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EDITORIALS

# Yellow fever in Africa

## Vaccines protect only when governments commit

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In the late 19th century, when major outbreaks of yellow fever halted work on the Panama Canal, intensive study by Walter Reed led to understanding of its transmission by the *Aedes aegypti* mosquito. Larval control—destruction of *A aegypti* breeding sites—was then the primary strategy for managing yellow fever outbreaks in the Americas.[1]

By the 1940s, the viral aetiology of yellow fever had been confirmed and a yellow fever vaccine had been developed, providing a tool to both prevent infection and contain epidemics.[2] In 1969 yellow fever vaccination was included in the International Health Regulations as one of the measures that could be required from international passengers arriving from countries with ongoing outbreaks.[3] By 1988, recommendations were made to include yellow fever vaccine in routine childhood immunisation programmes in African countries at risk of yellow fever.[4] And in 2006, the vaccine alliance GAVI, began a yellow fever initiative, recommending additional mass vaccination campaigns in African countries with endemic disease to help protect susceptible groups.[5] Since then 12 countries have completed mass campaigns.

Despite these international efforts, Angola—a country that introduced routine yellow fever vaccination in 1999—has a major outbreak of yellow fever. With nationally reported routine vaccine coverage at 72% among children aged 9 months,[6] below the level required for herd immunity, and having failed to participate in the GAVI yellow fever initiative, Angola was at high risk of an outbreak.

Yellow fever has spread throughout Angola since January 2016, and by 1 July there were over 3500 suspected cases (875 of which are confirmed) with a 10-13% case fatality rate.[7] The outbreak is largely concentrated in main cities and spread across the border to the Democratic Republic of the Congo (DRC) in March. Nearly 90% of reported cases there have been imported from Angola.[7] In addition, two imported yellow fever cases have been identified in Kenya and 11 in the People's Republic of China. The unvaccinated guest workers returning to China with yellow fever were immediately isolated and the country has reported no local transmission.[8]

More than 13 million people have been vaccinated in Angola and two million in DRC, but circulation of the virus persists. The extra vaccinations have placed a huge strain on the limited global stockpile of six million doses of yellow fever vaccine maintained for use in outbreaks by the International Coordinating Group (ICG) on vaccine prioritisation.[9] The ICG has approved several million doses of vaccine for use in Angola, targeted at areas with local transmission and DRC border areas. Vaccination in DRC has also begun and will be expanded to the whole city of Kinshasa (population 10-12 million) as vaccine supplies come on stream. Chinese guest workers are also being vaccinated.

WHO and partners are addressing the vaccine shortage, and working with manufacturers to increase global production. Authorities in DRC are also considering fractional dosing to expand stocks. This approach has been approved by the Scientific Advisory Group of Experts on immunisation (SAGE), which provides guidance to WHO. Yellow fever vaccines have higher potency than the minimum recommended by WHO, and previous clinical studies have shown that using doses sparingly may be an option.[10]

Vaccines are effective when used as recommended. Research during the recent Ebola outbreaks in west Africa has identified an effective vaccine,[11] and there is much talk about how to ensure that it is licensed quickly and made available before the next Ebola outbreak. But the current yellow fever outbreaks show that the existence of an effective vaccine isn't always enough. Political commitment is also required in countries at risk. In Angola, the government must commit to more effective routine childhood vaccination against yellow fever, along with full cooperation with international initiatives if it is to prevent future outbreaks. International travellers to Angola and other countries should consider the risk of infection and seek vaccination based on travel guidance in their home countries before departure; and countries at risk of yellow fever transmission because of the presence of the mosquito vector should assess the need for requiring that travellers from countries reporting yellow fever are vaccinated, under the framework of the International Health Regulations.

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