

The Transformation Agenda

Improved capacity to tackle epidemics in the WHO African Region

Lessons from the 2016 Yellow Fever outbreaks in The Republic of Angola and the Democratic Republic of the Congo

July 2019



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The Transformation Agenda Series 3: Improved Capacity to Tackle Epidemics in the WHO African Region – Lessons from the 2016 Yellow Fever Outbreaks in the Republic of Angola and the Democratic Republic of the Congo

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FOREWORD



The Transformation Agenda of the World Health Organization Secretariat in the African Region 2015–2020 strives to deliver “the WHO that the staff and stakeholders want”. Over the past five years, WHO in the African Region has made a concerted effort to transform itself into a forward-looking, proactive, responsive, results-driven, transparent, accountable, and appropriately resourced organization. Member States, development partners, donors, and other stakeholders have stood shoulder to shoulder with WHO in advancing this agenda – for this I am sincerely thankful.

Implementation of the Transformation Agenda began in 2015, coinciding with the global adoption of the Sustainable Development Goals. Goal 3 is to ensure healthy lives and promote well-being for all at all ages. The WHO Secretariat in the African Region used this opportunity to institutionalize the Transformation Agenda by developing *The Africa Health Transformation Programme 2015–2020: a vision for universal health coverage*. This document serves as the strategic framework for guiding WHO’s contribution to the sustainable development platform in Africa. The framework aims to ensure universal access to a package of essential health services in all Member States of the Region and thus achieve universal health coverage with minimal financial, geographic and social obstacles to services.

To date, we can see the impact of the Transformation Agenda in three key areas:

- (1) **Health security has improved** through increased regional and country capacity to promptly detect and effectively respond to public health threats. Many of the outbreaks we have faced have been rapidly contained.
- (2) **Member States are progressing towards universal health coverage** through efforts to strengthen health systems. Improving access to cost-effective health interventions is leading to improved health outcomes in Member States.
- (3) **A values-based organizational culture is emerging** where harassment is openly addressed, and a respectful working environment is in place. We are seeing fundamental shifts in our ways of working, thinking and engaging with others as well as increased accountability, effectiveness and transparency, and tangible results in countries.

The Transformation Agenda Series seeks to share the key achievements of this initiative in six booklets:

- **The Transformation Agenda Series 1:** Enhancing the country focus approach for greater health impact;
- **The Transformation Agenda Series 2:** Strengthening partnerships towards universal health coverage;
- **The Transformation Agenda Series 3:** Improved capacity to tackle epidemics in the WHO African Region – lessons from the 2016 yellow fever outbreaks in Angola and the Democratic Republic of the Congo;
- **The Transformation Agenda Series 4:** Sustained progress towards polio eradication in the WHO African Region;

- **The Transformation Agenda Series 5:** Promoting efficiency, accountability and value for money – the story of managerial key performance indicators; and
- **The Transformation Agenda Series 6:** Moving towards a stronger focus on quality and results – the story of programmatic Key performance indicators.

As we celebrate the gains made, I would like to express my gratitude to our stakeholders – Member States, development partners, donors, foundations and others – for walking the talk with us. Now, these gains need to be consolidated, sustained and stepped up in the coming year and beyond.

It is my expectation that the achievements highlighted in this series will spur us all to continuously strive towards ensuring healthy lives and promoting well-being for all people in the African Region and beyond by achieving universal health coverage, addressing health emergencies, and promoting healthier populations.

Dr Matshidiso Moeti
 WHO Regional Director for Africa
 Brazzaville, Republic of Congo

July 2019



- 1 WHO Regional Office for Africa (2018). The Work of WHO in the African Region - Report of the Regional Director: 2017-2018. Brazzaville. (<https://apps.who.int/iris/bitstream/handle/10665/273743/AFR-RC68-2-eng.pdf>, accessed 25 February 2019).
- 2 WHO Regional Office for Africa (2016). Mapping risks and the distribution of epidemics in the WHO African region, a technical report for the Regional Office for Africa. WHO: Brazzaville. (<https://apps.who.int/iris/handle/10665/206560>; and Jones KE, Patel NG, Levy MA et al. (2008). Global trends in emerging infectious diseases. *Nature*, 451: 990–993. doi:10.1038/nature06536.
- 3 Talisuna TO, Yahaya AA, Rajatonirina SC et al. Joint External Evaluation of the International Health Regulations (2005) capacities: Current status and lessons learnt in Africa (accepted for publication in *BMJ*).

