] Shearer FM, Longbottom J, Browne AJ, Pigott DM, Brady OJ, Kraemer MUG, et al. Existing and potential infection risk zones of yellow fever worldwide: a modelling analysis. Lancet Global Health 2018;6:e270–8.
[52] Shearer FM, Moyes CL, Pigott DM, Brady OJ, Marinho F, Deshpande A, et al. Global yellow fever vaccination coverage from 1970 to 2016: an adjusted retrospective analysis. Lancet Infect Dis 2017;17:1209–17.
[53] Hansen CA, Staples JE, Barrett ADT. Fractional dosing of yellow fever live attenuated 17D vaccine: a perspective. Infect Drug Resist 2023;16:7141–54.
[54] Schnyder JL, de Jong HK, Bache BE, Schaumburg F, Grobusch MP. Long-term immunity following yellow fever vaccination: a systematic review and meta-analysis. Lancet Global Health 2024;12:e445–56.
[55] Doshi RH. Immunological response to fractional-dose yellow fever vaccine administered during an outbreak in Kinshasa, democratic Republic of the Congo: results 5 years after vaccination from a prospective cohort study. Lancet Infect Dis 2024;24:611–8.
[56] Juan-Giner A. Immunogenicity and safety of fractional doses of 17D-213 yellow fever vaccine in children (YEFE): a randomised, double-blind, non-inferiority substudy of a phase 4 trial. Lancet Infect Dis 2023;23:965–73.
[57] Kimathi D. Immunogenicity and safety of fractional doses of 17D-213 yellow fever vaccine in HIV-infected people in Kenya (YEFE): a randomised, double-blind, non-inferiority substudy of a phase 4 trial. Lancet Infect Dis 2023;23:974–82.
[58] Casey RM. Immunogenicity of fractional-dose vaccine during a yellow fever outbreak - final report. N Engl J Med 2019;381:444–54.
[59] Kimathi D, Investigators N. Low-dose yellow fever vaccine in adults in Africa. N Engl J Med 2025;392:788–97.
[60] Tonacio AC. Immunogenicity and safety of primary fractional-dose yellow fever vaccine in autoimmune rheumatic diseases. PLoS Neglected Trop Dis 2021;15:e0010002.
[61] Roukens AHE, Visser LG. Fractional-dose yellow fever vaccination: an expert review. J Trav Med 2019;26.
[62] Beck AS, Barrett AD. Current status and future prospects of yellow fever vaccines. Expert Rev Vaccines 2015;14:1479–92.
[63] Tsai TF, Paul R, Lynberg MC, Letson GW. Congenital yellow fever virus infection after immunization in pregnancy. J Infect Dis 1993;168:1520–3.
[64] Kuhn S, Twele-Montecinos L, MacDonald J, Webster P, Law B. Case report: probable transmission of vaccine strain of yellow fever virus to an infant via breast milk. CMAJ (Can Med Assoc J) 2011;183:E243–5.
[65] CDC. Transfusion-related transmission of yellow fever vaccine virus–California, 2009. MMWR Morb Mortal Wkly Rep 2010;59:34–7.
[66] Gould CV, Free RJ, Bhatnagar J, Soto RA, Royer TL, Maley WR, et al. Transmission of yellow fever vaccine virus through blood transfusion and organ transplantation in the USA in 2021: report of an investigation. Lancet Microbe 2023;4:e711–21.
[67] Biscayart C, Carrega ME, Sagradini S, Gentile A, Stecher D, Orduna T, et al. Yellow fever vaccine-associated adverse events following extensive immunization in Argentina. Vaccine 2014;32:1266–72.
[68] de Abreu AJL, Cavalcante JR, de Araújo Lagos LW, Caetano R, Braga JU. A systematic review and a meta-analysis of the yellow fever vaccine in the elderly population. Vaccines (Basel) 2022;10.
[69] Presser LD, Baronti C, Moegling R, Pezzi L, Lustig Y, Gossner CM, et al. Excellent capability for molecular detection of Aedes-borne dengue, Zika, and chikungunya viruses but with a need for increased capacity for yellow fever and Japanese encephalitis viruses: an external quality assessment in 36 European laboratories. J Clin Microbiol 2025;63:e0091024.
[70] Nemg FBS, Abanda NN, Yonga MG, Ouapi D, Samme IE, Djoumetio MD, et al. Sustained circulation of yellow fever virus in Cameroon: an analysis of laboratory surveillance data, 2010-2020. BMC Infect Dis 2022;22:418.
[71] Escalera-Antezana JP, Montesinos-Jove RD, Gonzales-Flores CE, Arauco-Gutierrez CN, Aviles-Sarmiento JL, Montenegro-Narvaez CM, et al. Oropouche fever in Beni, Bolivia. 2024 New Microbes New Infect 2025;66:101610.
[72] Rodriguez-Morales AJ, Sah R, Silva-Ramos CR, Pava-Garzón DM. Challenges in emerging and reemerging arboviral diseases: the examples of oropouche and yellow fever. Pathogens 2025;14(7):621. https://doi.org/10.3390/pathogens14070621.
[73] Higuera A, Ramírez JD. Molecular epidemiology of dengue, yellow fever, Zika and Chikungunya arboviruses: an update. Acta Trop 2019;190:99–111.
[74] de Almeida MT, Merighi DGS, Visnardi AB, Boneto Gonçalves CA, Amorim VMF, Ferrari ASA, et al. Latin America's dengue outbreak poses a global health threat. Viruses 2025;17.
[75] Escalera-Antezana JP, Montesinos-Jove RD, Gonzales-Flores CE, Arauco-Gutierrez CN, Aviles-Sarmiento JL, Montenegro-Narvaez CM, et al. Chapare virus hemorrhagic fever (CHHF) in Bolivia, 2020-2025. New Microbes New Infect 2025;64:101569.
[76] Silva-Ramos CR, Faccini-Martínez ÁA, Calixto OJ, Hidalgo M. Bolivian hemorrhagic fever: a narrative review. Trav Med Infect Dis 2021;40:102001.
[77] Silva-Ramos CR, Montoya-Ruíz C, Faccini-Martínez ÁA, Rodas JD. An updated review and current challenges of Guanarito virus infection, Venezuelan hemorrhagic fever. Arch Virol 2022;167:1727–38.
[78] Kallas EG, D'Elia Zanella L, Moreira CHV, Buccheri R, Diniz GBF, Castiñeiras ACP, et al. Predictors of mortality in patients with yellow fever: an observational cohort study. Lancet Infect Dis 2019;19:750–8.
[79] Gnanadurai R, Campos-Matos I, Kanagarajah S, Geary K, Simons H, Patel D. National review of reported yellow fever vaccine incidents in the UK. Trav Med Infect Dis 2022;47:102289.
