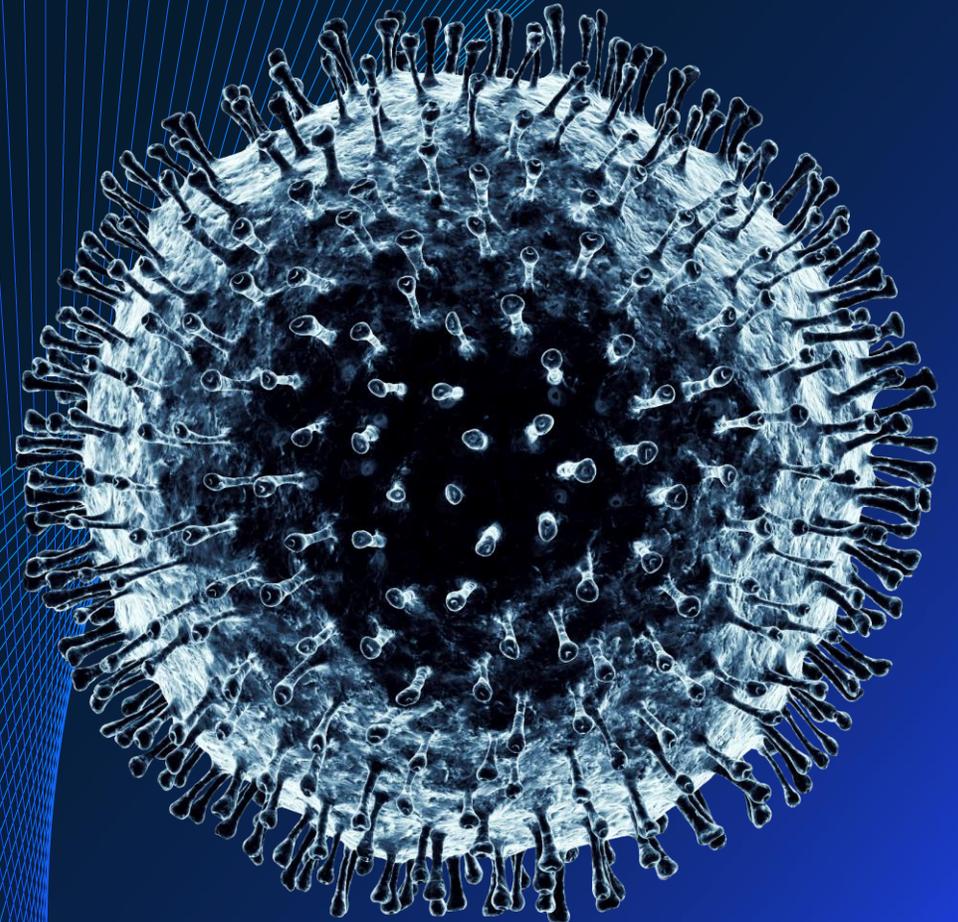


McKinsey  
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# Coronavirus COVID-19: Facts & Insights

Updated: February 25, 2020

Global Health + Crisis Response



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- **COVID-19 is, first and foremost, a humanitarian challenge.** COVID-19 has affected communities on multiple continents, with over 2,700 deaths out of over 80,000 reported cases. To date, Wuhan and Hubei province have been the most affected locations. Thousands of health professionals are heroically battling the virus, putting their own lives at risk. Overstretched health systems mean that Wuhan and Hubei will need time and help to return to a semblance of normalcy.
- **Solving the humanitarian challenge is the top priority.** Much remains to be done globally to respond and recover, from counting the humanitarian costs of the virus, to supporting the victims and families, to developing a vaccine.
- **This document is meant to help with a narrower goal: provide facts and insights on the current COVID-19 situation to help decision-makers understand best practices.** In addition to the humanitarian challenge, there are implications for the wider economy, businesses, and employment. This document sets out some of those challenges and how organizations can respond in order to protect their people and navigate through an uncertain situation.

# Executive summary (February 25, 2020)

- **The COVID-19 outbreak continues to impact Hubei, but 24<sup>th</sup> February, 2020 saw a new inflection point for the epidemic. New cases for the day outside China (282 new cases) exceeded new cases inside China (220 new cases) for the first time since the start of the outbreak.** Although daily incremental case growth within China may fluctuate, it has declined 88% over the last 7 days in spite of the economy slowly restarting – a sign that China’s attempts to contain the disease within Hubei may be yielding results. While Hubei continues to be impacted with overstretched health systems, the recent arrival of nearly 30,000 medical professionals to the area is making a difference, and new case growth and fatality rates may start to come under control over the next 4-6 weeks.
- **With the rise in cases in East Asia (esp. S. Korea), Middle East (esp. Iran), and Europe (esp. Italy), there are now four ‘transmission complexes’ in which COVID-19 is currently active.** In total, countries now affected represent nearly 40% of the global economy. Deep economic connections and historical people movements within these complexes could make it difficult (though not impossible) for regions to fully seal off intra-complex transmission. While we have no evidence that the virus is currently circulating in Africa, many health experts are concerned that continuing operation of travel routes between Africa and China could seed an outbreak that would be tough to control.
- **In our refreshed base case scenario:**
  - Individual countries in each of the four transmission complexes make aggressive attempts to contain the spread of COVID-19. While this action reduces the spread of the disease, it does not prevent continued discovery of “disease leakage” across the transmission complex, which would undermine public confidence in the ability of regional health institutions to control the spread of the virus (e.g., new cases are discovered across continental Europe, though these are limited in number).
  - The disease does not break past the existing transmission complexes, preventing it from advancing towards a full pandemic (e.g., US does not experience widespread community transmission of the virus).
  - The news of the disease being active in new countries drives conservative actions by governments, firms, and individuals that increases the potential for a global recession, and delays economic recovery.
- **What business decision-makers need to do:**
  1. Ensure safety and care for their employees and create purpose for the organization, including by supporting response efforts
  2. Create pragmatic, trigger-based contingency plans for the global impact scenario – in particular, (i) sustained case transmission across Europe; (ii) development of high risk features (e.g., virus persist beyond change in season) and start to enact it through a nerve center