1. BACKGROUND

Epidemics pose risks to human health, livelihoods and global health security. Every country in the WHO African Region is at risk of health security threats.¹ Emerging and re-emerging threats with pandemic potential continue to challenge fragile health systems on the continent, exacting an enormous human and economic toll and resulting in unacceptably high morbidity, mortality, disability and socioeconomic losses.

Every year the Region records more public health emergencies than any other WHO region. Over time the risk of emerging infectious diseases has risen.² An acute public health event is reported every four days, equating to more than 150 acute public health events annually.³ More than 80% of the public health emergencies observed in the Region are due to infectious diseases, of which approximately 75% originate from the human-animal-environment interface.⁴ This is largely due to the growth of cross-border and international travel, increasing human population density and the growth of informal settlements.⁵ Other factors include climate change, changes in the way humans and wild animals interact and changes in trade and livestock farming.⁶

Emergency preparedness and response interventions in Africa are guided by the International Health Regulations (IHR, 2005); and the regional integrated disease surveillance and response (IDSR) and disaster risk management (DRM) strategies. The Region has continued to face challenges including fragmented implementation of interventions, limited intersectoral collaboration, inadequate resources, weak health systems, and inadequate IHR (2005) core capacities.

- 4 WHO (2018b). Investing global, investing local: supporting value for money towards the health SDGs. (July 2018). WHO Department of Health Systems Governance and Financing. Geneva. (https://www.who.int/docs/default-source/investment-case/value-for-money.pdf?sfvrsn=16e9889b_8, accessed 6 March 2019).
- 5 (Oppenheim et al., 2019)
- 6 McMichael AJ (2004). Environmental and social influences on emerging infectious diseases: past, present and future. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences*, 359: 1049–1058. DOI 10.1098/rstb.2004.1480.



To address issues of fragmentation and define clear priorities, within her first 100 days of assuming office, the Regional Director created the Health Security and Emergencies (HSE) Cluster. This was done by merging the teams responsible for Outbreak Response, International Health Regulations, and Disaster and Emergency Response programmes.

Learning from the 2014 West Africa Ebola epidemic and other emergencies, in 2015, WHO undertook major reforms to better address global health security by establishing the WHO Health Emergencies Programme (WHE). WHE's major functions are: addressing high threat pathogens and establishing expert networks; monitoring and evaluation of national preparedness capacities, planning and building critical capacities in line with the IHR; event detection and verification, health emergency operations monitoring and data management and analytics; incident management, operational partnerships and readiness and operations support and logistics; emergency operations management and administration and external relations and cross-cutting human resources management as well as administrative and logistic support for technical programme areas.

The establishment of WHE created a single platform across the three levels of the Organization (headquarters, regional offices, and country offices). This platform is designed to bring speed and predictability to WHO's emergency work, using an all-hazards approach, promoting collective action and encompassing preparedness, readiness, response and early recovery activities. The Programme has one clear line of authority, one workforce, one budget, one set of rules and processes, and one set of standard performance metrics. WHE complements WHO's technical and normative role and brings new operational capacities and capabilities for work in outbreaks and humanitarian emergencies.

The above developments were expected to result in a WHO that is fit for purpose in addressing global health threats and providing more effective support to countries to respond to outbreaks and emergencies, with better coordination and faster deployment of experts. These capacities were put to the test in 2016 when Angola and the Democratic Republic of the Congo experienced outbreaks of yellow fever.