[80] Krief I, Goldblatt JG, Paz A, Potasman I. Late vaccination against yellow fever of travelers visiting endemic countries. Trav Med Infect Dis 2006;4:94–8.
[81] Leggat PA, Ross MH, Durrheim DN, de Frey A, Blumberg LH. Linking yellow fever vaccination centre registration and training in travel medicine. Trav Med Infect Dis 2003;1:17–8.
[82] O'Brien B, Leggat PA. Linking yellow fever vaccinator approval and renewal with training in travel medicine in New Zealand. Trav Med Infect Dis 2010;8:210–2.
[83] Schaumburg F, Schuler F, Grobusch MP. New recommendation on yellow fever booster vaccination in Germany. Trav Med Infect Dis 2022;50:102487.
[84] Zida-Compaore WIC, Gbeasor-Komlanvi FA, Tchankoni MK, Halatoko WA, Sadio AJ, Konu YR, et al. Estimation of yellow fever incidence in Togo between 2010 and 2020. Trav Med Infect Dis 2022;50:102470.

[85] Arya SC. Travel and yellow fever vaccine. J Trav Med 2002;9:334.
[86] Bovier PA, Althaus B, Glueck R, Chippaux A, Loutan L. Tolerance and immunogenicity of the simultaneous administration of virosome hepatitis A and yellow fever vaccines. J Trav Med 1999;6:228–33.
[87] Jong EC, Kaplan KM, Eves KA, Taddeo CA, Lakkis HD, Kuter BJ. An open randomized study of inactivated hepatitis A vaccine administered concomitantly with typhoid fever and yellow fever vaccines. J Trav Med 2002;9:66–70.
[88] Labelle C, Macpherson DW. Evaluation of yellow fever vaccination centers in Canada. J Trav Med 2005;12:180–3.
[89] McClenathan BM, Taylor JN, Housel LA, Ryan M. Incidence of anaphylaxis to YF-VAX(R) yellow fever vaccination: a retrospective evaluation of vaccine adverse event reports 1999-2018. J Trav Med 2024;31.
[90] Rodriguez-Valero N, Fletcher R, Simons H, Richards-Zoubir S, Kanagarajah S, Patel D. UK healthcare worker hesitancy on the use of yellow fever vaccine in 'precautionary groups'. J Trav Med 2025;32(5):taaf030. https://doi.org/10.1093/jtm/taaf030.
[91] Jentes ES, Han P, Gershman MD, Rao SR, LaRocque RC, Staples JE, et al. Travel characteristics and yellow fever vaccine usage among US global TravEpiNet travelers visiting countries with risk of yellow fever virus transmission, 2009-2011. Am J Trop Med Hyg 2013;88:954–61.
[92] Gallego V, Berberian G, Lloveras S, Verbanaz S, Chaves TS, Orduna T, et al. The 2014 FIFA world cup: communicable disease risks and advice for visitors to Brazil–a review from the Latin American Society for Travel Medicine (SLAMVI). Trav Med Infect Dis 2014;12:208–18.
[93] Risquez A, Marrero A, Naranjo N, Palacios Y, Rossomando MT, Rodriguez-Morales AJ. Diseases and injuries associated with travel among students, employees and teachers of the central university of Venezuela during the national summer vacations. Trav Med Infect Dis 2010;8:41–6.
[94] Araújo ACM, da Silva TPR, Velasquez-Melendez G, Nascimento LMD, Ferraz CC, Matozinhos FP, et al. Evaluation of the adherence of municipalities and states to the ministry of Health's microplanning for high-quality vaccination activities and the increase in vaccination coverage in Brazil. BMC Public Health 2025;25:217.
[95] Villamil-Gómez W. Protocolo diagnóstico del síndrome febril con afectación hematológica en áreas geográficas de riesgo endémico de infecciones tropicales. Medicine - Programa de Formación Médica Continuada Acreditado 2022;13:3445–54.
[96] Wilder-Smith A. Yellow fever in travelers. Curr Infect Dis Rep 2019;21:42.
[97] Gossner CM, Haussig JM, de Bellegarde de Saint Lary C, Kaasik Aaslav K, Schlagenhauf P, Sudre B. Increased risk of yellow fever infections among unvaccinated European travellers due to ongoing outbreak in Brazil, July 2017 to March 2018. Euro Surveill 2018;23.
[98] Oliosi E, Serero Corcos C, Barroso PF, Bleibtreu A, Grard G, De Filippis BAM, et al. Yellow fever in two unvaccinated French tourists to Brazil, January and March, 2018. Euro Surveill 2018;23.
[99] Chen Z, Liu L, Lv Y, Zhang W, Li J, Zhang Y, et al. A fatal yellow fever virus infection in China: description and lessons. Emerg Microb Infect 2016;5:e69.
[100] Cui S, Pan Y, Lyu Y, Liang Z, Li J, Sun Y, et al. Detection of yellow fever virus genomes from four imported cases in China. Int J Infect Dis 2017;60:93–5.
[101] Ling Y, Chen J, Huang Q, Hu Y, Zhu A, Ye S, et al. Yellow fever in a worker returning to China from Angola, March 2016. Emerg Infect Dis 2016;22:1317–8.
[102] Song R, Guan S, Lee SS, Chen Z, Chen C, Han L, et al. Late or lack of vaccination linked to importation of yellow fever from Angola to China. Emerg Infect Dis 2018;24:1383–6.
[103] Wang L, Zhou P, Fu X, Zheng Y, Huang S, Fang B, et al. Yellow fever virus: increasing imported cases in China. J Infect 2016;73:377–80.
[104] Zhang X, Liu Z, Wang J, Huang J, Huang S, Di B, et al. An imported yellow fever adverse events following immunization case identified by targeted next-generation sequencing - guangdong Province, China, October 2024. China CDC Wkly 2025;7:261–4.
[105] Schaffner F, Mathis A. Dengue and dengue vectors in the WHO European region: past, present, and scenarios for the future. Lancet Infect Dis 2014;14:1271–80.
[106] Amraoui F, Vazeille M, Failloux AB. French Aedes albopictus are able to transmit yellow fever virus. Euro Surveill 2016;21.
[107] Manica M, Guzzetta G, Filipponi F, Solimini A, Caputo B, Della Torre A, et al. Assessing the risk of autochthonous yellow fever transmission in Lazio, central Italy. PLoS Neglected Trop Dis 2019;13:e0006970.
[108] Amraoui F, Pain A, Piorkowski G, Vazeille M, Couto-Lima D, de Lamballerie X, et al. Experimental adaptation of the yellow fever virus to the mosquito Aedes albopictus and potential risk of urban epidemics in Brazil, South America. Sci Rep 2018;8:14337.