# COVID-19

Latest epidemiological information as of February 25, 2020

## Impact to date

LAST UPDATED: Feb 24, 2020

**>80,000<sup>1</sup>** Reported confirmed cases

**2,700+<sup>1</sup>** Deaths

**34<sup>1</sup>** Countries affected

## Features of disease to date

**1.5-2x** Higher transmission compared to the flu<sup>2</sup>

**Up to 20%** Patients have severe disease

**<1/40** Patients die; fatality rates are significantly lower outside Hubei

**84%** New reported cases are in China in the last week

**>140** New reported cases daily outside China for the last 7 days<sup>4</sup>

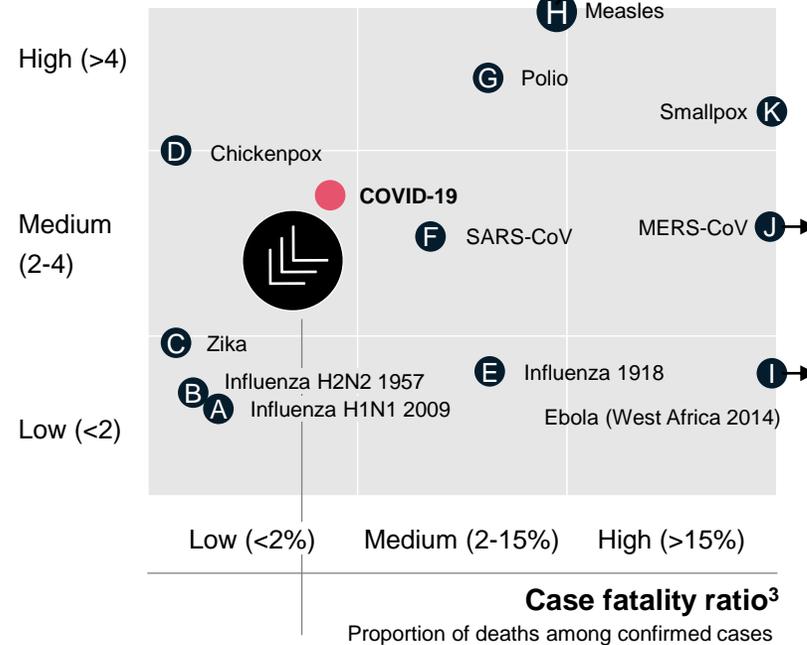
**16** Countries with any evidence of community transmission (Highest: China, S. Korea, Italy, Iran, Japan, Singapore)

**~1/2** Proportion of affected countries with new cases in the last 7 days<sup>4</sup>

## Comparison to other diseases

### Reproduction number<sup>5</sup>

The average number of individuals infected from each infected individual



**Identification of cases early** in the disease (i.e., with fewer symptoms), **intensification of viral control methods**, and **deployment of treatments** (when available) will drive down the reproduction number and reduce case fatality

## Global considerations

### China outside Hubei:

- Daily incremental case count remains low for the last 7 days; <1 reported cases per million
- The number of confirmed cases reported is generally trending down

### Outside China:

- Community transmission suspected in at least 5 locations: South Korea, Japan, Singapore, Italy and Iran; cases still under investigation to track source of infection
- Oversight intensifying in weaker health systems less capable of handling outbreak

1. Latest numbers are available from a number of sources, including daily situation reports from the World Health Organization

2. Evidence on exact numbers are emerging, however expected to decrease as viral containment measures intensify and treatments are developed

3. Case fatality numbers are reflective of the outbreak setting and depend on a number of factors, including patient's age, community immunity, health system capabilities, etc. This graphic aims to offer a broad comparison

4. Excluding cruise ship

5. In outbreak setting or at the beginning of the introduction of a new disease

# Wuhan and Hubei continue to be deeply impacted...

The epicenter of the outbreak is facing emergency conditions and will need time to return to normalcy

## Humanitarian toll and economic impacts are high

- ~59M** Individuals under quarantine
- 200+** New confirmed cases daily<sup>1</sup>
- 1,700** Health worker infections
- 9%** Wuhan automotive GDP shut down
- 400+** Publicly traded companies shut down<sup>2</sup>

## A large effort is underway to regain control...<sup>3</sup>

- **42** designated hospitals
- **21,574** beds to treat patients (19,049 in use)
- **10,317** additional beds at shelters to handle patients with lighter symptoms (7,299 in use)
- **27,387** medical staff from across China have come to Wuhan to provide support

## ...but Wuhan and Hubei will need time to return to normalcy

- **Infection rates remain high** – Hubei has had between 200-800 infections every day for the last 5 days – far higher than 50-100 for the rest of China combined
- **Fatality rates are more than 3 times higher in Hubei** relative to the rest of China – indicative of a stretched medical system and / or changing virus characteristics
- Once these measures are under control, Hubei will need time to **lift the quarantine, disinfect and restart safely**

1. Refers to reported cases using new confirmed case definition, including clinical feature and laboratory-confirmed, latest available information available from a number of sources  
 2. As per Bloomberg, companies engaged in supply chain production  
 3. Latest update from 2/20/2020

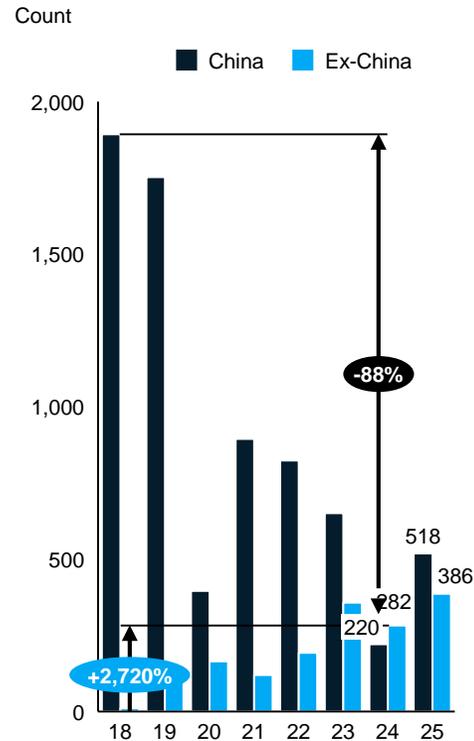
# ...but Feb 24<sup>th</sup> represented an inflection point for COVID-19

