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Virus Resilient Workplace to Fight COVID-19: Forecasting, Prevention, and Mitigation

ideaship

Introduction

Given the recent global spread of the novel coronavirus disease or COVID-19, researchers have predicted that we can expect more such pandemics in the coming years, especially due to the increased animal-human interaction from habitat loss and changing weather patterns from the climate change. As a consequence, we are all becoming much more aware of how our physical environments impact our health, from air pollution to pathogen transmission. The current COVID-19 pandemic is, unfortunately, unlikely to be the last of its kind. This begs an important question: **how can we design our buildings to protect us now, and future-proof them for subsequent viral outbreaks?**

Aim

This whitepaper aims to explain Japan's greater exposure to highly infectious disease like COVID-19, which poses a question of its tentative forecast and calls for the prompt preventive measures, and later provides mitigation strategy.

It should be noted that the proposed prevention and mitigation strategy are in line with the WELL Building Standard, to make spaces virus resilient, keeping employees' health and well-being in mind.

Objectives

1) Assess Japan's potentially high risk to the spread of highly infectious disease.
2) Evaluate WELL Building Standard to design prevention and mitigation strategy.

Scope

The whitepaper primarily focuses on immediate solutions backed by evidence. There may be other ways to set forth more advanced and thoughtful guide — which requires serious attention and further study; however, are beyond the scope of the paper due to time and resource constraint.

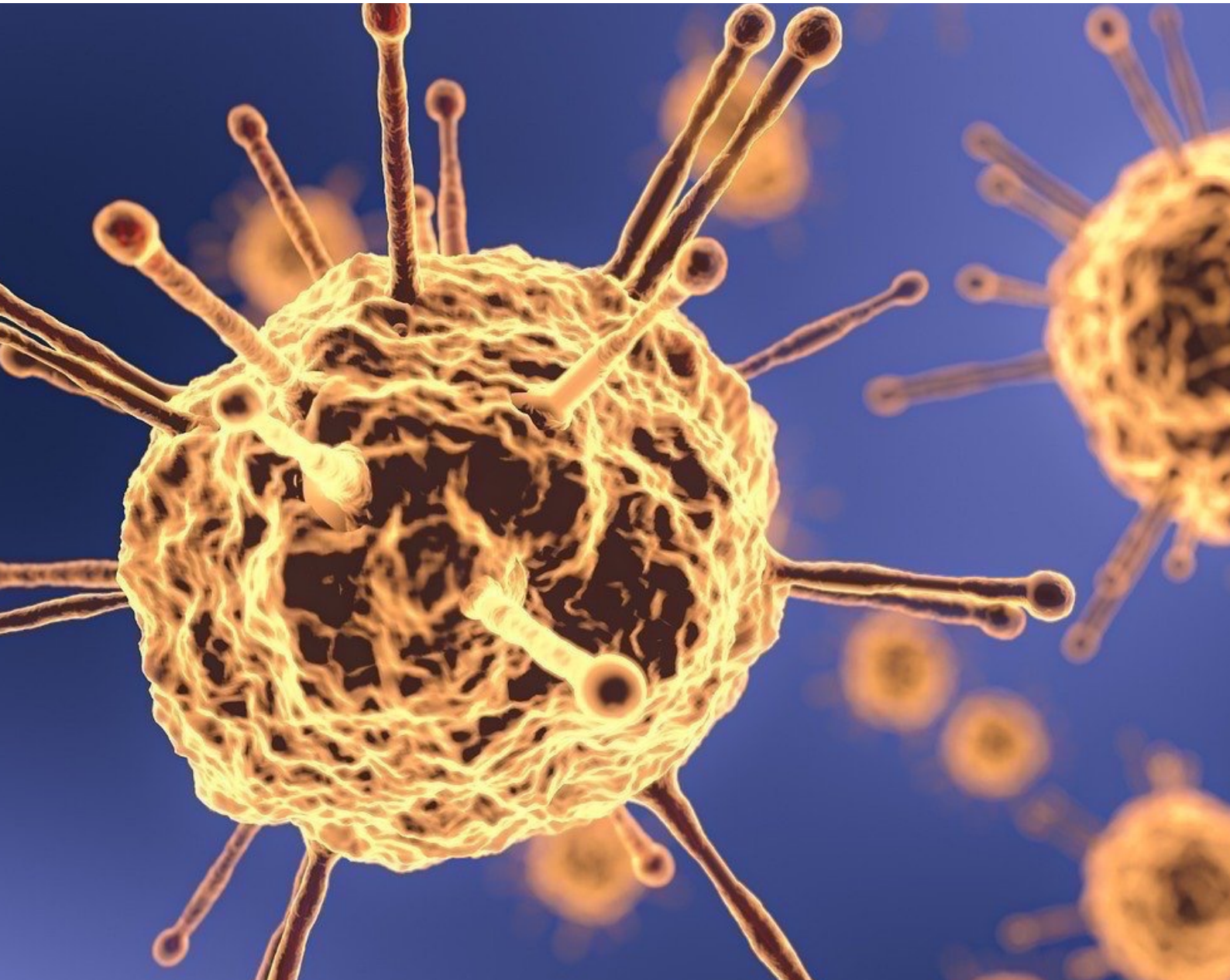
In addition, although the document is Japan-centric, the presented methodologically forecast, prevention, and mitigation may very well be useful, provided that it considers all variables to adjustable extent.

