Pandemic preparedness and
“World Flu Day” Initiative

George F. Gao
Director-General, China CDC
December 5th, 2019
The history of emerging influenza viruses: Continuous threats

George F. Gao, Cell, 2018
Pandemics in the history

- More than 40 million deaths
- 1-4 million deaths
- 100-400 thousand deaths
- 1-4 million deaths
- 10 years thus far
The largest national flu surveillance network

- **Since 2009, Covering whole country, 408 labs, 554 hospitals**
- **Testing capacity:** 99% labs can conduct flu virus Nucleic acid detection
  87% labs can conduct flu virus isolation
WHO | Global Influenza Surveillance and Response System (GISRS)

Birth of GISN 1952

1962
2 WHOCCs 59 NICs/42 countries

1984
3 WHOCCs 108 NICs/76 countries

2004
5 WHOCCs 112 NICs/83 countries

2008
5 WHOCCs 121 NICs/93 countries

2011
6 WHOCCs 136 NICs/106 countries

- Virus monitoring
- Vaccine composition recommendation
- Accumulating knowledge of influenza epidemiology

1962-2011 - Risk assessment
- Diagnostics
- Antiviral susceptibility monitoring

2008-2018 - Virological/laboratory support to all aspects of influenza surveillance, preparedness and response, pharmaceutical and non-pharmaceutical
- Higher expectations

GISAIID 2008 - 2018
Annual Disease Burden of Influenza

Deaths
Severe Cases/Hospitalizations
Cases

Global

291,000 – 646,000
(9,243 – 105,690 in <5 y)
3M to 5M
1.0 B

United States

12,000 – 79,000
140,000 – 960,000
9.2M – 35.6M

Total direct medical costs in US: $10.4 B ($4.1-$22.2 B) per year
Total burden for all ages in US: $87.1 B ($47.2-$149.5B) per year

### Table  Mean annual influenza-associated excess mortality rates (EMRs) per 100,000 population by age group for EMR-contributing countries

<table>
<thead>
<tr>
<th></th>
<th>Age &lt;65 years</th>
<th>Age 65–74 years</th>
<th>Age ≥75 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>0.5 (0.2)</td>
<td>3.5 (1.7)</td>
<td>20.8 (9.8)</td>
</tr>
<tr>
<td>Southern Brazil</td>
<td>1.0 (0.2)</td>
<td>19.8 (5.6)</td>
<td>111.1 (40.5)</td>
</tr>
<tr>
<td>Canada</td>
<td>0.4 (0.1)</td>
<td>6.1 (2.2)</td>
<td>44.5 (12.5)</td>
</tr>
<tr>
<td>China</td>
<td>0.7 (0.3)</td>
<td>19.1 (7.0)</td>
<td>112.7 (34.3)</td>
</tr>
<tr>
<td>Germany</td>
<td>0.4 (0.1)</td>
<td>2.9 (1.3)</td>
<td>21.0 (7.6)</td>
</tr>
<tr>
<td>India</td>
<td>2.2 (1.2)</td>
<td>35.5 (12.3)</td>
<td>88.1 (30.4)</td>
</tr>
<tr>
<td>Japan</td>
<td>0.2 (0.03)</td>
<td>3.5 (0.4)</td>
<td>27.5 (2.9)</td>
</tr>
<tr>
<td>Kenya</td>
<td>6.4 (2.5)</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>South Africa</td>
<td>5.2 (0.4)</td>
<td>37.4 (4.0)</td>
<td>123.3 (7.5)</td>
</tr>
<tr>
<td>South Korea</td>
<td>0.1 (0.03)</td>
<td>3.8 (1.0)</td>
<td>24.9 (6.6)</td>
</tr>
<tr>
<td>UK</td>
<td>2.4 (1.9)</td>
<td>17.3 (13.2)</td>
<td>66.6 (39.9)</td>
</tr>
<tr>
<td>USA</td>
<td>0.6 (0.1)</td>
<td>8.6 (1.0)</td>
<td>49.4 (6.2)</td>
</tr>
</tbody>
</table>

Estimated country-specific and age-specific influenza-associated respiratory mortality rates (per 100 000 individuals) in people 

