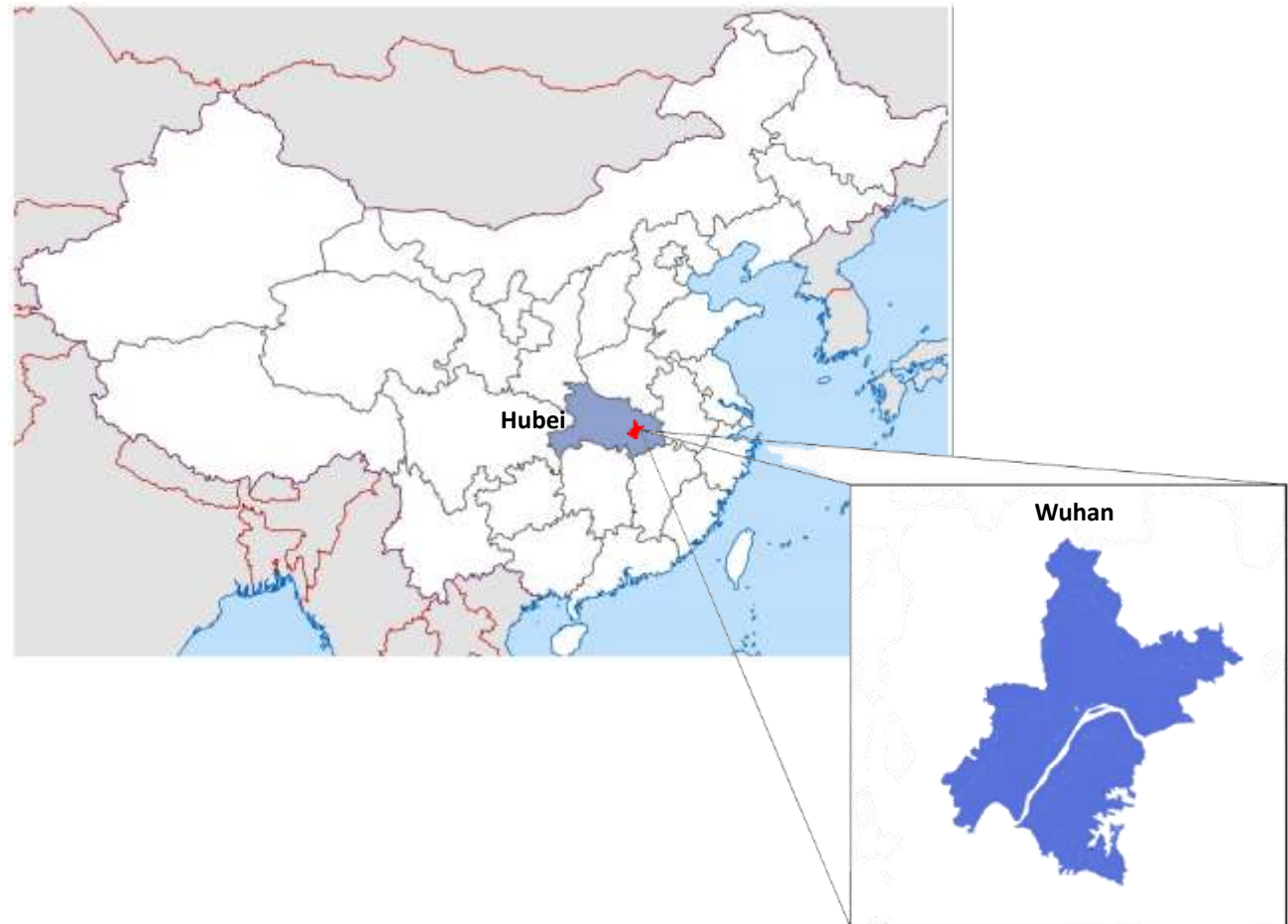


# Epidemiology of COVID-19, Global and India Update

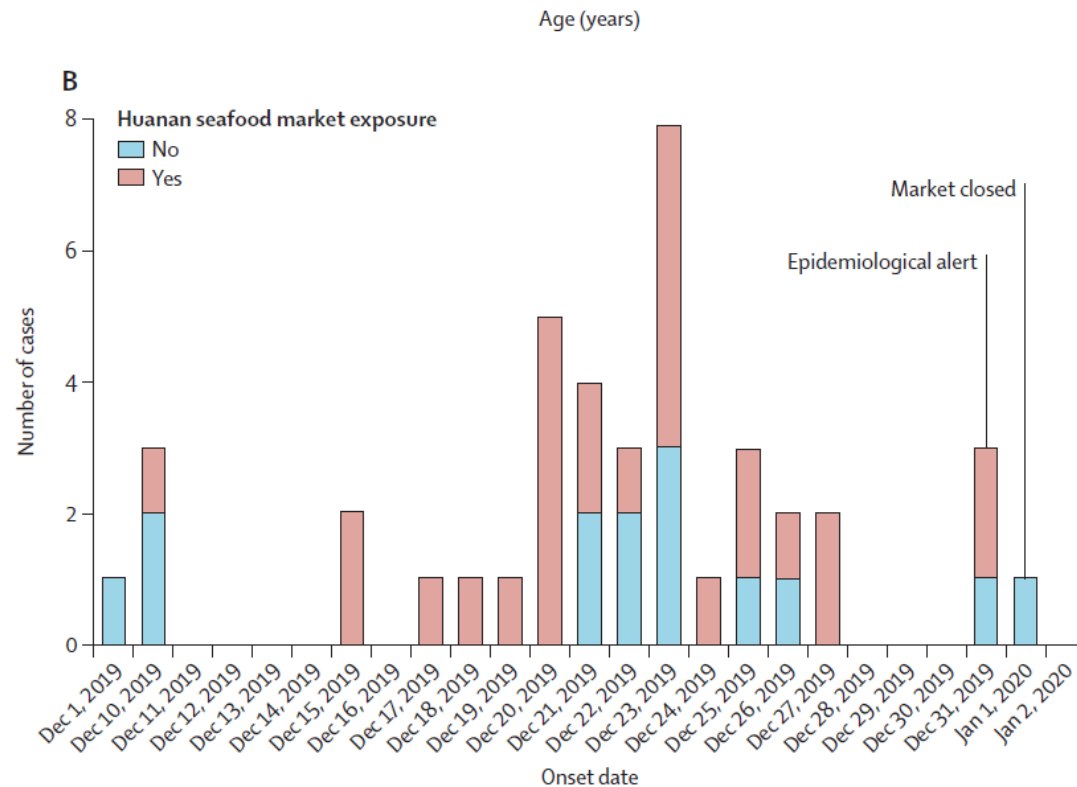
# Cluster of Pneumonia Cases of Unknown Origin in December 2019



# Cluster of Pneumonia Cases of Unknown Origin in December 2019



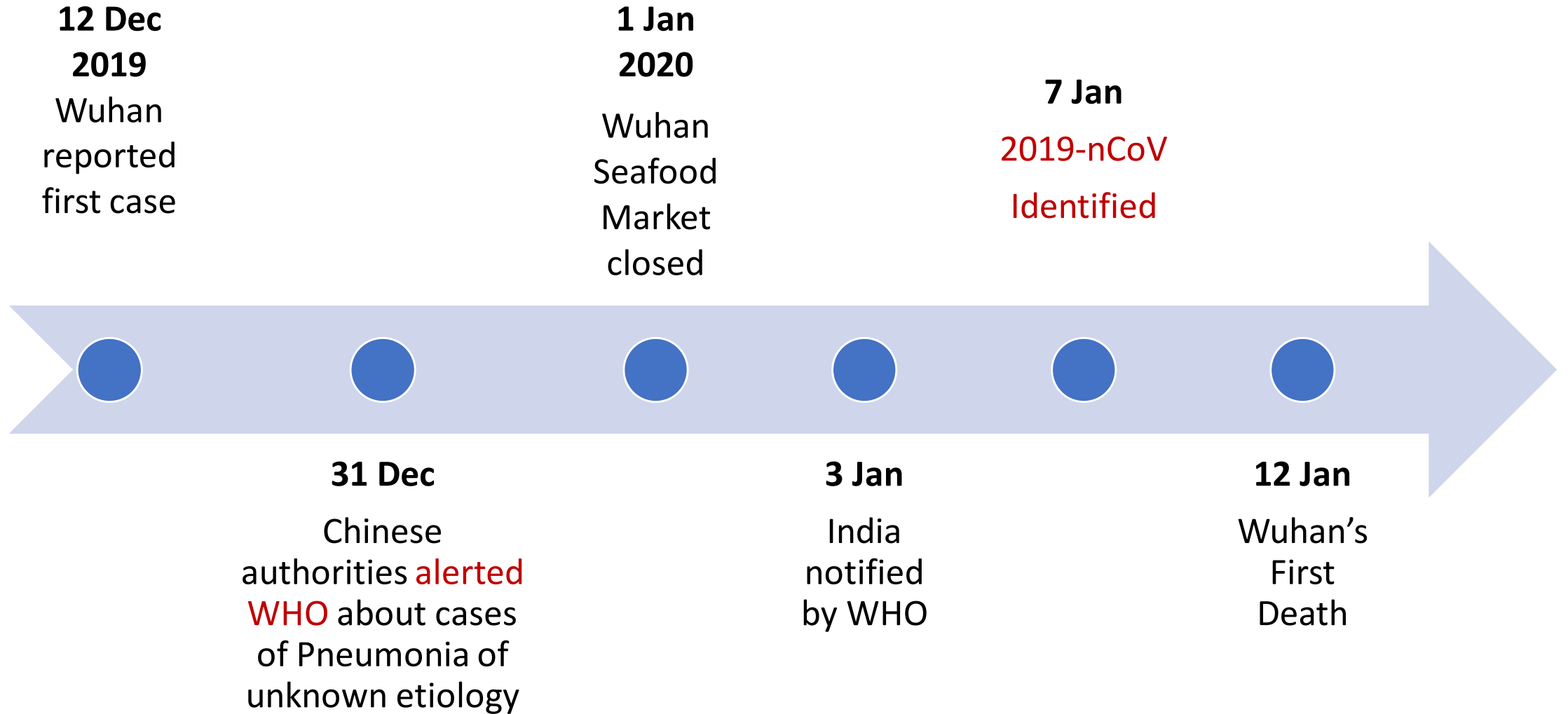
# Cluster of Pneumonia Cases of Unknown Origin in December 2019