Whereas case growth will still fluctuate, outside China exceeded in-China cases for the first time

● Towns in quarantine ■ >250 reported cases ■ 100-249 reported cases ■ 50-99 reported cases ■ 10-49 reported cases ■ <10 reported cases

## Countries with confirmed community transmission

### Daily incremental reported cases



### South Korea

The government raised COVID-19 alert to its 'highest' level as confirmed cases surpass 600



**977** Reported confirmed cases  
**949** Reported cases in the last 14 days  
**10** Reported deaths

Measures implemented by the South Korean government

- Closure of schools
- Reduced travel operations
- Rapid response team for cluster investigation (e.g. linked to a religious group)

### Japan

Japan is under pressure to act due to the upcoming Tokyo 2020 Summer Olympics



**157** Reported confirmed cases  
**131** Reported cases in the last 14 days  
**1** Reported deaths

Measures implemented by the Japanese government

- Travel restrictions
- Postponing preparations for the Tokyo 2020 Summer Olympics (e.g. Volunteer training)

### Italy

The number of cases in two northern regions is rising and several towns are under strict quarantine



**229** Reported confirmed cases  
**226** Reported cases in the last 14 days  
**6** Reported deaths

Measures implemented by the Italian government

- Schools and universities closed
- Public Events stopped (e.g. Venice carnival)
- Towns under full quarantine with curfew

### Singapore

Singaporean Prime Minister Lee fears that the coronavirus could bring a recession



**90** Reported confirmed cases  
**45** Reported cases in the last 14 days  
**0** Reported deaths

Measures implemented by the Singaporean government

- Travel restrictions (e.g. air borders closed with mainland China)
- School policies implemented (e.g. no assemblies)
- Policies to limit profiteering in place (e.g. price increase of surgical masks)

### Iran

Iran health officials are working to identify source of outbreak and have asked for limits on mass gatherings in affected areas



**43** Reported confirmed cases  
**43** Reported cases in the last 14 days  
**8** Reported deaths

Measures implemented by the Iranian government

- Schools, universities and cultural centers closed
- Surrounding countries responded with border closure (e.g. Armenia, Afghanistan, Iraq)

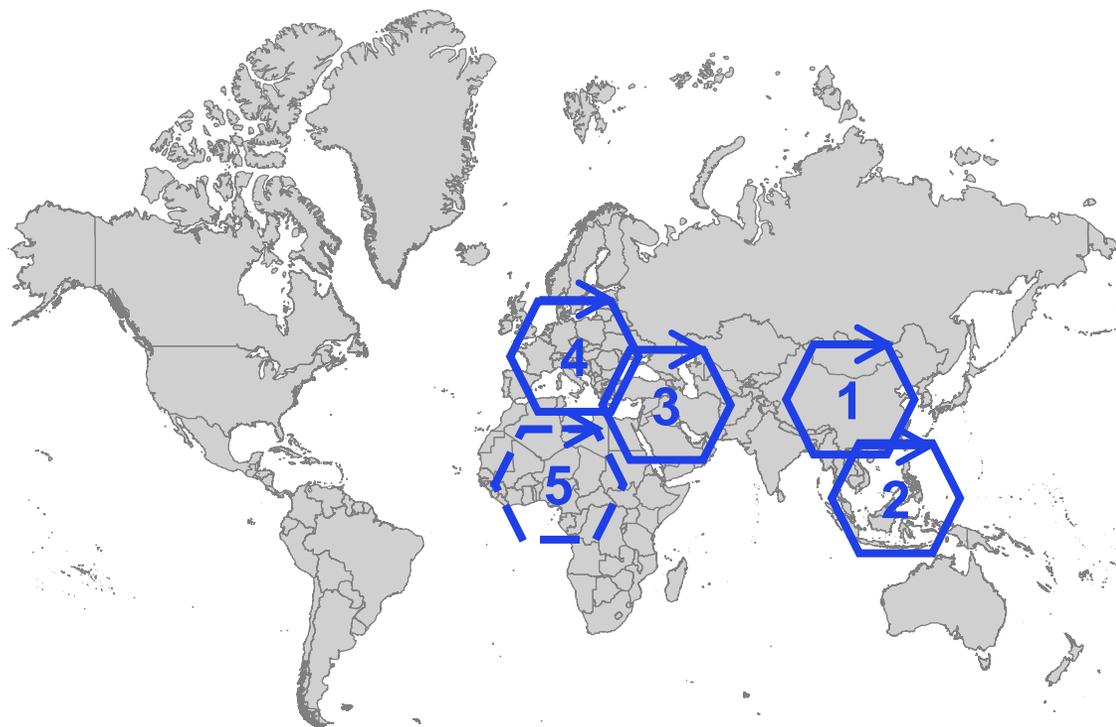
1. Governmental press briefing on 24 Feb 2020 by Italian Civil Protection Department  
 2. Confirmed cases of coronavirus in South Korea as of February 24, 2020 according to Yonhap News

# There are 4 COVID-19 transmission complexes to monitor globally

A complex combines confirmed community transmission with tough-to-prevent people movement

There are four economic complexes around the world where COVID-19 is now confirmed.