2. THE YELLOW FEVER OUTBREAKS IN ANGOLA AND THE DEMOCRATIC REPUBLIC OF THE CONGO

Background information on yellow fever

Yellow fever is caused by a virus (Flavivirus) which is transmitted to humans by the bites of infected *aedes* and *haemogogus mosquitoes*. The mosquitoes either breed around houses (domestic), in forests or jungles (wild), or in both habitats (semi-domestic). In the latter half of the 20th century the most frequent yellow fever virus transmission patterns were either sylvatic, where the animal reservoir (non-human primates living in the forest or jungle) infects tree-dwelling mosquitoes such as *Haemogogus* (in the Americas) and *Aedes* spp. (in Africa), which in turn bite humans who enter the forest to hunt or work, or intermediate, where various *Aedes* mosquito species moving between the forest and human settlements are implicated with humans serving as the hosts in the transmission cycle. This cycle can occur in rural villages and small towns, in what is called the “emergence zone” in Africa, but large outbreaks have occurred when infected people from these rural settlements travelled to urban centres. There is also urban transmission caused by the *Aedes aegypti* mosquito, involving human-to-human transmission without needing to go back to the wildlife reservoir. Urban outbreaks are particularly deadly and disruptive and are more likely to result in international spread.

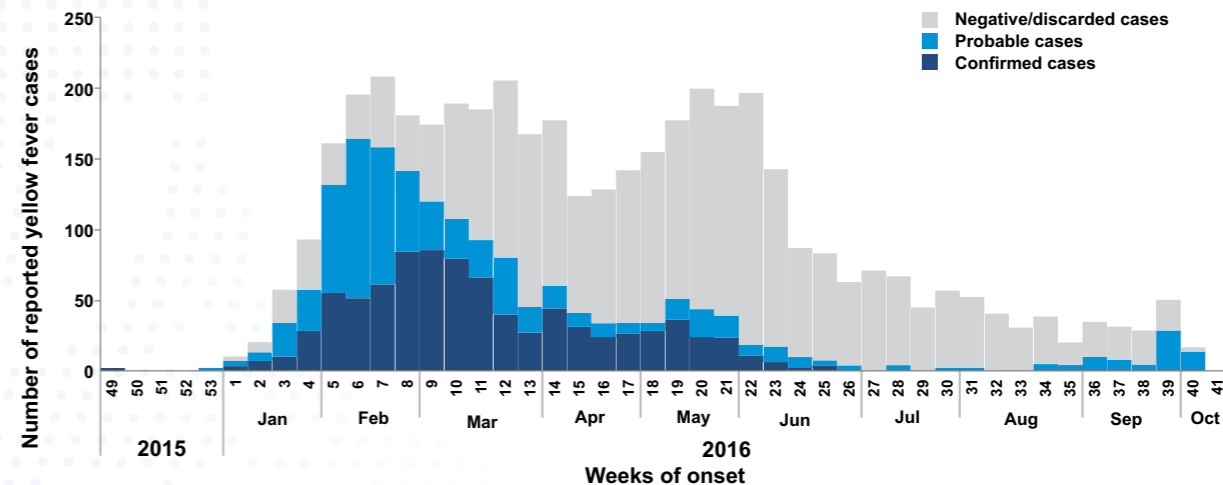
The world has largely forgotten the threat posed by yellow fever, but little more than a century ago it was a source of terror, decimating the populations of cities, destroying economies and driving political choices. Despite the availability of a vaccine that confers lifelong immunity, and the improved capacities for surveillance and response, at least 440 million people in the African Region remain at risk of yellow fever. This is because the national immunization coverage for yellow fever is not yet optimal, resulting in frequent outbreaks. To respond to the recurrent outbreaks in West Africa, the Yellow Fever Initiative (YFI) has, since 2005, supported efforts to reduce the burden of this disease through risk assessment and surveillance; vaccination and outbreak response; securing vaccine supply and monitoring the quality and effectiveness of interventions.⁷ While yellow fever cannot be eradicated, epidemics can be eliminated if population immunity levels are effectively raised through mass vaccination and sustained by routine childhood immunization. The 2016 yellow fever outbreaks in Angola and the Democratic Republic of the Congo clearly demonstrated that this disease is still a serious health risk within and outside the Region.