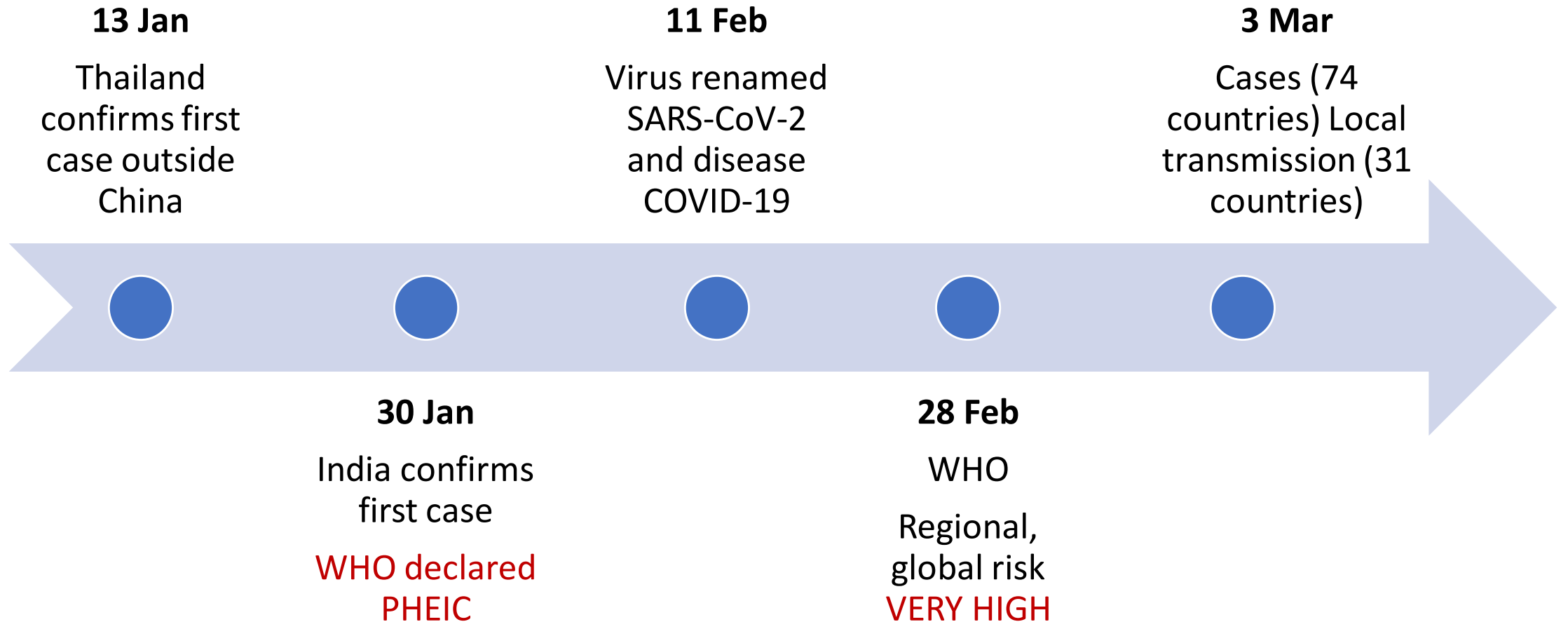
- SARS originated in Guangdong, China in November 2002
- Affected 8096 persons, 774 deaths in 26 countries

Of 41 patients, 66% (27) had exposure to a seafood market (Lancet, DOI 10298)

# Timeline



# Timeline

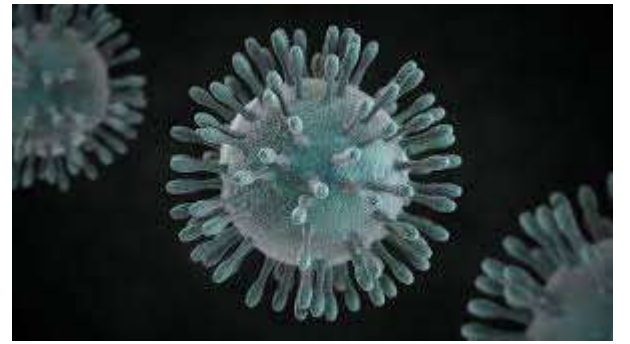


# WHO Risk Assessment

China	<b>Very High</b>
Regional	<b>Very High</b>
Global	<b>Very High</b>

- Likelihood of spread
  - Ongoing human-to-human transmission
  - Confirmed identified in 31 provincial level administrative areas (10 with >100 cases)
  - Majority of cases exported outside China have been epidemiologically linked to Wuhan
  - Human-to-human transmission documented in other countries
  - Source of outbreak remains unknown
  - Disaggregated data is needed to better understand the epidemiology
- Potential impact to human health
  - Can causes severe disease and fatalities
  - Severity is not fully understood
  - Transmission from asymptomatic cases
- Likelihood of insufficient control capacities
  - China has implemented major control measures
  - Currently affected countries have strong public health systems
  - Some countries may be less prepared to manage cases