(A) 65 years or younger

(B) 65–74 years
(C) 75 years and older.
>40% of countries listing influenza vaccination in NIP as 2015

- Brazil: children aged 6m - 5 years, pregnant women, 60+, health professionals, indigenous population, and people with chronic diseases since 1999
- Thailand: for older adults since 2008


Data source: WHO/IVB Database, as of 05 March 2015
Map production Immunization Vaccines and Biologicals (IVB), World Health Organization

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 lines on maps represent approximate border lines for which there may not yet be full agreement. ©WHO 2015. All rights reserved.
Influenza vaccine coverage

Figure 4. Seasonal influenza vaccination coverage rates in older age groups, 19 EU/EEA Member States, influenza seasons 2015–2016; 2016–2017 and, if available, 2017–2018

Figure 2. Flu Vaccination Coverage Among Adults, by Age Group and Season, United States, 2010–2018

Latin America and the Caribbean adults, 2013–2017

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>84.00</td>
<td>89.00</td>
<td>71.00</td>
<td>100.00</td>
<td>63.00</td>
</tr>
<tr>
<td>Colombia</td>
<td>71.00</td>
<td>100.00</td>
<td>88.00</td>
<td>93.00</td>
<td>90.00</td>
</tr>
<tr>
<td>Ecuador</td>
<td>75.00</td>
<td>39.00</td>
<td>88.00</td>
<td>93.00</td>
<td>90.00</td>
</tr>
<tr>
<td>Peru</td>
<td>42.00</td>
<td>89.00</td>
<td>53.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venezuela</td>
<td>9.00</td>
<td>9.60</td>
<td>14.00</td>
<td>13.00</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>88.00</td>
<td>86.00</td>
<td>89.00</td>
<td>96.00</td>
<td>88.00</td>
</tr>
</tbody>
</table>

**Influenza vaccine: Low coverage in China: 1%-3%**

The influenza vaccine coverage in China is much lower than that of Europe and US, and some developing countries in Asia and South America.

<table>
<thead>
<tr>
<th>Population</th>
<th>China</th>
<th>US (14/15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant women</td>
<td>contraindication</td>
<td>50.3%</td>
</tr>
<tr>
<td>Young children</td>
<td>Multi-cities 26% (6m-5y; 11/12)</td>
<td>70.4% (6-59m)</td>
</tr>
<tr>
<td></td>
<td>Xining 12%-13% (2-7y; 14-16)</td>
<td></td>
</tr>
<tr>
<td>Older adults</td>
<td>Multi-cities 4.3% (≥60y; 11/12)</td>
<td>66.7% (≥65y)</td>
</tr>
<tr>
<td>Health workers</td>
<td>Qingdao 4.8% (13/14)</td>
<td>77.3%</td>
</tr>
</tbody>
</table>

Data sources:
5 Song Y et al. Vaccine (2017)
One Health strategy to control Flu

Flu and Wild/Domestic Birds (Science, 2005; Science, 2014)

Influenza and the Live Poultry Trade

LIVE POULTRY TRADE AT LOCAL MARKETS HAS LONG BEEN A PART OF CHINA’S NATIONAL IDENTITY. From small villages to big cities, the gathering and selling of different birds in this vibrant atmosphere is at the heart of the country’s cuisine culture. Unfortunately, the backdrop to Last year, the H7N9 virus, a new strain of influenza A, jumped 144 cases of human infection and 47 deaths in China. Now coursing through the country, with 258 confirmed cases and 99 scientific evidence points to a connection between the conditions for spread of flu, suggesting that until other means are found to or effectively treat the illness, China must shut down live poultry spread of the virus and a possible global pandemic. The Center for Disease Control and Prevention and several promis quick identified H7N9 as the causative agent of the emergencie It was immediately traced to live poultry markets. With a call of these markets in major cities, includin (where the first H7N9 human infection remnant quickly controlled the spread of ent deemed long-term closure to be eco markets reopened soon after the summer. flu season in October, the virus bounced River delta region. This year, it has spread aning province) in China, which is all marke are commonplace there. the people infected with H7N9 had close xposure to a contaminated environme, where the virus can spread quickly ortation between provinces is probably n its spread across China. Although it is N9 has not developed human-to-human