Who should read further and why?

As the novel coronavirus spreads globally, businesses are trying to grapple with a host of issues such as keeping their **employees safe** and keeping **clients informed**, as well as managing productivity and a workforce that is now almost completely virtual.

The **workplace wellness** has risen up the corporate real estate agenda in recent years as landlords and occupiers become more aware of the role of the office environment in attracting tenants and talent. More recently, **COVID-19 outbreak has prompted** occupiers to accelerate the **implementation of wellness measures** in their workplaces while introducing additional hygiene and health-related steps. This means that we learn from the ongoing global health crisis and work toward for a resilient future.

Forecasting



As of May 17, the novel coronavirus or COVID-19 has affected lives of more than **4.7 million** people and accounted for thousands of fatalities across the world [1]. The outbreak first started in Wuhan, China and spread thereafter globally at an exponential rate. Therefore, it is important to look at Asian countries more closely, which are more at risk.

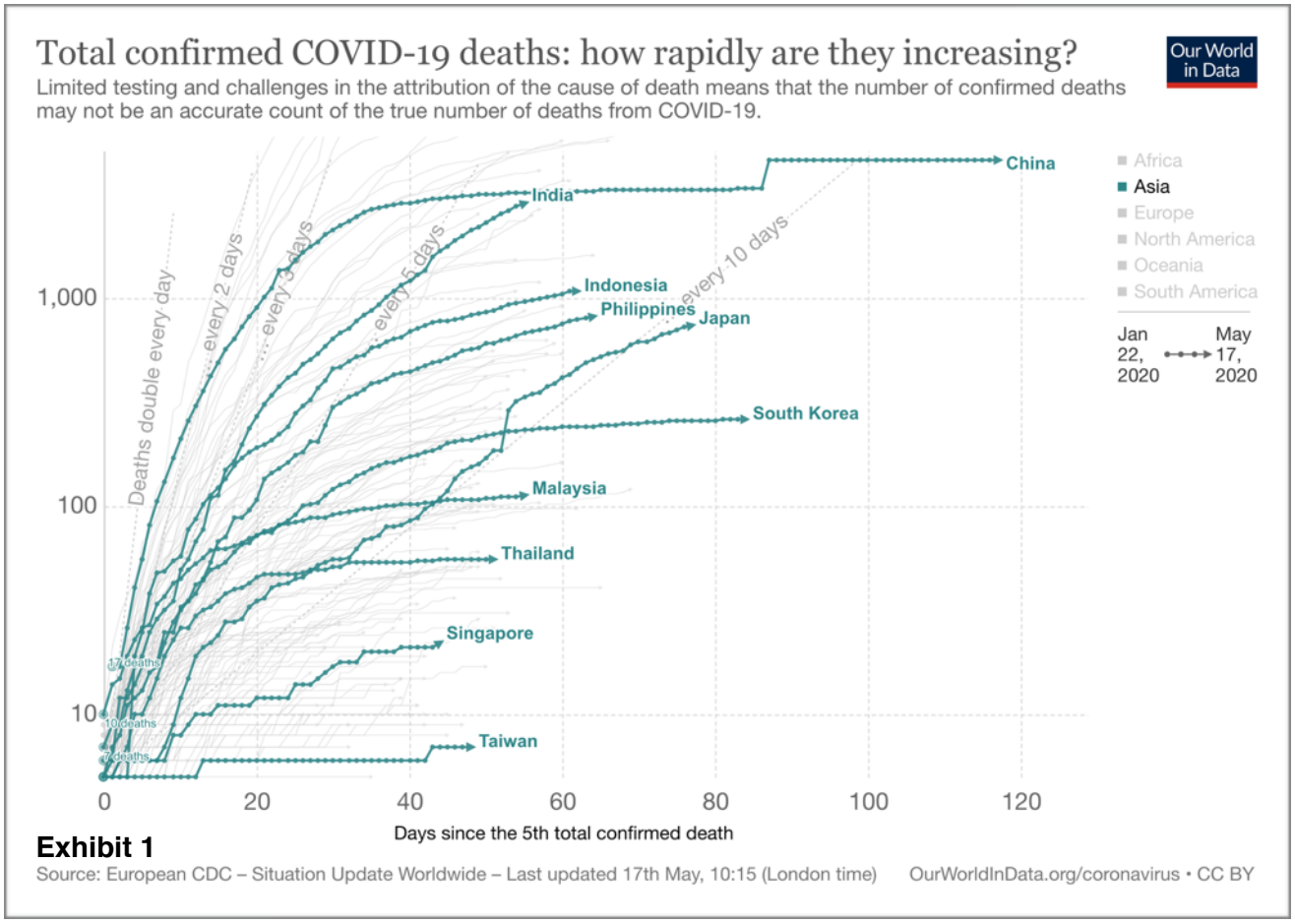


Exhibit 1

Exhibit 1 shows worst affected countries in South East and Central Asia. It can be seen that China topped in terms of number of deaths reported due to COVID-19. Even though the outbreak started a little late in Asia — excluding China — compared to Western countries, it is proved to be the deadliest across the region with a few exceptions. For example, Singapore and Taiwan managed to bend the curve and controlled the growth in its early phase. Japan, on the other hand, showed an exponential growth and may see an overshoot during the second wave.

What makes Japan more vulnerable?

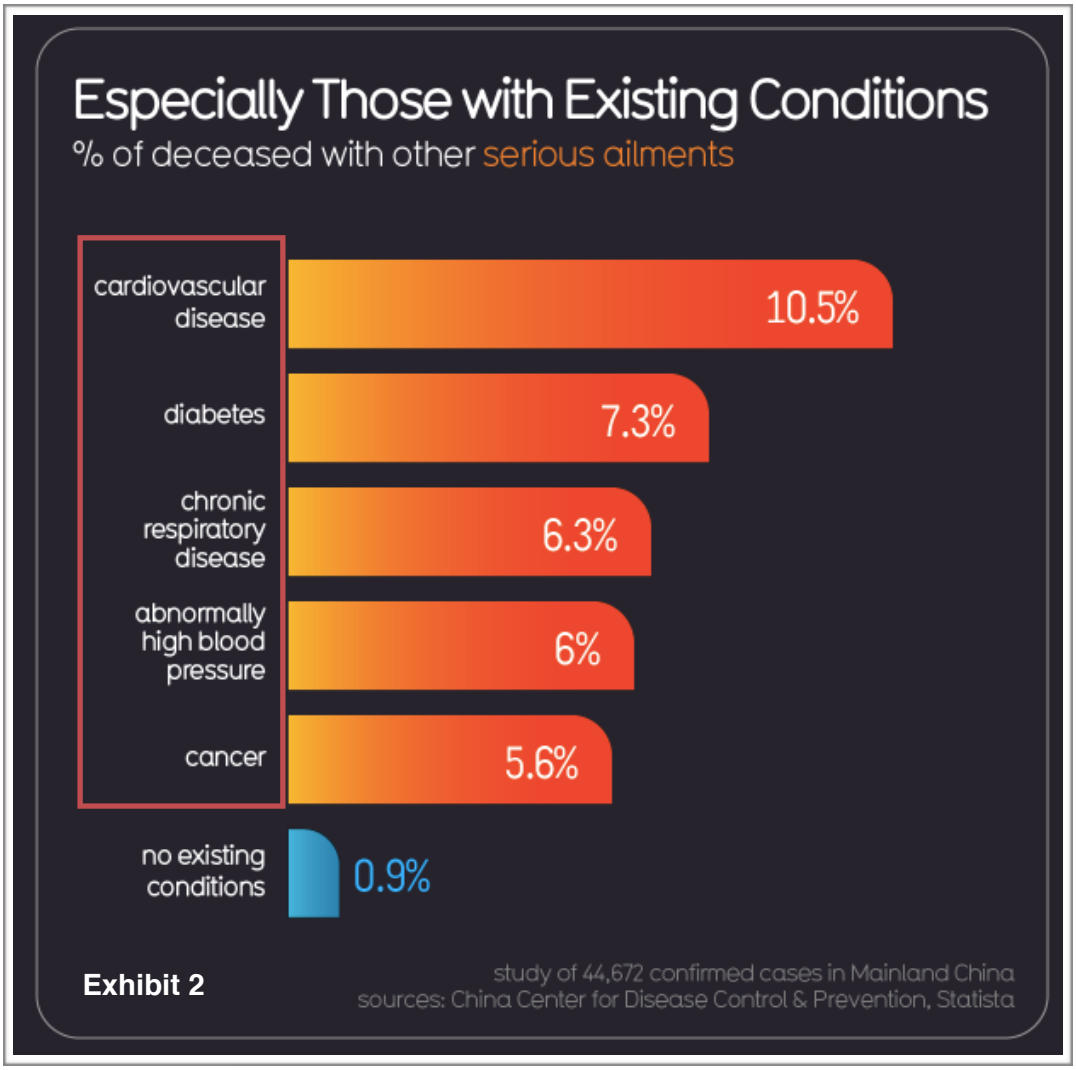
Italy, the worst-hit country by COVID-19 in its early days, reported that aged people and those with underlying health conditions are more at risk of contracting the novel coronavirus due to their **weakened immune system**. This pattern later had been witnessed in other European countries including Spain and France where people died at old age homes. Here, existing morbidity or comorbidity includes cardiovascular disease, diabetes, chronic respiratory disease, hyper tension, high blood pressure, and varied types of cancer.