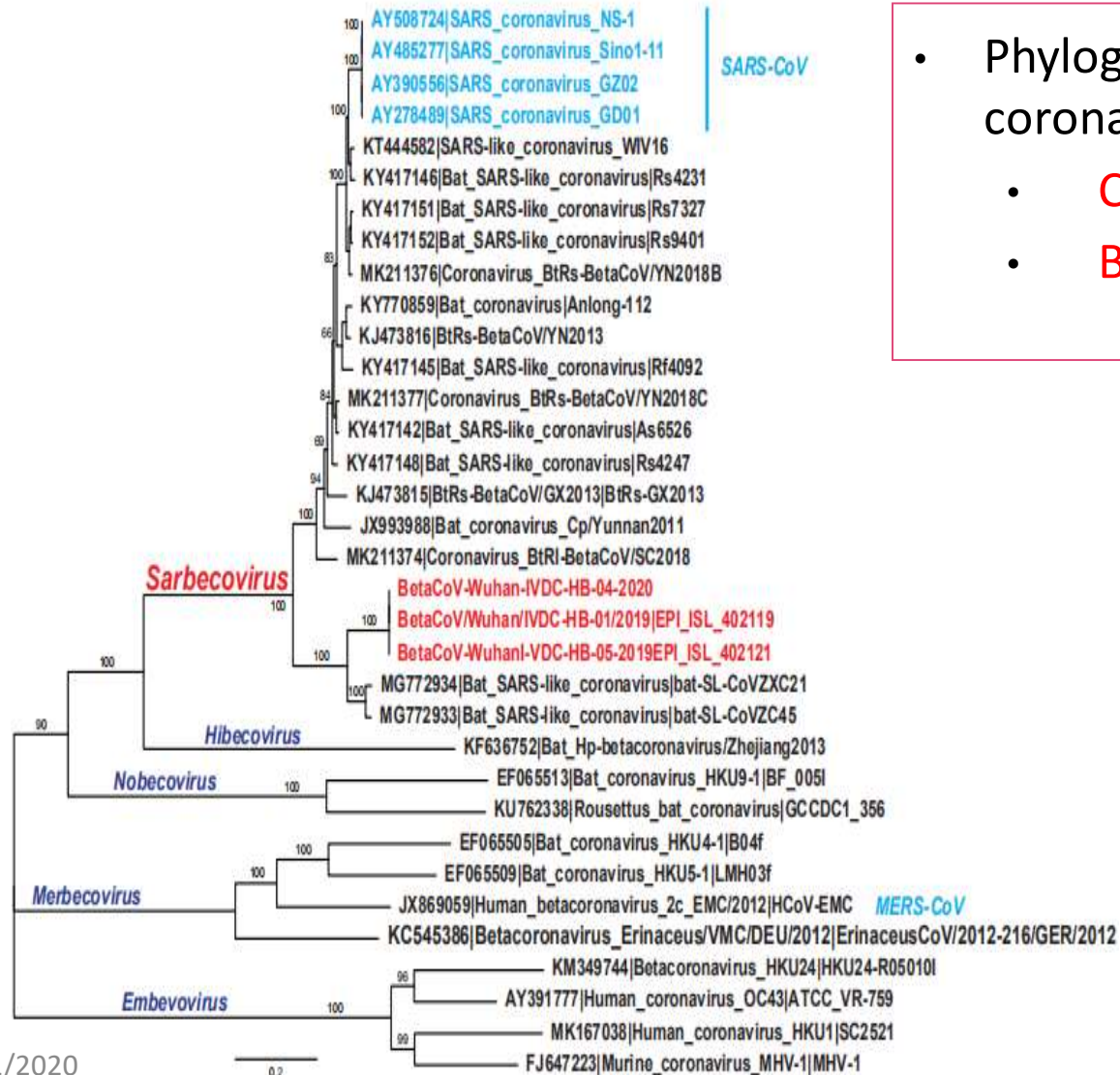
# Coronavirus



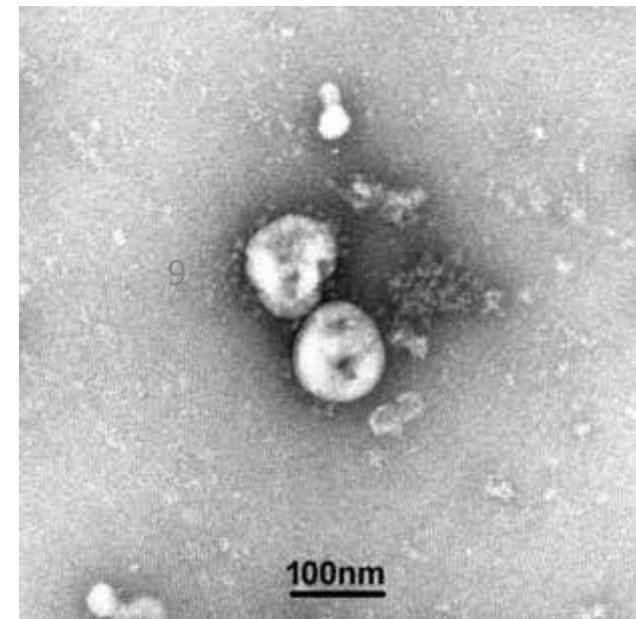
- Large family of enveloped, positive- strand RNA viruses
- Ecologically diverse, circulates in humans and animals
- Divided into 4 genera: alpha, beta, delta, and gamma
  - alpha and beta CoVs infect humans
- Four HCoVs (HCoV 229E, NL63, OC43, and HKU1) endemic globally
  - 10-30% of upper respiratory tract infections in adults
- Rarely, animal coronaviruses evolve and infect people and then spread between people—SARS (2002) and MERS (2012)



# Phylogenetic analysis of the 2019-nCoV and other *Beta coronavirus* genomes under the Orthocoronavirinae subfamily

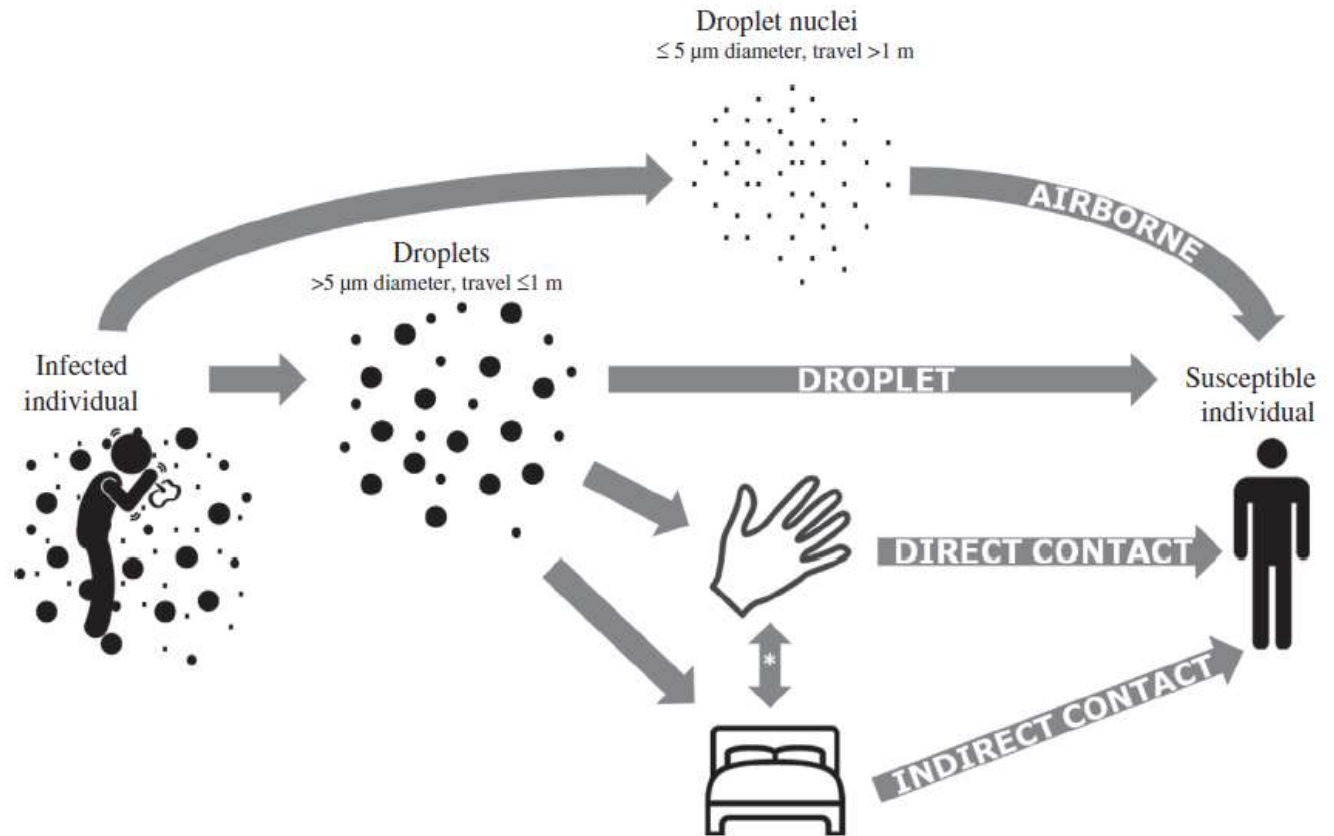


- Phylogeny – Closest genetic similarity was found in a coronavirus that had been isolated from bats
  - **CoVZC45 (MG772933.1) and**
  - **BM48-31/BGR/2008(GU190215.1) branches**



# Coronavirus –Transmissibility

- Infected droplets
  - $>5\mu\text{m}$ , travel  $<1\text{m}$
- Aerosols
  - $<5\mu\text{m}$ , travel  $>1\text{m}$
- Contact
  - Hands, surfaces



\* Transmission routes involving a combination of hand & surface = indirect contact.

Figure 1. Transmission routes: droplet, airborne, direct contact, and indirect contact. (Indirect contact: routes involving a combination of hand and surface.) Definitions of 'droplet' and 'droplet nuclei' are from Atkinson *et al.*<sup>5</sup>