Deep economic integration and regular human & material movements mean that it will be tough to limit virus propagation within these complexes



## China complex: Mature propagation

Disease continues to impact Hubei, but stringent public health measures (and the ability to enforce them more comprehensively) has meant that cases in the rest of China are low (under 100 cases/ day), and trending down in spite of measured economic activity restart



## East Asia complex: Early propagation

Multiple countries with strong health care systems are seeing sustained community propagation (Singapore, S. Korea, Japan). Concerns around “case leakage” (i.e., lack of confidence that every possible transmission has been identified and is being treated) are persisting. While emergency measures are being placed, the ability of these countries to have a comprehensive quarantine is limited



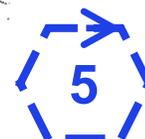
## Middle East complex: Early propagation

Iran is closely connected to its neighboring countries (e.g., Iraq, Syria, Afghanistan, Yemen) with frequent people and material movement (e.g., for pilgrimages) across porous borders. While there aren't many cases detected to date (under 100), there is a limited health infrastructure available to track every case down



## Western Europe: New propagation

Italy represents the first European case of sustained community transmission. While quarantine is being attempted across Northern Italy, there are concerns around leakage, and any sustained quarantine will prove challenging to execute. Effective clampdown on cross-border people movement is politically and economically difficult



## Africa complex: No reported propagation

While we have no evidence that the virus is circulating in Africa, health experts globally continue to be concerned about the possibility of an outbreak on the continent, partially because travel hubs connecting into China (e.g., Addis Ababa) continue to operate throughout the period of propagation of the virus

# COVID-19 propagating in countries that represent 32% of global GDP

CURRENT AS OF FEB 25, 2020

Country <sup>1</sup>	GDP		Case counts
	\$Tn	% of global	
China	13.61	16.1	77,000
South Korea	1.62	1.9	605
Italy	2.08	2.5	290
Japan	4.97	5.9	104
Singapore	0.36	0.4	65
Iran	0.45	0.5	28
Germany	3.95	4.7	14
<b>Total</b>	<b>27.04</b>	<b>32</b>	<b>~78,000</b>



- Even limited propagation within the Europe complex (e.g., to France, Germany), and concern around “case leakage” could cause **large behavior changes by governments, firms, and individuals** (e.g., curtailment of travel)
- Regardless of the precise clinical situation, such actions could easily **drive a global economic impact that takes longer to recover from** relative to previous estimates

1. Defined as countries showing at least 10 cases of in-country transmission

# Three scenarios for how COVID-19 could evolve

Different scenarios as part of contingency planning – what you have to believe

## Quick recovery

- Late Q1** Ex-Hubei China economic restart >80% complete, with most migrant workers returning
- Late Q1** Hubei starts to return to normalcy; result of a large-scale health response having an effect
- Late Q1** Community transmissions in East Asia and Europe are brought under control
- Early Q2** Community transmissions in Middle East are controlled  
Consumer confidence starts to return, even in setting of sustained transmission, due to lower case fatality ratio, case growth slowdown, promising treatment options
- Mid Q2** Cases peak in multiple regions; evidence mounts that the virus is not resilient to seasonality  
Aviation, tourism, hospitality sectors back to normal as countries lift travel bans

**Intra-complex transmission contained; economic impact mostly restricted to Q1**

## Global slowdown (BASE CASE)

- Late Q1** Ex-Hubei China restart >80% complete, with most migrant workers returning
- Early Q2** Hubei starts to return to normalcy; result of a large-scale health response having an effect
- Early Q2** East Asia, Middle East and Europe transmission complexes all see continued case growth until early Q2, contributing to perception of “leakage,” causing significant impact on economic growth in all three regions; early Q2 is the first time they see a reduction in new cases
- Mid Q2** Consumer confidence starts to return, even given evidence of sustained transmission, due to lower case fatality ratio, case growth slowdown, promising treatment options
- Q3** Aviation, tourism, hospitality start return to normalcy as countries, corporations, lift travel restrictions