To better understand, let us examine the number of coronavirus cases one month apart:

17th February 2020 - Japan: 66, South Korea: 30, Italy: 3
17th March 2020 - Japan: 878, South Korea: 8,320, Italy: 31,506 [2]

What caused the virus to spread like wildfire in Italy?

Looking back, it took more than four weeks for Italian government to flatten the curve and during that time COVID-19 claimed lives of more than 10,000 people, making it then epicentre of Europe. **What were the reasons behind such high fatality even though we compare COVID-19 with flu?** The lack of hospital beds and medical resource scarcity are not reasons enough to justify the cause of the tragedy because Italy has one of the finest medical facilities in the world and has about 6 hospital beds available per 1,000 people — second best worldwide [3] and yet, the hospitals were overwhelmed in matter of days. One could also argue about slow government response and it may be true, however holding **only** the government responsible does not seem appropriate either. There is something more of a concern.



According to the UN Population Division, Italy has the world's second highest older population and having comorbidity as shown in **Exhibit 2** put them at greater risk, resulting in evidently high fatality rate as illustrated in **Exhibit 3**. Based on these observation, it would be fair to say that **Japan** is **more exposed** to highly infectious disease like COVID-19 than any other countries due to having the world's most aged populous and various causes of premature deaths as indicated in **Exhibit 4**, subsequently increase the overall fatality rate of the country. Hence, it is essential to design and shape virus resilient workplace in order to prevent and/or mitigate the impact of any future outbreak of this scale.

