



**CIDRAP**

Center for Infectious Disease Research and Policy  
University of Minnesota

**CIDRAP Leadership Forum  
December Intelligence BRIEFING**

**December 9, 2015**

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## **1. Mosquito-borne diseases**

- Zika, Chikungunya
- Dengue, West Nile

## **2. Influenza**

- Seasonal, Pandemic
- Avian, Poultry

## **3. Ebola**

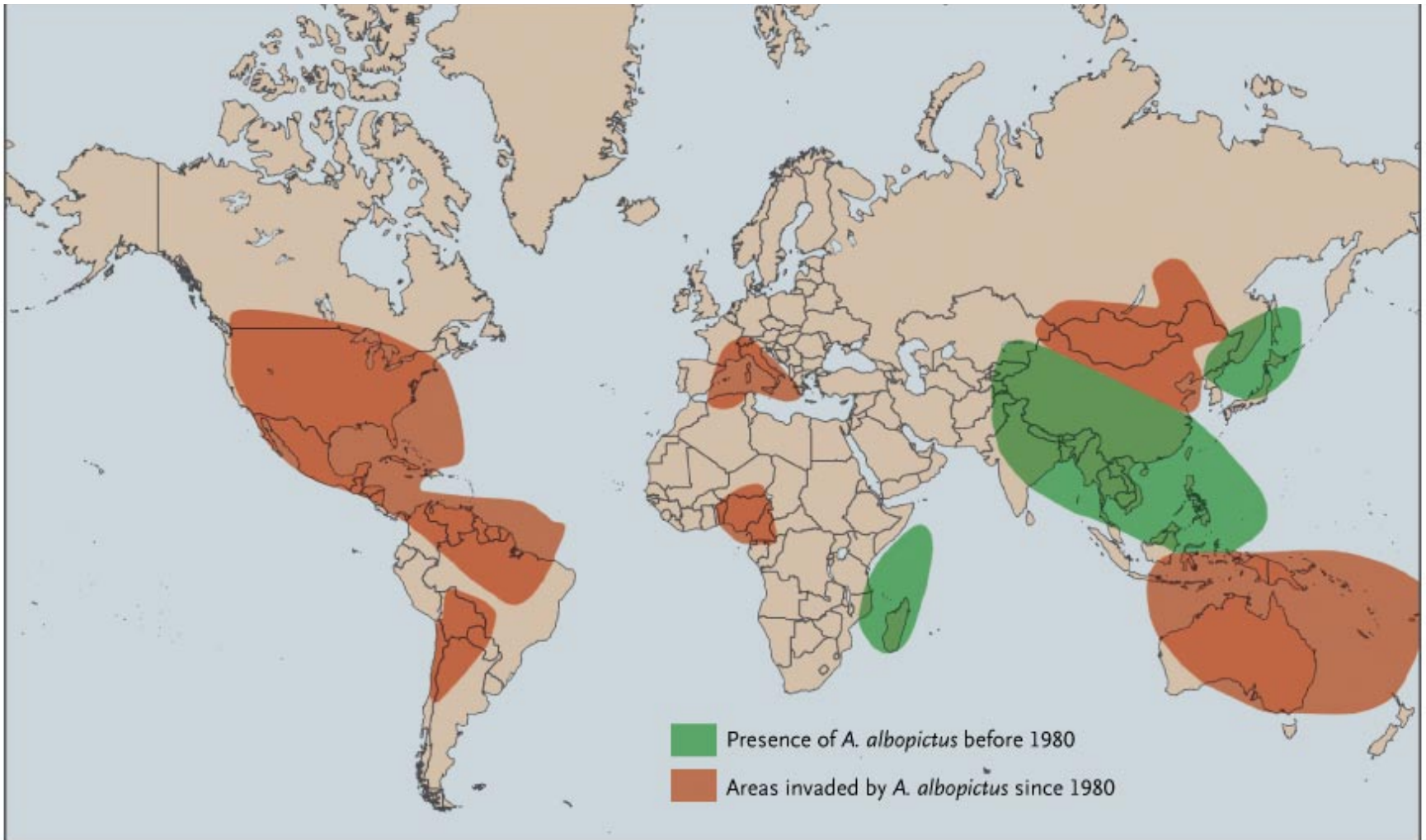
- Epi update
- Vaccine update

## **4. Middle East respiratory syndrome coronavirus (MERS-CoV)**

## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**

# World Distribution of the *Aedes albopictus* Mosquito



## **1. Mosquito-borne diseases**

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- Dengue, West Nile

## **2. Influenza**

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- Epi update
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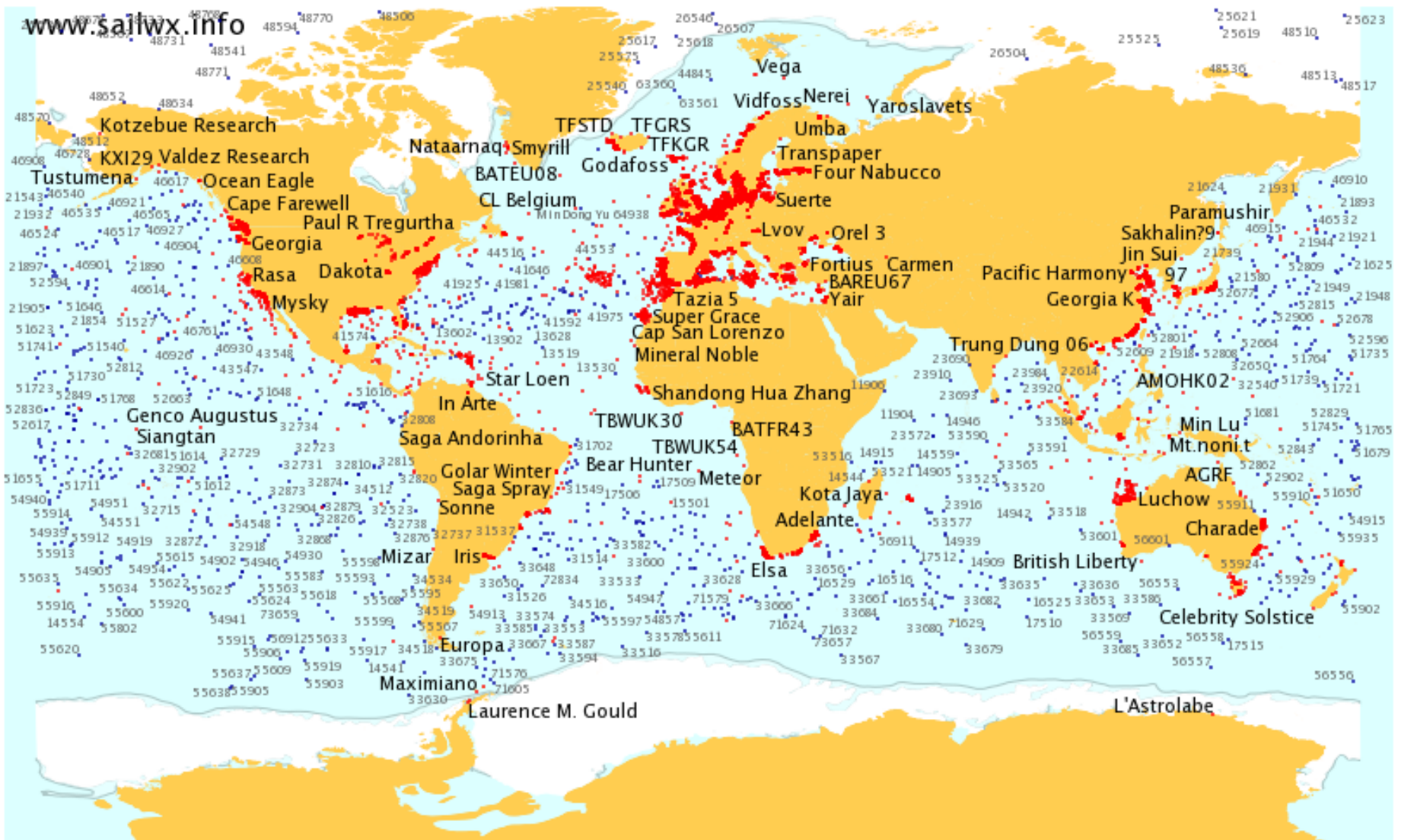
## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**



*Aedes albopictus* Female





*World container ship traffic has doubled since 1997*

Ship Traffic Worldwide: Wednesday, Dec 09, 2015, 3:00 PM UTC



*Aedes aegypti*



# *Aedes aegypti* Distribution in the Americas

1930



1970



2000



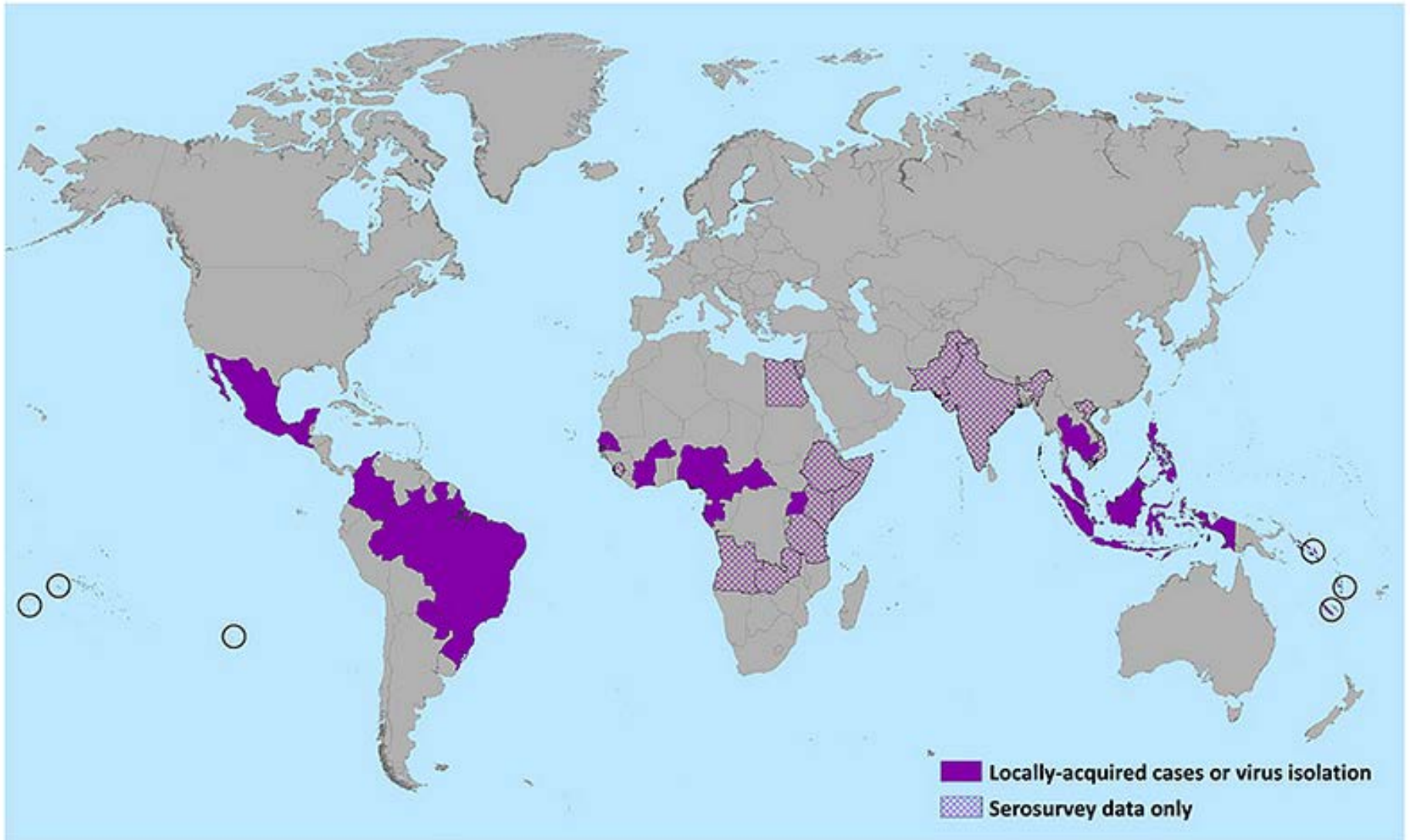
# Zika Virus Infection

- Flavivirus
- *Aedes* mosquito vector
- Nonhuman and human primates are likely the main reservoirs of the virus, and anthroponotic (human-to-vector-to-human) transmission occurs during outbreaks.
- First reported in Uganda in 1947

# Zika Virus Infection

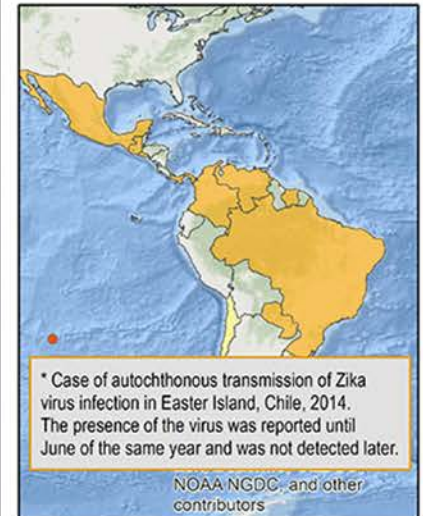
- About 1 in 5 people infected with Zika virus become symptomatic
- Characteristic clinical findings are acute onset of fever with maculopapular rash, arthralgia, or conjunctivitis
- Other commonly reported symptoms include myalgia, headache, retro-orbital pain and vomiting
- Ill several days to a week

# Countries that have past or current evidence of Zika virus transmission (as of December 2015)



## Countries and territories with confirmed cases of Zika virus (autochthonous transmission) in the Americas, 2014-2015.

Updated as of Epidemiological Week 48  
(Nov 29-Dec 5, 2015)



**Data Source:**  
Reported from the IHR National Focal Points and through the Ministry of Health websites.

**Map Production:**  
PAHO-WHO AD CHA IRARO

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## Ministério da Saúde publica Protocolo de Vigilância sobre microcefalia e vírus Zika

PROTOCOLO DE VIGILÂNCIA E RESPOSTA À OCORRÊNCIA DE MICROCEFALIA RELACIONADA À INFECÇÃO PELO VÍRUS ZIKA



O Ministério da Saúde divulgou, nesta terça-feira (08) o Protocolo de Vigilância e Resposta à Ocorrência de Microcefalia relacionada à infecção pelo vírus Zika. O material foi elaborado a partir das discussões entre o Ministério da Saúde e especialistas de diversas áreas da medicina, epidemiologia, estatística, geografia, laboratório, além de representantes das Secretarias de Saúde de estados e municípios afetados. O protocolo contém informações, orientações técnicas e diretrizes relacionadas às ações de vigilância das microcefalias aos profissionais de saúde e equipes de vigilância.