**Sustained intra-complex transmission; impact drives a global slowdown in 2020**

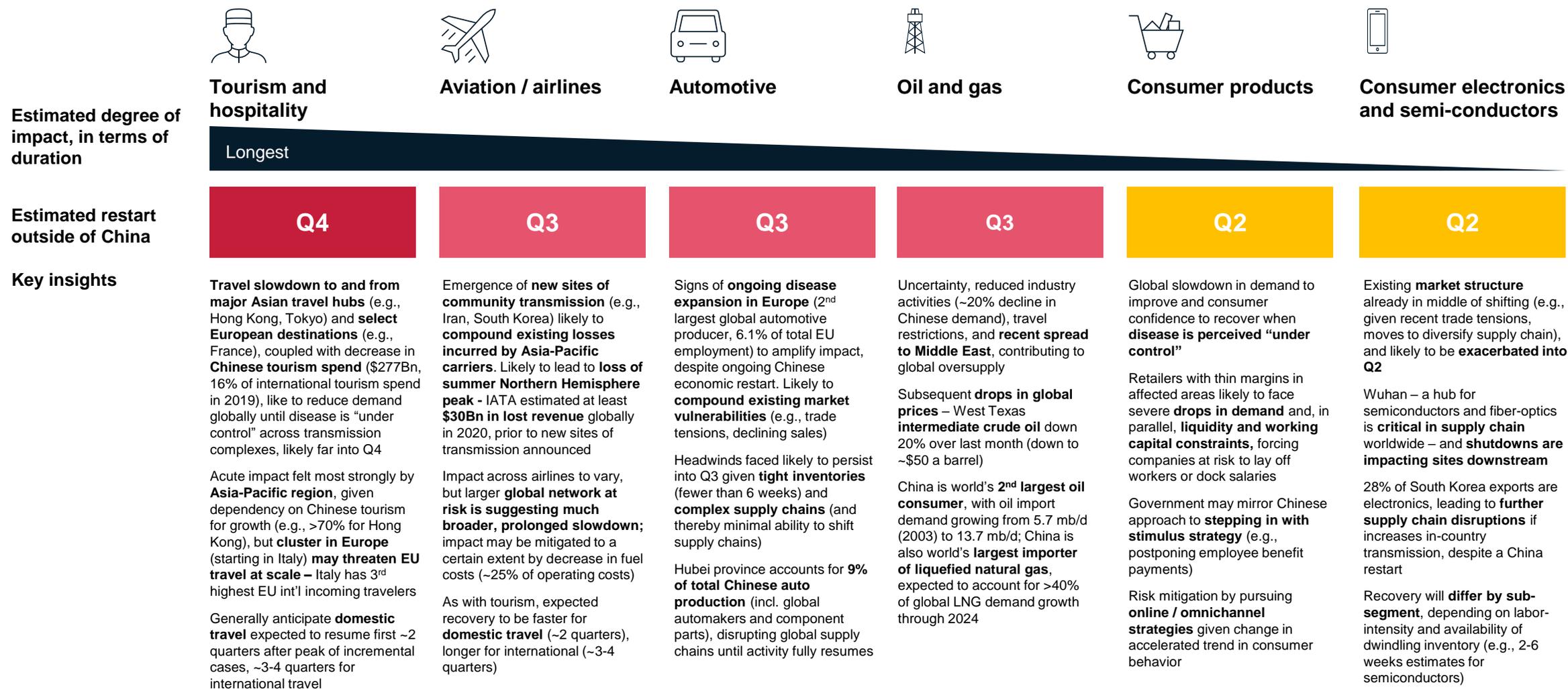
## Global Pandemic & recession

- Late Q1** Ex-Hubei China restart >80% complete, with most migrant workers returning
- Early Q2** Hubei starts to return to normalcy; result of a large-scale health response having an effect
- Mid Q2** East Asia, Middle East and Europe transmission complexes all see continued case growth until mid Q2, potentially with less robust health / containment response
  - Significant impact on economic growth in all three regions; mid Q2 is the first time they see a reduction in new cases
- Mid Q2** Disease expands to other parts of the world, including confirmed transmissions in North America, Africa and India
- Late Q4** Consumer confidence remains low, and air travel restrictions remain in place until late 2020

**Transmission jumps, new complexes; global pandemic drives a recession in 2020**

# All sectors are experiencing consequences, with several sectors likely to be most heavily impacted – through Q2 2020 and beyond

Preliminary views based on base case – Subject to change as the COVID-19 outbreak evolves



# Immediate actions to consider in response to COVID-19

## One-stop checklist for COVID-19 planning actions

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### Protect employees

- Follow the most conservative guidelines available among leading global & local health authorities (e.g., CDC, WHO)
- Communicate with employees frequently and with the right specificity; support any impacted employees per health guidance
- Benchmark your efforts (e.g., some companies have started to curb non-essential travel)

### Stand-up a cross-functional COVID-19 response team

- Overall lead should be at the CEO or CEO-1 level; team should be cross functional & dedicated
- 5 workstreams: a) employees, b) financial stress-testing & contingency plan, c) supply chain, d) marketing and sales e) other relevant constituencies
- Define specific, rolling 48 hour, 1 week goals for each workstream based on planning scenario
- Ensure a simple but well managed operating cadence and discipline. Output & decision focused. Low tolerance for “meetings for the sake of meetings”
- Minimum viable products: a) Rolling 6 week calendar of milestones; b) 1-page plans for each workstream; c) dashboard of progress & triggers; d) threat map

### Workstream based goals (other than employees)

#### Financial stress-testing & contingency plan

- Define scenarios that are tailored to the company. Identify planning scenario
- Identify variables that will impact revenue and cost. For each scenario, define input numbers for each variable through analytics and expert input
- Model cash flow, P&L, balance sheet in each scenario; identify input variable triggers that could drive significant liquidity events (incl. breach of covenants)
- Identify trigger based moves to stabilize organization in each scenario (A/P, A/R optimization; cost reduction; portfolio optimization through divestments, M&A)

#### Supply Chain

- Define extent & timing of exposure to areas that are experiencing community transmission (Tier 1, 2, 3 suppliers; inventory levels)
- Immediate stabilization (critical parts rationing, optimize alternatives, pre-book rail/ air freight capacity, after-sales stock as bridge, increase priority in supplier production, support supplier restart)
- Medium/ longer-term stabilization (updated demand planning & network optimization – solve for cash, accelerated qualification for alternative suppliers, drive resilience in supply chain)

#### Marketing & Sales

- Immediate stabilization (inventory planning, near-term pricing changes, discounts)
- Medium/ longer-term stabilization (investment & micro-targeting for priority segments with long-term growth)

### Practice plan with top team through in-depth table-top exercise.

- Define activation protocol for different phases of response (e.g., contingency planning only, full-scale response, other)
- Key considerations: Clarity on decision owner (ideally a single leader), roles for each top team member, “elephant in room” that may slow response, actions & investment needed to carry out plan

### Demonstrate purpose

- Support epidemic efforts where possible

# Supply chain actions to consider in response to COVID-19

## Immediate (2-4 weeks)

### Understand exposure

1. **Determine truly critical components** and understand risks of tier 1 to tier 2 suppliers onwards
2. **Define current inventory buffer** and locations<sup>1</sup>
3. **Identify origin of supply** (i.e. Hubei/ Wuhan) to identify severity of risk
4. **Conduct scenario planning** to understand financial and operational **implications in prolonged shutdown** (scenarios 2 and 3)
5. **Work with S&OP to get 3-6 month accurate demand signal** segmenting likely to be impacted demand to **determine required supply**

### Take action to address anticipated shortages

6. **Look to ramp up now on alternative sources** if supplies are in Hubei and accelerate exploration of additional options
7. **Pre-book air freight<sup>2</sup> / rail capacity** as required by current exposure
8. **Optimize limited production** determining highest margin and highest opportunity cost / penalty production
9. **Collaborate** with all parties to **jointly leverage freight capacity, new/alternate supply** sources, etc.
10. **Watch for extending lead times** to gauge performance and capacity against supplier promises
11. **Use after sales stock as bridge** to keep production running

