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Coronavirus COVID-19: Facts & Insights

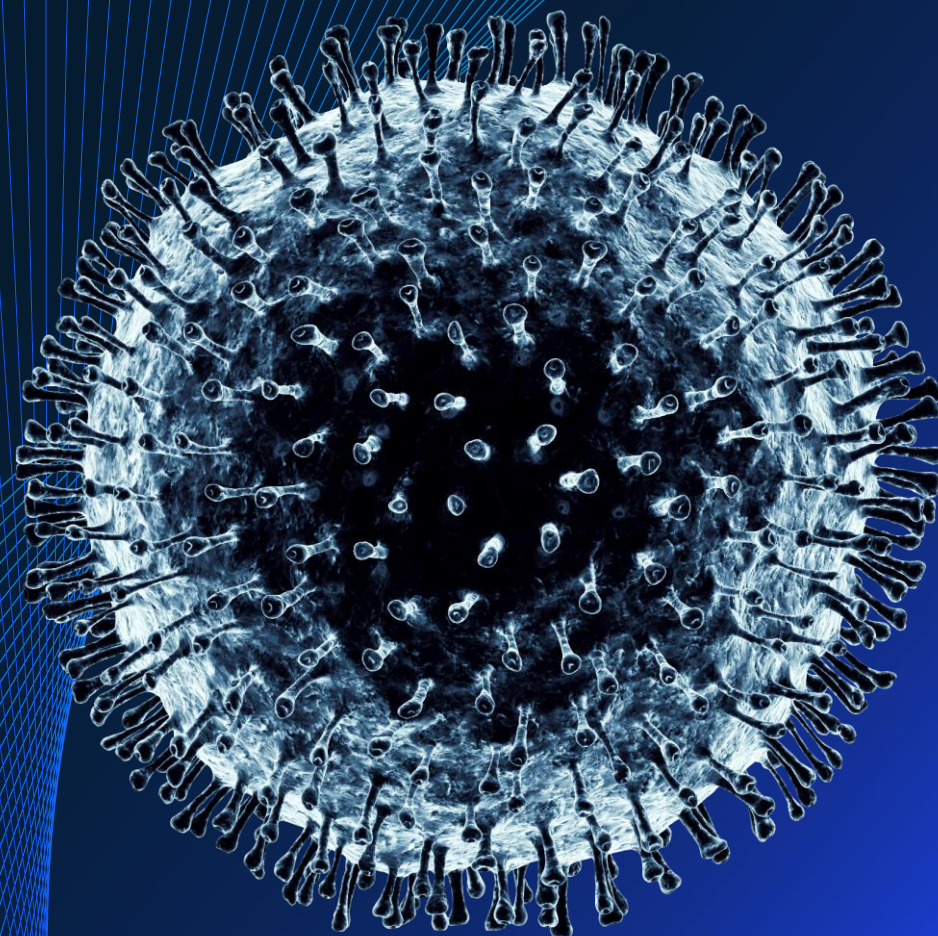
Updated: February 25, 2020

Global Health + Crisis Response

DOCUMENT INTENDED TO PROVIDE INSIGHT
AND BEST PRACTICE RATHER THAN SPECIFIC
CLIENT ADVICE

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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 24th 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