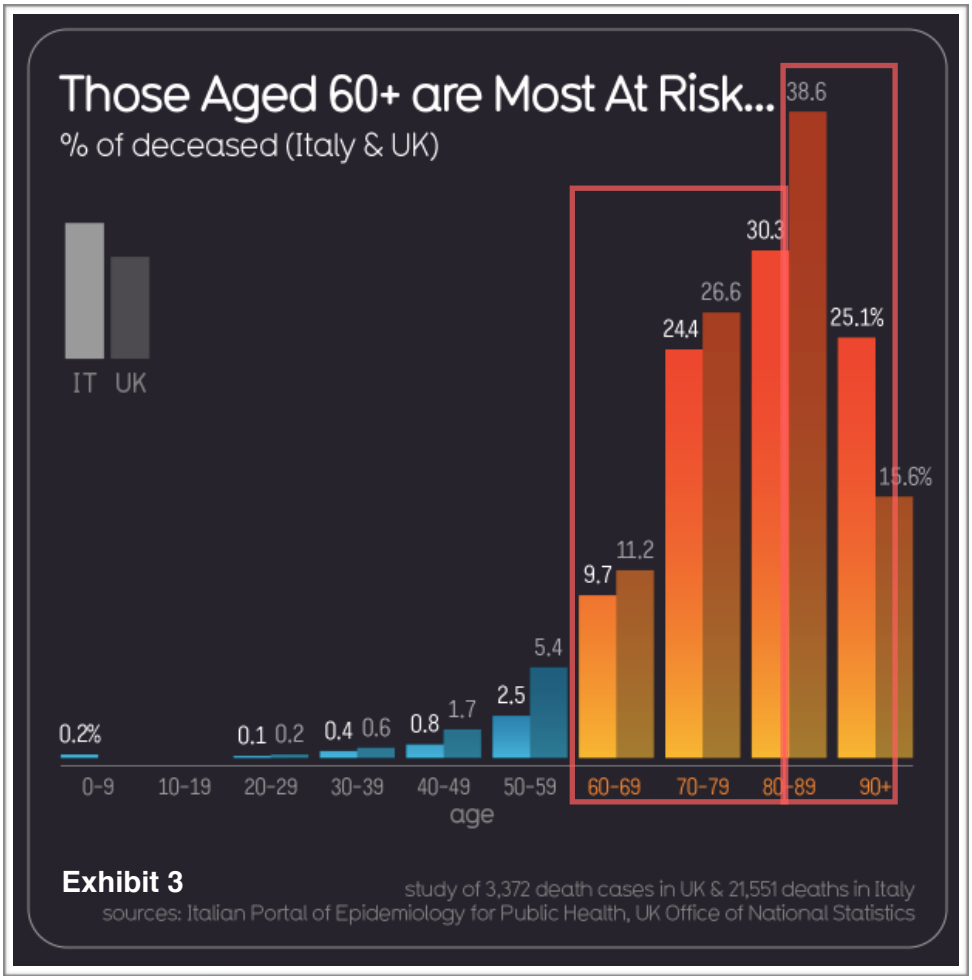


Exhibit 3

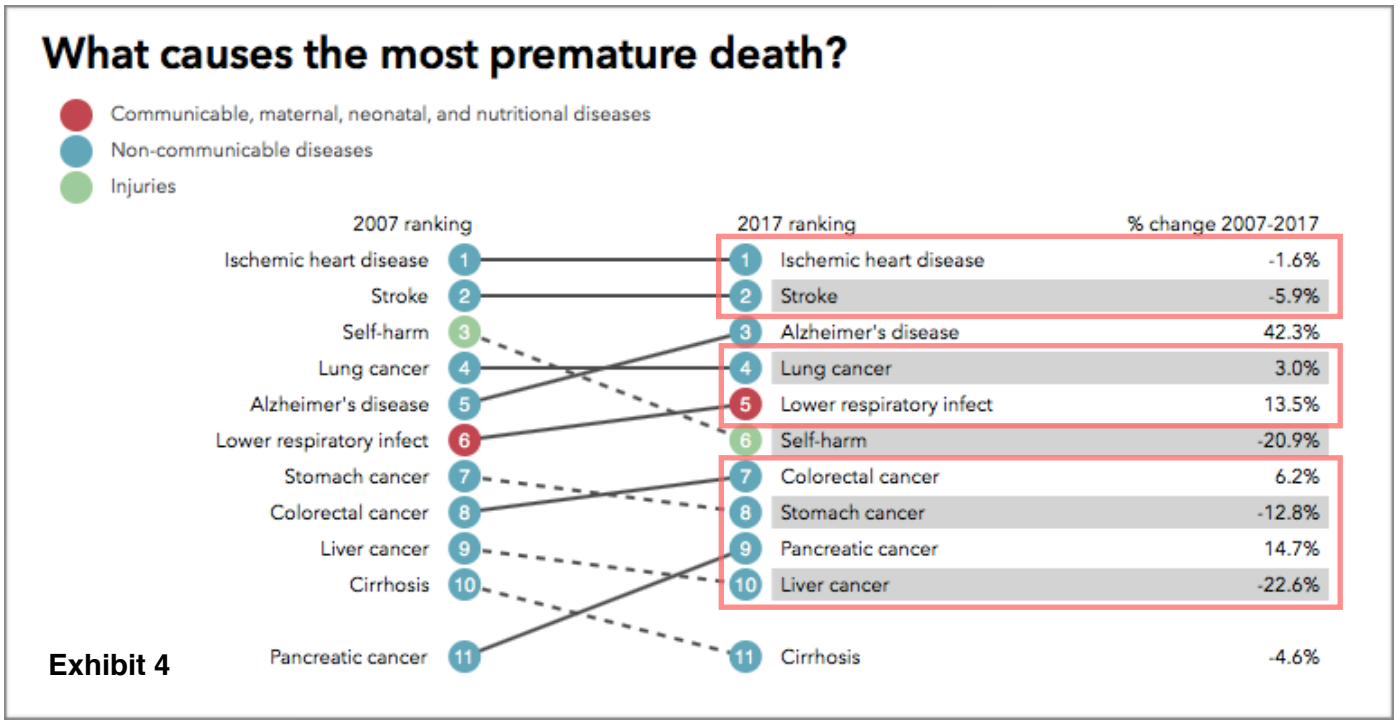


Exhibit 4

Prevention and Mitigation

For prevention and mitigation, one should first know the possible routes of transmission, so as to develop a strategy. According to the Ministry of Health New Zealand, infectious diseases can spread via three probable routes: air, close contact between people, and/or contaminated objects or surfaces [4]. Therefore, for the purpose of the prevention and mitigation, in context of a corporate workplace, there are key eight themes to prevent and/or mitigate the spread of the virus and its infection rate.