Entre as orientações estão as definições de casos suspeitos de microcefalia durante a gestação, casos suspeitos durante o parto ou após o nascimento, critérios para exclusão de casos suspeitos e sistema de notificação e investigação laboratorial. Além disso, há orientações sobre como deve ser feita a investigação epidemiológica dos casos suspeitos e sobre o monitoramento e análise dos dados. Por fim, o protocolo traz informações sobre o reforço do combate ao mosquito *Aedes aegypti*.

Neste protocolo, a circunferência encefálica dos bebês segue medida padrão da Organização Mundial de Saúde (OMS), definido como 32 cm. Inicialmente, diante do aumento inesperado e inusitado dos casos de microcefalia em recém-nascidos, o Ministério da Saúde recomendou que fosse adotada a medida de 33 cm para incluir um número maior de bebês na investigação, visando uma melhor compreensão da situação.

Vale esclarecer que o perímetro cefálico (PC) varia conforme a idade gestacional do bebê. Assim, na maioria das crianças que nascem após nove meses de gestação, o crânio com 33 cm de diâmetro é considerado normal para a população brasileira, podendo haver alguma variação para menor, dependendo das características étnicas e genéticas da população.

[Confira o protocolo na íntegra](#)



# Epidemiological Alert

## Neurological syndrome, congenital malformations, and Zika virus infection. Implications for public health in the Americas

1 December 2015

Given the increase of congenital anomalies, Guillain-Barré syndrome, and other neurological and autoimmune syndromes in areas where Zika virus is circulating and their possible relation to the virus, the Pan American Health Organization / World Health Organization (PAHO/WHO) recommends its Member States establish and maintain the capacity to detect and confirm Zika virus cases, prepare healthcare facilities for the possible increase in demand at all healthcare levels and specialized care for neurological syndromes, and to strengthen antenatal care. In addition, Member States should continue efforts to reduce the presence of mosquito vectors through an effective vector control strategy and public communication.

### Situation summary

#### Autochthonous transmission of Zika virus

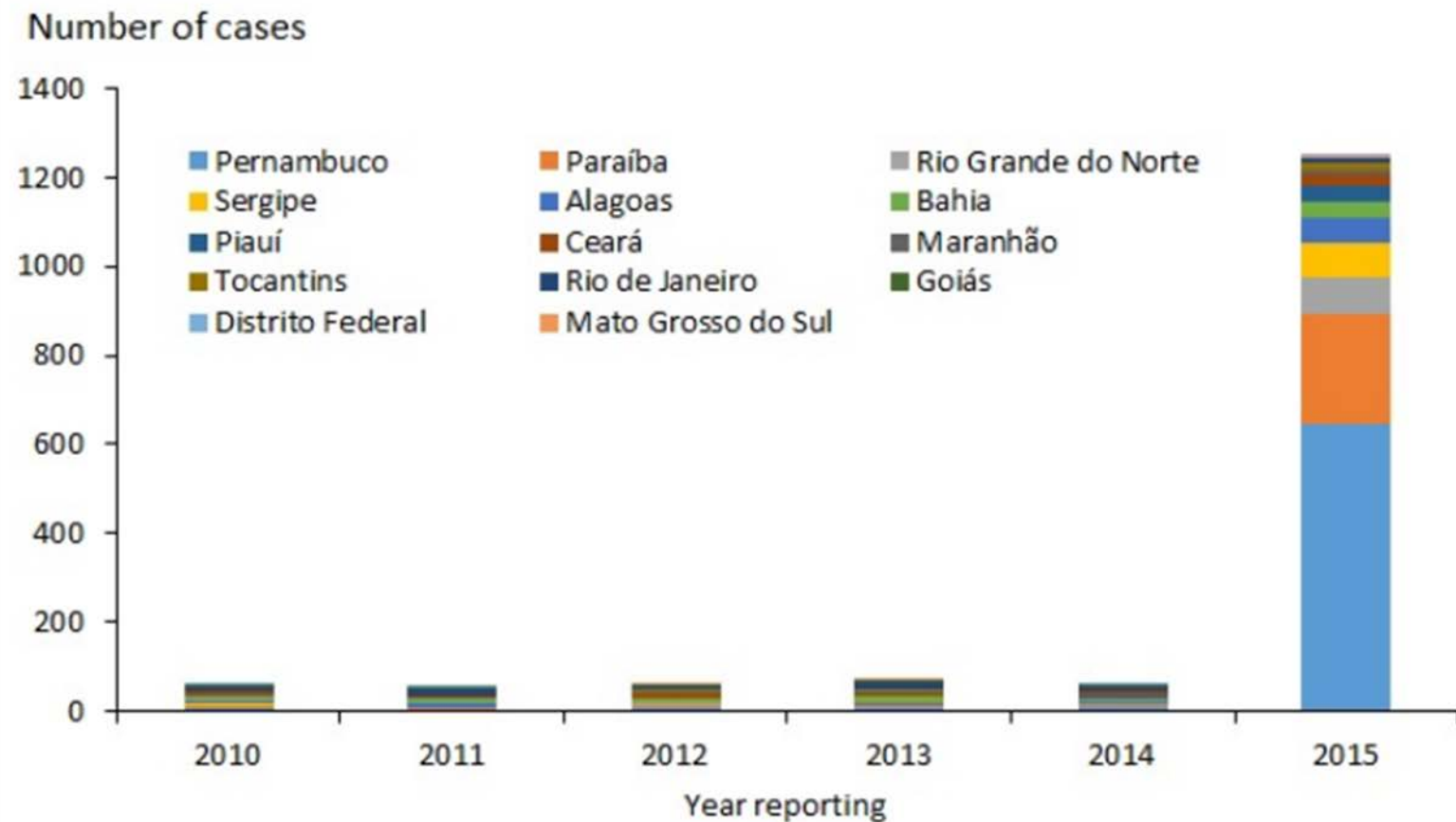
As of 1 December 2015, nine Member States in the Americas have confirmed autochthonous circulation of Zika virus: Brazil, Chile (on Easter Island), Colombia, El Salvador, Guatemala, Mexico, Paraguay, Suriname, and Venezuela.<sup>1</sup>

Autochthonous circulation of Zika virus (ZIKV) in the Americas was first confirmed in February of 2014 on Easter Island, Chile, and cases were reported there up to June of 2014.

In May 2015, the first autochthonous cases of Zika virus in Brazil were confirmed. As of 1 December 2015, a total of 18 states in Brazil have confirmed autochthonous circulation: North region (Amazonas, Pará, Rondônia, Roraima, and Tocantins), Northeast region (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, and Rio Grande do Norte), Southeast region (Espírito Santo, Rio de Janeiro, and São Paulo), Central-West region (Mato Grosso), and South region



## Number of cases of microcephaly reported annually in the fourteen Brazilian states, 2010–2015





## EMERGING INFECTIOUS DISEASES®

Volume 21, Number 5—May 2015

*Letter*

### Acute Zika Virus Infection after Travel to Malaysian Borneo, September 2014

**To the Editor:** Zika virus (ZIKV), a mosquito-borne flavivirus, causes Zika fever, a self-limiting febrile and exanthematic arthralgia syndrome closely resembling dengue fever. Most often, signs and symptoms are maculopapular rash, fever, arthralgia, myalgia, headache, and conjunctivitis; edema, sore throat, cough, and vomiting occur less frequently ([1](#)). The virus, which was initially isolated from a rhesus monkey (*Macaca mulatta*) in 1947 in Uganda, has come to attention recently after a large outbreak occurred in the western Pacific region, including French Polynesia, New Caledonia, Easter Island, and the Cook Islands ([2](#)). Travel-related imported infections have thus been increasingly reported from the western Pacific and sporadically also in travelers to other regions of the world, including Thailand, Indonesia, and Senegal ([2,3](#)). ZIKV is transmitted by different *Aedes* mosquito species, and nonhuman primates play a role as reservoirs ([1](#)). After the beginning of the ZIKV epidemic in late 2013, a 20-fold increase of Guillain-Barré syndrome incidence was noted in French Polynesia; 1 patient was infected a week before neurologic symptoms started ([4](#)). We report an acute ZIKV infection in a traveler returning from Malaysian Borneo who experienced bilateral hearing difficulties during the course of illness.

On September 1, 2014, a 45-year-old woman was seen in an outpatient clinic in Heidelberg, Germany for fever o

# Zika virus infection complicated by Guillain-Barré syndrome – case report, French Polynesia, December 2013

Eurosurveillance, Volume 19, Issue 9, 06 March 2014

E Oehler (erwan.oehler@cht.pf)<sup>1</sup>, L Watrin<sup>2</sup>, P Larre<sup>2</sup>, I Leperc-Goffart<sup>3</sup>, S Lastère<sup>4</sup>, F Valour<sup>1</sup>, L Baudouin<sup>5</sup>, H P Mallet<sup>6</sup>, D Musso<sup>7</sup>, F Ghawche<sup>2</sup>

Zika fever, considered as an emerging disease of arboviral origin, because of its expanding geographic area, is known as a benign infection usually presenting as an influenza-like illness with cutaneous rash. So far, Zika virus infection has never led to hospitalisation. We describe the first case of Guillain-Barré syndrome (GBS) occurring immediately after a Zika virus infection, during the current Zika and type 1 and 3 dengue fever co-epidemics in French Polynesia.

We report on a French Polynesian patient presenting a Zika virus (ZIKA) infection complicated by Guillain-Barré syndrome (GBS).

## Clinical description

In November 2013, a Polynesian woman in her early 40s, with no past medical history with the exception of acute articular rheumatism, was hospitalised in

elevated distal motor latency, elongated F-wave, conduction block and acute denervation, without axonal abnormalities. The administration of intravenous polyvalent immunoglobulin (0.4 g/kg/day for 5 days) allowed a favourable evolution, with no respiratory impairment necessitating tracheotomy or intensive care unit monitoring, and the patient was discharged home at Day 13. Paraparesis persisted after the end of hospitalisation, that imposed the use of a walking frame, and the facial palsy slowly disappeared. At Day 40, she was able to walk without help and had a satisfying muscular strength score of 85/100.

Retrospectively, anamnestic data revealed that she had suffered from an influenza-like syndrome at Day – 7, with myalgia, febricula, cutaneous rash, and conjunctivitis. Because an epidemic of Zika fever, which is still ongoing [1], had begun a few weeks prior to the patient

The Americas

# Brazil links dengue-like virus to birth defects in babies

By **Adriana Gomez Licon** | AP November 29

RIO DE JANEIRO — The dengue-like Zika virus has been linked for the first time to cases of babies being born with small heads, or microcephaly, Brazil's government said.

It said scientists studying a surge of such cases in northeastern Brazil found the presence of the virus in the blood of a baby born with birth defects in Ceara state. The girl died.

"This is an unprecedented situation in the global scientific community," the Health Ministry said in a statement released Saturday.

Researchers with the U.S. Centers for Disease Control and Prevention are coming soon at the request of Brazil's government to study the link between the rare neurological condition and Zika.