Highly Pathogenic H5N1 Influenza Virus Infection in Migratory Birds

J. Liu,1* H. Xiao,2,4* F. Lei,3* Q. Zhu,3 K. Qin,1 X.-w. Zhang,6 X.-l. Zhang,1 D. Zhao,1 G. Wang,2,4 Y. Feng,2,4 J. Ma,2 W. Liu,2 J. Wang,3 G. F. Gao2†

Avian influenza virus (AIV) involving at least three subtypes, H5, H7, and H9, has emerged as an important pathogen in the poultry industry and is of major current global health concern (1). The first case report of chicken-to-human transmission was in Hong Kong in 1997 (2); since 2003, H5N1, a highly pathogenic AIV, has emerged in 10 Asian countries, including Thailand, Vietnam, and China. The H5N1 viruses have caused outbreaks in Peking ducks and geese. They have been isolated from different bird species that have been common in markets. In Beijing, a village in China, several H5N1 viruses were isolated from various birds, including ducks and geese. These viruses have been isolated from wild birds and domesticated birds, such as ducks, geese, and chickens. The viruses have been isolated from different bird species that have been common in markets.

Several H5N1 viruses were isolated from different bird species that have been common in markets. The viruses have been isolated from wild birds and domesticated birds, such as ducks, geese, and chickens. The viruses have been isolated from different bird species that have been common in markets.
1st World Flu Day
2018, Shenzhen China

[Film]
World Flu Day: momentum from China for influenza control

Nov 1 marks the first World Flu Day and was formally launched at the Asian-Pacific Centenary Spanish 1918-flu symposium in Shenzhen, China. The campaign was developed by George F Gao, director of the China Center for Disease Control and Prevention (CDC), in collaboration with other leading influenza specialists, including Yoshihiro Kawaoka from University of Wisconsin, WI, USA, Mark von Itzstein from Griffith University, QLD, Australia, and Kwok-Yung Yuen from Hong Kong University, Hong Kong. Gao told The Lancet that World Flu Day had four major purposes: to commemorate the centenary of the 1918–19 influenza pandemic; to raise public awareness of influenza; to accelerate scientific innovation and basic research efforts toward remaining challenges of influenza, particularly the development of a universal flu vaccine; and to push for stronger global political will in continuing the support of influenza prevention and control.

Unlike official global health campaigns such as World Health Day and World Tuberculosis Day, marked and sponsored by WHO, the proposal and implementation of World Flu Day are mainly driven by scientists who work on unsolved questions in influenza research. Furthermore, the major organising institution in the influenza campaign this year is China CDC. 2018 also marks the 15-year commemoration of the severe acute respiratory syndrome outbreak, after which strengthening the CDC became the top priority in China’s public policy agenda. As a result, China boosted investment in the public health system, strengthening national and local surveillance systems for all infectious diseases more efficiently and effectively, and improving research capacity, especially for emerging infectious diseases.

In the changing landscape of global health, China has increased its global health engagement and influence through health aid, health security, health governance, and knowledge exchange. Historical lessons from influenza should remain at the core of global efforts for pandemic preparedness. Launching the first World Flu Day in China is not just a timely call for raising global awareness about this common and easily ignored disease, but also an important opportunity for China to strengthen global collaboration in influenza research and control. ■ The Lancet
2nd “World Flu Day” 2019, Beijing
Know Flu, Prevent Flu and Beat Flu
China CDC Weekly (CCDC Weekly)

- Launch Issue: Vol. 1 No.1 Nov. 29, 2019.
- Publishes authoritative professional information on national population health, disease and risk factor monitoring, investigation data and important public health event investigation reports.
- Will follow a path initially set forth by the US CDC *Morbidity and Mortality Weekly Report* (MMWR).

**Foreword**

Foreword from Editor-in-Chief George F. Gao
— China’s Outreach to the World: Public Health Goes Global

Scan to submit
Thank you!

Flu virus sculpture
— CAS Campus

ZIKV and Ab sculpture
— Shenzhen 3rd People’s Hospital