

Current major event

Arbovirus diagnostics EQAP

In 2016, the World Health Organization (WHO) initiated a global external quality assessment program (EQAP) for arbovirus diagnostics to determine proficiency in countries to adequately detect the priority arboviruses, dengue virus (DENV), yellow fever virus (YFV), Zika virus (ZIKV), and chikungunya virus (CHIKV). Here we summarize the performance of WHO Eastern Mediterranean Region (EMR) laboratories in the first (2016) and second (2018) rounds of the EQAP.

Editorial note

Arboviruses spread by *Aedes* mosquitoes, particularly DENV, YFV, ZIKV and CHIKV, are major threats to human health worldwide. Outbreaks caused by one or more of these viruses have been reported in the EMR countries of Djibouti, Egypt, Oman, Pakistan, Saudi Arabia, Somalia, Sudan and Yemen in the past 14 years alone. While Zika virus disease is yet to be reported in the EMR, *Aedes* vectors are present in the countries mentioned and suitable habitat may be found in several of the region's other countries.

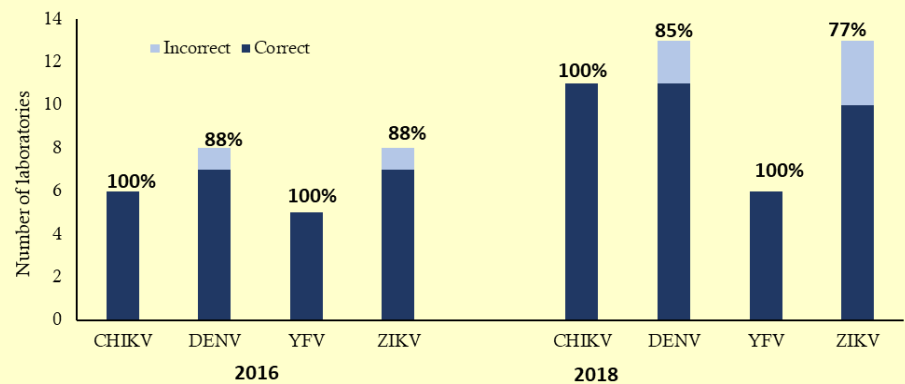
Laboratory detection and characterization of arboviruses is key to diagnosis, clinical and environmental intervention, and epidemiological study. WHO has developed an EQAP for arbovirus diagnostics to determine the proficiency of national public health laboratories to adequately detect DENV, YFV, ZIKV and CHIKV by polymerase chain reaction (PCR). Weak points revealed through the program offer laboratories (and WHO, as needed) the opportunity to implement corrective actions to improve the quality of testing available.

The first two rounds of the EQAP were implemented in 2016 and 2018 by the Royal College of Pathologists of Australasia Quality Assurance Programs, Australia. Testing panels consisted of 12 specimens of inactivated, lyophilized arboviruses, including DENV, YFV (optional), ZIKV and CHIKV. Two of the specimens were double-spiked to simulate coinfection. Panels were distributed to participating national-level public health laboratories between October and December, and confidential performance reports were sent in March of the following year.

In the 2016 round, 96 laboratories participated globally, including 9 laboratories from 7 countries in the EMR. Of these EMR laboratories, 5/5 (100%) correctly identified YFV (optional), 6/6 (100%) identified CHIKV and 7/8 (88%) identified DENV and ZIKV. PCR diagnostics for the 4 arboviruses were available in 5 laboratories. A single laboratory was responsible for 3/4 reported errors.