### Ensure resources required to restart

12. **Work with supplier to source personal protective equipment for production lines** operating in affected markets (e.g. glasses, gloves and masks)
13. Engage with crisis communication teams to **clearly communicate to employees** on infection risk concerns (e.g., disseminate facts about virus from credible source) and work from home options
14. **Consider short-term stabilization for suppliers** (e.g., low-interest loan) to allow for a faster restart

### Understand additional options

15. **Determine what portion of supply can be swung to another site** if shutdown persists **based on sourcing strategy** (single, dual, multi)
16. **Identify ways to expedite qualification process** and/or insource
17. **Determine possible geographies and supplier shortlists** utilizing a clean-sheet tool or industry developed tools in case alternate supply is required



## Mid-term (3-4 months)

### Continuously improve material supply stability

Evaluating **alternative sourcing options for all the materials impacted** –availability of suppliers, additional cost due to logistics, tariffs, estimate of price increase of the components

Determine **possible geographies and supplier shortlists** utilizing a clean-sheet tool or industry developed tools in case alternate supply is required

**Continuous support the mid-small size tier 2-3 suppliers** in financial troubles

### Kick off designing resilient supply chain for the future

Establish a **supply chain risk function**

Trigger the new supply network **design for resilience**

**Codify the processes and tools** created during the crisis management as formal documentation

Convert war room into a **reliable risk management process**

### Build collaborative relationship w/ ext. partners

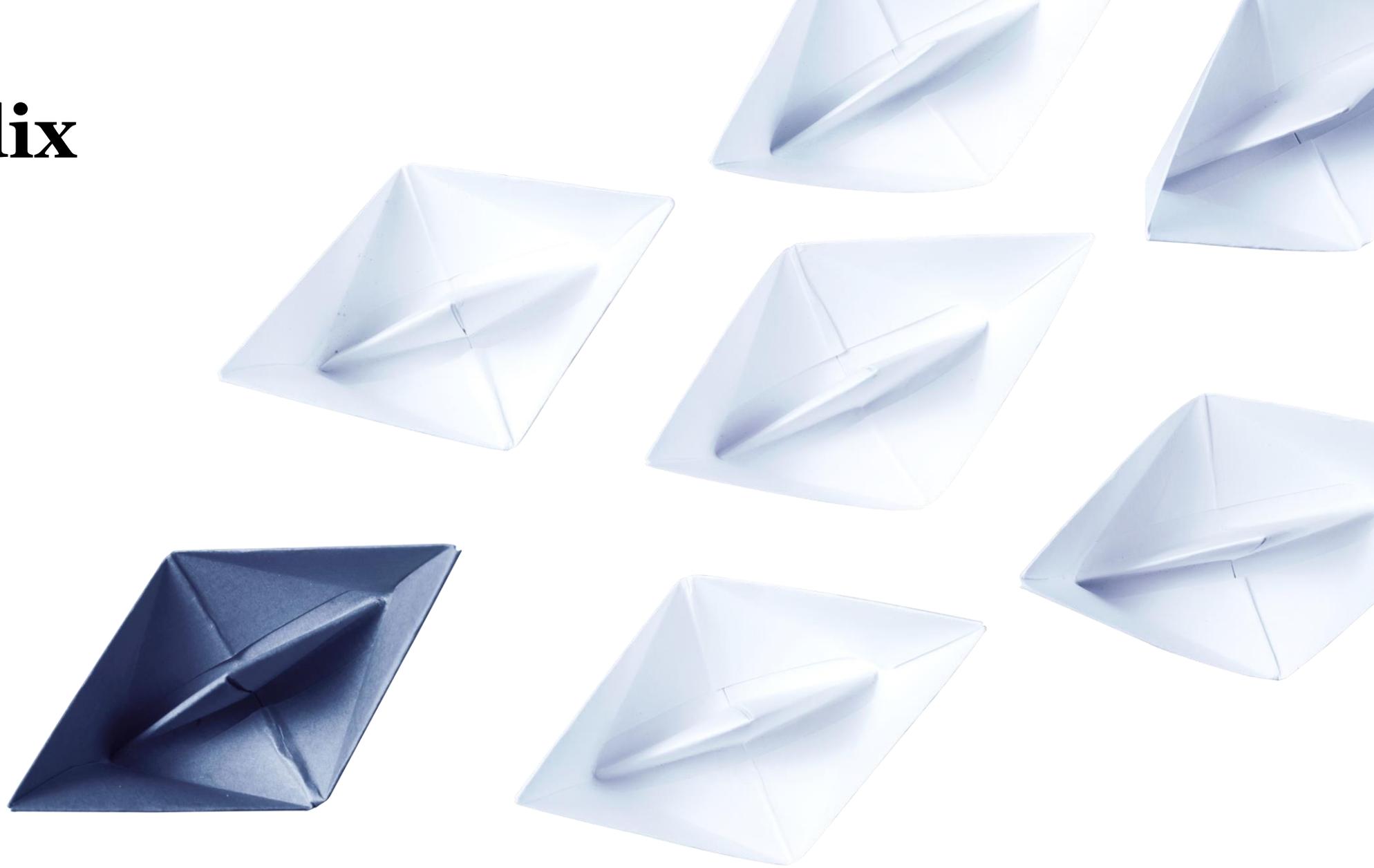
Work with government for the **potential tax benefits**

**Actively engage investors** and other stakeholders to build transparency on the situation and get help

1. Buffer stock from Chinese New Year may provide a cushion and potential false sense of security. Impact likely to be felt first in JIT supply chains (e.g. automotive).