[109] Damasceno-Caldeira R, Nunes-Neto JP, Aragao CF, Freitas MNO, Ferreira MS, Castro PHG, et al. Vector competence of Aedes albopictus for yellow fever virus: risk of reemergence of urban yellow fever in Brazil. Viruses 2023;15.
[110] Laporta GZ, Potter AM, Oliveira JFA, Bourke BP, Pecor DB, Linton YM. Global distribution of Aedes aegypti and Aedes albopictus in a climate change scenario of regional rivalry. Insects 2023;14.
[111] Piovezan-Borges AC, Valente-Neto F, Urbieta GL, Laurence SGW, de Oliveira Roque F. Global trends in research on the effects of climate change on aedes aegypti: international collaboration has increased, but some critical countries lag behind. Parasites Vectors 2022;15:346.
[112] Javelle E, Gautret P, Raoult D. Towards the risk of yellow fever transmission in Europe. Clin Microbiol Infect 2019;25:10–2.
[113] Osarenkhoe JO, Agbon GO, Esene H, Ohenhen V, Bassey AS. A comparison of the awareness, attitude, and uptake of COVID-19, hepatitis B virus, and yellow fever vaccines between rural and urban respondents in Edo state, Nigeria. Cureus 2023;15:e44352.
[114] Avelino-Silva VI, Francelino HS, Kallás EG. Yellow fever prevention strategies awareness among HIV-infected patients in São Paulo, Brazil. Rev Inst Med Trop Sao Paulo 2014;56:417–20.
[115] Mejia CR, Centeno E, Cruz B, Cvetkovic-Vega A, Delgado E, Rodriguez-Morales AJ. Pre-travel advice concerning vector-borne diseases received by travelers prior to visiting Cuzco, Peru. J Infect Public Health 2016;9:458–64.
[116] Otubu O, Mishori R. Immunizing in a global society: vaccines for travelers. Prim Care 2020;47:497–515.
[117] Gallego V, Berberian G, Siu H, Verbanaz S, Rodríguez-Morales AJ, Gautret P, et al. The 2019 pan American games: communicable disease risks and travel medicine advice for visitors to Peru - Recommendations from the Latin American society for travel medicine (SLAMVI). Trav Med Infect Dis 2019;30:19–24.
[118] Jaeger VK, Tschudi N, Rüegg R, Hatz C, Bühler S. The elderly, the young and the pregnant traveler – A retrospective data analysis from a large Swiss travel center with a special focus on malaria prophylaxis and yellow fever vaccination. Trav Med Infect Dis 2015;13:475–84.
[119] Schnyder JL, Bache BE, Welkers MRA, Spijker R, Schaumburg F, Goorhuis A, et al. Yellow fever breakthrough infections after yellow fever vaccination: a systematic review and meta-analysis. Lancet Microbe 2024;5:100937.
[120] Saucha CVV, Maia MLS, Sousa ESS, de Oliveira PMN, Xavier JR, de Castro TDM, et al. Immunogenicity of a single dose of the 17DD yellow fever vaccine in a cohort of adults and children in a non-endemic area, and its association with dengue and zika seropositivity. PLoS Neglected Trop Dis 2025;19:e0012993.
[121] Kimathi D, Juan-Giner A, Bob NS, Orindi B, Namulwana ML, Diatta A, et al. Low-dose yellow fever vaccine in adults in Africa. N Engl J Med 2025;392:788–97.
[122] Abdala-Torres T, Campi-Azevedo AC, da Silva-Pereira RA, Dos Santos LI, Henriques PM, Costa-Rocha IA, et al. Immune response induced by standard and fractional doses of 17DD yellow fever vaccine. NPJ Vaccines 2024;9:54.
[123] Islam MR, Dhar PS, Rahman MM. The emergence of yellow fever: outbreak, symptoms, transmission, prevention, treatment, and possible consequences. Int J Surg 2023;109:3213–4.
[124] Audain G, Maher C. Prevention and control of worldwide mosquito-borne illnesses: nurses as teachers. Online J Issues Nurs 2017;22:5.
[125] Barbosa CM, Di Paola N, Cunha MP, Rodrigues-Jesus MJ, Araujo DB, Silveira VB, et al. Yellow fever virus RNA in urine and semen of convalescent patient, Brazil. Emerg Infect Dis 2018;24:176–8.
[126] Igloi Z, Pezzi L, Charrel RN, Koopmans M. Detection of yellow fever virus genome in urine following natural infection or vaccination: review of current knowledge 1985-2023. J Clin Virol 2024;175:105740.
[127] de Freitas CS, Higa LM, Sacramento CQ, Ferreira AC, Reis PA, Delvecchio R, et al. Yellow fever virus is susceptible to sofosbuvir both in vitro and in vivo. PLoS Neglected Trop Dis 2019;13:e0007072.
[128] Ormundo LF, Barreto CT, Tsuruta LR. Development of therapeutic monoclonal antibodies for emerging arbovirus infections. Viruses 2023;15.
[129] Ricciardi MJ, Rust LN, Pedreño-Lopez N, Yusova S, Biswas S, Webb GM, et al. Therapeutic neutralizing monoclonal antibody administration protects against lethal yellow fever virus infection. Sci Transl Med 2023;15:eade5795.
[130] Cabezas C. Yellow fever in Peru and the americas, the latent risk of redevelopment: an avoidable threat. Rev Peru Med Exp Salud Publica 2025;42(2):113–4.
[131] Staples JE, Bocchini Jr JA, Rubin L, Fischer M, Centers for Disease Control and Prevention (CDC). Yellow fever vaccine booster doses: recommendations of the Advisory Committee on Immunization Practices, 2015. MMWR Morb Mortal Wkly Rep 2015;64(23):647–50.
[132] Kampmann B, Pley C, Strandmark J, Leigh MN, Ndow P, Clarke E, Roberts E, Faal A, Jeffries D, Kanteh E. Booster Vaccination against Yellow Fever in Gambian children-(BoVY) -a Phase 3 clinical trial to establish safety and immunogenicity of repeated YF vaccination in healthy Gambian children of different ages. Wellcome Open Res 2024;9:733. https://doi.org/10.12688/wellcomeopenres.23138.1.
[133] Mensah EA, Gyasi SO, Nsubuga F, Alali WQ. A proposed One Health approach to control yellow fever outbreaks in Uganda. One Health Outlook 2024;6(1):9. https://doi.org/10.1186/s42522-024-00103-x.
[134] Saad LDC, Chiaravalloti-Neto F. Reemergence of yellow fever in the state of São Paulo: the structuring role of surveillance of epizootics in non-human primates in a one health approach. Rev Bras Epidemiol 2024;27:e240064. https://doi.org/10.1590/1980-549720240064.
