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Dear colleagues –

Below is an update on emerging respiratory-borne viruses (ERV), including details related to:

1. **Increase in MERS-CoV cases in September and October 2014 primarily in Saudi Arabia and linked to camel contact.** Subsequent amplification through human-to-human spread within the nosocomial setting is reminiscent of SARS. Also in October, a travel-related MERS-CoV case has been reported for the first time in Turkey. Several Hajj-associated suspect cases are under investigation elsewhere but none have been confirmed to date.
2. **Continued sporadic cases of avian influenza A(H7N9) throughout the inter-seasonal summer and fall months in China.** This follows successively larger winter-spring epidemics in 2013 and 2014 in China, signalling the need for ongoing monitoring through the upcoming winter period.
3. **An additional swine-origin influenza A(H3N2)v detection in the United States (US) in October 2014.** However, there have been substantially fewer H3N2v cases overall in 2014 compared to prior years.
4. **Enterovirus D68 and associated respiratory and neurologic findings occurring in Canada and the US through the late summer and fall 2014.** Seasonal decline in activity has now been observed in several areas of North America but not as yet declared in British Columbia.
5. **Action and advice.**

A. EPIDEMIOLOGICAL UPDATES

1. Middle East Respiratory Syndrome Coronavirus (MERS-CoV), Middle East

Although MERS-CoV activity in the Middle East remains low compared to the dramatic surge observed in April 2014, the number of reported cases has increased slightly in September and October ([see attached MERS-CoV Epidemic Curve](#)). As with prior updates, the majority of cases (>90%) were reported in Saudi Arabia, driven in part by a health care-associated outbreak in Taif, located in the Mecca region of Saudi Arabia. According to the Saudi Ministry of Health, primary cases in the Taif outbreak were people who had camel contact, with onward secondary transmission to others, including health care workers. Of the 54 cases reported by Saudi Arabia since September 1, 23 were reported from Taif, including at least 5 health care workers.

On October 18, Turkey reported a fatal case in a Turkish citizen working in Saudi Arabia, the first case to be reported from this country. As reported in our previous update on October 4, Austria reported its first confirmed case of MERS-CoV in a visitor from Saudi Arabia in late September. Qatar also reported its two first cases in 2014, one with recent travel in Saudi Arabia.

Although no confirmed cases of MERS-CoV infection have been reported in association with the 2014 Hajj pilgrimage which occurred at the beginning of October, several suspect cases are still under investigation. Travel-associated cases have been reported previously, including in persons returning

from Umrah, a religious pilgrimage that can occur at any time of year, warranting ongoing monitoring of travelers returning from affected areas of the Middle East ([see attached MERS-CoV Map](#)).

As with the SARS epidemic in 2003, MERS-CoV shows a pattern of sporadic cases followed by secondary amplification in health care settings, exemplified by recent observations in Taif. Unlike SARS, large-scale nosocomial amplification has not yet occurred outside the primarily affected regions in the Middle East. The largest hospital outbreaks associated with MERS-CoV to date occurred in Jeddah and Riyadh, Saudi Arabia in the spring 2014. In a follow-up investigation into these outbreaks, Drosten et al. provide additional phylogenetic evidence that they did not result from viral changes, but rather from nosocomial transmission events. See: cid.oxfordjournals.org/content/early/2014/10/16/cid.ciu812.abstract.

Despite numerous instances of nosocomial transmission, there remains no evidence of sustained human-to-human community spread. As of November 3, 897 laboratory-confirmed cases of MERS-CoV have been reported to the WHO including at least 325 deaths (case fatality 36%).

For more information on MERS-CoV, see: www.who.int/csr/disease/coronavirus_infections/en/.

2. Avian Influenza A(H7N9), China

Since our last update on October 4, three new human cases of avian influenza A(H7N9) were reported in China ([see attached H7N9 Epidemic Curve](#)), including one in each of the previously affected areas of Beijing and Jiangsu, and a third case in the Xinjiang autonomous region (UAR), a newly affected region in north-western China outside the geographic range of the majority of prior cases, which are concentrated along the eastern coast of China ([see attached H7N9 Map](#)).