>80,000¹

Reported confirmed cases

2,700+¹

Deaths

34¹

Countries affected

Features of disease to date

1.5-2x

Higher transmission compared to the flu²

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 days⁴

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 days⁴

Comparison to other diseases

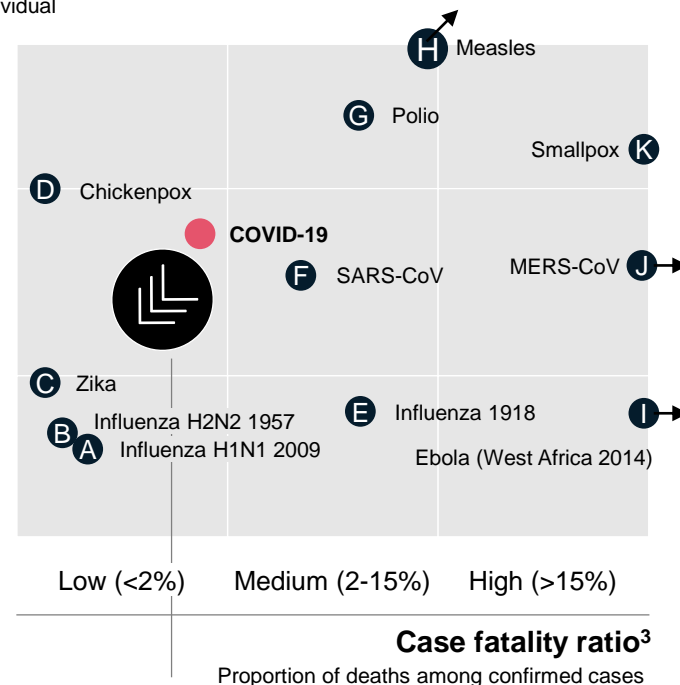
Reproduction number⁵

The average number of individuals infected from each infected individual

High (>4)

Medium (2-4)

Low (<2)



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 daily¹
- 1,700** Health worker infections
- 9%** Wuhan automotive GDP shut down
- 400+** Publicly traded companies shut down²

A large effort is underway to regain control...³

- **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

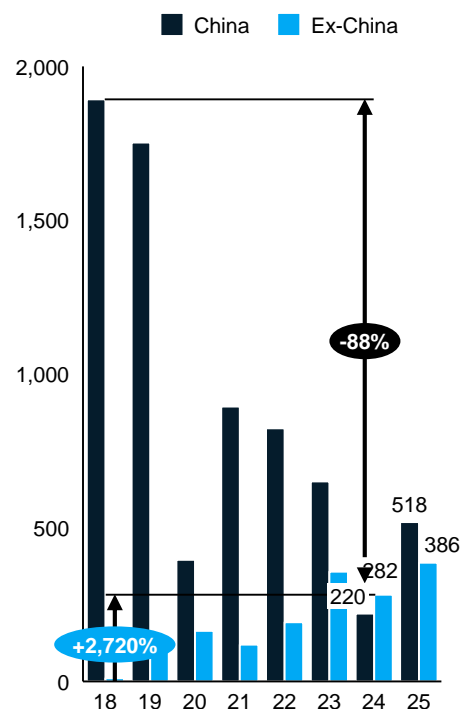
...but Feb. 24th represented an inflection point for COVID-19

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

Daily incremental reported cases

Count



Countries with confirmed community transmission

South Korea

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



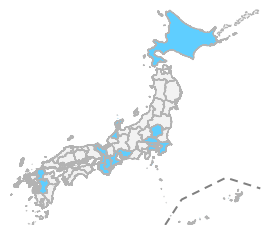
977 Reported confirmed cases
949 Reported cases in the last 14 days
10 Reported deaths

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



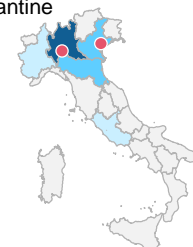
157 Reported confirmed cases
131 Reported cases in the last 14 days
1 Reported deaths

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)

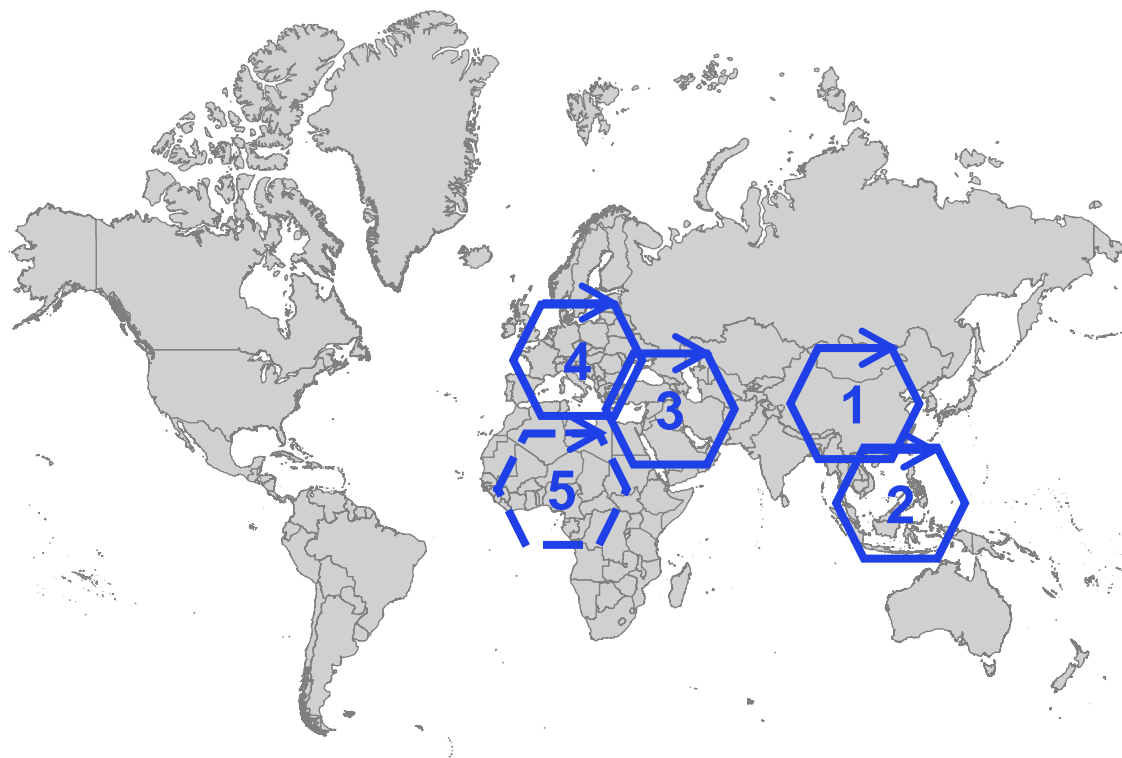
1. Governmental press briefing on 24 Feb 2020 by Italian Civil Protection Department
 2. Confirmed cases of coronavirus in South Korea as of February 24, 2020 according to Yonhap News