[135] Hughes HR, Russell BJ, Mossel EC, Kayiwa J, Lutwama J, Lambert AJ. Development of a real-time reverse transcription-PCR assay for global differentiation of yellow fever virus vaccine-related adverse events from natural infections. J Clin Microbiol 2018;56(6):e00323-18. https://doi.org/10.1128/JCM.00323-18.
[136] Fischer C, Torres MC, Patel P, Moreira-Soto A, Gould EA, Charrel RN, de Lamballerie X, Nogueira RMR, Sequeira PC, Rodrigues CDS, Kümmerer BM, Drosten C, Landt O, Bispo de Filippis AM, Drexler JF. Lineage-specific real-time RT-PCR for yellow fever virus outbreak surveillance, Brazil. Emerg Infect Dis 2017;23(11):1867–71. https://doi.org/10.3201/eid2311.171131.

Alfonso J. Rodriguez-Morales[a,dx,1,*], Abdulaziz H. Alhazmi[b], Abraham Katime[c,dy], Ahneez Abdul Hameed[d], Alejandra Morales[e], Alejandro Claudio Lepetic[f,dz], Alejandro Risquez[g], Alex Julián Forero-Delgadillo[h,ea], Alexis Holguin[i], Álvaro A. Faccini-Martínez[j,eb], Amanda Guerrero[k], Ana Ribeiro[l], Asma Al Balushi[m], Aysegul Taylan Ozkan[n], Balram Rathish[o], Baruch Diaz[p], Beatriz Elena Porras-Pedroza[q], Bhanasut Hunsajarupan[r], Botond Lakatos[s,fm], Carlos Álvarez-Moreno[t], Carlos Neftali Torres-Martinez[u], Caroline Ronnberg[v], Cecilia Perret[w], Christian Morberg Wejse[x,y,ec], Aayush Adhikari[z], Corneliu Petru Popescu[aa], Aula Abbara[ab,ed,ee], Cristian Biscayart[ac], D. Katterine Bonilla-Aldana[ad], Daniele Fasan[ae], Danna Calderon[af,ef], David de Luna[ag], David A. Forero-Peña[g,fn], Diana Isabela Costescu-Strachinaru[ah], Diogo Mendes Pedro[ai,eg,eh], Edward J.M. Monk[aj,ei], Eirini Iliaki[ak], Emanuele Pontali[al], Emmanuel O. Ngbede[am,ej], Ferenc Balázs Farkas[an,ek], Marta González-Sanz[ao,el], Florencia Escarrá[ap], Francesca Mariotti[aq], Francesca F. Norman[ar], Francesco Di Gennaro[as], Francisco Javier Membrillo[at], German Arrieta[au,em], Giacomo Guido[as], Ángel Viudes Fuster[av], Gustavo A. Grandez-Castillo[aw], Hakan Leblebicioglu[ax], Hanna K. de Jong[ay], Hernan Vargas[az,en], Jung-ah Kim[ba], Jaime A. Cardona-Ospina[bb,eo,ep], Jaime R. Torres[bc], Jara Llenas-García[bd,eq,er,es], Isabell Wagenhäuser[be], José A. Oteo[bf,bg], Jose Francisco Gallegos Braun[bh], Juan Carlos Sepulveda-Arias[bi], Juan Pablo Hernandez[bj], Julián Ruíz Sáenz[bk,et], Justin Onyebuchi Nwofe[bl], Justyna Kowalska[bm], Kate E. Jackson[bn], Kubra Aykac[bo,eu], Leonardo Francesco Rezzonico[bp], Luis Felipe Reyes[bq], Luisa Frallonardo[br], Manuel Krone[bs], Marcela Fuquen Malagón[bt], Marco A. Sempere-Alcocer[bu,ev], Marco Tulio Luque[bv], Maria Carlos[bw], Maria del Mar Faraco Oñorbe[bx], Marina Segura Moreno[by], Marinella Lauriola[bz], Mario Masana[ca], Marisa Fernandez[cb,ew,2], Marlen Martinez-Gutierrez[bk,et,ex], Marta Diaz-Menendez[cc], Miguel J. Martinez[cd,ey,ez], Miguel Mauricio Cabada[ce], Miguel Morante-Ruiz[cf], Miriam J. Alvarez-Martinez[cg], Nancy Sandoval-Paiz[ch], Nuria Chávez[ci,fo], Oana Joean[cj], Octavio Arce[ck], Oliver Koch[cl], Olivier Epaulard[cm], Osman Sezer Cirit[cn], Özlem Türkmen Recen[co], Pasesa Quispe[cp], Patricia Lourdes Guillot Passerini[cq], Petar Velikov[cr], Miguel Hueda-Zavaleta[cs], Petros Ioannou[ct], Poleta Luga[cu], Rama Shankar Rath[cv], René Echavarría[cw], Rhea O'Regan[cx,fa], Riccardo Paggi[cy], Rodrigo N. Angerami[cz], Salam Abbara[da,fb], Salim Mattar[db], Salvatore Scarso[dc], Samuele Gaggioli[dd], Sergio Verbanaz[de], Siti Mardhiah Muhamad Fauzi[df], Sofia Jordão[dg], Susana Lloveras[f,dh,fc], Tamara Ursini[di], Tánia Chaves[dj,fd,fe], Thomas Weitzel[dk,ff], Tomás Orduna[dl,fg], Tommaso Manciulli[dm], Tommy Rampling[dn,fh,fi], Victor Acero[do,fj,fk], Virgilio Lezcano[dp], Wendy Karely Moncada-Navas[dq], Wilmer Villamil-Gomez[dr], Yasemin Özsürekçi[ds,2], Yori Roque[ag], Nadia Noreen[dt], Paul Yonga[du], Pietro Ferrara[dv,fl], Zitta Barrella Harboe[dw,fp,fq]on behalf ofSLAMVI, ESGITM, EVASG, ALEIMC, GEPI-SEIMC, SEMEVI, and CMTZMV-ACIN

[a] *Faculty of Health Sciences, Universidad Científica del Sur, Lima, Peru*
[b] *Department of Basic Medical Sciences, Faculty of Medicine, Jazan University, Jazan 45142, Saudi Arabia*
[c] *Programa de Medicina, Universidad del Magdalena, Santa Marta, Magdalena, Colombia*
[d] *Hospital Selayang, Malaysia*
[e] *Instituto Nacional de Enfermedades Virales Humanas "Dr. Julio I. Maiztegui" (INEVH)-ANLIS, Pergamino, Argentina*
[f] *Argentine Infectious Diseases Society (SADI), Buenos Aires, Argentina. SLAMVI (Latin American Society of Travel Medicine), San Juan, PR, USA*
[g] *Faculty of Medicine, Universidad Central de Venezuela, Caracas, Venezuela*
[h] *Clinical and Translational Medicine Research Group, Critical Physiology Subdivision, Intensive Care Department, Hospital Federico Lleras Acosta, Ibagué, Colombia*
[i] *Instituto Nacional de Enfermedades Neoplasicas, Lima, Peru*
[j] *Servicio de Infectología, Hospital Militar Central, Bogotá, Colombia*
[k] *Instituto de Medicina Tropical, Asunción, Paraguay*
[l] *Instituto de Infectologia Emílio Ribas, São Paulo, SP, Brazil*
[m] *Infectious Diseases Unit, Department of Medicine, Sultan Qaboos University Hospital, University Medical City, Muscat, Oman*
[n] *Cyprus International University, North Nicosia, Cyprus*