As in previous years, sporadic case reports have continued throughout the inter-seasonal summer and fall months, suggesting ongoing presence across an extended geographic area. Since first emergence, prior peak seasonal activity of this virus occurred in March/April in 2013 and January/February in 2014. The latter second wave began earlier and showed a higher peak number of cases, resulting in about 2.5-fold more cases overall than the first wave ([see attached H7N9 Map](#)). Seasonal increase in affected regions in the coming winter months is also expected and ongoing close monitoring for a third epidemic wave of H7N9 is therefore warranted.

As of October 19, a total of 455 laboratory-confirmed human H7N9 cases have been reported to the WHO, including 176 deaths (case fatality 39%). This total includes four cases reported from Taiwan CDC, ten cases reported from Hong Kong CHP and one case reported from Malaysia MoH, but does not include the latest reported case from Jiangsu.

For the latest WHO risk assessment on avian influenza A(H7N9) (October 2, 2014), see: www.who.int/influenza/human_animal_interface/influenza_h7n9/Risk_Assessment/en/.

3. Swine-origin Influenza A(H3N2)v, United States

In late October, the US Centers for Disease Control and Prevention (CDC) reported a case of human infection with a swine-origin influenza A(H3N2) variant (H3N2v) virus in Wisconsin. The case reported close contact with swine in the week prior to symptom onset. This is the third case of H3N2v infection reported in 2014, a reduced number compared to reports in previous years (n=12 in 2011, n=309 in 2012 and n=19 in 2013).

Since August 2011, 343 cases of H3N2v have been reported from 13 US states, the majority from Indiana and Ohio ([see attached H3N2v Map](#)), and include 18 hospitalizations and one death. Most cases of

H3N2v have been in children who present with typical influenza-like illness in association with swine contact, notably around the summer-fall period of agricultural fairs popular in certain of the affected areas of the US.

For the latest US CDC case counts for H3N2v, see: www.cdc.gov/flu/swineflu/h3n2v-case-count.htm.

4. Enterovirus D68 (EV-D68), United States and Canada

The United States is currently experiencing a nationwide outbreak of enterovirus D68 (EV-D68), following earlier reports of spikes in severe respiratory illness due to EV-D68 in several children's hospitals beginning in mid-August 2014. Although EV-D68 is not a nationally notifiable disease in the US or Canada, as of November 5, a total of 1,112 laboratory-confirmed cases of respiratory illness caused by EV-D68 have been identified from 47 US states and the District of Columbia. For the week of October 19-25, 46 states and the District of Columbia reported low or declining activity, while 7 states reported elevated activity. Activity levels are anticipated to further decline by late fall, following the natural seasonality of this virus and concurrent with increased circulation of other respiratory viruses, such as influenza and respiratory syncytial virus (RSV).

Investigations into the early US clusters suggest that children with a history of asthma or wheezing may be at higher risk for severe EV-D68 infection. Notably, fever has not been a common symptom. Some children have required ICU admission and mechanical ventilation. To date, nine deaths have been reported among recently confirmed cases in the United States, although a causal role for EV-D68 has not been established.

The US CDC has also reported a number of cases of unexplained neurologic illness in children, some of whom have tested positive for EV-D68. As of October 29, the US CDC has identified 64 cases of acute neurologic illness with focal limb weakness in children in 28 states; however, the etiology of this illness is unknown at this time.

Cases of EV-D68 have also been identified in Canada. As of November 4, the BC provincial laboratory has confirmed 150 cases of EV-D68 in BC. Two-thirds of cases are in children ≤ 10 years of age (range: <1 to >80 years), and 57% of cases with known gender are male. Cases have been reported from all regional health authorities in BC, with one from out of province. The majority of cases ($>90\%$) have occurred since October 1, based on specimen collection date, with on average 25-30 cases reported per week in October. Three cases of neurologic illness and one death associated with EV-D68 infection have been reported in BC, the latter due to respiratory failure in an individual with prior history of severe asthma. However, it remains unclear to what extent EV-D68 infection caused or contributed to these severe manifestations.

For more information on EV-D68, see:

BCCDC: www.bccdc.ca/dis-cond/a-z/e/EnterovirusD68/default.htm.

US CDC: www.cdc.gov/non-polio-enterovirus/about/EV-D68.html.

B. RECOMMENDED ACTION AND ADVICE

1. MERS-CoV or Avian Influenza

In the event of severe acute respiratory illness (SARI) in a patient with links to affected areas in the two weeks prior to symptom onset (i.e. residence, travel history or contact with someone with such history), clinicians should notify their local health authority/Medical Health Officer. Travel history (direct or indirect) is thus critical to elicit from SARI patients.