Brazilian health officials believe pregnant women are more vulnerable of developing fetuses with microcephaly if they are infected with Zika in their first trimester. So far in 2015, the ministry has reported 739 cases of babies born with microcephaly in nine states that have been hit hard by Zika



## Zika virus spreads to more countries

Filed Under: [Zika virus](#)

Lisa Schnirring | News Editor | CIDRAP News | Nov 30, 2015

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In quickly evolving developments, more countries in the Americas reported Zika virus cases, as Brazil—one of the hardest hit countries—reported more microcephaly cases, which health officials suspect might be related to infections in pregnant women.

In a pair of updates, the European Centre for Disease Prevention and Control (ECDC) weighed in on the spread of mosquito-borne Zika virus to more countries and the possible connection to complications, which may also include Guillain-Barre syndrome (GBS) and congenital neurological malformations.

Also, the World Health Organization (WHO) said it has been notified of Zika virus infections in Guatemala and El Salvador, with infectious disease news sources flagging foreign language media reports suggesting that illnesses have been detected in Paraguay and Venezuela.



*James L. Occi/ Flickr cc*



## PAHO issues Zika virus alert

Filed Under: [Zika virus](#); [Misc Emerging Topics](#)

[Lisa Schnirring](#) | News Editor | [CIDRAP News](#) | [Dec 01, 2015](#)



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In a move that signals growing concerns over the spread of Zika virus and its neurologic complications, the Pan American Health Organization (PAHO) today issued an alert about the threat, urging countries in the region to be on the lookout for the disease and to watch for unusual patterns in newborns.

For the past few weeks health authorities have voiced strong suspicions about an unusual rise in microcephaly in Brazil's hardest-hit Zika virus regions, and in today's update, PAHO said Brazil's health ministry is reporting a 20-fold increase in microcephaly cases compared with previous years.

As of yesterday, Brazil reported 1,248 cases, a sharp increase from 739 reported in a World Health Organization update on Nov 27.

So far nine countries in the Americas have confirmed locally acquired Zika virus infections, passed to humans by *Aedes* mosquitoes. The virus was detected on Chile's Easter Island in February 2014. Besides Brazil, Colombia, El Salvador, Guatemala, Mexico, Paraguay, Suriname, and Venezuela have reported cases.



Marco Silva/ iStock



## Panama reports first Zika virus cases

Filed Under: [Zika virus](#)

[Lisa Schnirring](#) | News Editor | [CIDRAP News](#) | Dec 04, 2015

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Panama reported its first locally acquired Zika virus cases, according to local media reports, as the World Health Organization (WHO) provided more details about recent detections in three other countries in the Americas: Mexico, Paraguay, and Venezuela.

Zika virus, spread by *Aedes* mosquitoes, is spreading rapidly in Central and South America. The outbreak has been especially intense in Brazil, where health officials say the Zika surge appears to be linked to a 20-fold increase in microcephaly.

Earlier this week the Pan American Health Organization issued an epidemiologic alert, warning countries to look for the virus and to be on alert for any unusual health patterns in newborns.

### Panama's first cases

According to a pair of foreign language reports translated and posted yesterday by Avian Flu Diary, an infectious disease blog, Panama's health ministry announced three cases on the island of Ustupo during surveillance of people with fevers.



*European Commission DG ECHO / Flickr cc*

# Chikungunya Virus Infection

- *Alphavirus*
- Transmission to people by *Aedes aegypti* and *Aedes albopictus* mosquitoes
- Most common symptoms are fever and joint pain. Other symptoms may include headache, muscle pain, joint swelling, or rash
- Rheumatologic symptoms (e.g., polyarthralgia, polyarthritis, tenosynovitis) in the months following acute illness





**Countries/territories with autochthonous transmission or imported cases of Chikungunya in the Americas, EW 49, 2013 - EW 38, 2015**



Data source:  
PAHO/WHO. Number of reported cases of Chikungunya Fever in the Americas

<http://www.paho.org/chikungunya>

Map production:  
PAHO-WHO AD CHA RR ARD

\* Note: Entire countries have been shaded on the map though there is no evidence of country-wide virus presence.  
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## Chikungunya Virus Can Cause Fatal Encephalitis

Sue Hughes

November 25, 2015

2 comments



Print



Email

### EDITORS' RECOMMENDATIONS



**Chikungunya Virus  
Concern Growing**



**More in New York, New  
Jersey Infected With  
Chikungunya: CDC**

**Threat Rises in U.S. From  
Mosquito-Borne Chikungunya Virus**

### RELATED DRUGS & DISEASES

**Viral Encephalitis**

**Chikungunya Virus**

The mosquito-borne virus chikungunya can lead to severe encephalitis and even death, especially in young babies and older adults, a new study has found.

The study, [published online](#) November 25 in *Neurology*, reviewed cases of chikungunya that occurred during an outbreak on Reunion Island off the coast of Madagascar in 2005 to 2006, but the authors say the findings have implications for many other counties, including those in Europe and North America.

"These data are of paramount importance for public health stakeholders and policy makers, because owing to global climate warming, chikungunya threatens many countries, including those in the Western world, with possibilities of epidemics in Southern Europe, Southern Central, and even North America," lead author Patrick Gérardin, MD, from Central University Hospital in Saint Pierre, Reunion Island, told *Medscape Medical News*.

Article

## Chikungunya virus–associated encephalitis

### A cohort study on La Réunion Island, 2005–2009

Patrick Gérardin, MD, PhD, Thérèse Couderc, PhD, Marc Bintner, MD, Patrice Tournebize, MD, Michel Renouil, MD, Jérôme Lémant, MD, Véronique Boisson, MD, Gianandrea Borgherini, MD, Frédéric Staikowsky, MD, PhD, Frédéric Schramm, MD, PhD, Marc Lecuit, MD, PhD and Alain Michault, PharmD† On behalf of the Encephalchik Study Group

+ SHOW AFFILIATIONS | + SHOW FULL DISCLOSURES

Correspondence to Dr. Gérardin: [patrick.gerardin@chu-reunion.fr](mailto:patrick.gerardin@chu-reunion.fr)

Published online before print November 25, 2015, doi: <http://dx.doi.org/10.1212/WNL.0000000000002234>  
*Neurology* 10.1212/WNL.0000000000002234

Abstract

Full Text (PDF)

### ABSTRACT

**Objective:** To estimate the cumulative incidence rate (CIR) of Chikungunya virus (CHIKV)–associated CNS disease during the La Réunion outbreak, and assess the disease burden and patient outcome after 3 years.

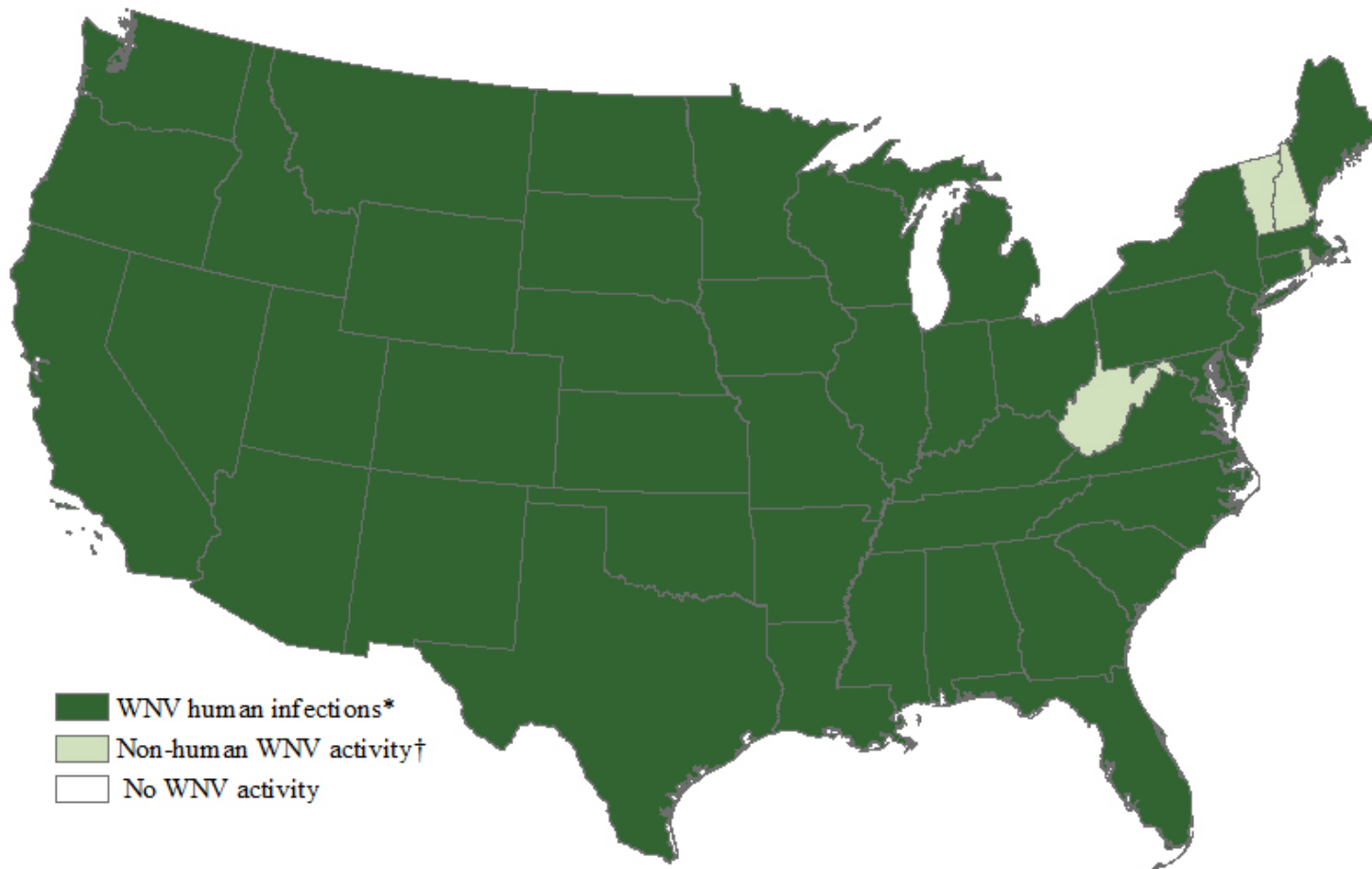
**Methods:** CHIKV-associated CNS disease was characterized retrospectively in a cohort of patients with positive CHIKV reverse transcriptase PCR or anti-CHIKV immunoglobulin M antibodies in the CSF and fulfilling International Encephalitis Consortium criteria for encephalitis or encephalopathy. Neurologic sequelae were assessed after 3 years.

Distribution of West Nile fever cases by affected areas, European region and Mediterranean basin  
Transmission season 2015 and previous transmission seasons; latest data update 19 Nov 2015

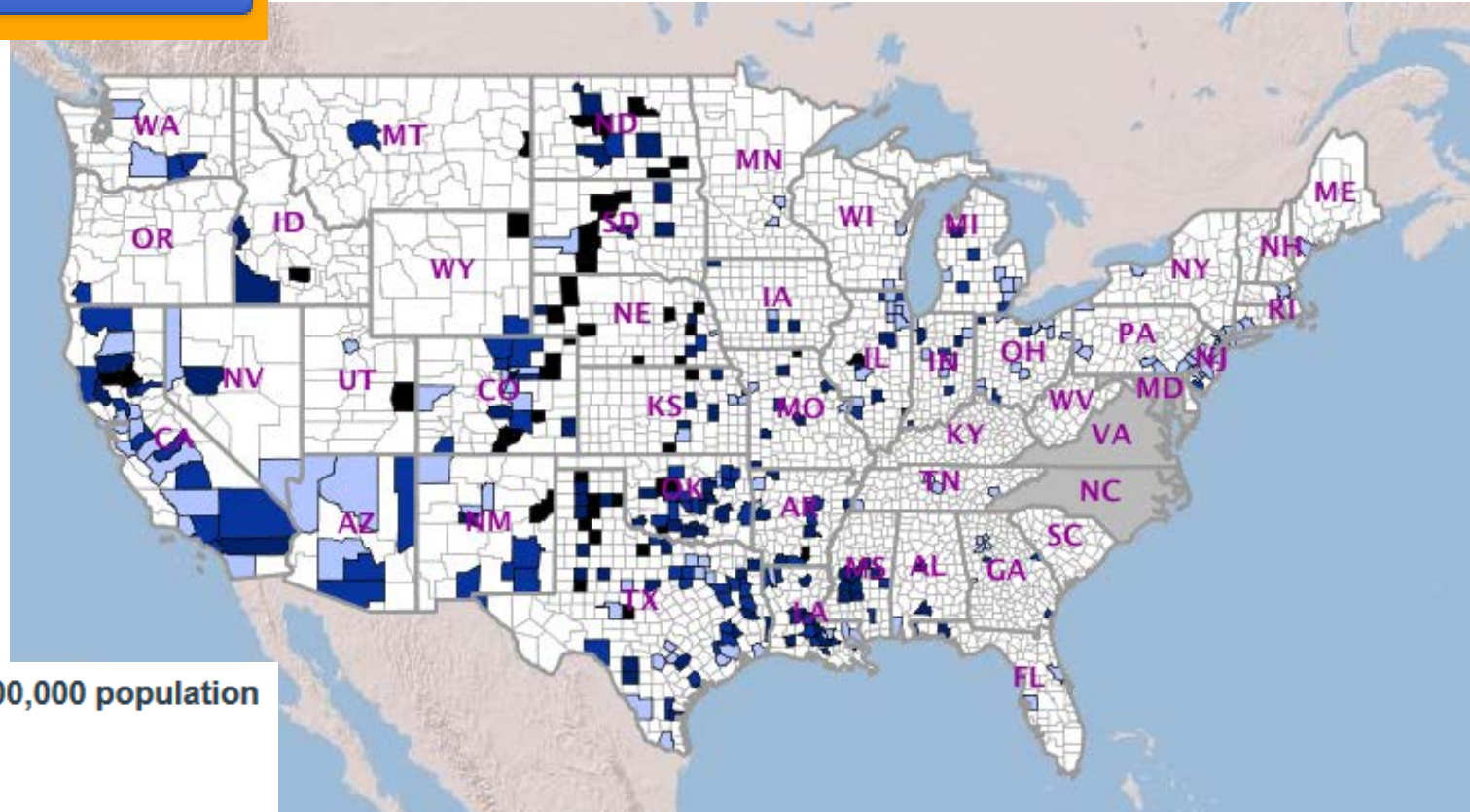


## West Nile virus

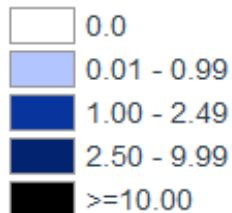
### West Nile Virus Activity by State – United States, 2015 (as of December 1, 2015)