[o] *Department of Infection & Immunity, Imperial College Healthcare NHS Trust, London, United Kingdom*
[p] *Travel Medicine Clinic, Faculty of Medicine, Universidad Nacional Autónoma de México, Ciudad de Mexico, Mexico*
[q] *Facultad de Medicina, Fundación Universitaria Sanitas, Bogotá, DC, Colombia*
[r] *Department of Disease Control, Ministry of Public Health, Nonthaburi, Thailand*
[s] *Semmelweis University Department of Internal Medicine and Hematology, School of Infectious Diseases, Budapest, Hungary*
[t] *Clinica Universitaria Colombia, Clinica Colsanitas and Facultad de Medicina, Universidad Nacional de Colombia, Bogota, Colombia*
[u] *Department of Pediatrics, Universidad El Bosque, Bogota, Colombia*
[v] *Department of Microbiology, Unit for Parasitology, Public Health Agency of Sweden, Solna, Sweden*
[w] *Departamento de Enfermedades Infecciosas e Inmunología Pediátrica, División de Pediatría, Escuela de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile*
[x] *Department of Infectious Diseases, Aarhus University Hospital, Aarhus, Denmark*
[y] *Center for Global Health, Aarhus University (GloHAU), Aarhus, Denmark*
[z] *Tribhuvan University Institute of Medicine, Maharajgunj, Kathmandu, Nepal*
[aa] *Carol Davila University of Medicine and Pharmacy, Dr Victor Babes Clinical Hospital of Infectious and Tropical Diseases, Bucharest, Romania*
[ab] *Faculty of Medicine, Imperial College London, St Mary's Hospital, London, United Kingdom*
[ac] *Fundación GESICA (Grupo de Estudios Sobre Investigación Clínica en Argentina), Ciudad Autónoma de Buenos Aires, Argentina*
[ad] *College of Medicine, Korea University, Seoul, Republic of Korea*
[ae] *Azienda Ospedaliera Universitaria Integrata di Verona, Verona, Italy*
[af] *Hospital Federico Lleras Acosta, Ibague, Colombia*
[ag] *Hospital Metropolitano de Santiago (HOMS), Pontificia Universidad Católica Madre y Maestra (PUCMM), Santiago de Los Caballeros, Dominican Republic*
[ah] *HOST Iris, Brussels, Belgium*
[ai] *Serviço de Doenças Infeciosas, Unidade Local de Saúde Santa Maria, Lisbon, Portugal*
[aj] *London School of Hygiene and Tropical Medicine, London, United Kingdom*
[ak] *Cambridge Health Alliance and Harvard Medical School, Cambridge, MA, USA*
[al] *Department of Infectious Diseases - Galliera Hospital, Genoa, Italy*
[am] *Institute of Medical Microbiology and Hygiene, University of Saarland, Homburg Germany*
[an] *Semmelweis University, Pediatric Center, Budapest, Hungary*
[ao] *National Referral Unit for Tropical Diseases, Infectious Diseases Department, Ramón y Cajal University Hospital, IRYCIS, Madrid, Spain*
[ap] *Teaching hospital of Clinical Research and Medical Education Center (Centro de Educación Médica e Investigaciones Clínicas, CEMIC) "Norberto Quirno", Fundación de Lucha contra las Enfermedades Neurológicas de la Infancia, Buenos Aires, Argentina*
[aq] *Azienda USL Toscana Centro, Florence, Italy*
[ar] *National Referral Unit for Tropical Diseases, Infectious Diseases Department, Ramón y Cajal University Hospital, IRYCIS, CIBERINFEC, Madrid, Spain*
[as] *Clinic of Infectious Diseases, Department of Precision and Regenerative Medicine and Ionian Area - (DiMePRe-J), University of Bari "Aldo Moro", Bari, Italy*
[at] *Hospital Central de la Defensa "Gómez Ulla", Madrid, Spain*
[au] *Committee of Tropical Medicine, Zoonoses and Travel Medicine, Asociación Colombiana de Infectología ACIN, Colombia*
[av] *Servicio de Sanidad Exterior, Valencia, Spain*

[aw] Universidad Nacional Mayor de San Marcos, Lima, Peru
[ax] VM Medicalpark Samsun Hospital, Samsun, Turkey
[ay] Center of Tropical Medicine and Travel Medicine, Department of Infectious Diseases, Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands
[az] Área de Biología Molecular, Laboratorio de Salud Pública del Tolima, Ibagué, Colombia
[ba] Department of Laboratory Medicine at Soonchunhyang University Seoul Hospital, Seoul, Republic of Korea
[bb] Grupo de Investigación Biomedicina, Faculty of Medicine, Fundación Universitaria Autónoma de las Américas-Institución Universitaria Visión de las Américas, Pereira, 660003, Colombia
[bc] Infectious Diseases Section, Tropical Medicine Institute, Universidad Central de Venezuela, Caracas, Venezuela
[bd] Hospital Vega Baja, Orihuela, Spain
[be] Department of Paediatrics, University Hospital Würzburg, Würzburg, Germany
[bf] Infectious Diseases Department - Center of Rickettsiosis and Arthropod-Borne Diseases, Logroño, La Rioja, Spain
[bg] Hospital Universitario San Pedro/Centro de Investigación Biomédica de La Rioja, Logroño, La Rioja, Spain
[bh] Servicio de Sanidad Exterior en Algeciras, Cádiz, Spain
[bi] Grupo Infección e Inmunidad, Facultad de Ciencias de la Salud, Universidad Tecnológica de Pereira, Pereira, Colombia
[bj] Grupo de Investigación Biomedicina, Faculty of Medicine, Fundación Universitaria Autónoma de las Américas–Institución Universitaria Visión de las Américas, Risaralda, 660003, Pereira, Colombia
[bk] Committee of Tropical Medicine, Zoonoses and Travel Medicine, Asociación Colombiana de Infectología (ACIN), Bogotá, DC, Colombia
[bl] Global Health and Infectious Diseases Control Institute, Nasarawa State University, Keffi, Nigeria
[bm] Medical University of Warsaw, Warsaw, Poland
[bn] Belfast Health and Social Care Trust, United Kingdom
