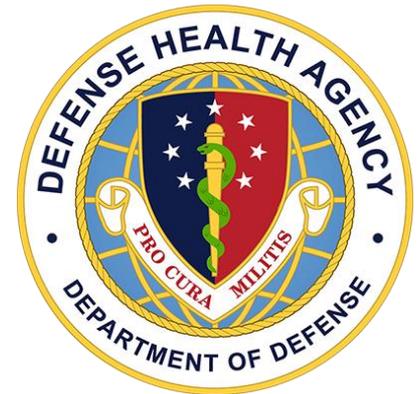


Department of Defense  
Armed Forces Health Surveillance Branch  
Global MERS-CoV Surveillance Summary  
(5 OCT 2016)



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# DEPARTMENT OF DEFENSE (AFHSB)

## Global MERS-CoV Surveillance Summary #93

### 5 OCT 2016 (next Summary 19 OCT)



**CASE REPORT:** As of 5 OCT 2016, 1,889 (+6) cases of Middle East respiratory syndrome coronavirus (MERS-CoV) have been reported, including at least 582 (+1) deaths (CDC reports at least 667 deaths as of 30 SEP) in the Kingdom of Saudi Arabia (KSA) (+3), Jordan, Qatar, United Arab Emirates (UAE), United Kingdom (UK), France, Germany, Tunisia, Italy, Oman, Kuwait (+3), Yemen, Malaysia, Greece, Philippines, Egypt, Lebanon, Netherlands, Iran, Algeria, Austria, Turkey, Republic of Korea (ROK), China, Thailand, Bahrain, and the U.S. **The case count above includes three suspect cases in a Kuwaiti family travelling in Thailand, which were reported by a state-run news agency in Kuwait on 30 SEP. According to the report, Thai authorities isolated all three family members (a father, mother, and son) and made arrangements with the Kuwait Embassy in Bangkok for the family's return to Kuwait. The individuals were hospitalized following their return. As of 5 OCT, the Kuwait MOH has not released any additional information about these cases, and it is unclear whether they have been laboratory confirmed.** AFHSB's death count (Case Fatality Proportion (CFP) - 31%) includes only those deaths which have been publicly reported and verified. While CDC's death count (CFP - 37%) may present a more complete picture, it's unclear when and where those additional deaths occurred during the outbreak.

**BACKGROUND:** In SEP 2012, [WHO reported two cases of a novel coronavirus](#) (now known as MERS-CoV) from separate individuals – one with travel history to the KSA and Qatar and one in a KSA citizen. This was the sixth strain of human coronavirus identified (including SARS). Limited human-to-human transmission has been identified in at least 51 spatial clusters as of 5 OCT, predominately involving close contacts. Limited camel-to-human transmission of MERS-CoV has been proven to occur. The most recent known date of symptom onset is 30 SEP 2016. The KSA Ministry of Health (MOH) has previously admitted to inconsistent reporting of asymptomatic cases. Due to these inconsistencies, it is also difficult to determine a cumulative breakdown by gender; however, AFHSB is aware of at least 589 (+1) cases in females to date. CDC reports 305 of the total cases have been identified as healthcare workers (HCWs).

On 1 AUG, OIE reported two outbreaks of MERS-CoV in camel herds from the cities of Irbid and Zarqa in Jordan that affected 14 camels (23 susceptible) and 22 camels (47 susceptible), respectively. **In the framework of an active surveillance program of MERS-CoV in camels, the country reported 97 negative PCR test results from the Jordan University of Science and Technology Research Laboratory between 1 AUG and 2 OCT.**