Health care workers should implement respiratory precautions immediately, and cases should be managed in respiratory isolation with contact and droplet precautions. Airborne precautions are warranted in the event of aerosol-generating procedures or conditions. Given a spectrum of illness inclusive of milder or atypical presentations, clinicians are encouraged to use their judgement and/or consult infection control for guidance around enhanced measures where the index of suspicion (e.g. based on contact, comorbidity or clustering history) and exposure risk may be higher. Facilities should be mindful of the protection of other patients and visitors, in addition to healthcare workers, to minimize nosocomial transmission and risk.

Please discuss with your local health authority/Medical Health Officer and consult a virologist or microbiologist at the BC Public Health Microbiology & Reference Laboratory (PHMRL) to arrange advance notification and direct shipping. For diagnostic testing for suspected MERS-CoV or avian influenza, lower respiratory specimens (e.g. sputum, endotracheal aspirate, or bronchoalveolar lavage) are recommended where possible and clinically indicated. Follow strict infection prevention and control guidelines when collecting respiratory specimens.

2. Enterovirus D68

Clinicians should consider EV-D68 infections in patients presenting with severe respiratory illness and report any increase or unusual clusters/outbreaks of respiratory illness to their local health authority/Medical Health Officer. More severe respiratory presentations of EV-D68 may be anticipated in association with underlying comorbidity, notably a history of asthma. EV-D68 diagnosis and reporting should also be considered alongside other investigations in patients presenting with acute onset of focal limb weakness.

There is no specific treatment or vaccine for EV-D68. Clinical care is supportive. Healthcare providers should implement routine infection control practices, including droplet and contact precautions for patients with suspected EV-D68 infection. Surfaces should be cleaned with a hospital-grade disinfectant with a DIN and label claim for non-enveloped viruses.

Suspect EV-D68 investigations should be conducted in consultation with the local Medical Microbiologist and Medical Health Officer, with referral to the BC PHMRL as indicated for EV-D68 typing. Clinicians are requested to submit respiratory (nasopharyngeal/oropharyngeal) and other specimens as clinically indicated. Only certain laboratories in the Lower Mainland conduct enterovirus testing; however, the PCR-based screening assays generally used do not reliably identify the specific type of enterovirus. At present, confirmation by the BCPHMRL is required before D68 diagnosis can be made.