[bo] Hacettepe University Faculty of Medicine, Department of Pediatric Infectious Diseases, Ankara, Türkiye
[bp] Infectious Diseases Dept, ASST GOM Niguarda, Milan, Italy
[bq] Unisabana Center for Translational Science, School of Medicine, Universidad de La Sabana, Chia, Colombia
[br] Dipartimento di Medicina di Precisione e Rigenerativa e Area Jonica - (DiMePRe-J)-University of Bari Italy
[bs] Central Laboratory Unit, University Hospital Würzburg, Würzburg, Germany
[bt] Colombian Association of Infectious Diseases (ACIN), Bogotá, D.C., Colombia
[bu] Hospital Universitario Virgen de la Victoria, Servicio de Microbiología, Málaga, Spain
[bv] Hospital Escuela, Instituto Hondureño de Seguridad Social, Tegucigalpa, Honduras
[bw] Infectious Diseases Department, Hospital de Curry Cabral, Unidade Local de Saúde de São José, Lisbon, Portugal
[bx] Servicio de Sanidad Exterior, Huelva, Spain
[by] Servicio de Sanidad Exterior, Málaga, Spain
[bz] Policlinico di Monza, Monza, Italy
[ca] Latin American Society for Travel Medicine (SLAMVI), Buenos Aires, Argentina
[cb] Hospital de Infecciosas F. J. Muñiz, Buenos Aires, Argentina
[cc] National Referral Centre for Tropical Diseases and International Health, High Level Isolation Unit, Hospital La Paz-Carlos III, IdIPAz, CIBERINFEC Madrid, Spain
[cd] Department of Clinical Microbiology, Hospital Clínic de Barcelona, 08036 Barcelona, Spain
[ce] Division of Infectious Diseases, Department of Internal Medicine, University of Texas Medical Branch, Galveston, TX, USA
[cf] Imported Diseases and Tropical Medicine Unit, Toledo University Hospital, Toledo, Spain
[cg] Microbiology Dpt. Hospital Clínic-University of Barcelona, ISGLOBAL, Spain
[ch] Hospital Roosevelt de Guatemala, Universidad Rafael Landivar, Guatemala City, Guatemala
[ci] Hospital Regional de Zacapa, Guatemala
[cj] Institute for Infectious Disease and Infection Control, Jena University Hospital, Friedrich-Schiller-University, Am Klinikum 1, 07749, Jena, Germany
[ck] High Level Isolation Unit. Infectious Diseases Department, Hospital Central de la Defensa "Gómez Ulla", Madrid, Spain
[cl] Regional Infectious Diseases Unit, NHS Lothian, Edinburgh, United Kingdom
[cm] Grenoble University Hospital, Grenoble, France
[cn] Gaziantep City Hospital, Gaziantep, Türkiye
[co] Izmir Public Health Laboratory, Izmir, Turkey
[cp] Dr. Radamés Nardini Clinical Hospital - ABC Santo André, São Paulo, SP, Brazil
[cq] Servicio de Sanidad Exterior, Tarragona, Spain
[cr] Medical University of Sofia, Sofia, Bulgaria
[cs] Universidad Privada de Tacna, Tacna, Peru
[ct] School of Medicine, University of Crete, Heraklion, Greece
[cu] Institute for Medical Microbiology and Hospital Hygiene, University Hospital of Giessen and Marburg (UKGM), Marburg, Germany
[cv] All India Institute of Medical Sciences, Gorakhpur, India
[cw] Official Vaccination & Travel Clinic, 122 Cll Rodrigo de Triana, San Juan, PR, USA
[cx] School of Medicine, University College Dublin, Dublin, Ireland
[cy] Florence's Local Health Unit, Florence, Italy
[cz] Núcleo de Vigilância Epidemiológica, Seção de Epidemiologia Hospitalar, Hospital de Clínicas, Universidade Estadual de Campinas, Campinas, SP, Brazil
[da] Department of Infectious Diseases, Raymond Poincaré Hospital, APHP, University of Versailles Saint Quentin en Yvelines, Garches, France
[db] Instituto de Investigaciones Biológicas del Trópico, Universidad de Córdoba, Montería, Colombia
[dc] Department of Infectious-Tropical Diseases and Microbiology, IRCCS Sacro Cuore Don Calabria Hospital, Negrar di Valpolicella, Italy
[dd] Università degli Studi di Firenze, Firenze, Italy
[de] Servicio de Infectología, Hospital Británico de Buenos Aires, Buenos Aires, Argentina
[df] Department of Infectious Diseases, Mater Misericordiae University Hospital, Dublin, Ireland
[dg] Infectious Diseases Department, Hospital Pedro Hispano, Matosinhos, Portugal
[dh] Cátedra de Enfermedades Infecciosas, University of Buenos Aires, Buenos Aires, Argentina
[di] Department of Infectious - Tropical Diseases and Microbiology, IRCCS Sacro Cuore Don Calabria Hospital, Negrar di Valpolicella, Verona, Italy
[dj] Evandro Chagas Institute, Health of Ministry of Brazil, Rodovia BR 316 Km 07, S/N, CEP 67030-000 Ananindeua, Pará, Brazil
[dk] Travel Medicine Program, Clínica Alemana, Facultad de Medicina Clínica Alemana, Universidad del Desarrollo, Santiago, Chile
[dl] Hospital de Infecciosas F. J. Muñiz (Travel and Tropical Medicine Consultant), Buenos Aires, Argentina
[dm] Department of Clinical and Experimental Medicine, University of Florence, Florence, Italy
[dn] United Kingdom Health Security Agency (UKHSA) Rare and Imported Pathogens Laboratory, Porton Down, Salisbury, United Kingdom
[do] Asociación Nacional de Médicos Veterinarios de Colombia (AMEVEC), Bogotá, Colombia
[dp] Instituto Medicina Tropical, Asunción, Paraguay
[dq] Servicio de Infectología, Instituto Nacional Cardiopulmonar, Servicio de Atención Integral a Personas que Viven con VIH, Tegucigalpa, Honduras
[dr] Centro de Investigación en Ciencias de la Vida, Universidad Simón Bolívar, Atlantico, Barranquilla, Colombia

[ds] Hacettepe University Faculty of Medicine, Department of Pediatric Infectious Diseases, Ankara, Turkey