In the 2018 round, 107 laboratories participated globally. Thirteen, including 5 repeat participants, represented 11 EMR countries. Of EMR laboratories, 6/6 (100%) correctly identified YFV (optional), 11/11 (100%) identified CHIKV, 11/13 (85%) identified DENV and

Proficiency of laboratories in the WHO EMR participating in the EQAP for arbovirus diagnostics, 2016 and 2018



Contents of samples in the EQAP for arbovirus diagnostics, 2016 and 2018

2016 EQAP		2018 EQAP	
Sample ID	Contents	Sample ID	Contents
ARBO-1:2016	CHIKV, YFV (17D strain)	ARBO-1:2018	ZIKV African lineage
ARBO-2:2016	Negative sample	ARBO-2:2018	DENV type 2
ARBO-3:2016	CHIKV	ARBO-3:2018	CHIKV ECSA genotype
ARBO-4:2016	ZIKV Asian lineage	ARBO-4:2018	ZIKV African lineage
ARBO-5:2016	ZIKV Asian lineage	ARBO-5:2018	ZIKV Asian lineage
ARBO-6:2016	DENV type 3, ZIKV Asian lineage	ARBO-6:2018	CHIKV Asian genotype, ZIKV Asian lineage
ARBO-7:2016	DENV type 1	ARBO-7:2018	DENV type 3
ARBO-8:2016	ZIKV African lineage	ARBO-8:2016	ZIKV African lineage
ARBO-9:2016	DENV type 4	ARBO-9:2018	TBEV
ARBO-10:2016	WNV	ARBO-10:2018	DENV type 4
ARBO-11:2016	JEV	ARBO-11:2018	Negative sample
ARBO-12:2016	ZIKV Asian lineage	ARBO-12:2018	JEV
YFV-1:2016	YFV (17D strain)	YFV-1:2018	YFV (Asibi strain)
YFV-2:2016	ZIKV African lineage	YFV-2:2018	YFV (17D strain)
YFV-3:2016	Negative sample	YFV-3:2018	YFV (Asibi strain)
YFV-4:2016	YFV (17D strain)	YFV-4:2018	ZIKV (African lineage)
YFV-5:2016	YFV (17D strain)	YFV-5:2016	Negative sample

10/13 (77%) identified ZIKV. Six laboratories had PCR diagnostics for the 4 arboviruses. Of the 5 repeat participants, all accurately detected CHIKV in both rounds, 75% accurately detected DENV and ≥60% accurately detected ZIKV. The 3 repeat participants that tested YFV in both rounds did so correctly. Most errors (4/6) were reported in a single DENV-ZIKV double-spiked specimen. The laboratory that had made the most errors in 2016 demonstrated error-free testing in 2018.

While the EMR laboratories participating in the 2016 and 2018 rounds of the EQAP demonstrated good proficiency, they represent only half of the countries in the region, providing an incomplete picture of national capacities for arbovirus diagnostics. In addition, few countries with arbovirus outbreaks have consistently, or ever, participated. For some this is due to conflict and the commensurate difficulty in sourcing the necessary reagents. WHO will assist where it can to help countries obtain the necessary reagents as well as encourage the enrolment of others in the program.

Update on outbreaks

in the Eastern Mediterranean Region

MERS in Saudi Arabia; **cholera** in Sudan; **cholera** in Somalia; **cholera** in Yemen; **multidrug-resistant typhoid fever** in Pakistan.

Current public health events of concern

[cumulative N° of cases (deaths), CFR %]

Avian influenza: 2006-2017

Egypt (A/H5N1) [359 (122), 33.98%]

Egypt (A/H9N2) [4 (0)]

Ebola virus disease (EVD): 2018-2019

Democratic Republic of Congo (DRC) [3 343 (2 210), 66.11%]

Cholera: 2017-2019

Somalia [9 487 (48), 0.51%]

Yemen [2 188 503 (3 750), 0.17%]

Sudan [344 (11), 3.25%]

Diphtheria: 2018-2019

Yemen [4 788 (281), 5.87%]

Bangladesh [8 916 (46), 0.52%]

MERS: 2012-2019

Saudi Arabia [2 102 (780), 37.11%]

Multidrug-resistant typhoid fever: 2016-2019

Pakistan [14 320 (0)]