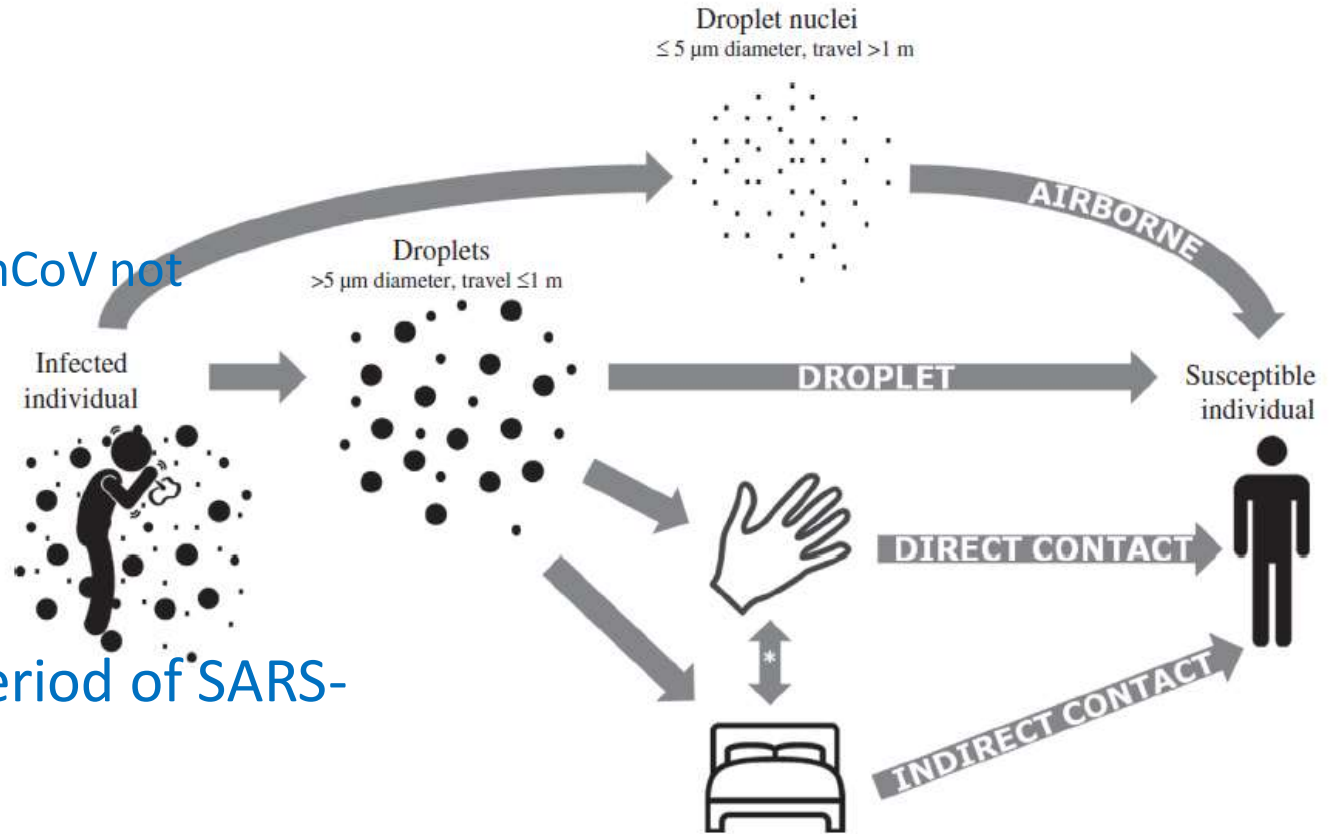
# Coronavirus –Transmissibility

## Survivability outside body:

- 1-2 days on nonporous surfaces
- 8-12 hours on porous surfaces
- Currently this information on 2019-nCoV not clear

## Incubation period:

Current estimates of the incubation period of SARS-CoV-2 range from 2-14 days.



\* Transmission routes involving a combination of hand & surface = indirect contact.

Figure 1. Transmission routes: droplet, airborne, direct contact, and indirect contact. (Indirect contact: routes involving a combination of hand and surface.) Definitions of 'droplet' and 'droplet nuclei' are from Atkinson *et al.*<sup>5</sup>

# Cases and Deaths–China

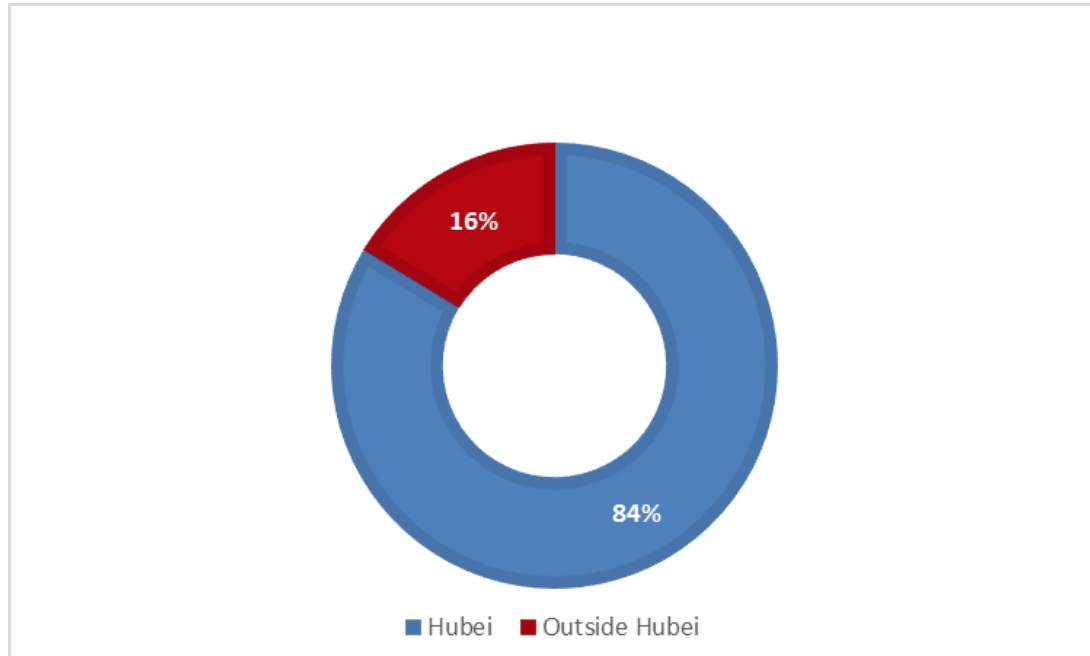
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	<b>Cases</b>	<b>Deaths</b>	<b>CFR (%)</b>
Hubei	67,332	2,871	4.2
Outside Hubei	13,090	113	0.8
China	<b>80,422</b>	<b>2,984</b>	<b>3.7</b>

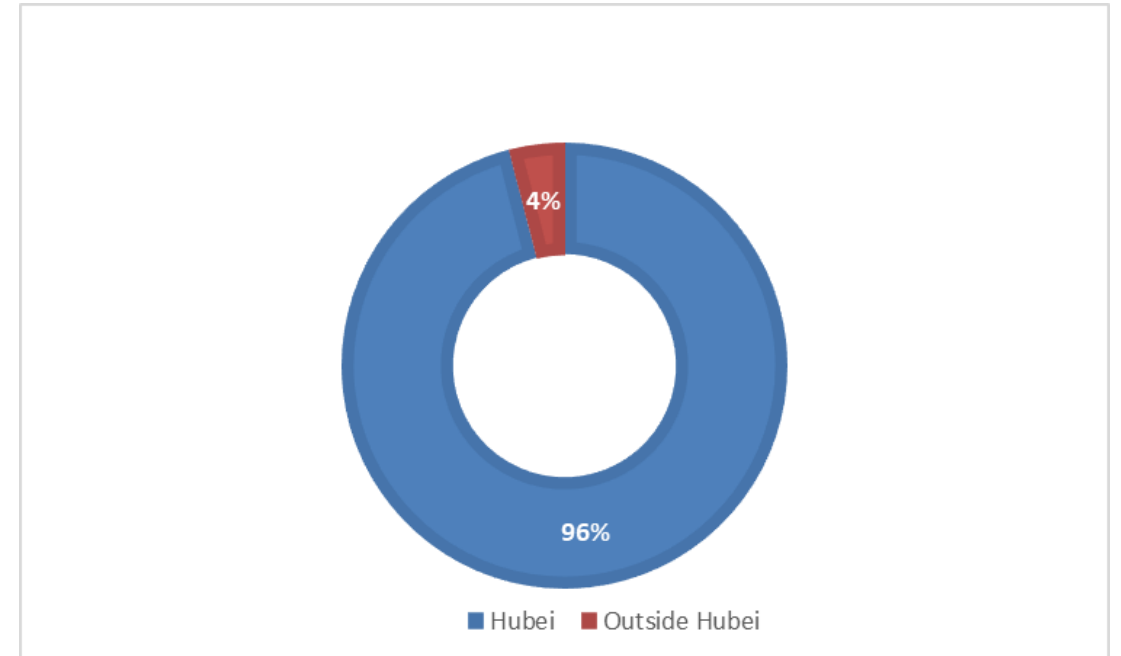
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Source: WHO  
As on 04 March, 2020

# Comparison of Cases and Deaths in China–Hubei and other Provinces



Cases



Deaths

Source: WHO  
As on 04 March, 2020

# Distribution of Cases – Outside China

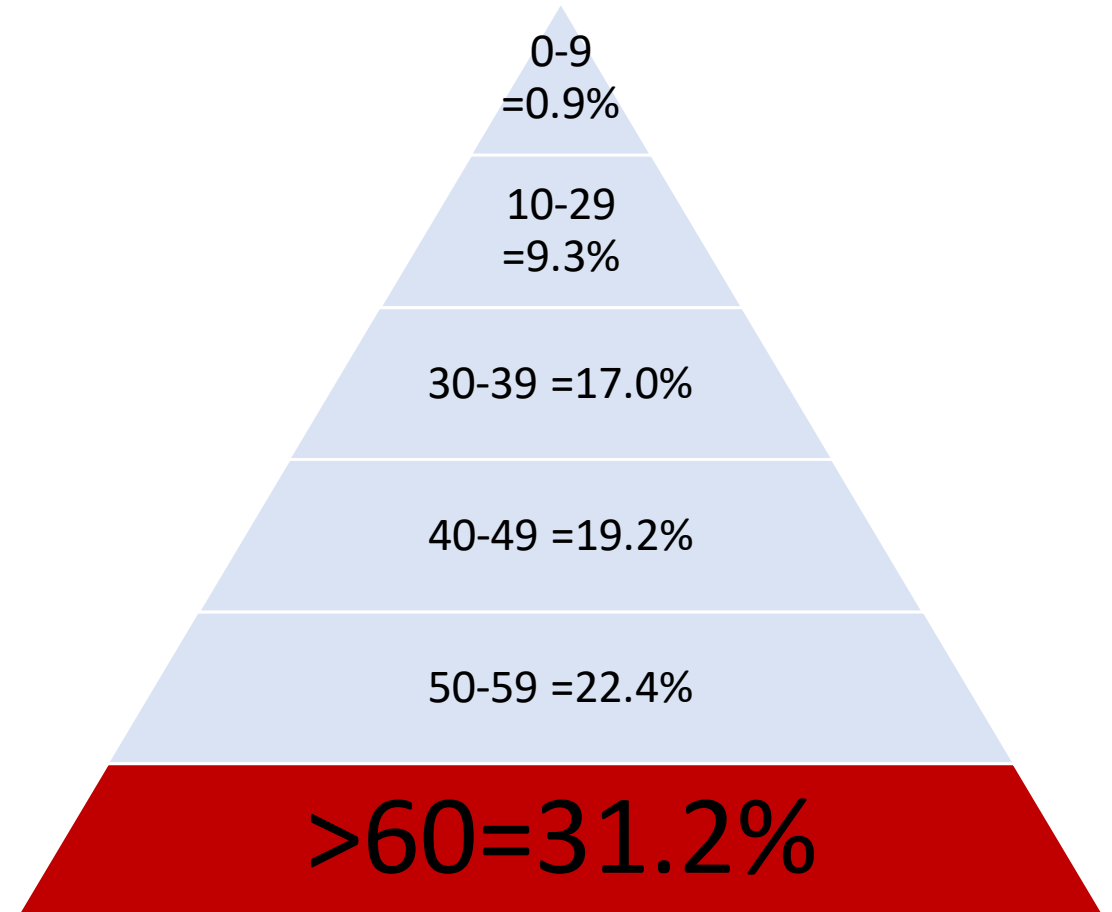
Number of Countries reporting*	77
Cases	12,668
Deaths	214
CFR %	1.7
Local Transmission %	42