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 ¹	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
Total	27.04	32	~78,000



- 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

						
	Tourism and hospitality	Aviation / airlines	Automotive	Oil and gas	Consumer products	Consumer electronics and semi-conductors
Estimated degree of impact, in terms of duration	Longest					
Estimated restart outside of China	Q4	Q3	Q3	Q3	Q2	Q2
Key insights	<p>Travel slowdown to and from major Asian travel hubs (e.g., Hong Kong, Tokyo) and select European destinations (e.g., France), coupled with decrease in Chinese tourism spend (\$277Bn, 16% of international tourism spend in 2019), like to reduce demand globally until disease is “under control” across transmission complexes, likely far into Q4</p> <p>Acute impact felt most strongly by Asia-Pacific region, given dependency on Chinese tourism for growth (e.g., >70% for Hong Kong), but cluster in Europe (starting in Italy) may threaten EU travel at scale – Italy has 3rd highest EU int'l incoming travelers</p> <p>Generally anticipate domestic travel expected to resume first ~2 quarters after peak of incremental cases, ~3-4 quarters for international travel</p>	<p>Emergence of new sites of community transmission (e.g., Iran, South Korea) likely to compound existing losses incurred by Asia-Pacific carriers. Likely to lead to loss of summer Northern Hemisphere peak - IATA estimated at least \$30Bn in lost revenue globally in 2020, prior to new sites of transmission announced</p> <p>Impact across airlines to vary, but larger global network at risk is suggesting much broader, prolonged slowdown; impact may be mitigated to a certain extent by decrease in fuel costs (~25% of operating costs)</p> <p>As with tourism, expected recovery to be faster for domestic travel (~2 quarters), longer for international (~3-4 quarters)</p>	<p>Signs of ongoing disease expansion in Europe (2nd largest global automotive producer, 6.1% of total EU employment) to amplify impact, despite ongoing Chinese economic restart. Likely to compound existing market vulnerabilities (e.g., trade tensions, declining sales)</p> <p>Headwinds faced likely to persist into Q3 given tight inventories (fewer than 6 weeks) and complex supply chains (and thereby minimal ability to shift supply chains)</p> <p>Hubei province accounts for 9% of total Chinese auto production (incl. global automakers and component parts), disrupting global supply chains until activity fully resumes</p>	<p>Uncertainty, reduced industry activities (~20% decline in Chinese demand), travel restrictions, and recent spread to Middle East, contributing to global oversupply</p> <p>Subsequent drops in global prices – West Texas intermediate crude oil down 20% over last month (down to ~\$50 a barrel)</p> <p>China is world's 2nd largest oil consumer, with oil import demand growing from 5.7 mb/d (2003) to 13.7 mb/d; China is also world's largest importer of liquefied natural gas, expected to account for >40% of global LNG demand growth through 2024</p>	<p>Global slowdown in demand to improve and consumer confidence to recover when disease is perceived “under control”</p> <p>Retailers with thin margins in affected areas likely to face severe drops in demand and, in parallel, liquidity and working capital constraints, forcing companies at risk to lay off workers or dock salaries</p> <p>Government may mirror Chinese approach to stepping in with stimulus strategy (e.g., postponing employee benefit payments)</p> <p>Risk mitigation by pursuing online / omnichannel strategies given change in accelerated trend in consumer behavior</p>	<p>Existing market structure already in middle of shifting (e.g., given recent trade tensions, moves to diversify supply chain), and likely to be exacerbated into Q2</p> <p>Wuhan – a hub for semiconductors and fiber-optics is critical in supply chain worldwide – and shutdowns are impacting sites downstream</p> <p>28% of South Korea exports are electronics, leading to further supply chain disruptions if increases in-country transmission, despite a China restart</p> <p>Recovery will differ by sub-segment, depending on labor-intensity and availability of dwindling inventory (e.g., 2-6 weeks estimates for semiconductors)</p>