2. Given costs, airfreight might not be an option for many industries; availability is already limited

# Appendix



# Medical Supply Chain Deep Dive: PPE

Personnel protective equipment is experiencing a demand surge



**There is a major supply shortfall in affected areas, where healthcare needs are compounded by general public ordering surgical masks, seeking to maximize preventive measures**

- Frontline response requires 7% to 10% of total market capacity to protect China's healthcare workers
- Stockpiles of advanced medical masks (N95 masks) are depleted; there is a 4- to 6-month backlog as global stocks are insufficient to meet the needs of frontline healthcare workers
- City of Xiaogan - the second-worst hit city in Hubei - faces a shortfall of 24,000 protective gear, 60,000 masks, as well as 15,000 goggles and face shields



**Typical supply is from China and Taiwan, but many factories in affected areas have not yet reopened due to restrictions**

- Media has reported limits on mask exports, with companies prioritizing domestic need
- Prestige Ameritech, a Texas company, received orders from governments of Hong Kong, Singapore, and Taiwan
- Chinese and Taiwanese manufacturers typically source parts for masks and respirators from variety of countries so limitations on transport in and around China will prevent quick turnaround
- Some companies have taken the decision to only supply masks to medical professionals, given limited stock of PPE and high demand among non-medical staff



**Alternative supply is from companies in USA and Europe, but are facing challenges to ramp up their production**

- Small players are ramping up production and using automation (e.g., Pardam, Czech company sold out of entire stock of 2000 masks in 1 week)
- Case study: Kolmi Hopen, a manufacturer in France, makes about 170 million masks a year, but received orders for a half a billion in first week of February