Evolution of the 2016 yellow fever outbreaks

Angola: In January 2016, yellow fever cases were reported in Angola, first among the Eritrean community and later in the local population. The outbreak started on 5 December 2015 in the municipality of Viana. From there, it spread through the country to the neighbouring Democratic Republic of the Congo. From 5 December 2015 to 13 June 2016, a total of 4306 suspected cases with 376 deaths were reported in Angola, with a case fatality rate (CFR) of 8.8% (Figure 1). These numbers included 884 laboratory-confirmed cases with 121 deaths (CFR: 13.7%). By the time the outbreak was declared over, suspected cases had been reported from all 18 provinces; while confirmed cases had been reported from 80 districts in 16 provinces and autochthonous transmission had been reported from 45 districts in 12 provinces. The last confirmed case was reported in 2019, by which time the number of reported probable and confirmed cases had decreased considerably.

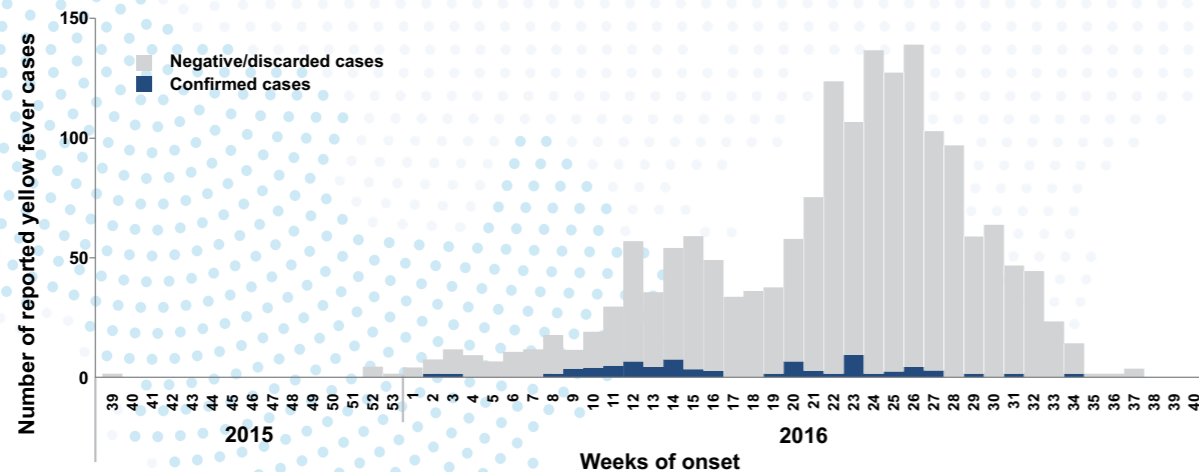
⁷ World Health Organization. (2010). Yellow Fever Initiative: providing an opportunity of a lifetime (No. WHO/HSE/GAR/ERI/2010.3). World Health Organization.

Fig. 1: National weekly number of confirmed, probable and negative yellow fever cases in Angola, 5 December 2015 to 13 October 2016



Democratic Republic of the Congo: Local transmission of yellow fever was documented from March 2016 in Kongo Central and in Kinshasa. This local transmission was established after cross-border spread of the outbreak from Angola. From 1 January to 26 October 2016, a total of 2987 suspected cases were reported from all 26 provinces. Of these, 78 cases were laboratory-confirmed by the national reference laboratory (INRB). Sixteen deaths were reported among the confirmed cases leading to a CFR of 21%. Of the 78 confirmed cases reported from eight provinces, 57 were acquired infections in Angola, 13 were autochthonous, and eight were cases of sylvatic transmission (not related to the outbreak). By the end of June 2016, the number of reported cases had decreased considerably (Figure 2).

Fig 2: National weekly numbers of confirmed and negative yellow fever cases in the Democratic Republic of the Congo, 21 September 2015 to 26 October 2016*



The response to the 2016 yellow fever outbreaks and outcome

To quickly control the outbreaks, WHO and partners provided managerial, technical, logistical and financial support to the two countries. In line with the Emergency Response Framework (ERF) requirements, the two events were classified as grade two and an incident management system (IMS) was put in place within 48 hours of the grading call. The IMS teams coordinated the overall response to the outbreaks in the two countries which led to a sharp decrease of the number of confirmed cases by the end of June 2016.