Neuroinvasive disease incidence



**Incidence per 100,000 population**



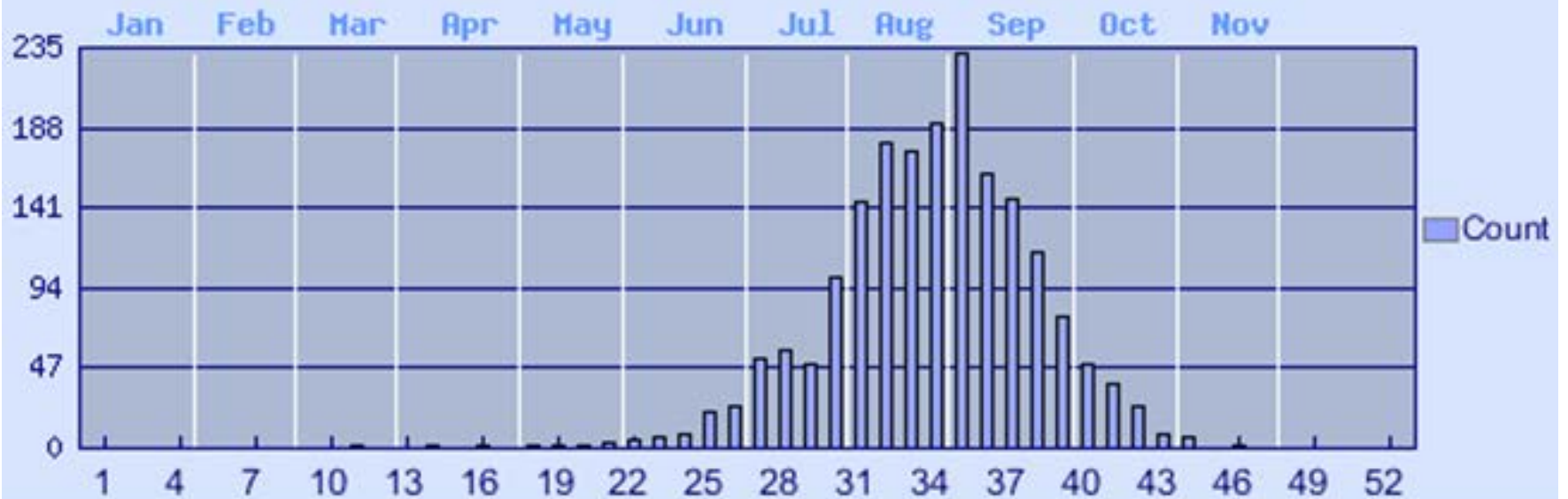
Reports state level data only

Cumulative 2015 Data as of 3 am, Dec 01, 2015

Information From CDC

Surveillance data from Public Health Agency of Canada

### West Nile Virus - Human Disease Cases by Week - United States, 2015





HEALTH

# Hawaii's Dengue Fever Outbreak Grows

CHRISTINE HAUSER DEC. 7, 2015

The number of cases of [dengue fever](#) in [Hawaii](#) has risen to 139, prompting health authorities this week to warn residents and travelers to the popular winter vacation destination to take precautions to avoid contracting the virus.

The Department of Health [said in its latest statement](#) on the outbreak that 122 residents and 17 visitors on Hawaii Island, the largest of the state's eight main islands, have been confirmed to have dengue fever.

The first cases in the current outbreak were traced back to September, and over time they developed into what is now being treated as a cluster of 108 adults and 31 children. The cluster has now grown to rival the [last major dengue outbreak](#), which took place in 2001 and lasted about 10 months with 92 cases on Maui, 26 on Oahu and four on Kauai.

The outbreak is taking place at the start of the island's peak tourism season, which usually begins around mid-December and lasts until March or mid-April. The Hawaii Tourism Authority [published an alert](#) last month instructing tourists to take precautions against the illness.

The virus, spread by a bite from infected mosquitoes, is uncommon on the island of Hawaii. County health officials said that it was probably introduced to the island by a person who contracted it in another part of the world, became infectious while in Hawaii and was bitten by there by a mosquito, which spread the [fever](#).



The Asian Tiger mosquito is contributing to the spread of the dengue fever outbreak in Hawaii.  
Pascal Guyot/Agence France-Presse — Getty Images



## News Scan for Dec 07, 2015

### Hawaii dengue cases grow to 139

The Hawaii Department of Health (HDOH) said today that the number of locally acquired dengue fever cases has risen by 27 in less than a week, for a total of 139 cases on the big island of Hawaii.

Of the confirmed cases of dengue fever, 122 are in Hawaii residents and 17 involve visitors. Most of the total cases (78%, or 108) have occurred in adults, while 31 cases (22%) involve children. Illness onset occurred from Sep 11 to Nov 28.

The HDOH has excluded 424 potential cases due to negative test results or failure to meet case criteria. "This is the first cluster of locally-acquired dengue fever since the 2011 outbreak on Oahu," the agency said in the update.

High- and moderate-risk areas for dengue fever currently lie along the western and eastern coasts of the big island. State health officials continue to conduct vector control activities and monitor for imported cases.

**Dec 7 HDOH update**

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- Zika, Chikungunya
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- Epi update
- Vaccine update

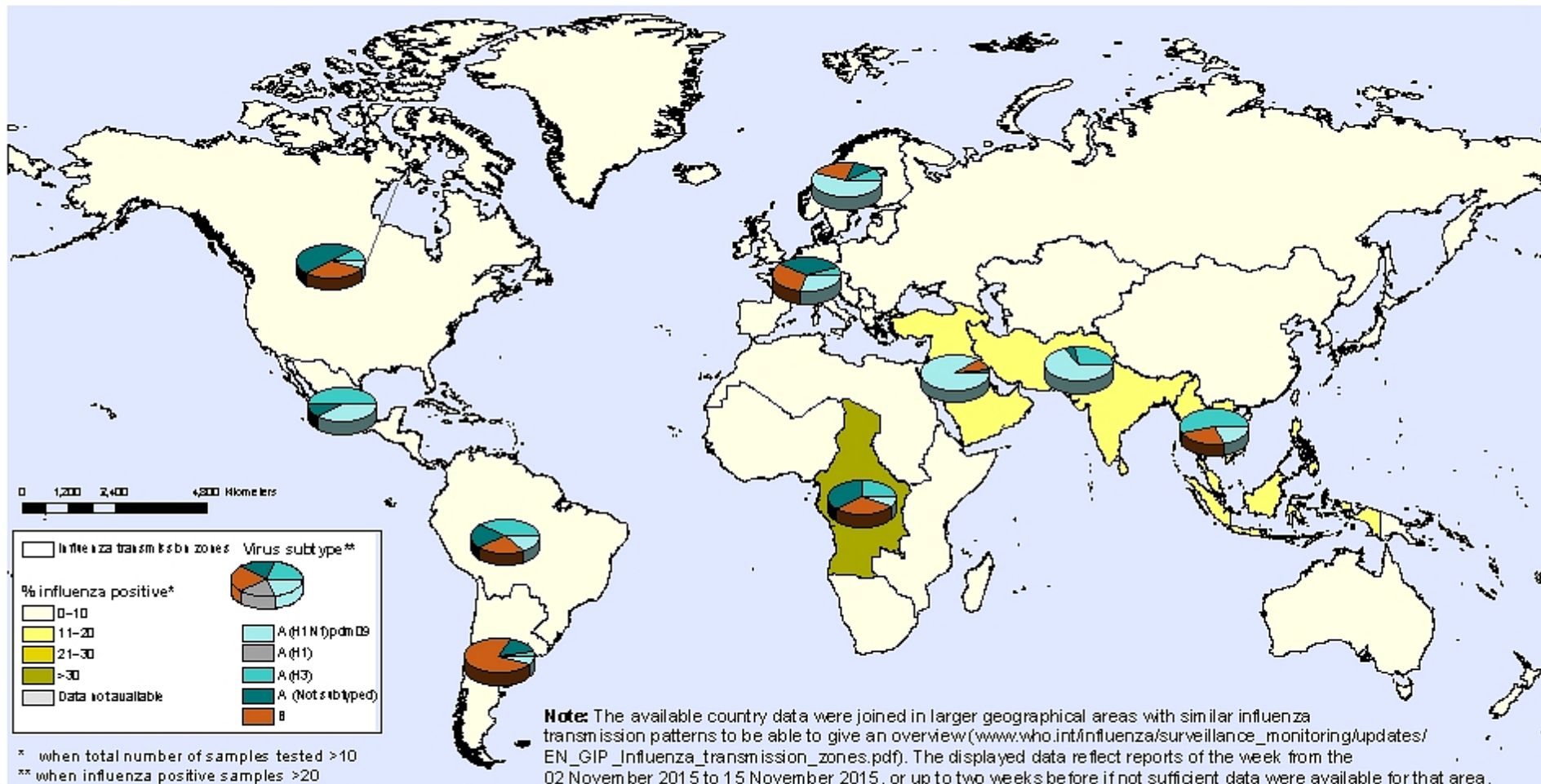
## **4. Middle East respiratory syndrome coronavirus (MERS-CoV)**

## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**

# Percentage of respiratory specimens that tested positive for influenza By influenza transmission zone

Status as of 26 November 2015



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: Global Influenza Surveillance and Response System (GISRS), FluNet ([www.who.int/flu-net](http://www.who.int/flu-net)).



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## Flu Scan for Dec 04, 2015

### US flu activity inches upward

For the third week in a row, US influenza activity increased slightly, with H3N2 still the dominant strain, the Centers for Disease Control and Prevention (CDC) said today.

The percentage of clinic visits for influenza-like illness (ILI) rose from 1.6% to 1.9%, according to the CDC update, which covers the week through Nov 28. That level is still below the national baseline of 2.1%, but several regions reported elevated outpatient ILI levels.

Puerto Rico, Oklahoma, and South Carolina reported moderate ILI levels, up from one state a week ago. Four states reported low activity, and the rest logged minimal activity. Flu was reported as widespread in Guam, regional in Puerto Rico, and local in seven states, up from five the week before.

Deaths for pneumonia and influenza (P&I) are tracked by the CDC in two ways: through the National Center for Health Statistics (NCHS) Mortality Surveillance System and the 122 Cities Mortality Reporting System. Based on NCHS data, P&I deaths accounted for 5.9% of all deaths, well below the 6.8% epidemic threshold for this time of year. Using cities data, P&I deaths accounted for 6.1% of all deaths, below the epidemic threshold of 6.5%.

No pediatric deaths were reported last week.

Among specimens from public health labs that test positive for flu this season, 82.4% have been influenza A and 17.6% influenza B. Of the 333 "A" viruses subtyped, 262 (78.7%) were H3N2. That strain is typically associated with more severe flu seasons.

**Dec 4 CDC FluView report**



## Middle East

🕒 Dec. 07, 2015 | 05:42 PM (Last Updated: December 07, 2015 | 07:42 PM)

### Iran swine flu outbreak kills 33 in three weeks: state media

Agence France Presse

TEHRAN: An outbreak of swine flu has left 33 people dead in two provinces of southwestern Iran in the past three weeks, the official IRNA news agency reported on Monday.