[dt] Ministry of National Health Services Regulations and Coordination Islamabad Pakistan, Health Services Academy, Islamabad, Pakistan
[du] CA Medlynks Medical Centre and Laboratory, Nairobi, Kenya
[dv] Center for Public Health Research, University of Milan-Bicocca, Monza, Italy
[dw] Department of Pulmonary and Infectious Diseases, Copenhagen University Hospital, North Zealand, Hillerød, Denmark
[dx] Grupo de Investigación Biomedicina, Facultad de Medicina, Fundación Universitaria Autónoma de las Américas-Institución Universitaria Visión de las Américas, Risaralda, Pereira 660003, Colombia
[dy] Servicio de Infectología, Hospital Universitario Julio Méndez Barreneche, Magdalena, Santa Marta, Colombia
[dz] Member of the International Society of Travel Medicine (ISTM), GlaxoSmithKline [GSK], Rio de Janeiro, 22783-110, Brazil
[ea] Intensive Care Department, Hospital Federico Lleras Acosta, Ibagué, Colombia
[eb] Facultad de medicina, Universidad Militar Nueva Granada, Bogotá, Colombia
[ec] European Society for Clinical Microbiology and Infectious Diseases (ESCMID) Study Group for Infections in Travellers and Migrants (ESGITM), Basel, Switzerland
[ed] Syria Public Health Network, United Kingdom
[ee] MSF OCA, Manson Unit, London, United Kingdom
[ef] Fundacion Universitaria Navarra, Huila, Neiva, Colombia
[eg] Laboratório de Microbiologia na Saúde Ambiental, Instituto de Saúde Ambiental, Faculdade de Medicina, Universidade de Lisboa, Lisbon, Portugal
[eh] Clínica Universitária de Doenças Infeciosas, Faculdade de Medicina, Universidade de Lisboa, Lisbon, Portugal
[ei] Medical Research Council Unit the Gambia at the London School of Hygiene and Tropical Medicine, Banjul, the Republic of the Gambia
[ej] College of Veterinary Medicine, Joseph Sarwuan Tarka University, Makurdi, Nigeria
[ek] Semmelweis University, Institute of Medical Microbiology, Budapest, Hungary
[el] Universidad de Alcalá, Madrid, Spain
[em] Universidad de Córdoba, Instituto de Investigaciones Biológicas del Trópico, Corporación Universitaria del Caribe: CECAR, Sucre, Colombia
[en] Grupo de Inmunología Molecular - GYMOL, Universidad del Quindío, Armenia, Colombia
[eo] Division of Infectious Diseases and Vaccinology, School of Public Health, University of California, Berkeley, CA, 94704, USA
[ep] Grupo de Investigación en Infecciones Emergentes y Medicina Tropical, Instituto para la Investigación en Ciencias Biomedicas - Sci-Help, Risaralda, Pereira, Colombia
[eq] Miguel Hernández University, Elche, Spain
[er] CIBERINFEC Carlos III Health Institute, Madrid, Spain
[es] FISABIO, Valencia, Spain
[et] Grupo de Investigación en Ciencias Animales-GRICA, Universidad Cooperativa de Colombia, Bucaramanga, Colombia
[eu] Hacettepe University Children's Hospital Infection Control Committee, Ankara, Türkiye
[ev] Universidad Internacional de la Rioja (UNIR), Facultad de la salud, Madrid, Spain
[ew] Instituto Nacional de Parasitología Fatala Chaben, Administración Nacional de Laboratorios e Institutos de Salud Dr. Carlos G. Malbrán, Buenos Aires, Argentina
[ex] Grupo de Investigación en Microbiología Veterinaria, Escuela de Microbiología, Universidad de Antioquia, Medellín, Colombia
[ey] Barcelona Institute for Global Health (ISGlobal), Hospital Clínic de Barcelona, Universitat de Barcelona, 08036 Barcelona, Spain
[ez] Centro de Investigación Biomédica en Red de Enfermedades Infecciosas (CIBERINFEC), Instituto de Salud Carlos III, 28029, Madrid, Spain
[fa] Dept of Infectious Diseases, Mater Misericordiae University Hospital, Dublin, Ireland
[fb] Department of Laboratory Medicine and Research Institute of Bacterial Resistance, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Republic of Korea
[fc] Jefatura, Sección de Zoopatología Médica, Hospital de Enfermedades Infecciosas F. J. Muñiz, Buenos Aires, Argentina
[fd] Faculdade de Medicina da Universidade Federal do Pará, Pará, Brazil
[fe] Curso de medicina - Centro Universitário do Estado do Pará (CESUPA), Belém, PA, Brazil
[ff] Charité Center for Global Health, Charité - University Medicine Berlin, Berlin, Germany
[fg] Scientific Committe Fundación Mundo Sano, Buenos Aires, Argentina
[fh] Hospital for Tropical Diseases, University College London Hospitals, London, United Kingdom
[fi] National Institute for Health and Care Research (NIHR) University College London Hospitals Biomedical Research Centre (BRC), London, United Kingdom
[fj] Comité de Medicina Tropical, Zoonosis y Medicina del Viajero de la Asociación Colombiana de Infectología (ACIN), Bogotá, Colombia
[fk] Facultad de Medicina Veterinaria y Zootecnia, Fundación Universitaria San Martín (FUSM), Bogotá, Colombia
[fl] Laboratory of Public Health, IRCCS istituto Auxologico Italiano, Milan, Italy
[fm] National Institute of Hematology and Infectious Diseases, Budapest, Hungary
[fn] Infectious Diseases Research Department, Infectus, Caracas, Venezuela
[fo] Universidad de San Carlos de Guatemala, Zacapa, Guatemala
[fp] Department of Bacteria, Parasites, and Fungi, Statens Serum Institute, Copenhagen, Denmark
[fq] Department of Clinical Medicine, Faculty of Health and Medical Science, University of Copenhagen, Copenhagen, Denmark

[*] Corresponding author. Faculty of Health Sciences, Universidad Científica del Sur, Lima, Peru.