\* Includes one international conveyance

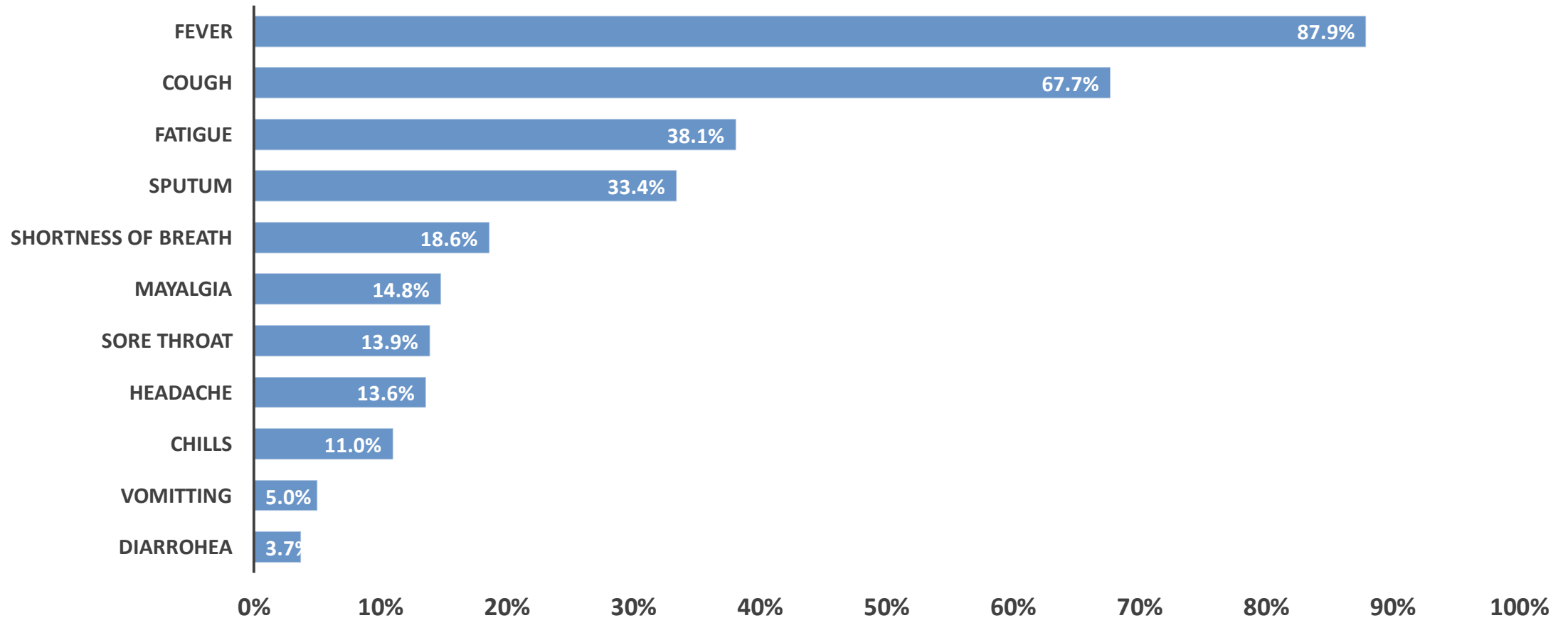
Source: WHO  
As on 04 March, 2020

# Age Distribution of Cases in China, Surveillance Data (n=72,314)

- Median age: 51 years
- Interquartile range=39-63 years
- Range= 2 days-100 years
- Males: 51%
- Health care workers: 3.8%
  - 88% reported from Hubei

