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Hosting of mass gathering sporting events during the 2013–2016 Ebola virus outbreak in West Africa: experience from three African countries

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1. Introduction

Mass gatherings at sporting events,[1,2] or religious pilgrimages,[3,4] attract millions of international and national host-country travellers, who put themselves at risk of acquiring local endemic infectious diseases.[5–7] Over the past five decades, the public health authorities of the host country have focused their attention on the transmission of infectious diseases and their impact on the attendees at the mass gathering, the local population, and the local health system. The appearance and re-emergence of several new lethal pathogens of humans with epidemic potential have heightened awareness of the potential of rapid spread at mass gathering events.[8] New zoonotic infectious diseases of humans include Nipah virus, hantaviruses, West Nile virus, Ebola virus, severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory syndrome coronavirus (MERS-CoV), and avian viruses, among others.[7,8] The unprecedented Ebola virus disease (EVD) epidemic in West Africa[9] and the ongoing Zika virus (ZIKV) outbreak in South America[10,11] were declared Public Health Emergencies of International Concern (PHEIC) by the World Health Organization (WHO) in August 2014 and February 2016, respectively. Yellow fever outbreaks in a number of African countries in 2015/2016 are cause for concern, with infections in unvaccinated travellers to Angola posing a risk on return to their countries of residence.[12,13]

There are a number of challenges for countries hosting major international sporting events during a PHEIC.[4,14,15] The 2013–2016 EVD outbreak in West Africa, which resulted in over 28 637 cases and 11 315 deaths,[16] required that countries holding these events put in place public health programmes for enhanced surveillance and specific response plans for any suspected cases of viral haemorrhagic fever (VHF). Three major sports events were held in Africa during different phases of the Ebola virus outbreak, with participation by sportsmen and women and supporters from a broad range of African countries, including Liberia, Sierra Leone, and Guinea, the three most affected countries.

At the invitation of the host countries, WHO missions were conducted to the three respective countries to support and advise on specific Ebola prevention and response strategies. In this article, the three major sporting events are described, highlighting the activities undertaken to ensure public health security and the outcomes of these mass gatherings with specific reference to EVD.

2. African Youth Games, Botswana, 2014

The African Youth Games are held every 4 years. The first Games were hosted by Morocco in Rabat and 1000 athletes from 40 countries participated. The second African Youth Games were held in Gaborone, the capital city of Botswana, from May 22 to May 31, 2014; in retrospect, this was at a time when the Ebola virus outbreak had expanded rapidly within the affected region. This event took place at a number of venues in Gaborone and drew

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around 2000 athletes aged 15 to 20 years, who took part in a wide range of sporting events including football, swimming, fencing, boxing, cycling, and rugby, as well as their support teams; the participants came from 51 African countries including Liberia, Sierra Leone, and Guinea. Spectator attendance was mainly from Botswana and countries in the region. At the beginning of May 2014 the Ministry of Health of Botswana was on high alert and requested that the WHO provide rapid technical support in strengthening public health capacities under the framework of the International Health Regulations (IHR) 2005, in the context of the expanding Ebola virus outbreak. Botswana had never previously managed cases of suspected or confirmed VHF.

While no general travel restrictions were applied to athletes from the EVD-affected countries, contacts of known cases of EVD were not permitted to leave their respective countries. Proof of yellow fever vaccination was required as a condition of entry for travellers from yellow fever endemic countries. At the international airport in Gaborone, port health staff screened incoming travellers for fever; they were supported by a small team of medical personnel trained for the event. A small medical facility was established at the airport for the isolation of patients. While a strong national surveillance system supported by district outbreak response teams was already in place for epidemic-prone diseases, this was supplemented by a daily surveillance system for specific priority conditions pertinent to the event. Both a syndromic approach and laboratory confirmation to identify participants with an acute febrile illness were used. A daily analysis attempted to establish trends. An emergency 24-h reporting system was established for persons with suspected meningitis or VHF, and for any outbreaks.