IRNA quoted Deputy Health Minister Ali Akbar Sayyari as saying there had been 28 deaths in Kerman province and five in Sistan-Baluchistan and warning the H1N1 virus was likely to spread to other areas including the capital Tehran.

"The health ministry predicts that the virus will spread in the coming days to Tehran, West and East Azerbaijan and Kermanshah provinces more than to other places," he said.

Nearly 600 people have been hospitalized in Kerman province over the outbreak, the head of the province's medical university, Ali Akbar Haghdoost, told the ISNA news agency.

"Traces of the H1N1 virus were uncovered three weeks ago and we were the first province to report the epidemic," Haghdoost said.



## Flu Scan for Nov 25, 2015

### **FDA approves first US adjuvanted flu vaccine**

The US Food and Drug Administration (FDA) yesterday approved the nation's first seasonal flu vaccine containing an adjuvant—an immune-boosting substance—although European and other countries have used adjuvanted vaccines for years.

The agency approved Novartis's Flud, a trivalent (three-strain) vaccine for preventing seasonal flu in people age 65 and older, it said in a press release. The egg-based vaccine contains MF59, an oil-in-water emulsion of squalene oil, which is a naturally occurring substance that is highly purified for use in vaccines.

"Flud provides another alternative for a safe and effective influenza vaccine in people 65 years of age and older," said Karen Midthun, MD, director of the FDA's Center for Biologics Evaluation and Research. "Immunizing individuals in this age group is especially important because they bear the greatest burden of severe influenza disease and account for the majority of influenza-related hospitalizations and deaths."

In a multicenter clinical trial of 7,082 seniors, Flud showed comparable immune-boosting capabilities as Agriflu, a trivalent flu vaccine also made by Novartis. Studies of about 27,000 other people 65 and older demonstrated the safety of Flud, the FDA said.

**Nov 24 FDA [press release](#)**



HEALTH

## Flu hearing turns tense as Congress questions progress on vaccines

BALCE CENETA/AP

By SHEILA KAPLAN NOVEMBER 19, 2015

**W**ASHINGTON — Lawmakers fiercely questioned federal officials at a congressional hearing Thursday on US preparedness for seasonal influenza, demanding to know why the flu remains a serious threat to public health.

The atmosphere at the hearing, held by the House Energy and Commerce Committee Oversight and Investigations subcommittee, quickly turned tense as members of Congress challenged witnesses from the the nation's public health agencies to explain why more progress has not been made in developing effective flu vaccines and treatments.



## **Warning signals from the volatile world of influenza viruses**

**February 2015**

The current global influenza situation is characterized by a number of trends that must be closely monitored. These include: an increase in the variety of animal influenza viruses co-circulating and exchanging genetic material, giving rise to novel strains; continuing cases of human H7N9 infections in China; and a recent spurt of human H5N1 cases in Egypt. Changes in the H3N2 seasonal influenza viruses, which have affected the protection conferred by the current vaccine, are also of particular concern.

### **Viruses in wild and domestic birds**

The diversity and geographical distribution of influenza viruses currently circulating in wild and domestic birds are unprecedented since the advent of modern tools for virus detection and characterization. The world needs to be concerned.

Viruses of the H5 and H7 subtypes are of greatest concern, as they can rapidly mutate from a form that causes mild symptoms in birds to one that causes severe illness and death in poultry populations, resulting in devastating outbreaks and enormous losses to the poultry industry and to the livelihoods of farmers.



## **Warning signals from the volatile world of influenza viruses**

**February 2015**

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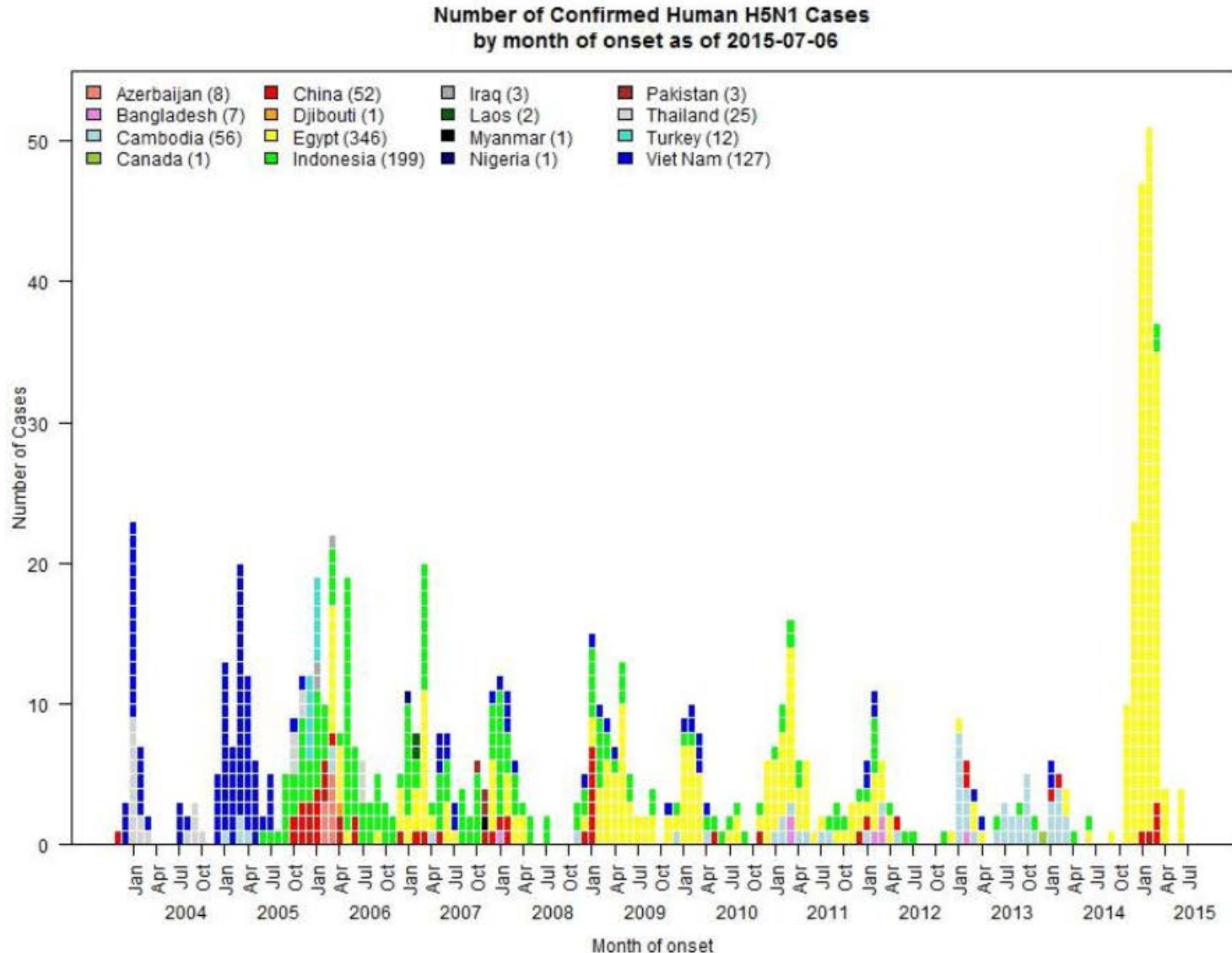


## **Warning signals from the volatile world of influenza viruses**

**February 2015**

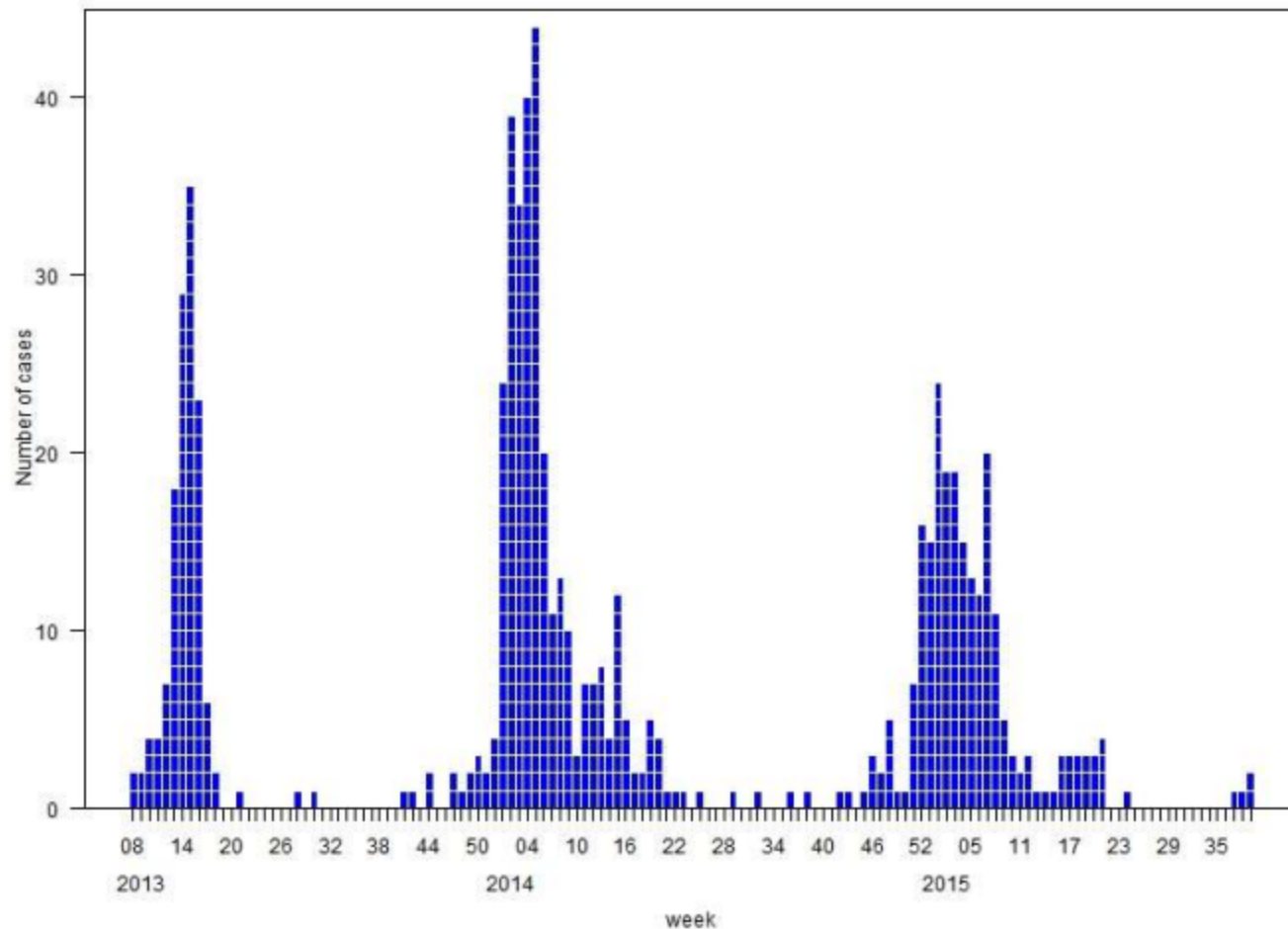
Since the start of 2014, the Organisation for Animal Health, or OIE, has been notified of 41 H5 and H7 outbreaks in birds involving 7 different viruses in 20 countries in Africa, the Americas, Asia, Australia, Europe, and the Middle East. Several are novel viruses that have emerged and spread in wild birds or poultry only in the past few years.

# Epidemiologic Curve of Avian Influenza A(H5N1) Cases in Humans by Reporting Country and Month of Onset (*WHO data*)



## Epidemiologic Curve of Avian Influenza A(H7N9) Cases in Humans by Week of Onset (*WHO data*)

Figure 1: Epidemiological curve of avian influenza A(H7N9) cases in humans by week of onset.





## Avian flu strikes poultry in Europe, Africa, found in Oregon duck

Filed Under: [Avian Influenza \(Bird Flu\)](#)

Lisa Schnirring | News Editor | CIDRAP News | Dec 07, 2015

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Avian flu was detected in as many as five poultry flocks in France and one in Germany, while heightened surveillance in the United States recently found H5 genetic material in a mallard duck killed by a hunter in Oregon.

France had earlier reported three avian flu outbreaks, the country's first in 8 years, with Germany reporting an outbreak earlier this year.

Elsewhere, Ghana reported another H5N1 outbreak in poultry, part of an ongoing resurgence in the region that has been underway over the past year.

### French outbreaks

France's outbreaks were in the southwestern part of the country, in Dordogne department, an area that saw the three earlier outbreaks were reported, and in Landes department, located southwest of there on the Atlantic coast. Official statements and media reports on the outbreaks were translated and posted by online infectious disease news sites FluTrackers, Avian Flu Diary (AFD), and ProMED Mail.