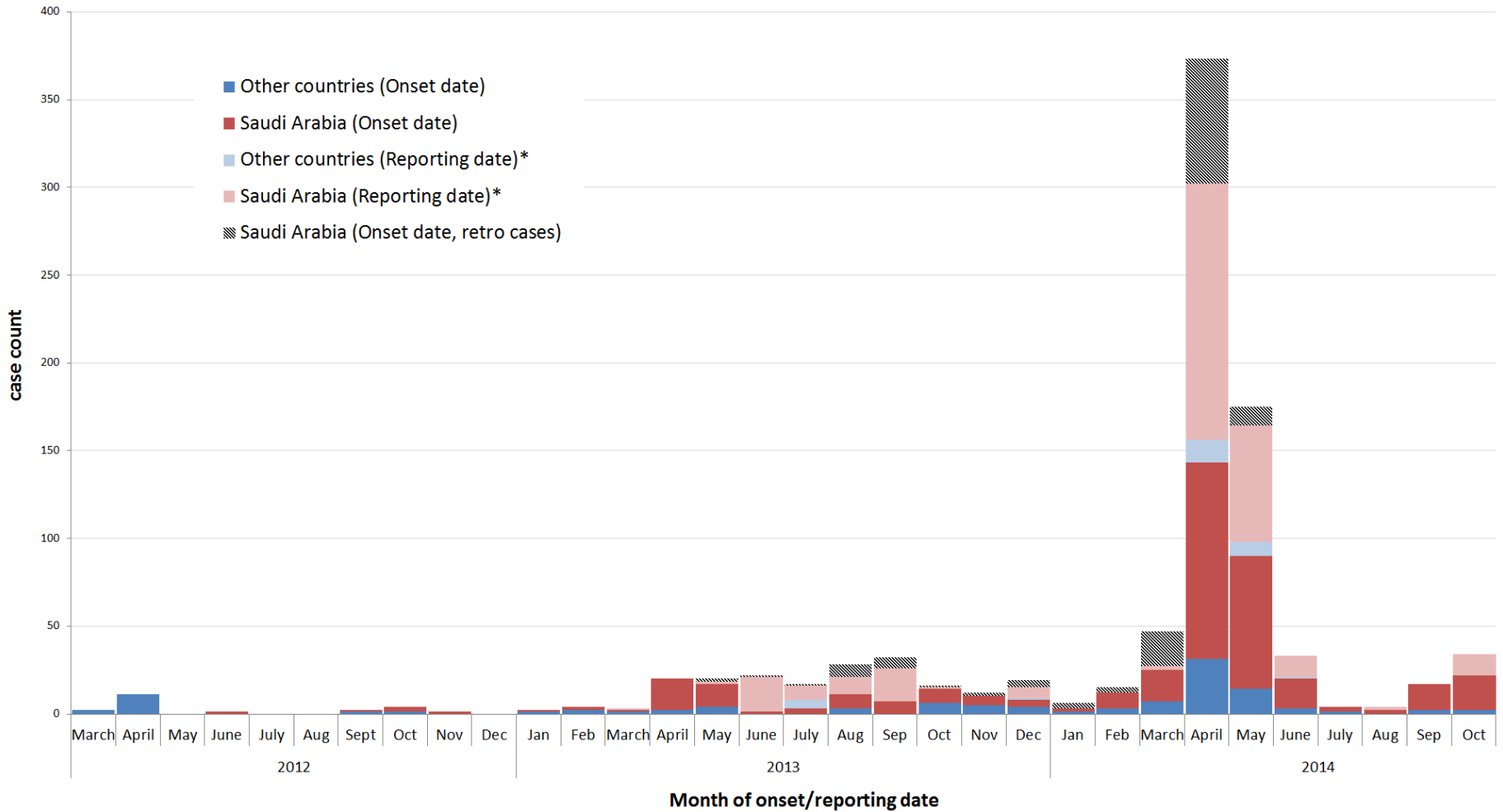
C. FURTHER INFORMATION

To review prior bulletins issued by the BCCDC Influenza & Emerging Respiratory Pathogens team, and to obtain higher resolution figures, please see:

www.bccdc.ca/dis-cond/DiseaseStatsReports/EmergingRespiratoryVirusUpdates.htm.