Immediate actions to consider in response to COVID-19

One-stop checklist for COVID-19 planning actions

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	<ol style="list-style-type: none"> 1. Determine truly critical components and understand risks of tier 1 to tier 2 suppliers onwards 2. Define current inventory buffer and locations¹ 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	<ol style="list-style-type: none"> 6. Look to ramp up now on alternative sources if supplies are in Hubei and accelerate exploration of additional options 7. Pre-book air freight² / 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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



COVID-19 response team

Crisis Response



Mihir Mysore (Partner, Houston)

Global leader, Crisis Response Practice - extensive crisis management experience across multiple sectors and topics



Linda Liu (Partner, New York)

Core leader in the Crisis Response Practice, inc. long-term strategic planning, crisis response and preparedness

McKinsey Global Institute in China



Jeongmin Seong (Partner, Shanghai)

Core leader of McKinsey Global Institute in China, focusing on business and economic research

Global Public Health



Matt Wilson (Senior Partner, NYC)

Overall leader of the Global Health Practice focused on infectious diseases, and healthcare systems and services



Matt Craven (Partner, Silicon Valley)

Leader of our work in Infectious Diseases; Medical doctor with deep expertise in outbreak response; leadership role in the WHO's Ebola Response in Sierra Leone



Bo Chen (Partner, Beijing)

Leader in Healthcare Practice, with in-depth experience in the Chinese healthcare system, across the healthcare value chain



Sanjiv Baxi (Engagement Manager, Silicon Valley)

Leader in the Healthcare Practice; medical doctor with deep expertise in epidemiology and infectious diseases; focus is on strategy, finance and operations



Marie-Renee B-Lajoie (Engagement Manager, Boston)

Global public health expert focused on response preparedness operations, practicing emergency physician with 10+ years experience in humanitarian response

Supply Chain Risk



Knut Alicke (Partner, Stuttgart)

Leader of Manufacturing and Supply Chain Practice, with deep expertise across sectors including logistics and advanced industries



Edward Barriball (Partner, Washington DC)

Manufacturing and supply chain practitioner, with expertise in complex supply chains; leads global McKinsey research efforts on supply chain risk



Didier Cheneveau (Expert Associate Partner, Taipei)

30+ years in industry leadership positions in the High-Tech, Consumer Electronics and Logistics Service Industry. Based in Asia since 2008