The main control strategies were: enhanced coordination; epidemiological surveillance; laboratory confirmation; vector control interventions; risk communication, social mobilization and community engagement; and case management and preventive/reactive vaccination campaigns. These strategies were facilitated by the establishment of strong partnerships and effective resource mobilization.

Government leadership and ownership: Both the Governments of Angola and the Democratic Republic of the Congo are commended for promptly declaring the outbreaks as required by the IHR. The government-led response efforts were supported by WHO and partners. In both countries, there was strong commitment of the central government, local authorities, religious and traditional leaders.

As part of the outbreak response strategy, both countries established a national response committee headed by the Minister of Health to coordinate the response. The coordination committee met weekly and included other government departments (education, interior, territorial administration, defence), agencies of the United Nations system and other bilateral and multilateral partners. Several subcommittees were established to deal with technical issues, specifically: surveillance, research and laboratory; vaccination and logistics; case management; integrated vector control; social mobilization; hygiene and sanitation. The same coordination structures were established at provincial and municipal council levels with strong involvement of governors, mayors and local commissions such as the commission for civil protection in Angola.

There was strong political commitment to the response. For example, in Angola, the Government allocated US\$ 40 million for the response, including US\$ 30 million for vaccine purchase and US\$ 10 million for operations. In both countries, the administrative and political authorities at all levels were involved in the organization and conduct of reactive vaccination campaigns.

There was intense collaboration between health authorities and religious and traditional leaders. Churches played a significant role in social mobilization and risk communication. They contributed significantly in dispelling misinformation and misconceptions about the disease. Churches assisted in the sensitization and mobilization of people to get appropriate treatment from hospitals and to get vaccinated. Traditional leaders were trained to pass on accurate information and messages. They also participated in reporting suspected cases and non-vaccinated people in their constituencies and provided food for the agents involved in the vaccination campaigns.

Coordination: Incident management teams were put in place to coordinate support to the government-led response. This coordination included functional links with the government-led Ministry of Health coordination mechanism. Strategic health operation centres, also called emergency operations centres, were established in both countries to coordinate response efforts. Regular coordination meetings were held as well as regular teleconferences with the regional and global levels.

Surveillance: Yellow fever case definitions and surveillance guidelines were revised in the affected countries and daily notification mechanisms put in place. Health workers and community volunteers were trained in case detection and notification as well as for sample collection and transportation to reference laboratories. Case classification committees were established for final classification of cases. Technical support was provided through the deployment of skilled international and national epidemiologists in the affected health districts. Situation reports, investigation reports, bulletins and other information products were regularly developed and disseminated.

Laboratory confirmation: Laboratory confirmation plays a key role in outbreak management. The capacity of national reference laboratories in both countries was reinforced through the deployment of mobile laboratories. Laboratory experts were deployed to support the national reference laboratory.

The stock of reagents was regularly replenished to avoid stock-outs and laboratory results were disseminated daily to allow for quick decision-making.

Vector control interventions: Based on the entomologic indices in the two countries, vector control strategies and actions plans were developed and implemented. The main actions included insecticide spraying, destruction of mosquito breeding sites, environmental management, and sanitation.

Risk communication, social mobilization and community engagement: Communication action plans were developed and implemented in the two countries. Risk communication experts were deployed in the affected countries to manage media communication and to implement interpersonal approaches.

Case management: Guidelines for case management were updated and disseminated. Select hospitals were identified and designated to conduct case management. Mechanisms for transporting patients to designated hospitals were established. Medicines and other logistics for case management were made available.

Preventive/reactive immunization campaigns: Reactive vaccination (immunization campaigns conducted when an outbreak has been declared) and preventive mass immunization activities (in areas without declared outbreaks) were a key component of the outbreak control efforts. More than 29.4 million vaccine doses were delivered to Angola and to the Democratic Republic of the Congo respectively. In Angola, reactive/preventive vaccination campaigns with full doses were conducted in 73 districts, with a cumulative number of 16 002 820 people vaccinated, representing 95% of the target population.