An isolation facility was established in an existing health centre outside of the major hospitals. Extensive staff training was conducted using videos and demonstrations in the use of personal protective equipment (PPE) and infection control practices, as well as simulation exercises. Sourcing of adequate supplies of PPE was a challenge. Since Botswana did not have laboratory capacity for VHF and other specialized testing, arrangements were made for testing to be conducted in the biosafety level 4 (BSL4) laboratory and reference laboratories at the National Institute for Communicable Diseases in South Africa, approximately 4 h by road from Gaborone. The requisite export permits and transport arrangements were facilitated. The public health and hospital laboratories in Gaborone were able to test for malaria and meningitis and common pathogens. Training sessions in the recognition and management of a range of communicable diseases were held for medical personnel.

3. Africa Cup of Nations, Equatorial Guinea, 2015

The 2015 Africa Cup of Nations competition was organized by the Confederation of African Football and held in Equatorial Guinea between January 17 and February 8, 2015. Initially scheduled to be hosted by Morocco, this major football tournament was moved to Equatorial Guinea at a late stage after Morocco requested postponement due to the Ebola virus epidemic in West Africa. South Africa, Egypt, Ghana, and Sudan all declined to take over as hosts. Fifty-one countries competed and 16 qualified for the tournament: South Africa, Equatorial Guinea, Congo, Mali, Algeria, Gabon, Burkina Faso, Cameroon, Cote d'Ivoire, Guinea, Ghana, Zambia, Tunisia, Senegal, Democratic Republic of Congo, and Cape Verde. Four cities in Equatorial Guinea hosted the event: the capital city Malabo, Bata, Mongomo, and Ebebiyin. In addition to supporting the overall EVD preparedness, the main objective of the joint WHO team was to strengthen the country's readiness to detect and manage EVD during the Africa Cup of Nations.

Equatorial Guinea had never previously detected a human case of EVD, neither associated with the most recent epidemic in West Africa nor during any previous outbreak. Nevertheless, the neighbouring country of Gabon verified its first EVD outbreak in 1994 and detected sporadic EVD outbreaks in 1996 and 2001/2002, with 124 confirmed cases and 97 deaths reported.[17] With people coming to the country from many African countries, the risk of importing EVD existed and required mitigation.

A crisis committee to coordinate preparedness and response activities for EVD, chaired by the Prime Minister, was established in December 2014 following the declaration of the PHEIC by the WHO. Overall, no major communicable disease events were reported.

4. All-Africa Games, Republic of Congo, 2015

The Republic of Congo hosted the XI edition of the All-Africa Games. The Games were held in 11 stadia throughout the city of Brazzaville from September 4 to September 19, 2015, with participation of athletes from 54 countries, including Sierra Leone, Liberia, and Guinea. The Ministry of Health and Population of Congo was responsible for the overall coordination and delivery of health services, and worked in close collaboration with other ministries, the organizing committee, and the WHO, to ensure rapid detection and containment of infectious diseases, especially EVD. The Republic of Congo had previous experience of managing VHF with referral to the reference laboratory in Kinshasa, Democratic Republic of Congo, directly across the Congo River from Brazzaville. Health risks to visitors and local communities during the All-Africa Games were assessed at an early stage, and planning for constant disease surveillance and risk assessment during the event was organized. Enhanced surveillance for key notifiable diseases was implemented in all 11 stadia and other important locations like the airport. During the games, the Ministry of Health participated in daily all-hazard assessment with the National Organizing Committee and developed and shared daily situation reports.

The data gathered from the surveillance units at the sports village during the events showed that of the 731 cases reported from the sports sites during the events, trauma accounted for 43%, followed by malaria at 27% and respiratory tract infections at 15%. No significant threat to public health was detected during the event, with a minimum effect on the surge capacity of the public health services. Thus, early planning, risk assessment, and preparedness activities as well cross-sectoral collaboration resulted in successful organization of the event amidst the ongoing EVD in West Africa.

5. Discussion

No major public health incidents occurred during the three major sporting events. Each of the countries enhanced their surveillance and reporting systems. Only a few outbreaks of gastrointestinal and respiratory infections and malaria and a few traumatic injuries were recorded during the period, and importantly, no suspected cases of EVD or other VHF occurred.