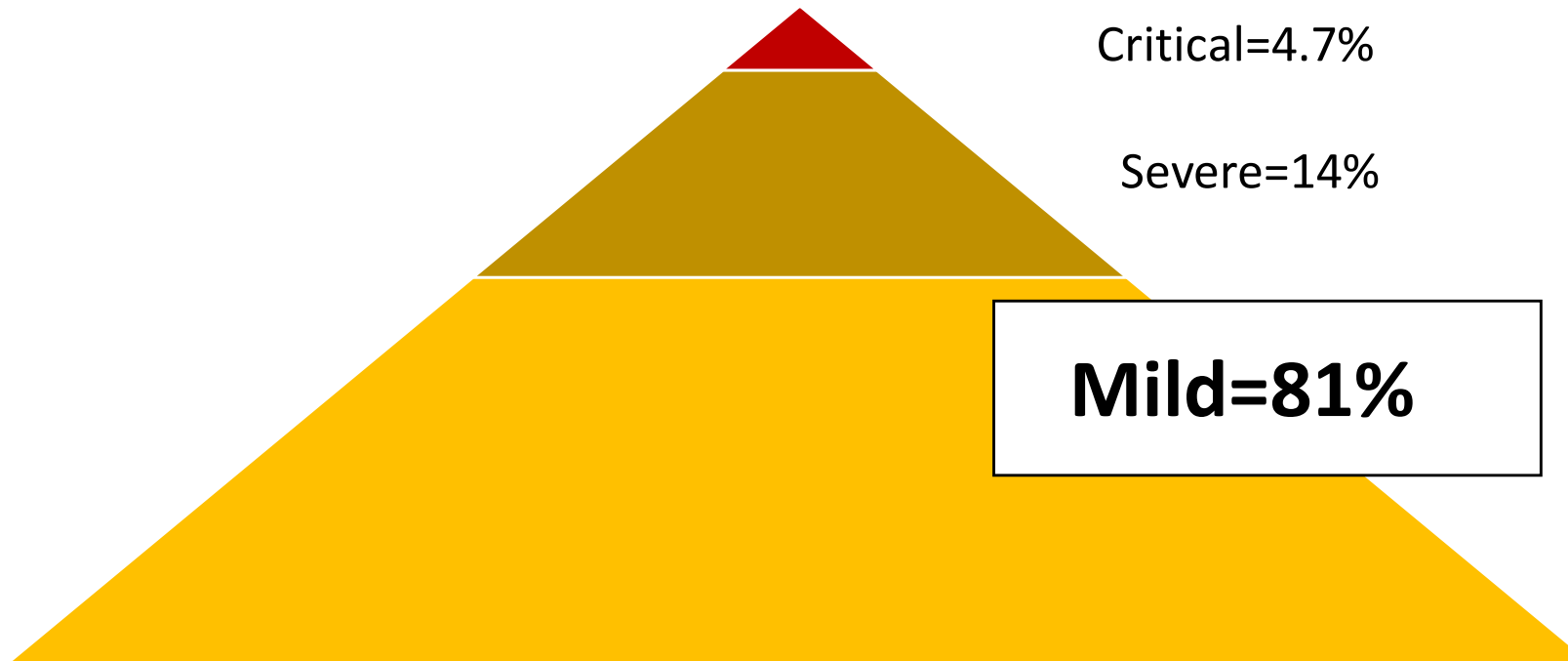


# Signs and Symptoms of Cases in China

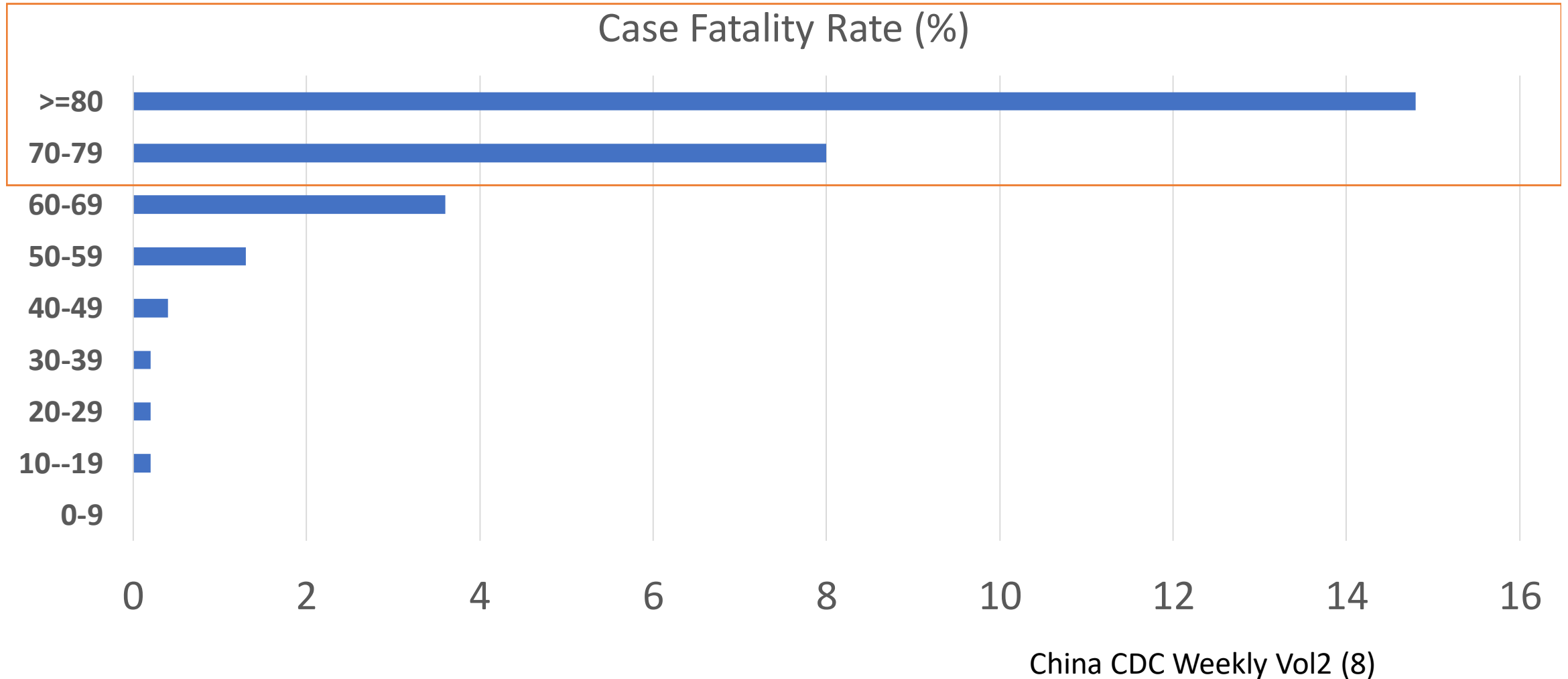




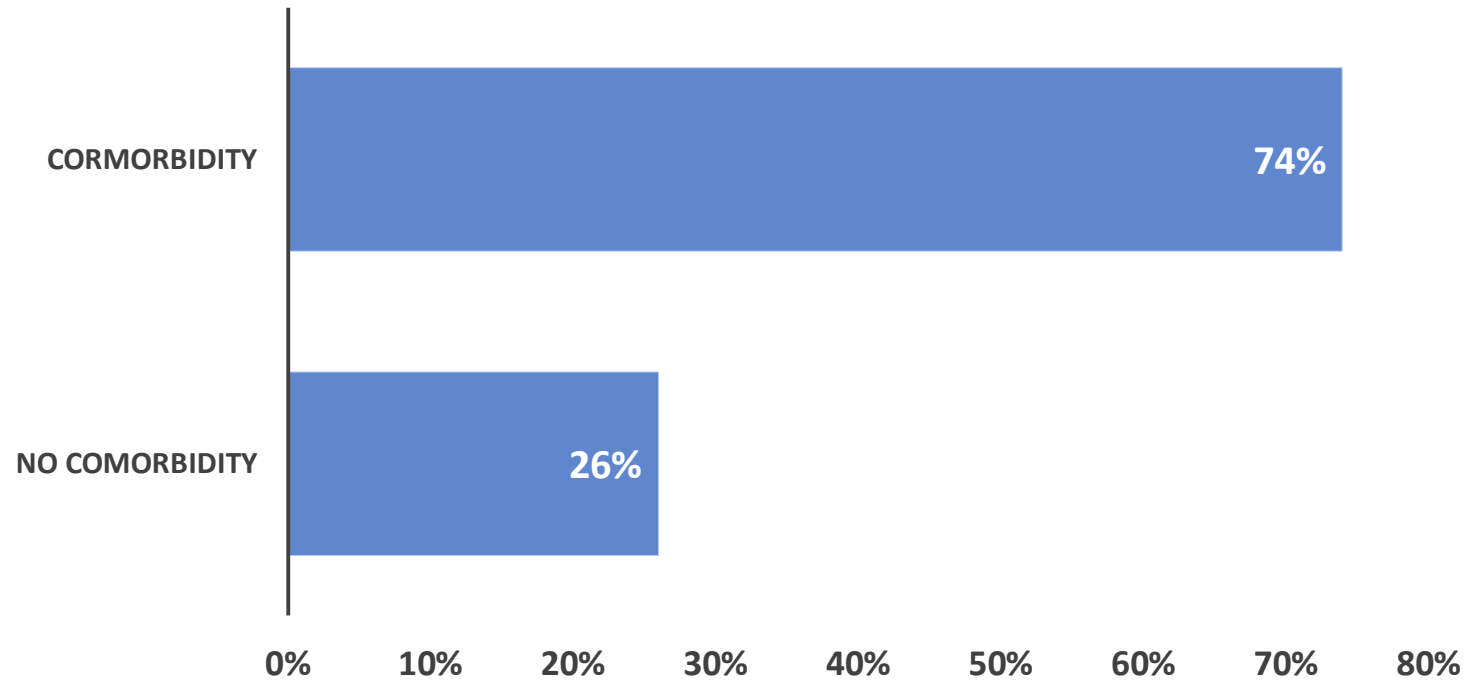
# Epidemiology–Presentation of Illness (n=72,314)



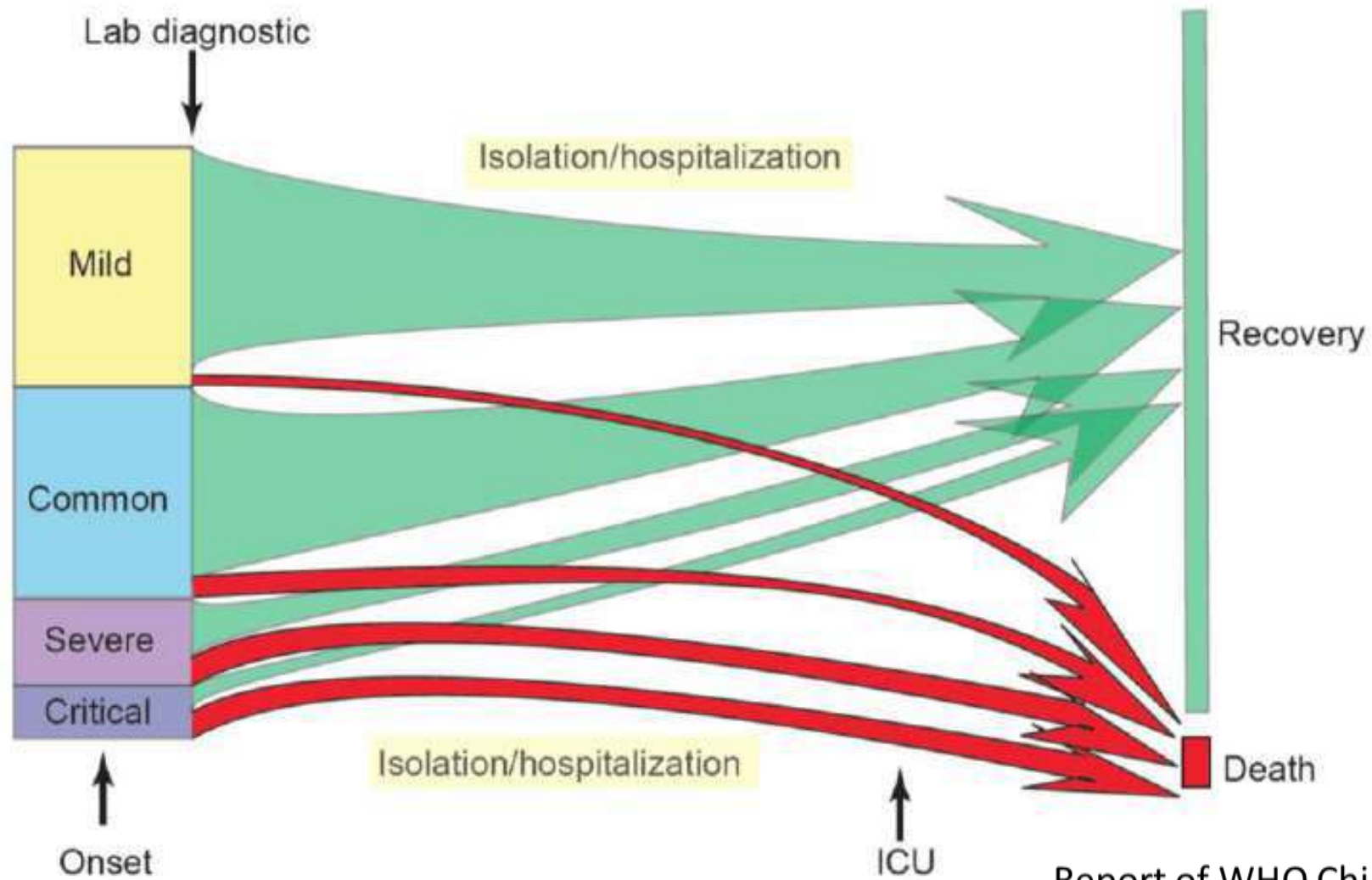
# Epidemiology—Severity of Illness (n=72,314)