*Peter Corbett / Flickr cc*



## Avian influenza outbreaks reported in Africa, Asia

Filed Under: [Avian Influenza \(Bird Flu\)](#)

Lisa Schnirring | News Editor | CIDRAP News | Nov 24, 2015



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Avian influenza outbreaks tied to the H5N1 virus continue to strike poultry in Africa, with Ghana and Nigeria reporting new events, and two Asian locations are reporting new highly pathogenic H5N6 detections in birds.

Agriculture officials in each of the locations reported the details in notifications over the past 2 days to the World Organization for Animal Health (OIE).

### Latest African outbreaks

In Ghana, the virus struck two locations in Greater Accra region, located on the country's southern coast, that affected backyard birds in a village and a farm.

The village birds comprised a wide range of species, with exotic birds and assorted poultry, including ducks and turkeys. The poultry farm had old white layers, pullets, and cockerels.

One outbreak began in early October, and the other occurred in early November. Of 3,837 birds between the two locations, the virus killed 176, with the remaining ones culled to curb the spread of the disease. So far the source of the outbreaks hasn't been determined.



*Chris Goldberg / Flickr cc*



# ALL Findings

## Update on Avian Influenza Findings Poultry Findings Confirmed by USDA's National Veterinary Services Laboratories

<b>Animal Health</b>
Contact Us
Program Overview
Animal Disease Information
Emergency Management
Export from the U.S.
Import into the U.S.
Laboratory Information Services

**219**  
Detections Reported

**48,082,293**  
Birds Affected

**12/19/14**  
First Detection Reported

**6/17/15**  
Last Detection Reported





## Minnesota eases ban on poultry exhibits

Filed Under: [Avian Influenza \(Bird Flu\)](#)

[Lisa Schnirring](#) | News Editor | [CIDRAP News](#) | Dec 01, 2015

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Animal health officials in Minnesota yesterday lifted a ban on poultry exhibitions and other bird events, one of the steps the state took in May to curb the multistate spread of highly pathogenic H5N2.

In the wake of the outbreaks this spring, several states instituted similar bans.

Meanwhile, the US Department of Agriculture (USDA) recently announced a second request for proposals for poultry avian influenza vaccines to stock a national stockpile, one of the steps federal officials have taken in response to the outbreaks.

### Months of flu-free findings led to ban's easing

The Minnesota Board of Animal Health (MBAH) said in a statement that the easing of the measure is effective as of today, clearing the way for birds to appear at fairs, swap meets, exotic sales, petting zoos, and other settings where they commingle or gather.

No new cases have been detected in Minnesota since Jun 5, which paved the way for the ban to be lifted, the MBAH said. It added that over the course of the outbreak, the virus was detected on 108 farms in 23 of the state's counties.



*brotherM/ Flickr cc*

## **1. Mosquito-borne diseases**

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- Seasonal, Pandemic
- Avian, Poultry

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- Epi update
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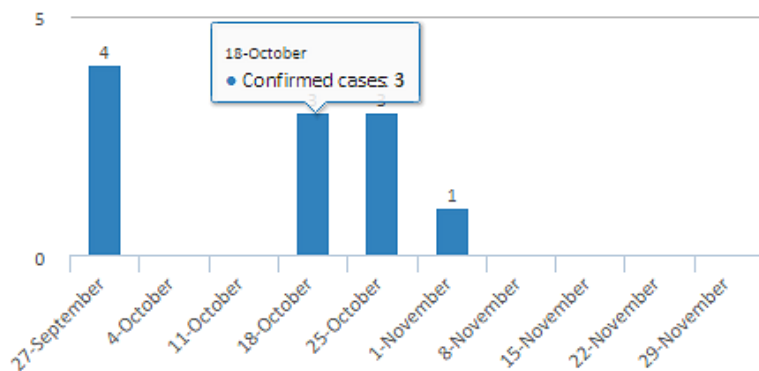
## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**

## Ebola Situation Report - 2 December 2015

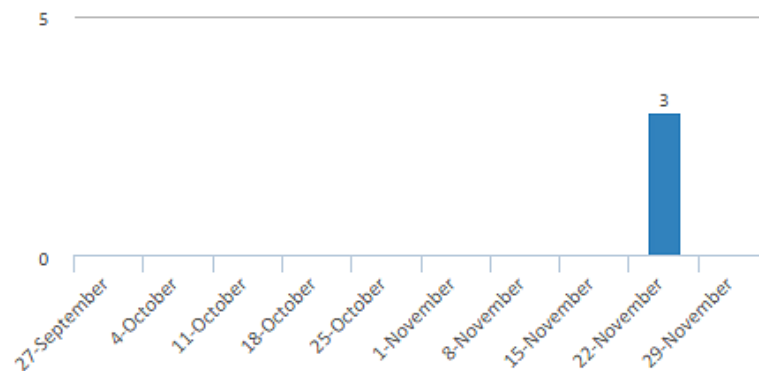
Total confirmed cases (by week, 2015)

### Guinea



Copyright World Health Organization (WHO), 2015

### Liberia



Copyright World Health Organization (WHO), 2015

## SUMMARY

- No confirmed cases were reported in the week to 29 November. Investigations are ongoing into the origin of infection of the cluster of 3 confirmed cases of Ebola virus disease (EVD) reported from Liberia in the week to 22 November. The first-reported case in that cluster was a 15-year-old boy who tested positive for EVD after admission to a health facility in the Greater Monrovia area on 19 November. He was then transferred to an Ebola treatment centre along with the 5 other members of his family. Two other members of the family – the boy's 8-year old brother and his 40-year-old father – subsequently tested positive for EVD whilst in isolation. The 15-year-old boy died on 23 November. In addition to the family of the first-reported case, 165 contacts have been identified so far, including 34 high-risk contacts. Liberia was previously declared free of Ebola transmission on 3 September 2015.



## Reports probe semen Ebola viability, survivor eye problems

Filed Under: [Ebola](#); [VHF](#)

[Lisa Schnirring](#) | News Editor | [CIDRAP News](#) | Nov 20, 2015



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Two new studies shed more light on Ebola survivor-related medical issues, one on virus survival in semen outside of the body and the other a case report on eye problems that cropped up in a US physician not long after he recovered from an infection he contracted while working in Liberia.

Both studies were published in *Emerging Infectious Diseases*. The experiments on semen were conducted by a research team from National Institutes of Health Rocky Mountain Laboratory in Hamilton, Mont., which published their findings yesterday. The case report involving the eye infection was published today by researchers from Massachusetts and the US Centers for Disease Control and Prevention (CDC).

Both of the studies underscore issues health officials are grappling with now in the late stages of West Africa's Ebola outbreak, as they search for more answers about lingering persistence of the virus in survivors, posing real but relatively rare transmission threats, and how to best manage long-term medical complications in the thousands who have recovered from the disease.



Maurizio De Angelis, Wellcome Images / Flickr cc



## Ebola review calls for reforms to boost global outbreak response

Filed Under: [Ebola](#); [VHF](#)

Lisa Schnirring | News Editor | CIDRAP News | Nov 23, 2015

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The World Health Organization (WHO) disease outbreak functions need to be reorganized to streamline future emergency responses, with systems in place to avoid political pressure, build country core capacities, and ensure adequate funding, an independent group said yesterday in its review of the Ebola epidemic.

A 19-member group headed by Peter Piot, MD, PhD, one of the scientists who discovered the Ebola virus in 1976, published its findings yesterday in the latest edition of *The Lancet*. The review was convened by the Harvard Global Health Institute and the London School of Hygiene and Tropical Medicine (LSHTM).

Experts are from academia, think tanks, and nongovernmental organizations, and the review was designed to help guide public debate alongside other reports on outbreak response and preparedness. Piot is director of the LSHTM.



UNMEER / Flickr cc



## Panel suggests separate WHO subgroup for outbreaks

Filed Under: [Ebola](#); [VHF](#); [Public Health](#)

Lisa Schnirring | News Editor | CIDRAP News | Nov 19, 2015



An expert panel appointed in July to review what World Health Organization (WHO) emergency reforms are needed in light of gaps revealed by the Ebola outbreak recently released its initial findings, which recommend a separate entity within the WHO to handle both outbreaks and emergencies.

WHO Director-General Margaret Chan, MD, MPH, last spring suggested a small, focused review committee to specifically look at what reforms are needed for how the organization responds to outbreaks and emergencies, which was well received by the World Health Assembly when it met in May.

Chan appointed the 19-member committee on Jul 21 with David Nabarro, MD, the United Nations' special Ebola representative, as its chair. In the lead-up to its first report, the committee met four times by teleconference and once in person for 2 days in late October.

The group's Nov 15 report includes initial findings and a set of recommendations, some of them asking for immediate action from Chan. It will release a second report when it concludes its work.



*UNMEER / Simon Ruf / Flickr cc*

David Nabarro, MD, who chairs the expert committee.

The Post's View

## Everything went wrong in the Ebola outbreak. We're still not ready if it happens again.

By **Editorial Board** November 28 [Follow @postopinions](#)

ALMOST EVERYTHING that could go wrong did go wrong in the world's early response to the outbreak of the Ebola virus in West Africa in 2014. Before it was over, the virus infected some [28,634 people and claimed more than 11,000 lives](#). It could happen again — and the world is still not ready.

Guinea had a weak health-care system when the virus took root in its remote regions, making it easier for the virus to spread to neighboring [Liberia and Sierra Leone](#). Guinean authorities played down the seriousness for fear of creating panic and disrupting business. The World Health Organization [declared](#) the outbreak “[relatively small still](#)” in April 2014, and expert teams that had been sent in to the region were pulled out prematurely in May. WHO outbreak response teams had been “disproportionally” cut in a wave of headquarters layoffs. Margaret Chan, director general of the WHO, did not use her authority to declare a [public-health emergency of international concern](#) until five months after Guinea and Sierra Leone had notified the

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- Dengue, West Nile

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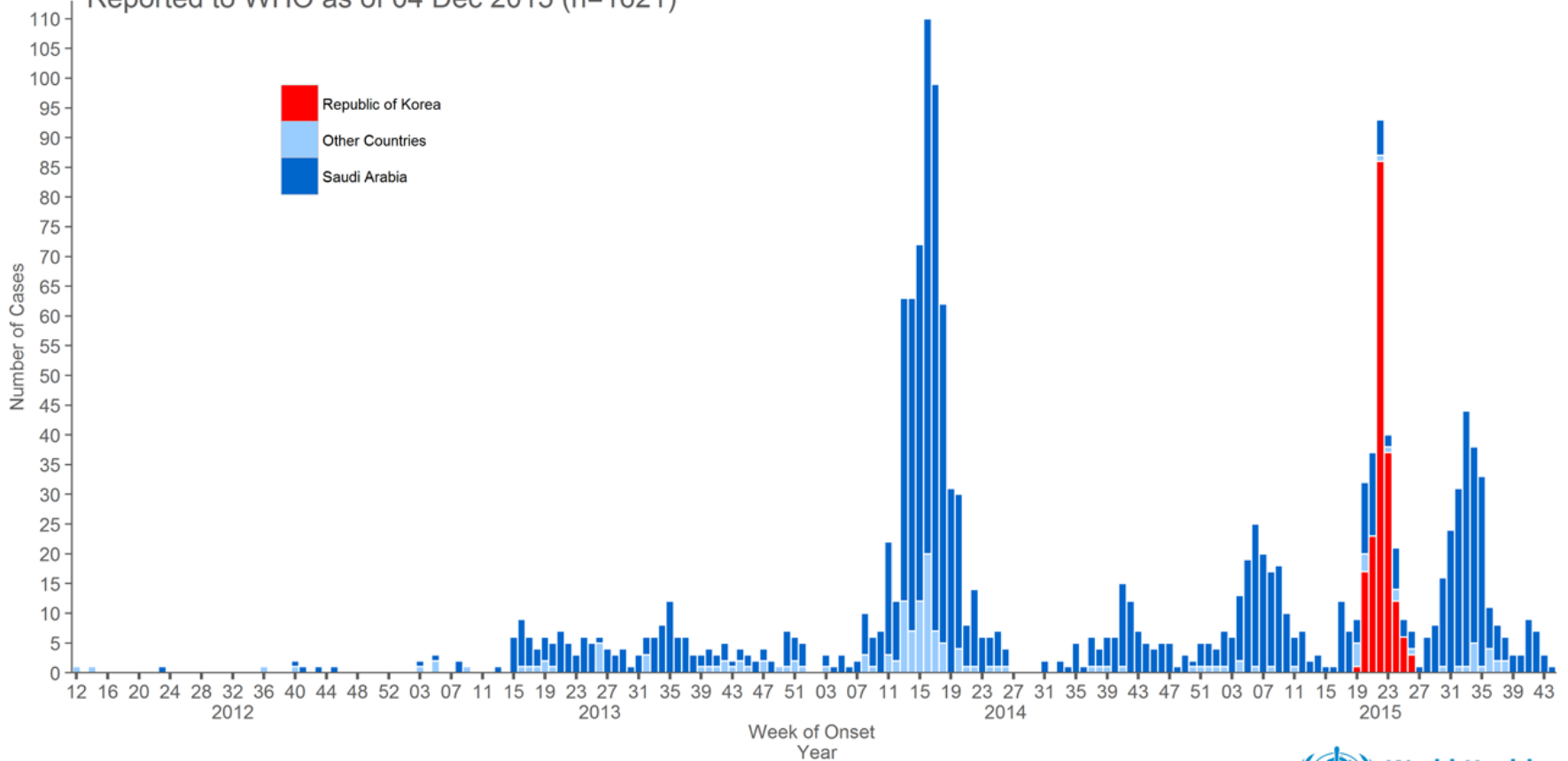
## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**