## 100X

Higher demand for PPE

## 20X

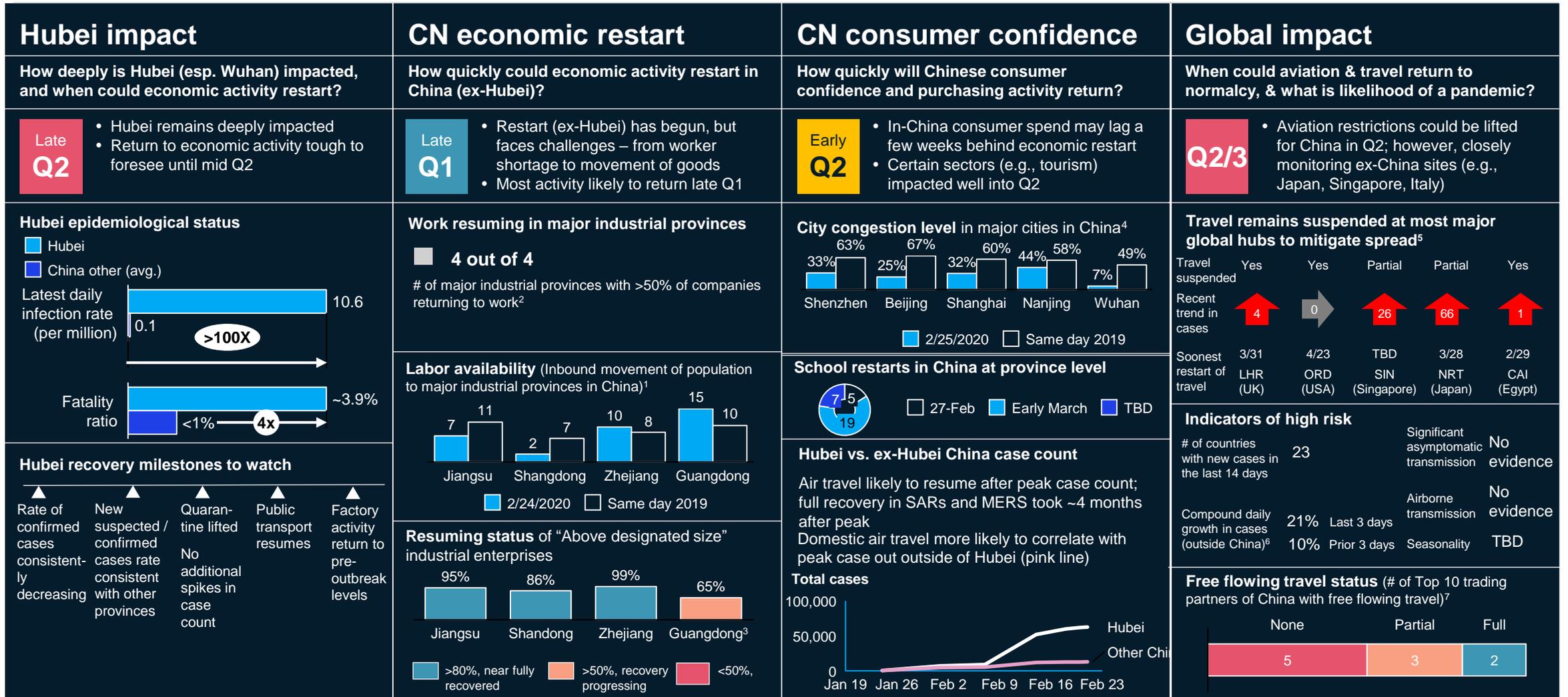
Increase in price

## 4-6 mths

Backlog for advanced medical masks

# COVID-19 Leading Indicator Dashboard

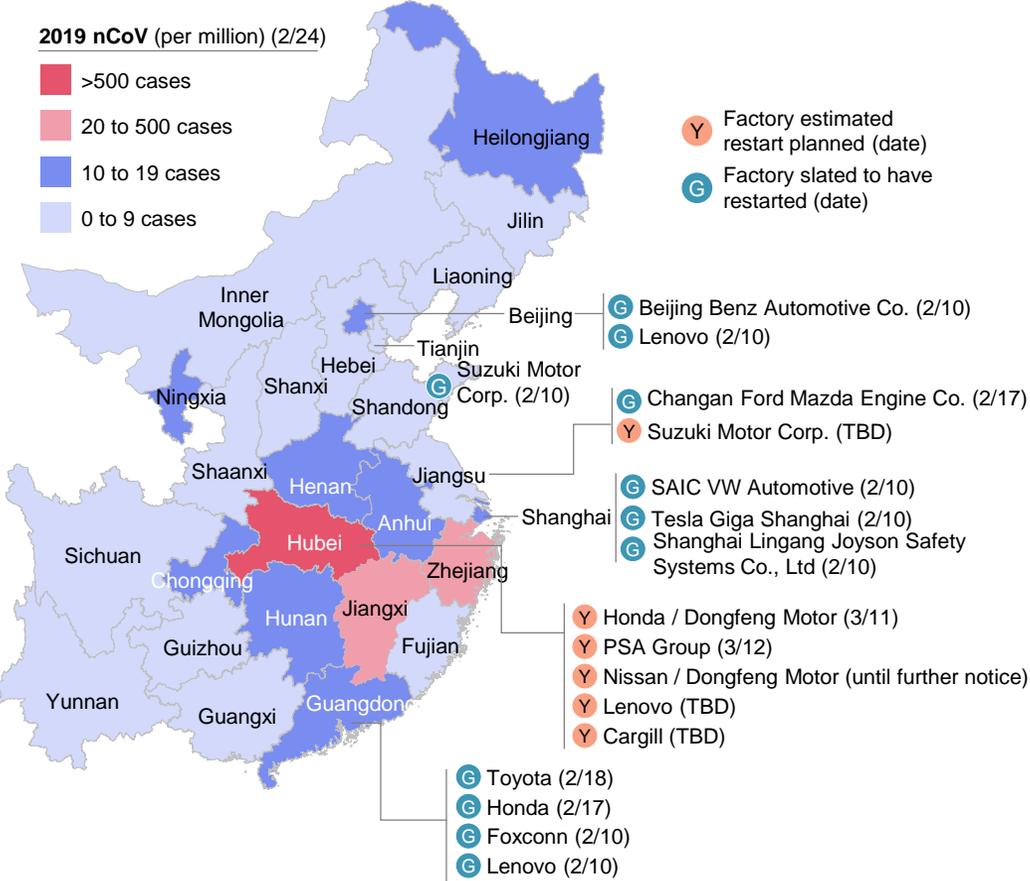
Currently tracking towards restart in China, but likelihood of global outbreak has increased in last week



1. Measures movement of population into destinations as of 2/20/2020; 2. Shandong, Jiangsu, Guangdong, and Zhejiang; 3. Latest data from Guangdong and Jiangsu as of 2/20, Zhejiang as of 2/19, and Shandong as of 2/18; 4. Car traffic only. Congestion level measures % increase in travel time compared to free flow condition; 5. Air travel data based of major carriers in each airport, British Airways, United, Singapore Airlines, Garuda Airlines, EgyptAir respectively; trend is based on week over week values based on latest data available; 6. China updated definition of confirmed cases on 2/13/20 to include people diagnosed by clinical criteria and diagnostic kits instead of diagnostics kits only, which may impact these statistics; calculated where  $(FV/PV)^{\wedge}(1/days) - 1$ ; 7. United States, European Union, Japan, South Korea, Australia, Vietnam, Malaysia, Brazil, India, Russia; Full represents no restriction, partial represents restricting some travelers or ports of entry, none represents complete closure of ports of entry

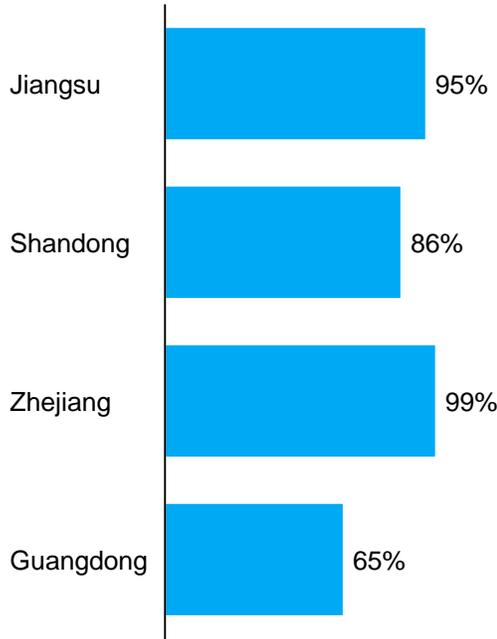
# Outside Hubei, China is attempting to restart, but this may be slow

Many examples of factories restarting have been reported along the eastern coast of China, away from the epicenter in Wuhan<sup>1</sup>



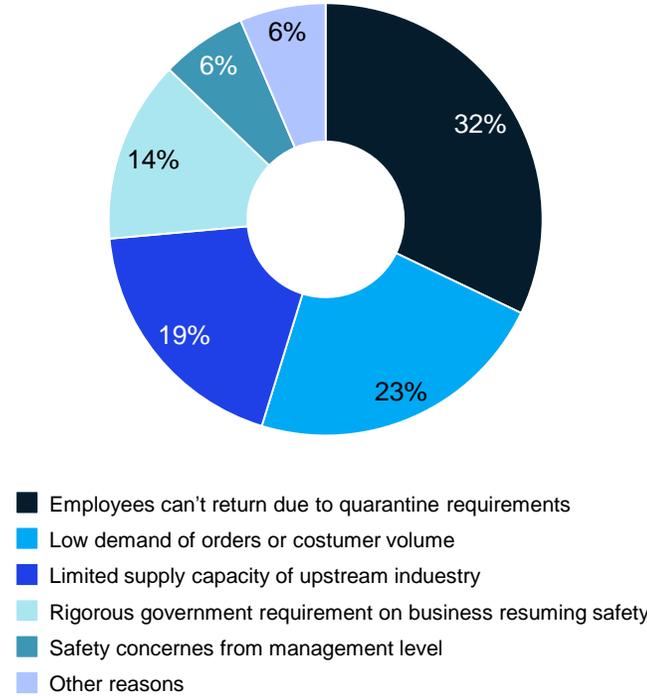
Large industrial enterprises and state owned companies are leading the way

Resuming status of "Above designated size" industrial enterprises<sup>2</sup>



Challenges being faced by organizations

% of responses on the single selection of "Which factor stopped business resuming"



1. Dates estimated given latest available information - situation rapidly unfolding and subject to change; 2. "Above designated size" (ADS) industrial enterprise is a definition by China Statistic Bureau, namely enterprises that has more than RMB 20 million annual main business income;