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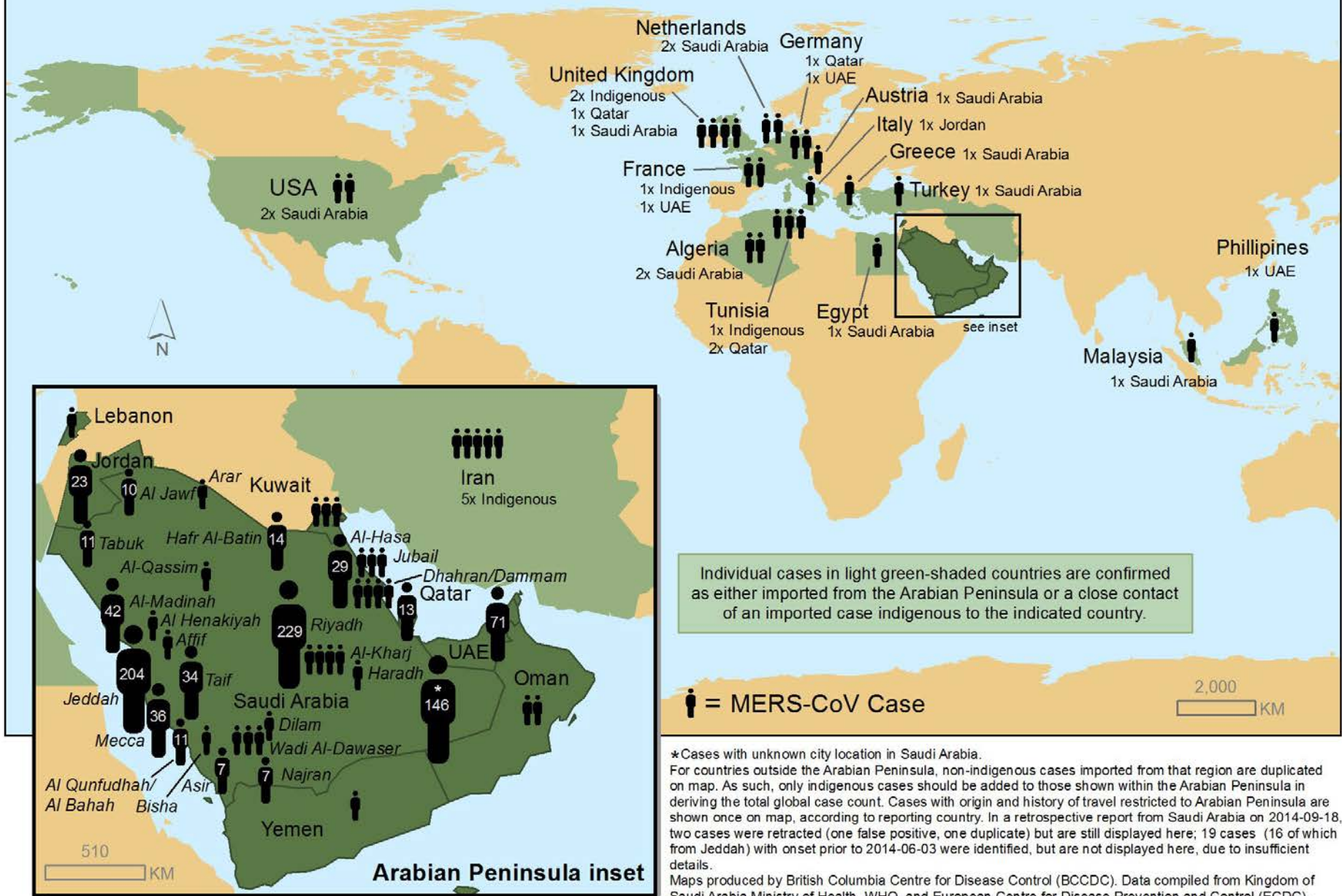
MERS-CoV Epidemic Curve



* Cases are shown by country of exposure (or by reporting country if place of exposure unknown) and by symptom onset date (or by reporting date if onset date unavailable or case is asymptomatic).

Note: 7 cases reported in November 2014 with probable onset in October are not shown here due to missing onset dates.

MERS-CoV case activity as of October 31, 2014



Individual cases in light green-shaded countries are confirmed as either imported from the Arabian Peninsula or a close contact of an imported case indigenous to the indicated country.