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

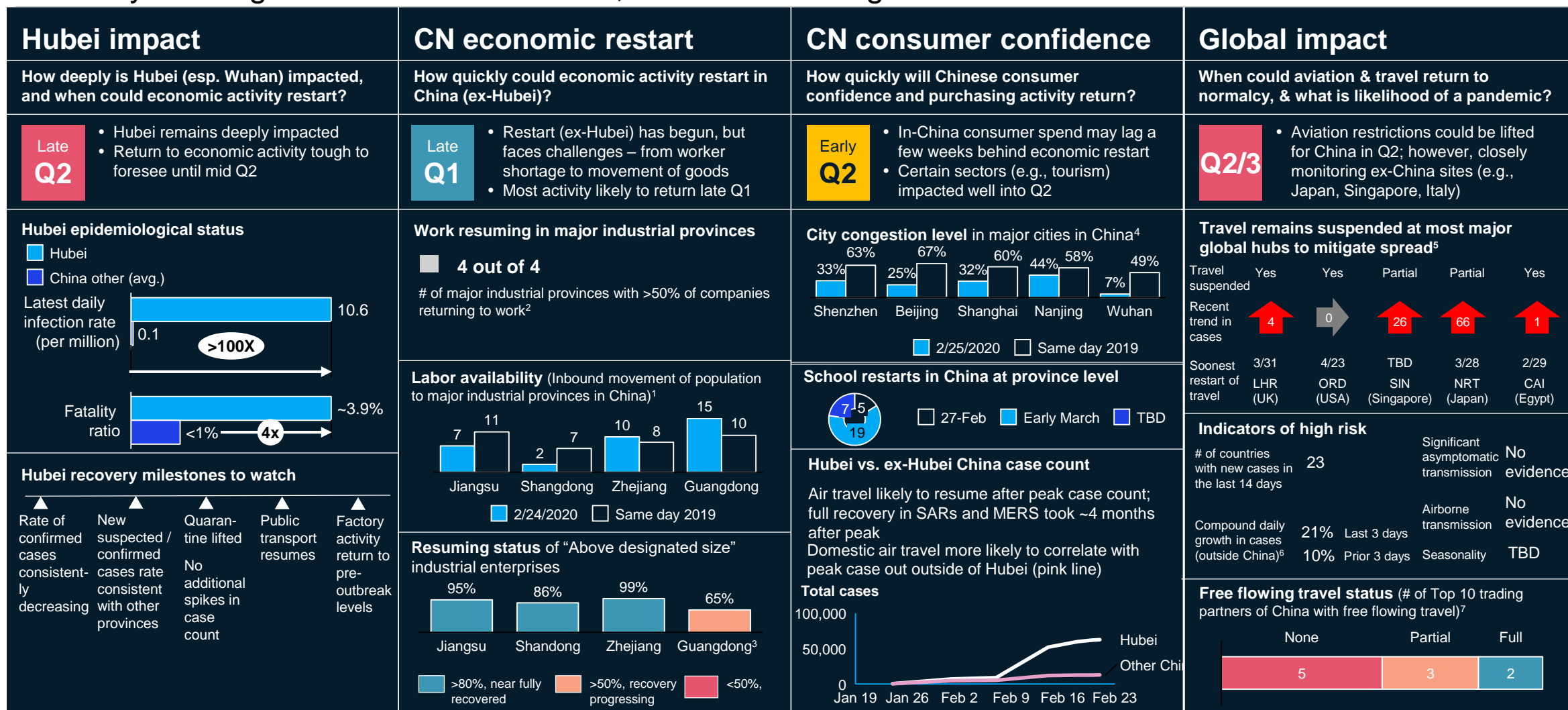
Increase in price

4-6 mths

Backlog for advanced medical masks

COVID-19 Leading Indicator Dashboard

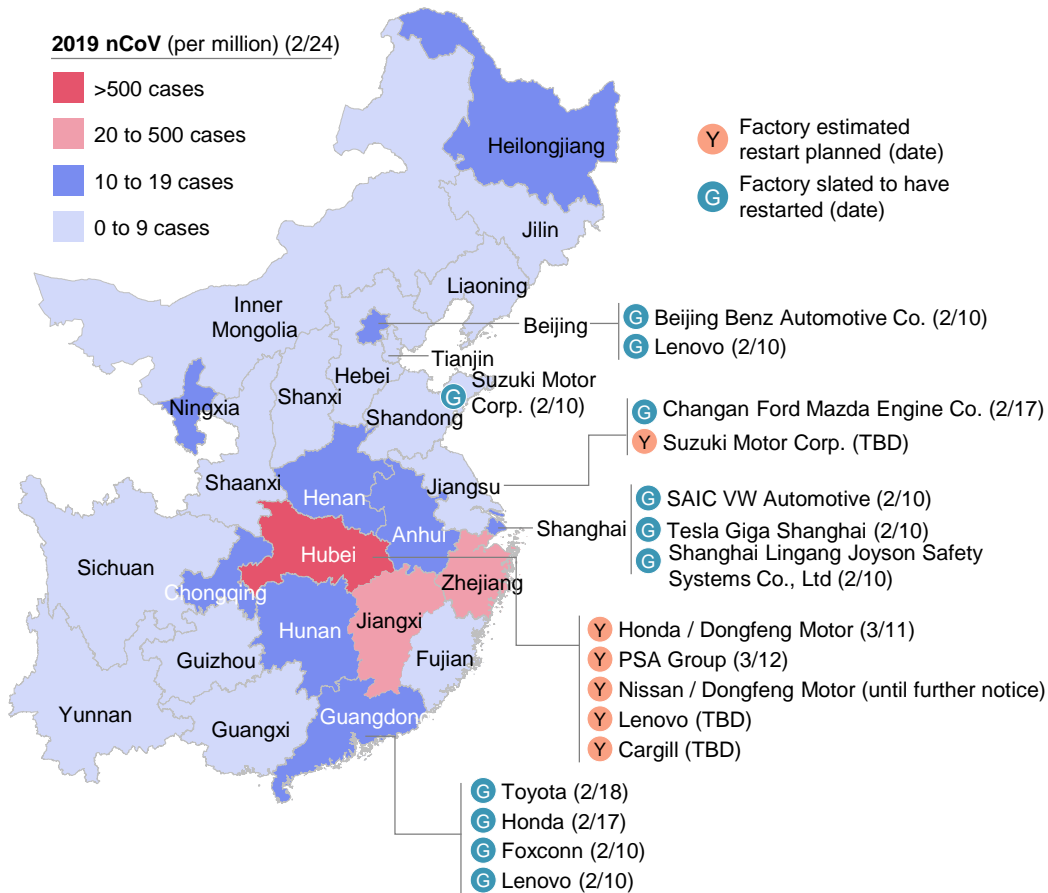
Currently tracking towards restart in China, but likelihood of global outbreak has increased in last week