E-mail addresses: arodriguezmo@cientifica.edu.pe (A.J. Rodriguez-Morales), Hazmi_6@hotmail.com (A.H. Alhazmi), doctorkatime@gmail.com (A. Katime), drahneez@gmail.com (A.A. Hameed), mariaalejandra@yahoo.com.ar (A. Morales), alejandro.c.lepetic132@gmail.com (A.C. Lepetic), risqueza@gmail.com (A. Risquez), ajfode@gmail.com (A.J. Forero-Delgadillo), alexisholg@hotmail.com (A. Holguin), afaccini@gmail.com (Á.A. Faccini-Martínez), amigquintana3@gmail.com (A. Guerrero), anafribeiro1@gmail.com (A. Ribeiro), thebrightsoul2@gmail.com (A. Al Balushi), ataylan@ciu.edu.tr (A. Taylan Ozkan), balramrnair@gmail.com (B. Rathish), baruchjdr@clinicadeviajero.unam.mx (B. Diaz), dramedtrop@gmail.com (B.E. Porras-Pedroza), porbhanasut@gmail.com (B. Hunsajarupan), Botondt.lakatos@gmail.com (B. Lakatos), caalvarezmo@unal.edu.co (C. Álvarez-Moreno), catorres@uniandes.edu.co (C.N. Torres-Martinez), caroline.ronnberg@folkhalsomyndigheten.se (C. Ronnberg), cperret@uc.cl (C. Perret), wejse@clin.au.dk (C.M. Wejse), draayuz@gmail.com (A. Adhikari), cornel160@yahoo.com (C.P. Popescu), cristianbiscayart@hotmail.com (C. Biscayart), dbonilla@continental.edu.pe (D.K. Bonilla-Aldana), daniele.fasan.93@gmail.com (D. Fasan), dannaluciacalderon@gmail.com (D. Calderon), delunadavid1@gmail.com (D. de Luna), vacter.cv@gmail.com (D.A. Forero-Peña), isabelastrachinaru@gmail.com (D.I. Costescu-Strachinaru), diogo.pedro@ulssm.min-saude.pt (D. Mendes Pedro), edward.monk@lshtm.ac.uk (E.J.M. Monk), eiiliaki@challiance.org (E. Iliaki), emanuele.pontali@galliera.it (E. Pontali), drngbede@hotmail.com (E.O. Ngbede), farkas.ferenc.balazs@semmelweis.hu (F.B. Farkas), florescarra@gmail.com (F. Escarrá), francescamariotti94@gmail.com (F. Mariotti), ffnorman@gmail.com (F.F. Norman), francesco.digennaro1@uniba.it (F. Di Gennaro), javimembrillo@gmail.com (F.J. Membrillo),

arrietager@yahoo.es (G. Arrieta), giacguido@gmail.com (G. Guido), angel.viudes@correo.gob.es (Á.V. Fuster), gustavo.grandez@unmsm.edu.pe (G.A. Grandez-Castillo), hakanomu@yahoo.com (H. Leblebicioglu), h.k.dejong@amsterdamumc.nl (H.K. de Jong), hernan.vargas@yahoo.com (H. Vargas), 124526@schmc.ac.kr (J.-a. Kim), jaime.cardona@uam.edu.co (J.A. Cardona-Ospina), jaimerafael.torres@gmail.com (J.R. Torres), jarallenas@gmail.com (J. Llenas-García), wagenhaeu_i@ukw.de (I. Wagenhäuser), jaoteo@riojasalud.es (J.A. Oteo), jose.gallegos@correo.gob.es (J.F. Gallegos Braun), jcsepulv@utp.edu.co (J.C. Sepulveda-Arias), juan.hernandez@uam.edu.co (J.P. Hernandez), julian.ruizs@campusucc.edu.co (J. Ruíz Sáenz), justin.nwofe@gmail.com (J.O. Nwofe), jdkowalska@gmail.com (J. Kowalska), kjackson09@qub.ac.uk (K.E. Jackson), kubraklnc.kk@gmail.com (K. Aykac), leonardo.rezzonico@gmail.com (L.F. Rezzonico), luis.reyes5@unisabana.edu.co (L.F. Reyes), Luisana.frallonardo@gmail.com (L. Frallonardo), krone_m@ukw.de (M. Krone), Marcefuquen@gmail.com (M.F. Malagón), marcosempere@gmail.com (M.A. Sempere-Alcocer), mtluque@yahoo.com (M.T. Luque), mariamiguelcarlos@gmail.com (M. Carlos), mar.faraco@correo.gob.es (M. del Mar Faraco Oñorbe), info@semevi.es (M. Segura Moreno), marinella.lauriola@gmail.com (M. Lauriola), mariomasana@gmail.com (M. Masana), marisa.fernandez@gmail.com (M. Fernandez), marlen.martinez@udea.edu.co (M. Martinez-Gutierrez), marta.diazmenendez@gmail.com (M. Diaz-Menendez), myoldi@clinic.cat (M.J. Martinez), micabada@utmb.edu (M.M. Cabada), miguel.cuentaexterna@gmail.com (M. Morante-Ruiz), Malvarez@clinic.cat (M.J. Alvarez-Martinez), nsandovalpaiz@gmail.com (N. Sandoval-Paiz), nuriamariach@yahoo.com (N. Chávez), oana.joean@gmail.com (O. Joean), octavioaarce@gmail.com (O. Arce), oliver.koch@nhs.scot (O. Koch), OEpaulard@chu-grenoble.fr (O. Epaulard), osmancirit@yahoo.com (O.S. Cirit), ozlemturkmen09@gmail.com (Ö. Türkmen Recen), pasesa2@hotmail.com (P. Quispe), patricia.guillot@correo.gob.es (P.L. Guillot Passerini), petar.kr.velikov@gmail.com (P. Velikov), mighueda@virtual.upt.pe (M. Hueda-Zavaleta), p.ioannou@uoc.gr (P. Ioannou), pluga123@gmail.com (P. Luga), ramashankar.aiims@gmail.com (R.S. Rath), dr.echevarriacofino@gmail.com (R. Echavarría), rheaoregan@gmail.com (R. O'Regan), paggi.riccardo@gmail.com (R. Paggi), rodrigo.angerami@gmail.com (R.N. Angerami), salam.abbara@gmail.com (S. Abbara), smattar@correo.unicordoba.edu.co (S. Mattar), salvatore.scarso@sacrocuore.it (S. Scarso), samuele.gaggioli@unifi.it (S. Gaggioli), sergioverbanaz@gmail.com (S. Verbanaz), sitimardhiah1994@yahoo.com (S.M.M. Fauzi), sofjordao@gmail.com (S. Jordão), sclloveras@gmail.com (S. Lloveras), tamara.ursini@sacrocuore.it (T. Ursini), tania.chaves@uol.com.br (T. Chaves), thomas.weitzel@gmail.com (T. Weitzel), torduna@intramed.net (T. Orduna), tommaso.manciulli@unifi.it (T. Manciulli), tommy.rampling@nhs.net (T. Rampling), victor.acero@sanmartin.edu.co (V. Acero), Virgilio.lezcano@gmail.com (V. Lezcano), karely.mn@gmail.com (W.K. Moncada-Navas), wilmer.villamil@unisimon.edu.co (W. Villamil-Gomez), yas.oguz99@yahoo.com (Y. Özsürekçi), yoriroque@gmail.com (Y. Roque), Nadia.jamil3@gmail.com (N. Noreen), ypaul.py@gmail.com (P. Yonga), pietro.ferrara@unimib.it (P. Ferrara), zitta.barrella.harboe@regionh.dk (Z.B. Harboe).

[1] Editor-in-Chief, Travel Medicine and Infectious Disease.

[2] Associate Editors, Travel Medicine and Infectious Disease.