While outbreaks of infectious diseases have been reported during events, mostly from faeco-oral, respiratory, and vector-borne transmission, to date there have been no published incidents of a case of VHF presenting at a mass gathering.[4–6]

Even though the risk of introduction of a case of EVD would in reality be quite low, the high profile of these sporting events and the major negative effect of even one suspected or confirmed case on the games, necessitated special preparations over and above those needed to monitor and manage the more usual communicable disease risks associated with mass gatherings. Persons with

early or acute EVD are less likely to travel and unlikely to take part in a sporting event. Exit screening was introduced after the declaration of EVD as a PHEIC, and transmission requires direct contact with blood and body fluids of infected persons.[18] However, EVD was spread to a number of countries through travel,[19] persons are asymptomatic during the incubation period, sexual transmission by survivors is now well documented,[20] and certain contact sports may pose a risk, albeit small, for transmission.

With specific reference to EVD, the challenges are the non-specific nature of early illness with its broad differential diagnosis, the infrequent finding of haemorrhage, which could raise the index of suspicion of a VHF, the many other infections presenting with bleeding, delays in laboratory exclusion of VHF in the settings of these three events or the confirmation of alternative diseases, the need to ensure that patients receive adequate treatment for common infectious diseases and importantly for a mass gathering scenario, the potential for panic amongst athletes and the local communities, and the risk of potential disruption to the games.

There are many additional resources needed to respond to potential VHF cases, some of which are not readily available, and these require additional funding.

Given the countries of origin of the participants and spectators, a large range of infectious diseases other than EVD needed to be considered with respect to the differential diagnosis of acute febrile illness and the provision of laboratory diagnostics and treatment options. Training of health workers and resources needed to be provided, given that these were not necessarily common diseases in the host countries. These conditions included trypanosomiasis, meningococcal disease, Crimean-Congo haemorrhagic fever (CCHF), Lassa fever, dengue, arboviral infections, and leptospirosis, as well as the more familiar typhoid, malaria, hepatitis (A, B, and E), HIV, sexually transmitted infections, tuberculosis, and gastrointestinal (viral and bacterial) and respiratory infections, including influenza. The annual influenza season in temperate zones in southern Africa typically occurs from late May to August.

Meningococcaemia or meningococcal meningitis was a particular concern, given the increased risks in young people, particularly those in close contact in hostel-type accommodation, the origin of some of the participants from countries within the African meningitis belt, and possible increased carriage rates. The typically very rapid progression to severe illness over a matter of hours, difficulty in recognition because of non-specific signs and symptoms, particularly with meningococcaemia, high mortality rates, and occurrence of bleeding with confusion with VHF, was particularly concerning in the setting of a mass gathering.

Overall, for vaccine preventable diseases, such as measles, meningococcal meningitis, pneumococcal sepsis, influenza, mumps, and hepatitis A, pre-travel vaccination for participants is known to reduce disease incidence at mass gatherings. Meningococcal disease at the Hajj has rarely been recorded since pre-travel vaccination was enforced.

For communicable diseases that do not have vaccines available, a high state of public health alert, with public health teams on standby coupled to educating the attendees and local population, can go a long way in improving their prevention and detection. Brazil will be hosting the 2016 Olympics in Rio de Janeiro in August 2016, with many thousands of people from all over the world travelling to Brazil. The unexplained rapid spread of the mosquito-borne ZIKV across South and Central America adds another viral threat (in addition to dengue, Japanese encephalitis, and yellow fever) for the attendees of the Olympic Games, further challenging preparedness and surveillance efforts. South Africa successfully hosted two mass gatherings during the influenza A (H1N1)pdm09 virus PHEIC without any major communicable disease incidents. These were the Confederation Cup in 2009 and the Fifa Soccer World Cup in 2010. While epidemics due to vector-borne transmission pose different challenges to Ebola virus and influenza, the same principles of enhancing surveillance and response efforts and reducing all possible risks would apply.

6. Conclusions

The experience garnered during these three mass gathering events during the Ebola epidemic illustrates that these events can be held safely even during a PHEIC provided that countries put measures in place for enhanced surveillance for communicable diseases and are well prepared to respond to any incidents. Although additional resources and training will be required, the efforts are worthwhile and form part of the legacy of mass gatherings for the detection and response to future cases or outbreaks of formidable diseases.

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