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

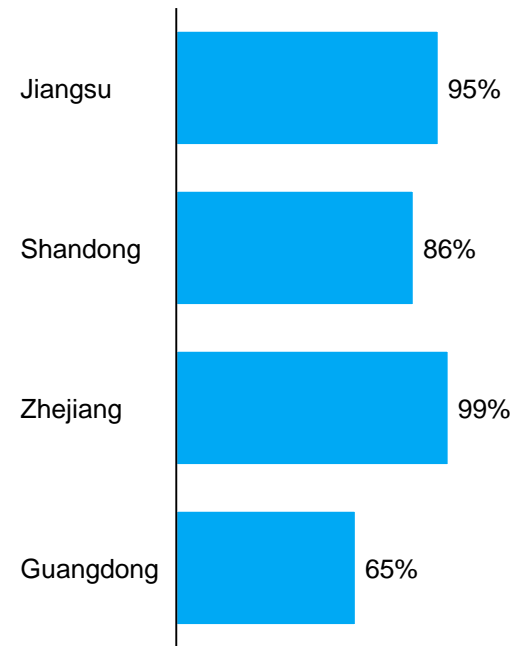
Outside Hubei, China is attempting to restart, but this may be slow

Many examples of factories restarting have been reported along the eastern coast of China, away from the epicenter in Wuhan¹



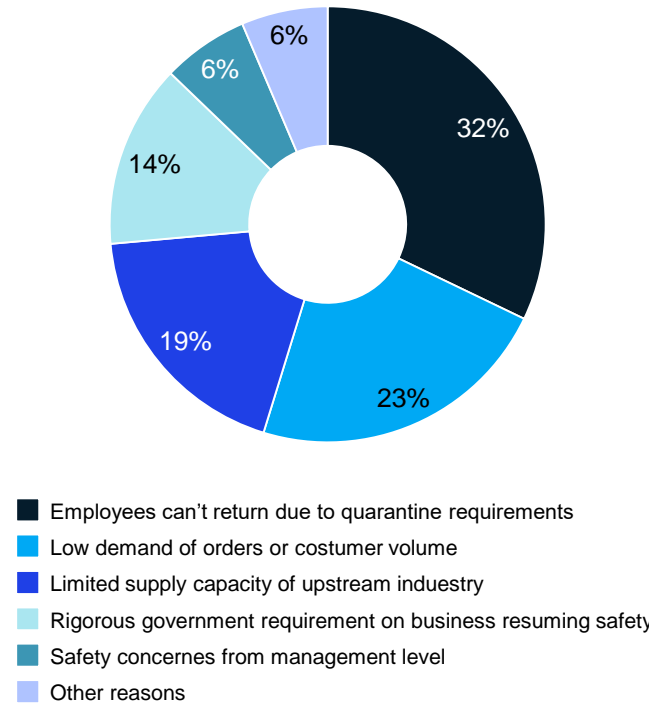
Large industrial enterprises and state owned companies are leading the way

Resuming status of "Above designated size" industrial enterprises²



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;