# Epidemiology—Severity of Illness (n=72,314)



# Pattern of Disease Progression



# Comparison of Severity and Transmissibility of Human Infection with Coronavirus and Influenza virus

Virus	Transmissability ( $R_0$ )	Severity (CFR %)
<b>COVID-19<sup>i</sup></b>	2.00	3.00
SARS	3.00	9.00
MERS	1.05	36.00
IFL-S <sup>ii</sup>	1.27	NA
IFL-P	1.45	0.02
HCoV <sup>s</sup> <sup>iii</sup>	1.00	NA

Source: Communicable Disease Manual

# Comparison of Severity and Transmissibility of Human Infection with Coronavirus and Influenza virus

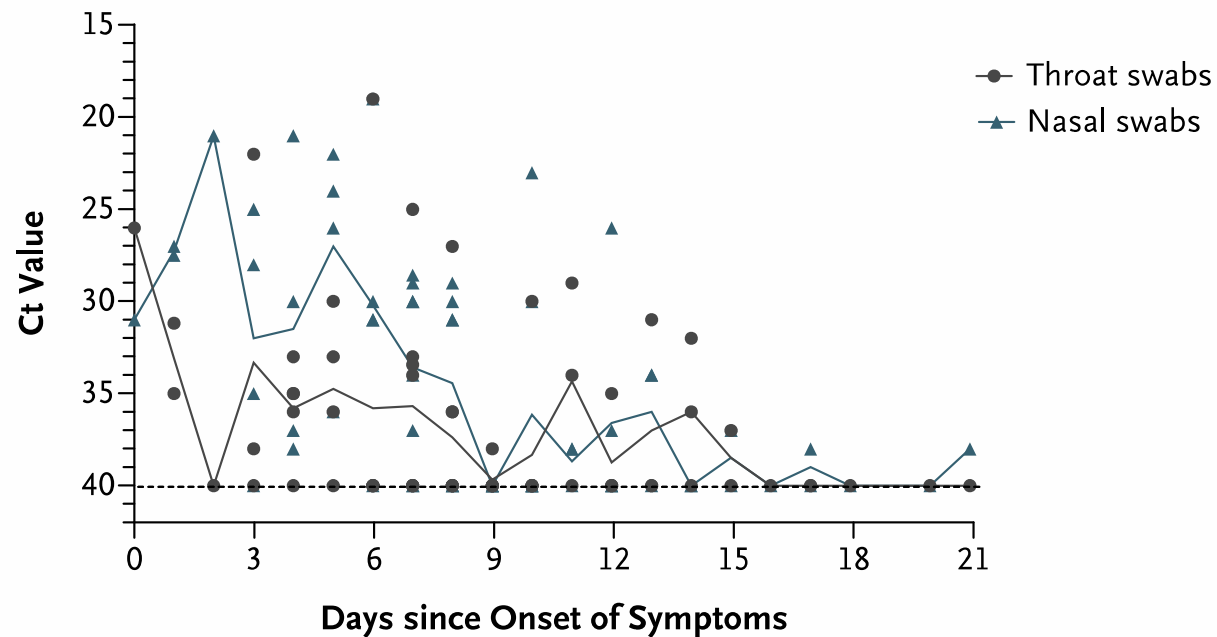
- Source: Communicable Disease Manual

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HCoV <sup>s</sup> <sup>iii</sup>	1.00	NA

Source: Communicable Disease Manual

# Risk of Disease Transmission in COVID-19 Patients following Onset of Illness (n=18)

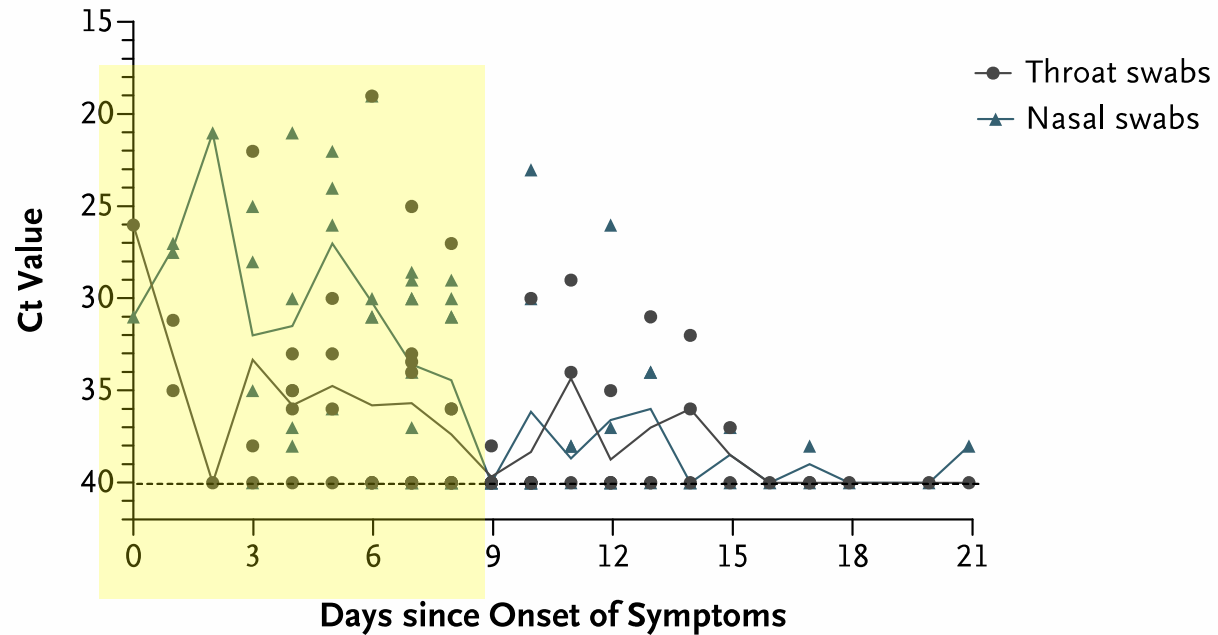
C Aggregated Ct Values



(NEJM, DOI 10,1056)

# Risk of Disease Transmission in COVID-19 Patients following Onset of Illness (n=18)

C Aggregated Ct Values



- High viral load detected soon after symptom onset upto day 21 of illness onset
- More in nose than throat
- Viral shedding similar to Influenza as opposed to SARS

(NEJM, DOI 10,1056)



# Asymptomatic Stage in COVID-19

- China Surveillance record of 72,314 cases shows 1.2% asymptomatic cases
- Diamond Princess ship with 3712 crew and staff reported 2.9% asymptomatic cases

# Role of Asymptomatic COVID-19 Cases in Disease Transmission

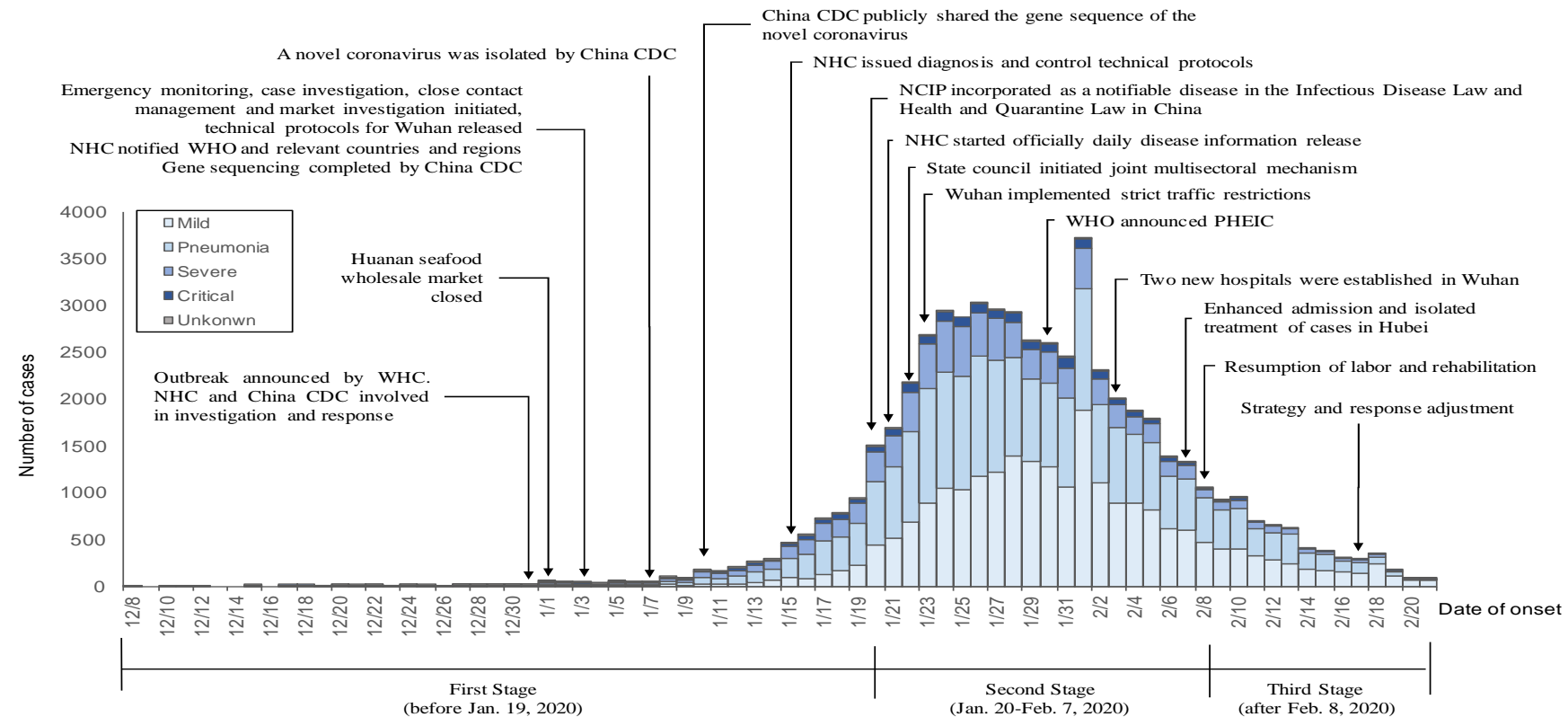
## Findings from two case reports indicate possibility of transmission in asymptomatic stage