**DIAGNOSTICS/MEDICAL COUNTERMEASURES:** On 8 AUG, GeneOne Life Science (based in ROK) and U.S.-based Inovio Pharmaceuticals announced that full enrollment had been reached for the first human clinical trial of a MERS-CoV vaccine (GLS-5300). The Phase I clinical trial is being funded by the Walter Reed Army Institute of Research (WRAIR), and will be conducted at WRAIR's Clinical Trials Center in Silver Spring, MD. A human antibody treatment for MERS-CoV (SAB-301) that was developed by SAB Biotherapeutics and funded by the National Institutes of Health (NIH) began its Phase I clinical trials on 24 MAY, with a clinical report expected by the end of the first quarter in 2017; while antibodies to MERS-CoV have been developed using animals, SAB is the first to produce fully human antibodies in large animals (cattle). Regeneron Pharmaceuticals and the Biomedical Advanced Research and Development Authority (BARDA) of the U.S. Department of Health and Human Services (HHS) have developed a pair of antibodies to prevent and treat MERS-CoV. HHS has agreed to provide up to \$8.9 million in funding to Regeneron to help back manufacturing, Investigational New Drug (IND) submission, and a clinical trial conducted by the NIH. On 17 AUG, Alpha Diagnostic International announced its recent development of multiple ELISA test kits for screening MERS-CoV infections in humans and animals; the kits are intended for in vitro research use only, not for diagnostic procedures.

Text updated from the previous report will be printed in red; items in (+xx) represent the change in number from the previous Summary (21 SEP 2016).

All information has been verified unless noted otherwise. For questions or comments, please contact: [dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil](mailto:dha.ncr.health-surv.list.afhs-ib-alert-response@mail.mil)

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# DEPARTMENT OF DEFENSE (AFHSB)