# Confirmed global cases of MERS-CoV

Reported to WHO as of 04 Dec 2015 (n=1621)

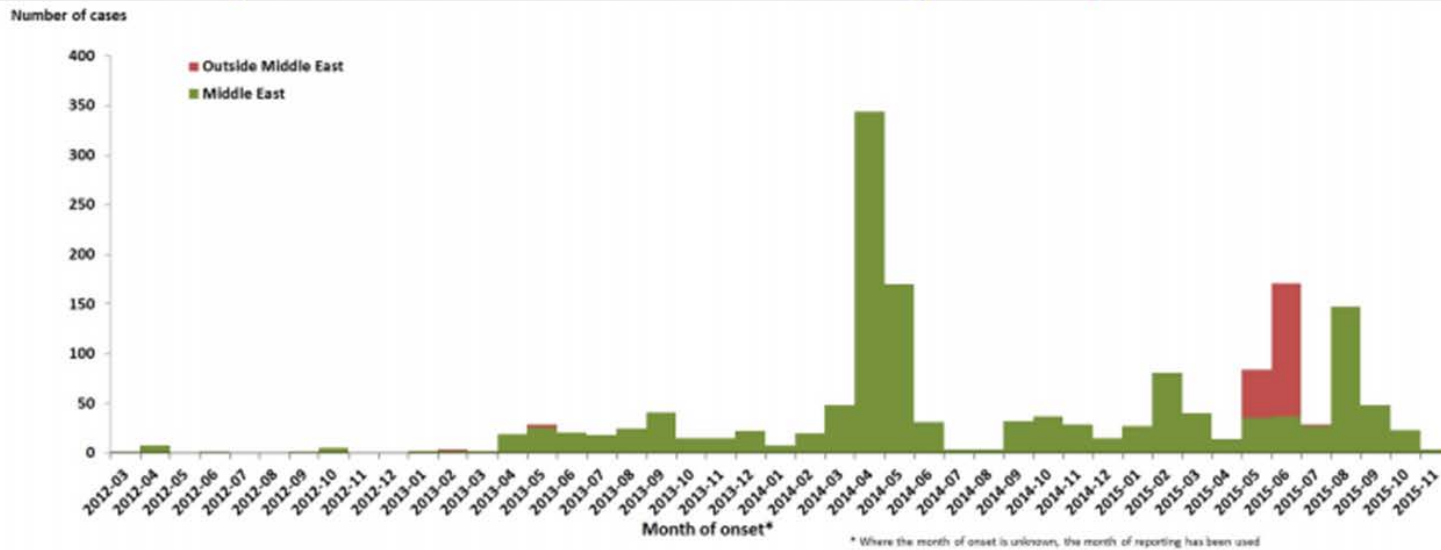


Other countries: Algeria, Austria, China, Egypt, France, Germany, Greece, Iran, Italy, Jordan, Kuwait, Lebanon, Malaysia, Netherlands, Oman, Philippines, Qatar, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States of America, Yemen  
 Please note that the underlying data is subject to change as the investigations around cases are ongoing. Onset date estimated if not available.

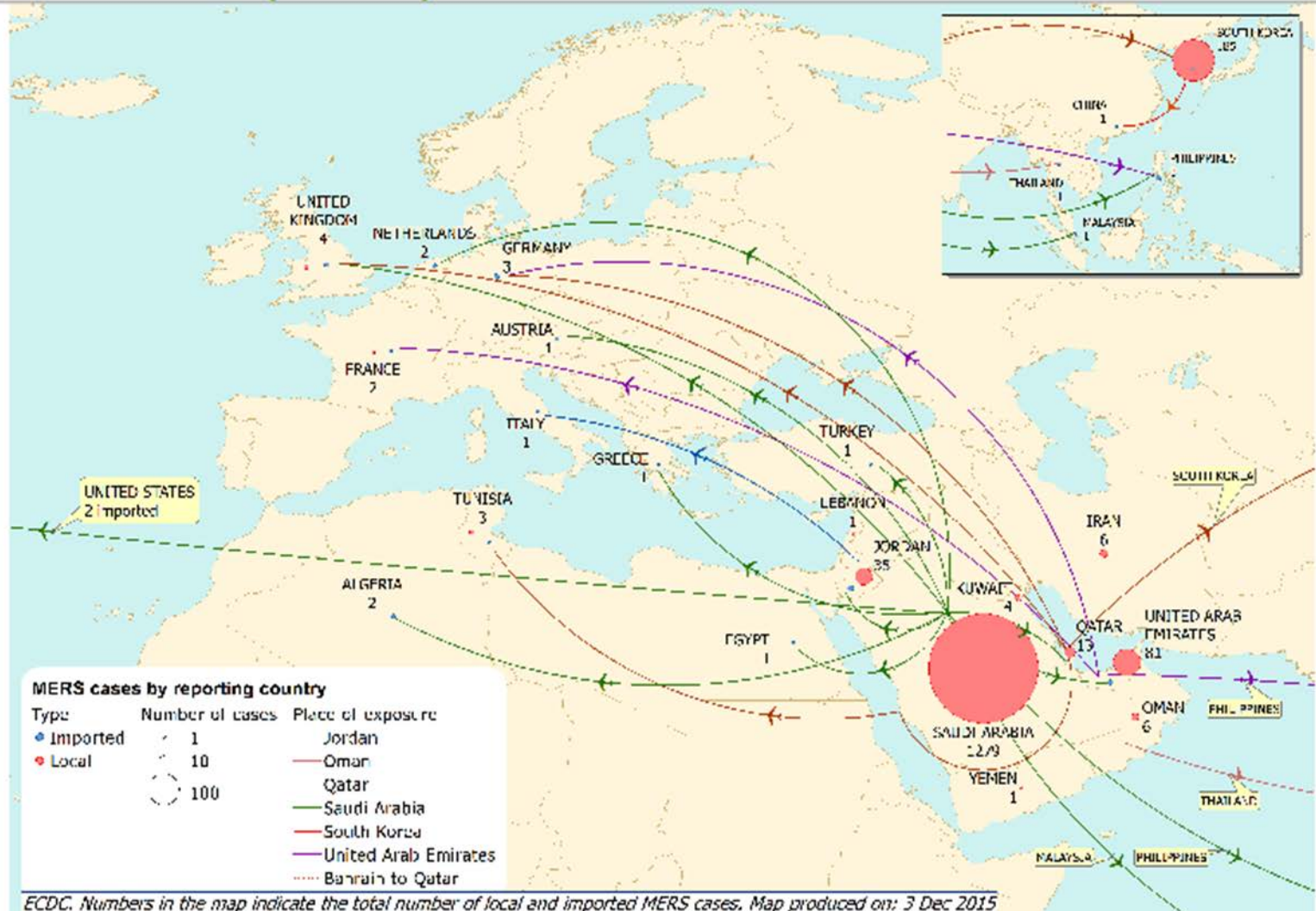


## European Centre for Disease Prevention and Control

### Distribution of confirmed cases of MERS-CoV by first available date and place of probable infection, March 2012 – 30 November 2015 (n=1 639)



## Distribution of confirmed cases of MERS-CoV by place of probable infection, March 2012 – 3 December 2015 (n=1 640)





## MERS update sheds light on Saudi hospital cases

Filed Under: [MERS-CoV](#)

[Lisa Schnirring](#) | News Editor | [CIDRAP News](#) | Nov 13, 2015



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The World Health Organization (WHO) today reported new details about seven recent MERS-CoV cases from Saudi Arabia, six of which had healthcare links.

Healthcare exposure seems to be playing a key role in fueling MERS-CoV (Middle East respiratory syndrome coronavirus) outbreaks. The cases in today's WHO update were reported by Saudi Arabia's Ministry of Health (MOH) between Oct 26 and Nov 1. Since then the country's MOH has announced three additional cases, though no new illnesses were reported today.

### Two Hofuf patients are health workers

Of the six healthcare-linked MERS cases detailed in today's WHO report, five were in Hofuf, a city in eastern Saudi Arabia that has been the site of a recent hospital outbreak. The sixth involves a healthcare worker in Riyadh, where a large hospital outbreak has been under way since late July, though reported cases have tapered off considerable.



*sudok1 / iStock*

Six of the seven cases were tied to hospitals.



## Study notes MERS, SARS virus shedding similarities

Filed Under: [MERS-CoV](#); [SARS](#)

Lisa Schnirring | News Editor | [CIDRAP News](#) | Nov 13, 2015

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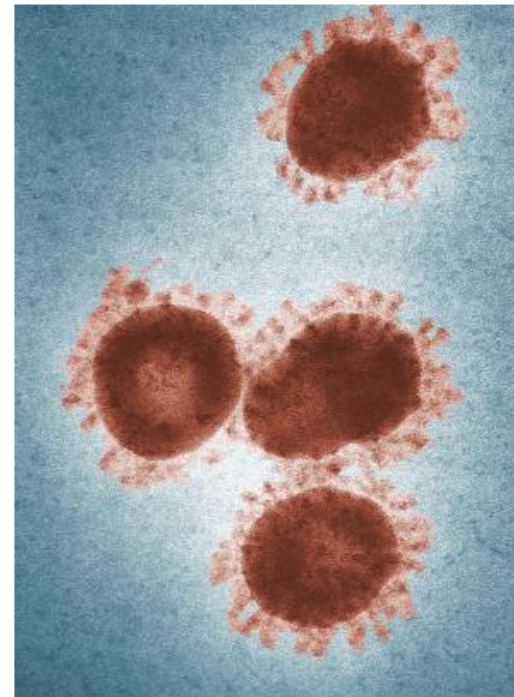
Scientists yesterday revealed that both the timing and intensity of MERS virus shedding is similar to SARS, a related coronavirus, based on a study of patients in a hospital outbreak.

In the *Clinical Infectious Diseases* study, Saudi scientists and their collaborators from Germany used a hospital outbreak last year to learn more about the MERS-CoV (Middle East respiratory syndrome coronavirus) infection process, such as respiratory shedding, viremia, and antibody response.

### Study included 24 fatal cases

The researchers analyzed lab specimens from 37 patients who were treated during a hospital outbreak between Mar 5 and May 1, 2014. The report didn't specify what hospital was involved, but several of the study authors are from Prince Sultan Military Medical City in Riyadh, and the review board approval was granted by the facility's research ethics committee.

Specimens included those from the upper and lower respiratory tract, blood, stool, and urine. The mean age of the patients was 63, and 27 were men. Of the 37 in the study, 24 died from their infections.



CDC / Dr. Fred Murphy; Sylvia Whitfield

## **Title: Co-circulation of three camel coronavirus species and recombination of MERS-CoVs in Saudi Arabia**

**Authors:** Jamal S. M. Sabir<sup>1†</sup>, Tommy T.-Y. Lam<sup>2,3,4†</sup>, Mohamed M. M. Ahmed<sup>1,6†</sup>, Lifeng Li<sup>3,4†</sup>, Yongyi Shen<sup>3,4</sup>, Salah Aboaba<sup>1,7</sup>, Mohammed I. Qureshi<sup>1</sup>, Mohammed Abu-Zaid<sup>1,7</sup>, Yu Zhang<sup>2,3,4</sup>, Mohammad A. Khiyami<sup>8</sup>, Njud S. Alharbi<sup>1</sup>, Nahid H. Hajrah<sup>1</sup>, Meshaal J. Sabir<sup>1</sup>, Mohammed H. Z. Mutwakil<sup>1</sup>, Saleh A. Kabli<sup>1</sup>, Faten A. S. Alsulaimany<sup>1</sup>, Abdullah Y. Obaid<sup>9</sup>, Boping Zhou<sup>2</sup>, David K. Smith<sup>4</sup>, Edward C. Holmes<sup>5</sup>, Huachen Zhu<sup>2,3,4\*</sup>, Yi Guan<sup>1,2,3,4\*</sup>

**Abstract:** Outbreaks of Middle East Respiratory Syndrome (MERS) raise questions about the prevalence and evolution of the MERS coronavirus (CoV) in its animal reservoir. Our surveillance in Saudi Arabia in 2014-2015 found that MERS-CoVs and a *Human coronavirus 229E* related lineage co-circulated at high prevalence with frequent co-infections in the upper respiratory tract of dromedary camels. Together with *Betacoronavirus 1* viruses, dromedary camels share three coronavirus species with humans. Several MERS-CoV lineages were present in camels, including a recombinant lineage that has been dominant since December 2014 and subsequently led to the human outbreaks in 2015. Camels therefore serve as an important reservoir for the maintenance and diversification of the MERS-CoV, and are the source of human infections with this virus.