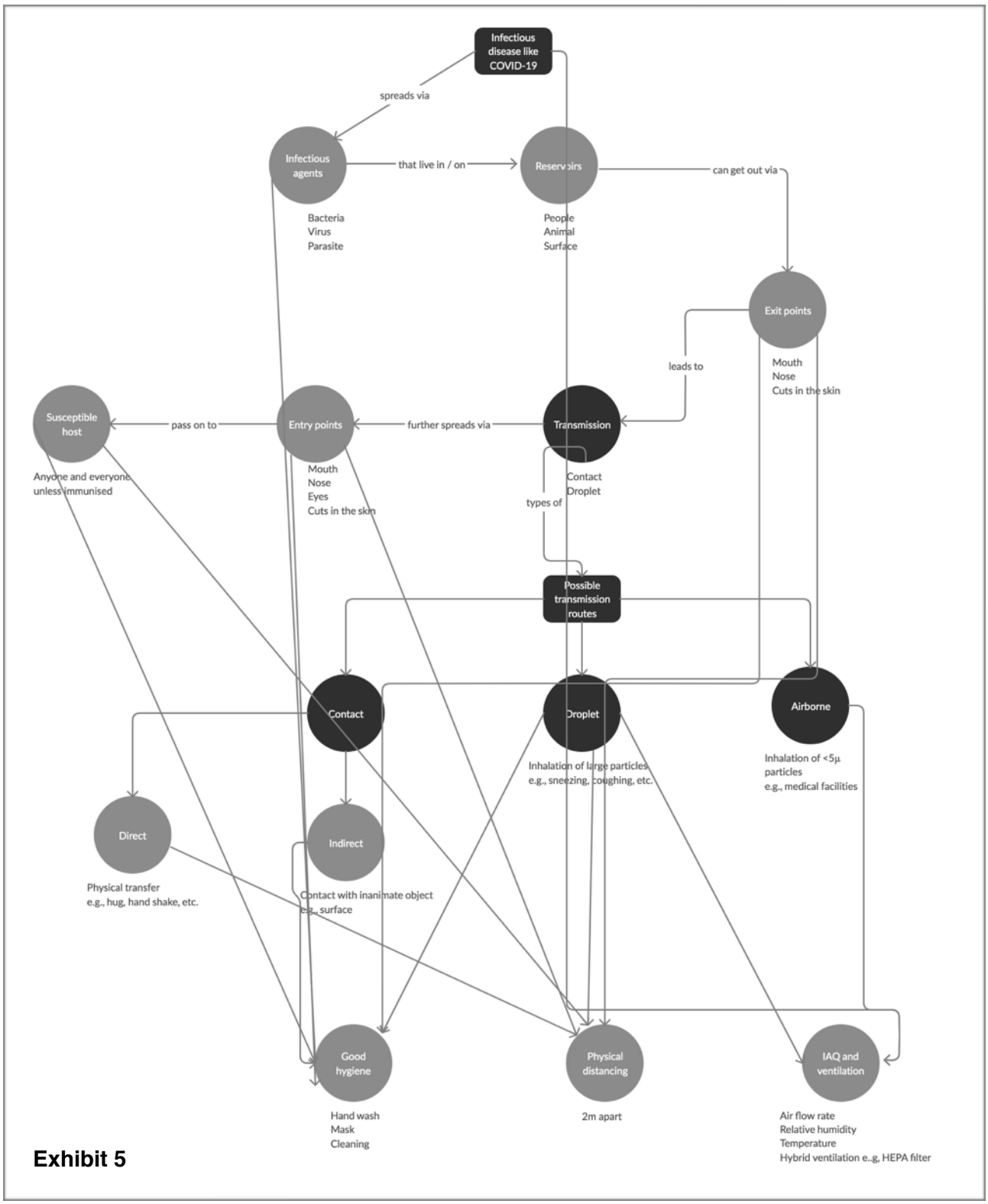


Exhibit 5

Based on **Exhibit 5** and keeping WELL Building Standard in mind, it is believed that the following pays a way forward to design virus resilient workplaces and ensure wellbeing at work.

1) Promote Superior Hygiene
2) Enhanced Indoor Air Quality (IAQ)
3) De-densification for Physical Distancing
4) Maintain Water Quality
5) Build Organisational Resilience
6) Support New Movement
7) Strengthen Immune System
8) Foster Mental Wellbeing

Here it should be noted that these variables are a part of both prevention and mitigation phase, depending on the circumstance. For example, superior hygiene could help prevent the spread and infection rate, as well as it also minimise the rate at which the virus is spreading and thus, mitigate its impact.

1) Promote Supreme Hygiene

COVID-19 is spread primarily through the close contact with an infect person or even via inanimate surfaces, where virus can live up to 3-4 days [5]. In fact, about 80% of the infections are transmitted by touch [6]. Hence, it is important to promote and practice supreme hygiene. Meaning, good cleaning protocols and handwashing habits can advance individual and collective resilience to lower the risk of infection. Soap has been found to be more effective than ordinary hand sanitizers, however hand gel with at least 60% alcohol can also be useful [7]. Nevertheless, soap has been considered as a standard practice to follow because it does not have any side effect, whereas alcohol-based hand rub could cause sensitivity.

Relevant WELL Strategy includes WELL Feature W08 - Handwashing and X09 - Cleaning Products and Protocol.

"Make those 20 seconds count"

2) Enhanced Indoor Air Quality (IAQ)

Generally, we breathe an average of 11,000-15,000 litres of air every day, making its quality exceedingly paramount [8]. In fact, studies have confirmed the correlation between IAQ and cognitive and physical performance of individuals. For instance, poor IAQ has been tied to symptoms of headache and fatigue. Conversely, studies have shown workers' improved decision-making performance when exposed to increased ventilation and lower levels of CO2 in their offices. Moreover, a study published in 2019 found that even maintaining optimum levels of natural ventilation reduced influenza transmission as much as having 50-60% of the immunised people in a building [9].