Innovative vaccine use: Due to the limited supply of the vaccine globally, WHO consulted with global experts on emergency use of a fractional dose of the yellow fever vaccine. This was based on studies that had shown that one-fifth of the standard dose would provide immunity for a year or more. The fractional-dose approach was used to contain the outbreak in Kinshasa (with a population of 10 million people) ahead of an anticipated increase in mosquitoes due to the rainy season. Reactive campaigns with full doses were conducted in 31 health zones while preventive campaigns with fractional doses (a fifth of the usual dose) were conducted in 32 health zones in Kinshasa in less than two weeks. Staff of the polio programme were quickly redeployed to conduct yellow fever vaccination.

The main outcome of the above measures was a sharp decrease in cases, mitigation and prevention of an imminent urban outbreak in Kinshasa, and ultimately declaration of the outbreak as controlled.

Lessons learned

The 2016 Angola and Democratic Republic of the Congo outbreaks were the largest yellow fever outbreaks in recent history. The Angola outbreak was protracted, with wide geographic spread from the initial epicentre in Luanda. The outbreak spread to 123 districts in 18 provinces with 884 laboratory-confirmed cases including 121 deaths (13.7% case fatality ratio).⁸ Cases from Angola were further spread to the Democratic Republic of the Congo, Kenya and China, with local transmission established in the Democratic Republic of the Congo. This demonstrates that yellow fever is a global problem with a serious health security risk that requires new strategic actions.

The outbreaks raised the urgent need for strengthened surveillance systems with a strong component of rumour monitoring, event-based surveillance, community-based surveillance and early warning mechanisms.

8 WHO, Yellow Fever Outbreak Situation Report, Angola, World Health Organization, December 2016

The outbreaks also highlighted the need for the reinforcement of the IHR in the African Region as well as the need for a strategy to eliminate yellow fever epidemics.

Key lessons learned were:

Low vaccination coverage needs to be addressed to improve population immunity: The limitation of routine vaccination to children under 11 months of age and the unwillingness of health providers to open a 10 or 20 dose vial for one child remain major challenges. In addition, priority for vaccines supply is always given to outbreak response rather than prevention. As a result, childhood immunization coverage is too low to maintain sufficient herd immunity. Due to competing vaccine introduction priorities and limited political will, no new country has introduced the yellow fever vaccine into national routine immunization programmes since 2008. Every effort must be made to increase childhood immunization coverage for yellow fever to maintain sufficient immunity.

Limited vaccine supply and the global shortage of the emergency stockpile need to be addressed: Between 2013 and 2015, fifteen countries among the 23 that introduced the yellow fever vaccine into their routine immunization programmes reported yellow fever vaccine stock-outs at national level. Consequently, vaccine coverage has stagnated. Prior to the epidemics in Angola and the Democratic Republic of the Congo, only six million doses were reserved annually as emergency stockpile to respond to any yellow fever outbreaks. In 2016, the yellow fever emergency stockpile was replenished twice and exceeded 18 million doses to enable control of outbreaks in Angola, the Democratic Republic of the Congo and Uganda. To achieve effective yellow fever control, demand and supply must be balanced to allow for a timely and effective risk reduction strategy. This will require the sustained engagement of stakeholders as well as robust mechanisms for need forecasting and market shaping.



Stronger global governance and coordination through more effective implementation of IHR is required: Yellow fever vaccination requirements are clearly stated in the IHR (2005) but are not being fully implemented.⁹ Past efforts to control yellow fever have not been sufficiently aligned and have failed to bring partners together under a common vision and a single coordinated and effective mechanism. Crucial functions such as surveillance, laboratory capacity and case management have often lacked an integrated approach. Despite the existence of national laboratory networks using standardized methods and tools for early detection and confirmation, inadequate laboratory capacity continues to be a challenge. Strong participatory governance, adequate human resources and sustainable financing at all levels will be key to eliminating yellow fever epidemics.