**One Sentence Summary:** Dromedary camels in Saudi Arabia harbor three coronavirus species, with a recombinant MERS-CoV lineage causing the recent outbreaks in humans.

## **An orthopoxvirus-based vaccine reduces virus excretion after MERS coronavirus infection in dromedary camels**

Abstract:

**Middle East respiratory syndrome coronavirus (MERS-CoV) infections cause an ongoing outbreak in humans fueled by multiple zoonotic MERS-CoV introductions from dromedary camels. Besides implementing hygiene measures to limit further camel-to-human and human-to-human transmissions, vaccine-mediated reduction of MERS-CoV spread from the animal reservoir may be envisaged. Here, we show that a modified vaccinia virus Ankara (MVA) virus vaccine expressing the MERS-CoV spike protein confers mucosal immunity in dromedary camels. Significant reduction of excreted infectious virus and viral RNA transcripts was observed in vaccinated animals upon MERS-CoV challenge as compared to controls. Protection correlated with the presence of serum neutralizing antibodies to MERS-CoV. Induction of MVA-specific antibodies that cross-neutralize camelpox virus, would also provide protection against camelpox.**

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## **3. Ebola**

- Epi update
- Vaccine update

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## **5. E coli / Chipotle**

## **6. Bioterrorism situational update**



## RESTAURANTS

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# Chipotle slashes guidance on E. coli news; stock drops

Katie Little | @KatieLittle

5 Hours Ago



**Chipotle Mexican Grill** stock plummeted in premarket trade on Monday after the burrito chain issued a warning on Friday for the fourth quarter and said its sales have been hammered due to an E. coli outbreak.

Earlier on Friday, the CDC reported the E. coli outbreak linked to the restaurant has expanded into nine U.S. states.

Chipotle said it now expects sales at established restaurants to fall 8 to 11 percent this quarter. The company's shares were down more than 11 percent in premarket trade Monday.

During regular trading, the stock ticked slightly lower after the CDC said seven more ill people have been reported in the multistate outbreak of E. coli infections linked to Chipotle locations.

## Chipotle Offers Dim Outlook As E. Coli Outbreak Slams Sales

Chipotle provided investors with a dour outlook on Friday afternoon, as an E. coli outbreak linked to the Mexican restaurant chain continues to pressure its sales.

Chipotle said for the fourth quarter it anticipates earnings in the range of \$2.45 to \$2.85 per share, which is well below the \$4.09 analysts had been anticipating. It is also calling for comparable restaurant sales to fall steeply, down 8% to 11%.

Chipotle further rescinded its guidance on comparable restaurant sales for 2016, citing "uncertainty" related to the E. coli incident.

The month of November was an ugly one, with comparable restaurant sales plummeting 16%, according to a regulatory filing. They dropped as low as -22% in the days after November 20 when the U.S. Centers for Disease Control and Prevention announced that the outbreak had spread.

Earlier Friday, Chipotle investors received even more bad news, with the CDC reporting that the E. coli strain had spread to three more states.

# Chipotle Shares Fall Amid E. Coli, Sales Issues

By THE ASSOCIATED PRESS • NEW YORK — Dec 8, 2015, 2:41 PM ET

Chipotle's stock edged lower in midday trading Tuesday as the Mexican food chain continues to deal with fallout from an [E. coli](#) outbreak and contends with weakening sales.

A national outbreak of [E. coli](#) has been linked to Denver-based Chipotle, which has said that it is adopting stricter food safety standards. On Monday 30 Boston College students, including at least eight members of the men's basketball team, complained of gastrointestinal symptoms after eating at a Chipotle restaurant.

On Tuesday, Boston College raised its estimate to 80.

[Chipotle Mexican Grill](#) Inc. closed the restaurant in Boston's Cleveland Circle and said it thinks the illnesses are the result of an isolated incident of norovirus, not a multi-state outbreak of [E. coli](#) linked to its restaurants. That outbreak has sickened 52 people in nine states, with the most recent illness starting on November 13.

The university says all students who reported symptoms have been tested for both [E. Coli](#) and norovirus, and that results will not be available for at least two days.

Aside from the [E. coli](#) troubles, [Chipotle Mexican Grill](#) Inc. has been experiencing a slowdown in its sales. Chipotle executives previously said that the chain's same-store sales growth would be more modest this year, as it's up against a tough year-ago comparison. The company is also raising prices to consumers to offset the higher cost of beef.




## As Chipotle plans to reopen, E coli source still a puzzle

Filed Under: [E coli](#); [Foodborne Disease](#)


Lisa Schnirring | News Editor | CIDRAP News | Nov 10, 2015

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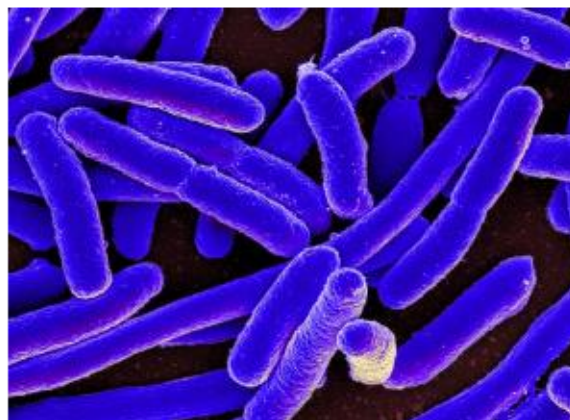
An initial round of testing of food from several Chipotle restaurants has yielded no positive results for *Escherichia coli* O26—the outbreak strain—and the company said today that it has taken several safety steps and will reopen its temporarily closed restaurants in Oregon and Washington within the next few days.

Also, Oregon reported 1 additional case linked to the two-state outbreak, putting the total so far at 42.

The Washington State Department of Health (WSDH) yesterday cited the Food and Drug Administration as the source of the testing information. Federal officials have been assisting state and county health departments with the ongoing investigation.

### Reopening plans, safety steps

Chipotle announced in a statement today that it would open all 43 restaurants in the Seattle and Portland, Ore., areas that it had voluntarily closed, which will be restocked with fresh ingredients. Eleven of the restaurants had ties to the outbreak.



NIAID

E coli bacteria, highly magnified.

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## **6. Bioterrorism situational update**

## U.S. system to detect bioterrorism can't be counted on, government watchdog finds

NOVEMBER 23, 2015, 3:00 AM | REPORTING FROM WASHINGTON

**T**he nation's main defense against biological terrorism — a \$1-billion network of air samplers in cities across the country — cannot be counted on to detect an attack, according to a new report by the Government Accountability Office.

The BioWatch system, introduced with fanfare by President [George W. Bush](#) in 2003, has exasperated public health officials with [numerous false alarms](#), stemming from its inability to distinguish between harmless germs and the lethal pathogens that terrorists would be likely to unleash in an attack.

[Timothy M. Persons](#), the GAO's chief scientist and lead author of the report, said health and public-safety authorities "need to have assurance that when the system indicates a possible attack, it's not crying wolf." U.S. Homeland Security officials cannot credibly offer that assurance, he said.

"You can't claim it works," Persons said in an interview.

The Department of Homeland Security, which oversees BioWatch, has repeatedly touted the system's effectiveness while seeking to upgrade it with new technology.

### Related



Full coverage: BioWatch under scrutiny

The GAO report challenges the department's central claims about BioWatch. It also illuminates the nation's vulnerability to biological terrorism at a time of heightened concern about the reach and resourcefulness of Islamic State and other extremist groups.

The 100-page document, scheduled for release Monday, says that Homeland Security "lacks reliable information" about

# Top U.S. lab regulator replaced in wake of incidents with bioterror pathogens



Alison Young, USA TODAY

2:40 p.m. EST December 8, 2015



(Photo: Getty Images)

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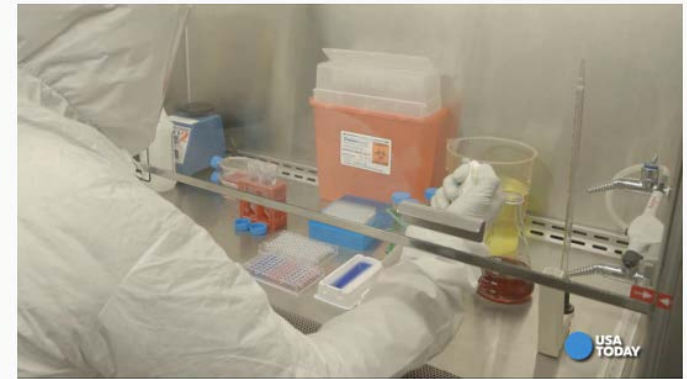
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The [Centers for Disease Control and Prevention](#) has replaced its longtime director of national lab regulation in the wake of several high-profile incidents involving bioterror pathogens and an internal review that identified areas of improvement for the oversight program, USA TODAY has learned.

The CDC, in a statement Tuesday, declined to say why it replaced Robbin Weyant on Nov. 9 as director of the agency's [Division of Select Agents and Toxins](#), which regulates hundreds of U.S. labs working with the organisms that cause anthrax, plague, Ebola and other deadly diseases that are deemed to pose bioterror risks.

The change occurred 18 days after the completion of an internal CDC review of the national lab oversight program that was launched after a USA TODAY NETWORK investigation prompted congressional probes and [revealed CDC's inspectors have allowed labs to keep experimenting](#) despite failing to meet key safety requirements on inspection after inspection, sometimes for years.

Weyant had served as select-agent director since 2006, according to his LinkedIn profile, and he now lists his current job with CDC as a senior adviser in the agency's newly created lab safety office. Weyant also declined to comment on his job change.



A USA TODAY Network investigation works to uncover details about accidents at biolabs where experiments are done with deadly pathogens. The labs are largely self-policing and often secretive when accidents occur. USA TODAY

The Opinion Pages | OP-ED CONTRIBUTOR

## Resurrecting Smallpox? Easier Than You Think

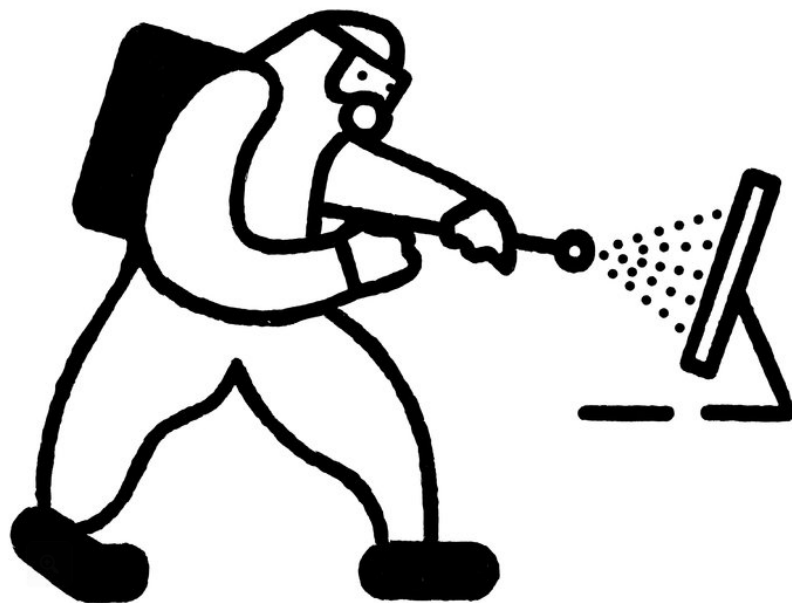
By LEONARD ADLEMAN OCT. 15, 2014

LOS ANGELES — ON Oct. 16, 1975, 3-year-old Rahima Banu of Bangladesh became the last human infected with naturally occurring [smallpox](#) (*variola major*). When her immune system killed the last smallpox virus in her body, it also killed the last such smallpox virus in humans. In what is arguably mankind's greatest achievement, smallpox was eradicated.

Our war with this smallpox virus was brutal. It appears likely that the virus killed about one billion of us. Initially, our only defense was our immune system, but eventually we developed new tools, including vaccination. In the late 1950s, the World Health Organization began responding to outbreaks by vaccinating everyone in the surrounding area to prevent the virus from spreading. By 1975, we had won.

The smallpox virus had only a single host species: us. Other viruses have multiple hosts. For example, some strains of [flu](#) live in both humans and pigs, hence “[swine flu](#).” If smallpox had had a second host, eradicating it in humans would have been of little value, since it would have thrived in its second host and later re-emerged in humans.

A few samples of the virus are still kept in special labs: one in the United States and one in Russia. We don't bother vaccinating against smallpox anymore; if the virus escapes from one of these labs, the war will begin again. Currently, there is debate about whether these samples should be destroyed or kept for scientific purposes.



Jan Bajtlík



# Questions, Comments, and Discussion



**CIDRAP**

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**December 09, 2015**

Thank you for attending!