= MERS-CoV Case

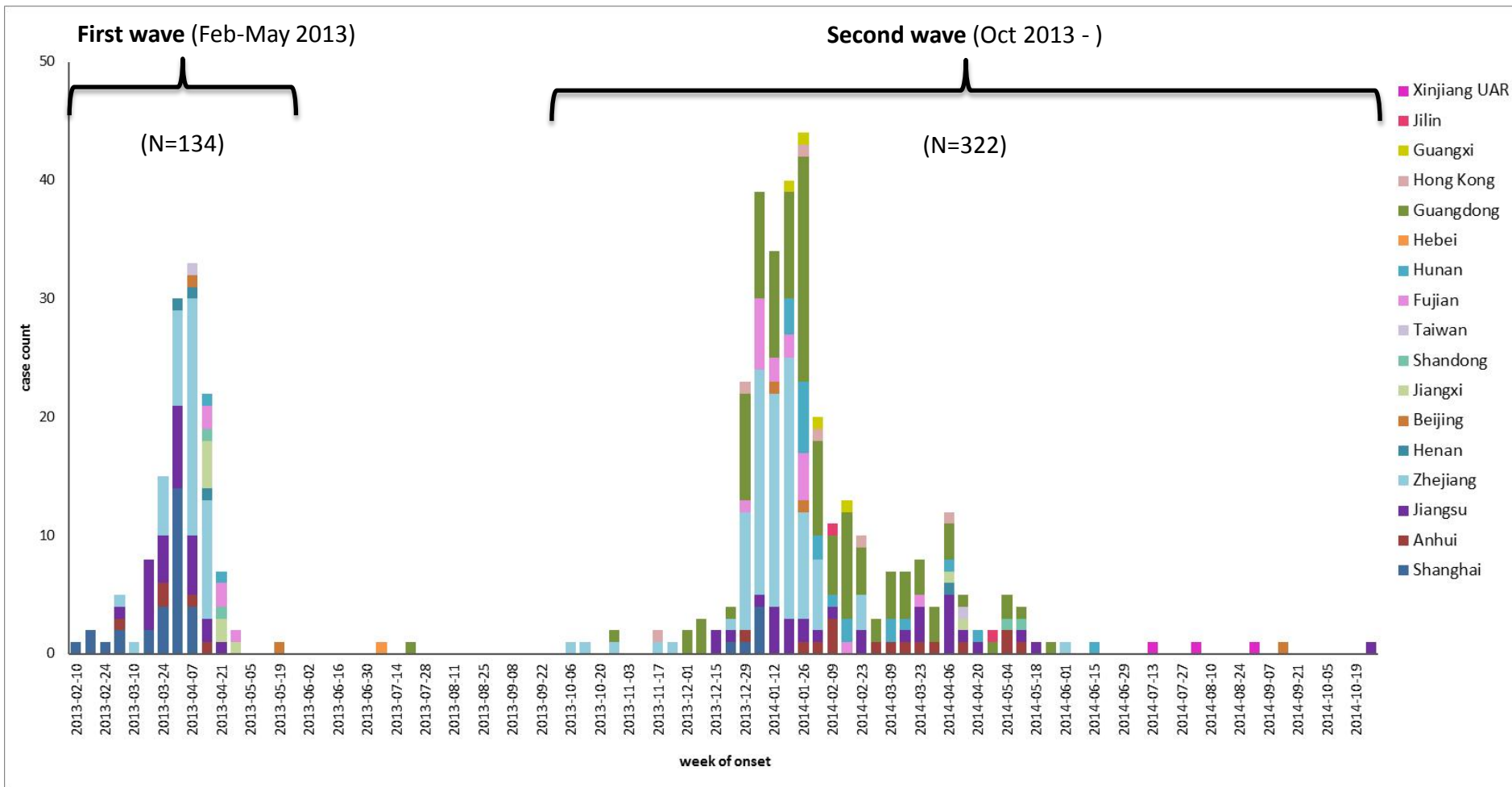
2,000 KM

*Cases with unknown city location in Saudi Arabia. For countries outside the Arabian Peninsula, non-indigenous cases imported from that region are duplicated on map. As such, only indigenous cases should be added to those shown within the Arabian Peninsula in deriving the total global case count. Cases with origin and history of travel restricted to Arabian Peninsula are shown once on map, according to reporting country. In a retrospective report from Saudi Arabia on 2014-09-18, two cases were retracted (one false positive, one duplicate) but are still displayed here; 19 cases (16 of which from Jeddah) with onset prior to 2014-06-03 were identified, but are not displayed here, due to insufficient details.

Maps produced by British Columbia Centre for Disease Control (BCCDC). Data compiled from Kingdom of Saudi Arabia Ministry of Health, WHO, and European Centre for Disease Prevention and Control (ECDC).

H7N9 Epidemic Curve

by place of residence and week of illness onset*



*Does not include: 1 Henan, 4 Jiangsu, and 1 Guizhou cases with unknown onset date; one asymptomatic case in Beijing. Latest case in Jiangsu plotted by reporting date pending availability of onset date.

H7N9 avian influenza first and second wave cases by province of residence



Province	Cumulative # of cases	Province	Cumulative # of cases
Anhui	20	Jiangsu	60
Beijing	6	Jiangxi	9
Fujian	22	Jilin	2
Guangdong	*114	Shandong	4
Guangxi	4	Shanghai	36
Guizhou	1	Xinjiang	3
Hebei	*1	Zhejiang	139
Henan	4	Hong Kong	6
Hunan	23	Taiwan	2
		Total	456

* Two cases with symptom onset in July 2013 (one in Hebei and one in Guangdong) are not represented on the map.
 ** Case was likely exposed in Zhejiang.
 † Cases reported travel to mainland China during exposure period.
 ‡ One case residing (and apparently exposed) in Guangdong was identified during travel to Malaysia, where the case was reported and hospitalised. Four other cases who lived in and were likely exposed in Guangdong were hospitalised and diagnosed in Hong Kong.
 Data compiled from ProMed, GPHIN alerts and other public reports. Map created October 31, 2014 by BCCDC.

Influenza A(H3N2)v detections in the USA, 2011-2014