A familial cluster of 5 patients in Anyang, China, had contact before their symptom onset with one asymptomatic family member who had traveled from the epidemic center of Wuhan. Asymptomatic patient turned PCR positive 20 days after contact with index case (JAMA, Feb 21,2020)

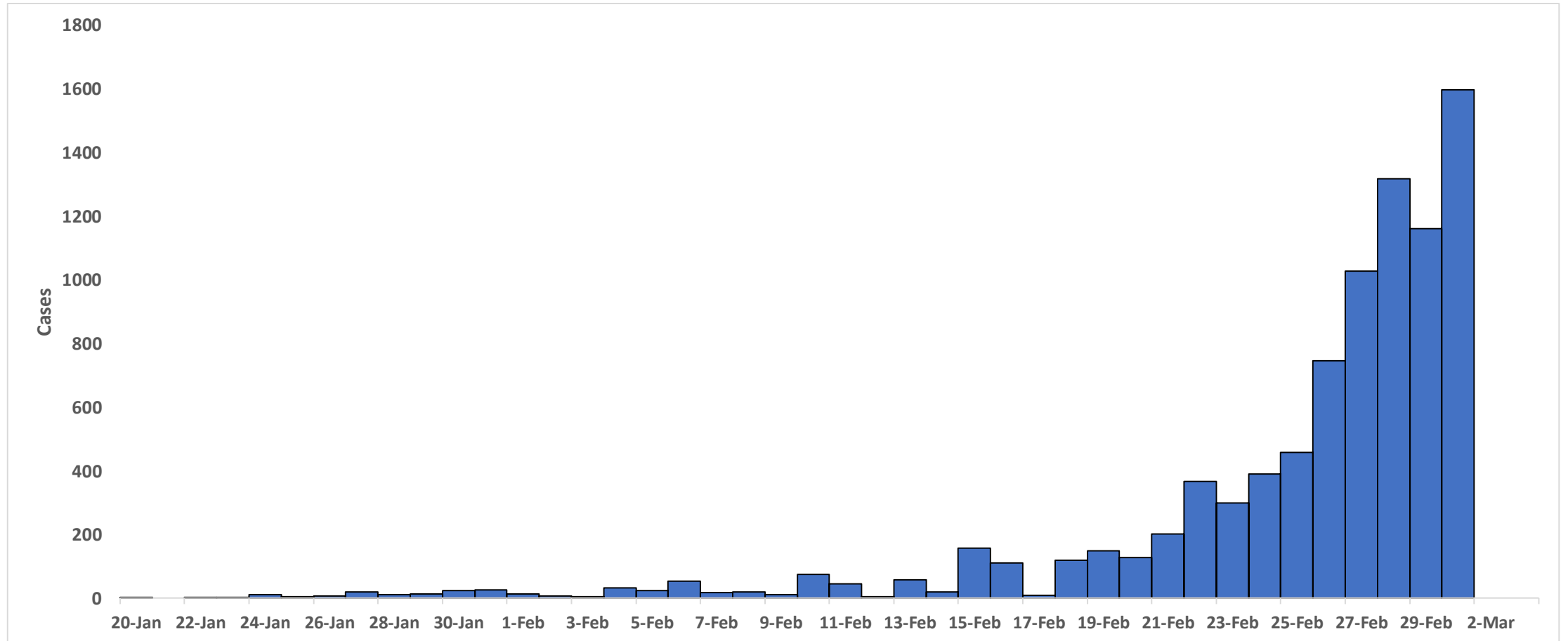
Two family cluster of 18 cases in Guangdong were examined for viral load in specimens, one asymptomatic contact turned PCR positive 7 days after contact (NEJM, DOI10,1056)

## Possible viral shedding and role of asymptomatic cases in driving transmission by in community

# COVID-19 Epidemic Curve and Major Interventions implemented in China

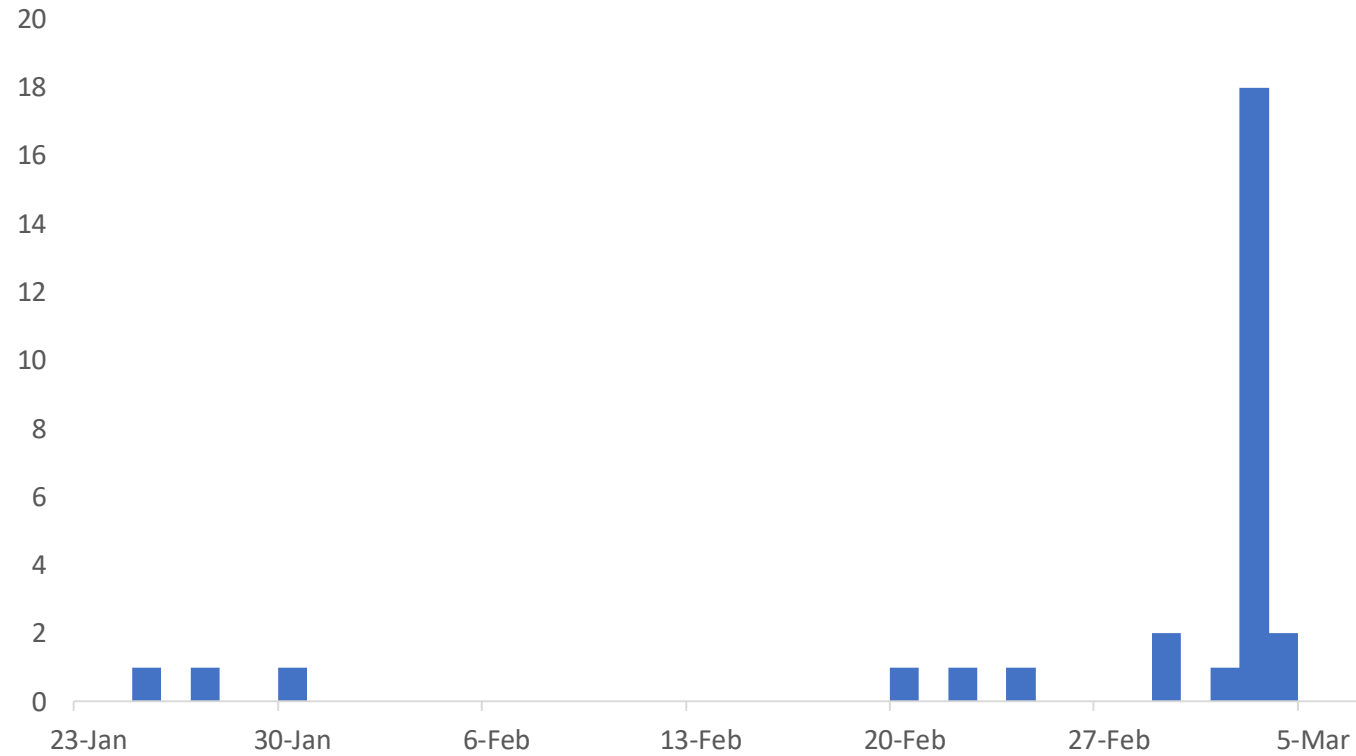


# COVID-19 Epidemic Curve outside China



Source: WHO Sitrep

# COVID-19 Epidemic Curve, India (n=29)



# COVID-19 Epidemic Curve, India (n=29)

- Median age: 37 years
- Range: 20-77 years
- Males: 59%
- Proportion with history of travel: 83%

# Conclusions

- COVID-19 respiratory pathogen, easily transmissible from person to person
- Elderly and co-morbid are high risk
- Cases rising outside China, including India, with limited local transmission
- Containment for elimination possible
  - Case management
  - Contact tracing
  - Health system strengthening (isolation wards, medical supplies)
  - Public risk communication

Thank you