## Global MERS-CoV Surveillance Summary #93

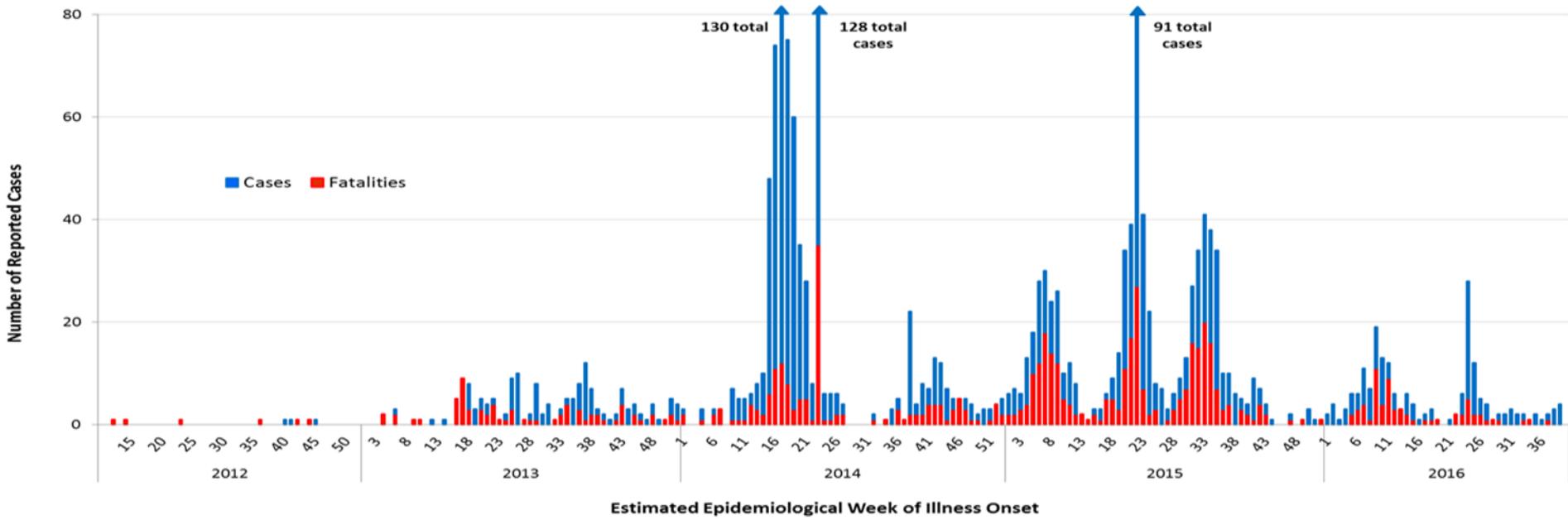
### 5 OCT 2016



**RELEVANT STUDIES:** A new study in NEJM found the first evidence of an association between a human coronavirus (HCoV) and fatal encephalitis, identifying OC43 strain RNA (which belongs to the same group of viruses as MERS-CoV and SARS) in cerebrospinal fluid from a very young immunodeficient patient who had died of encephalitis. On 24 AUG, CDC released updated estimates on the number of MERS-CoV cases. Using data from travelers to the region, the authors estimated 3,250 (95% CI 1,300-6,600) severe MERS cases occurred in the Middle East during SEP 2012-JAN 2016, which is 2.3-fold higher than the number of laboratory-confirmed cases recorded in these countries. The authors last estimated the incidence of MERS-CoV two years ago; since then the number of recorded cases has increased by more than 15 times. While significantly larger than the case count mentioned above, these results complement the results from a previous serologic study by KSA that reported antibodies to MERS-CoV were found in 0.15% of the population. On 4 MAR, CDC published a study that tested archived serum (from 2013-2014) from livestock handlers in Kenya for MERS-CoV antibodies to search for autochthonous MERS-CoV infections in humans outside of the Arabian Peninsula. The study found two (out of 1,122 samples) tested positive, providing evidence of previously unrecorded human MERS-CoV infections in Kenya.

**INTERAGENCY/GLOBAL ACTIONS:** WHO convened the Tenth International Health Regulations (IHR) Emergency Committee on 2 SEP 2015 and concluded the conditions for a Public Health Emergency of International Concern (PHEIC) had not yet been met.