Yellow fever outbreaks in urban settings require special attention: Rapid and unplanned urbanization, high population growth, low population herd immunity, coupled with frequent population movements to and from affected areas create conditions which increase the transmissibility of yellow fever. Responding to outbreaks in large urban settings is challenging and costly due to their rapid amplification and risk of international spread, resulting in high negative public health, economic, social and political impact.

Strong political commitment at global, regional and country levels is required: In countries with the greatest risk of yellow fever epidemics, it is essential that leadership be committed to preventing and responding to outbreaks. Campaigns and strategies can only work if country ownership is genuine. Where public health strategies, including vaccination, are successful, it is primarily because local people have worked hard to improve the health of their communities and are committed to improving the nation's health.

⁹ WHO, Implementation of International Health Regulations (2005) in the WHO African Region, Luanda, World Health Organization, 2012 (AFR/RC62/12)



3. FUTURE PERSPECTIVES

The yellow fever outbreaks in Angola and the Democratic Republic of the Congo in 2016 created an urgent need for more than 28 million vaccine doses in total, which exhausted the global supply. The outbreaks also diverted the focus of public health authorities and impacted the health systems in both countries. Wider international exportation from Angola to other countries, including China, showed that yellow fever poses a serious global threat requiring new strategic thinking.

Following these outbreaks, *A Global Strategy to Eliminate Yellow Fever Epidemics (EYE) 2017–2026* was developed by WHO and a coalition of partners, including the United Nations Children's Fund and Gavi, the Vaccine Alliance. This strategy considers the changing epidemiology of yellow fever, the resurgence of mosquitoes, and the increased risk of urban outbreaks and international spread. The strategy targets the most vulnerable countries, while addressing global risk, building resilience in urban centres and preparedness in areas with potential for outbreaks, and ensuring reliable vaccine supply. The strategy's objectives are: protecting at-risk populations; preventing international spread; and containing outbreaks rapidly.

Key to achieving the EYE goals is strong, country-centred surveillance and diagnostic capacity to rapidly detect all cases of yellow fever. Africa is a priority Region, with 27 high-risk countries for yellow fever outbreaks. Yellow fever diagnostics are complex and require highly specialized staff and protocols.¹⁰ Currently, there is a limited number of laboratories in Africa that can conclusively diagnose yellow fever. However, efforts are ongoing, particularly in high-risk countries, to improve availability of yellow fever diagnostic tests.

¹⁰ Strengthening country capacity for Yellow Fever diagnostics: Yellow Fever at the International Conference on Re-Emerging Infectious Disease in Addis Ababa, Ethiopia, 22 March 2019 <https://www.who.int/emergencies/diseases/yellow-fever/international-conference-on-emerging-infectious-diseases/en/>



Key areas of work include strengthening information systems, efficient sample transport, and coordinated laboratory networks to ensure that outbreak signals can be rapidly evaluated. These functions also have cross-cutting benefits for other epidemic-prone infectious diseases.

The WHO Regional Committee for Africa in 2017 endorsed a framework to support implementation of the global EYE strategy. With the vision of a region free of yellow fever epidemics, the goal is to eliminate yellow fever epidemics in the African Region by 2026. Its objectives are to: protect populations in all 35 countries at risk through preventive and routine vaccination; avert the international spread of yellow fever through vaccination of travellers and robust screening and onsite vaccination of people not vaccinated at major points of entry; and rapidly detect, confirm and contain outbreaks.

Guided by the framework, the WHO Secretariat in the African Region is supporting Member States to undertake risk assessments and catch-up campaigns; apply the IHR (2005); vaccinate everyone in areas or countries at high risk of yellow fever; improve routine immunization and vaccinate every child; protect high-risk workers; build resilient urban centres and establish readiness plans; sustain vector surveillance and control programmes in cities; strengthen surveillance and diagnosis for early detection; establish regional and subregional networks; and foster rapid outbreak response. The Secretariat will intensify its work with all countries at risk towards ensuring the WHO African Region is free of future yellow fever epidemics.



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