Global MERS-CoV Epidemiological Curve by Illness Onset





# DEPARTMENT OF DEFENSE (AFHSB)

## Global MERS-CoV Surveillance Summary #93

### 5 OCT 2016



## MERS-CoV Diagnostics and Medical Countermeasures at DoD Laboratories



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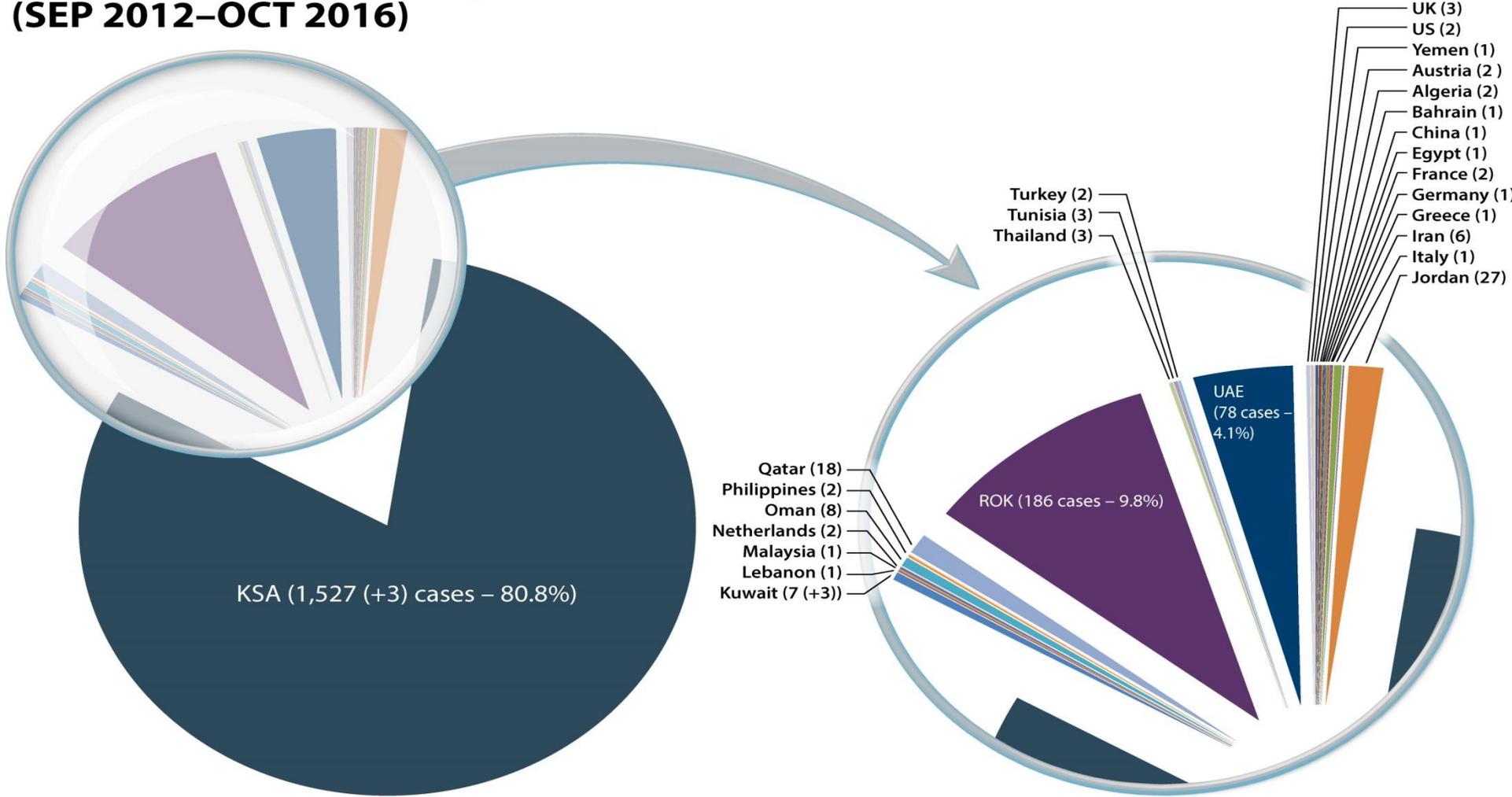
# DEPARTMENT OF DEFENSE (AFHSB)

## Global MERS-CoV Surveillance Summary #93

### 5 OCT 2016



## Global Distribution of Reported MERS-CoV Cases\* (SEP 2012–OCT 2016)

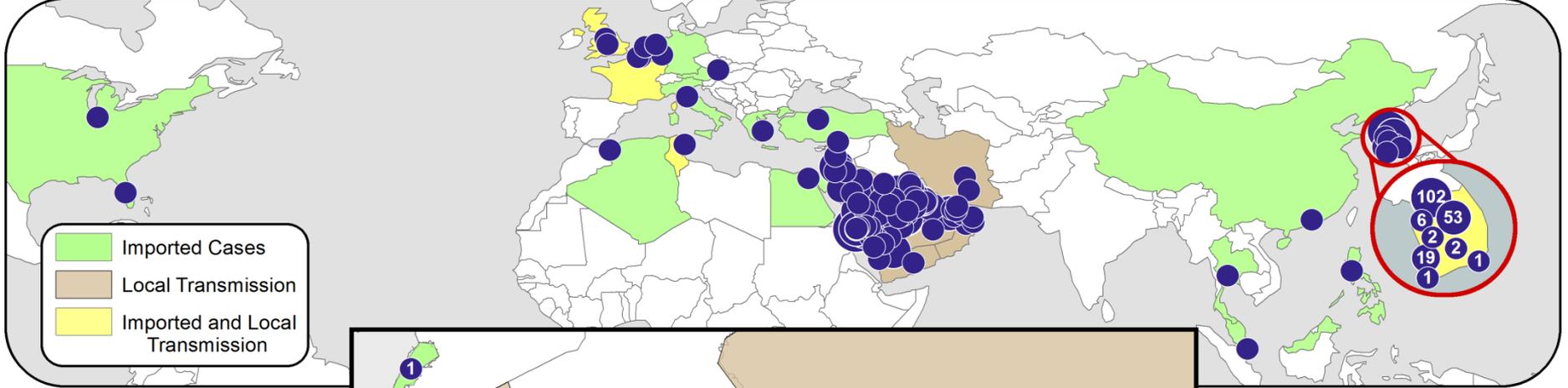


\*Data includes confirmed, suspect and probable cases reported by WHO, CDC, and various country MOHs

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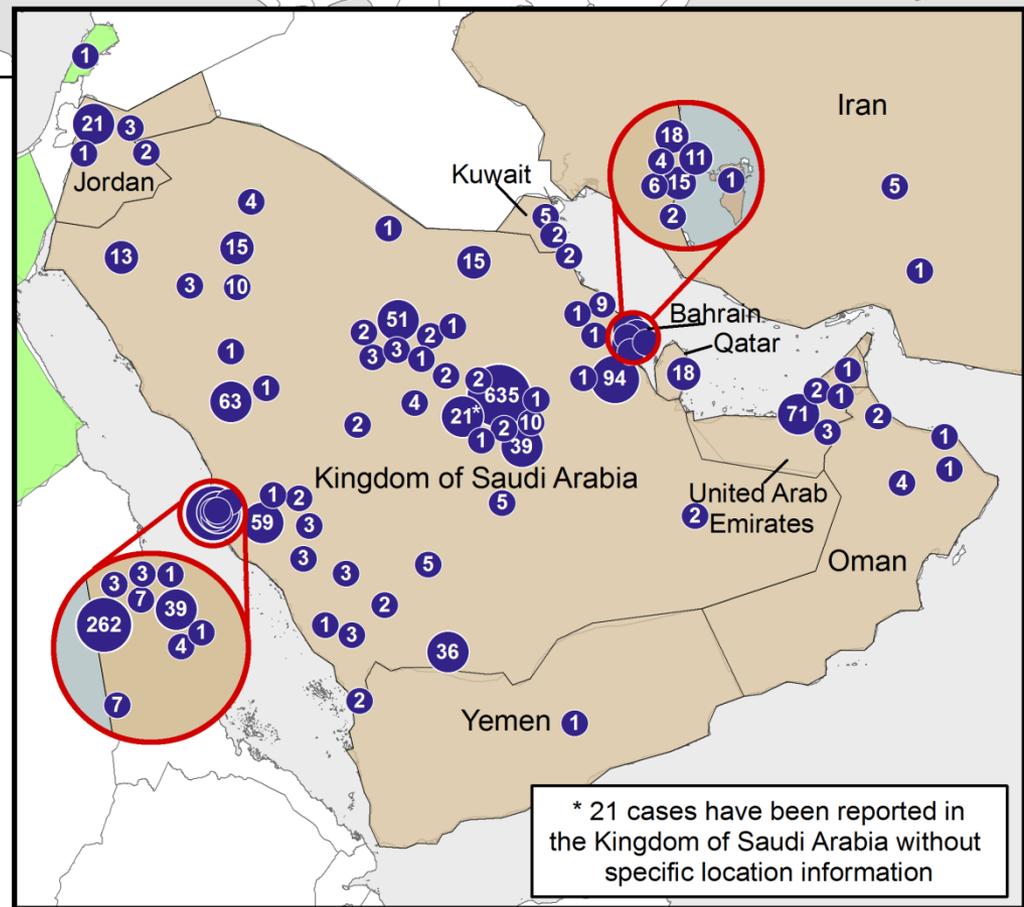


■ Imported Cases  
■ Local Transmission  
■ Imported and Local Transmission

**Geographic Distribution of MERS-CoV Cases**  
01 APR 2012 - 05 OCT 2016



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**Total Cases**  
N = 1889

- 1 - 10
- 11 - 20
- 21 - 75
- 76 - 150
- 151 - 300
- >300

\* 21 cases have been reported in the Kingdom of Saudi Arabia without specific location information

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