Furthermore, proper maintenance is required for filtration and HVAC systems, as they can build up mold and particulates matter that can breed respiratory diseases, particularly after periods of inactivity such as multiple lockdowns [10]. Additionally, maintaining relative humidity between 40-60% may help limit the spread and life of COVID-19 [11].

Relevant WELL Strategy includes WELL Feature A03 - Ventilation Effectiveness, A06 - Enhanced Ventilation, A07 - Operable Windows, A12 - Air Filtration, and A14 - Microbe and Mold Control.

"Be transparent about the quality of air we breathe at the workplace."

3) De-densification for Physical Distancing

While most workplaces have been following a certain metric of space allocated to individuals, the area allocated per person is going to shrink in the coming weeks, at least for short-term. Individual space occupancy plays a vital role in defining employee wellbeing. Amidst the disruption caused by COVID-19, the new pivotal point in the segment of workspace design is physical distancing.

A rise in the demand of private offices as compared to co-working spaces is highly probable. Given the consciousness towards proximity between people, industry standards are likely to improve. Furthermore, workspace design will need to embody a comfortable density of people to maintain appropriate distance — minimum of 6 feet — and safety [12].

Unfortunately, WELL does not address physical distancing and therefore, organisations need to be mindful about its implementation as an add-on.

"Less is more"

4) Maintain Water Quality

Drinking contaminated water can result in negative health impact including the spread of infectious disease [13]. As a standard practice, water is chlorinated to keep it free of pathogens; however, if and when left still for a long period, chlorine is likely to lose its disinfection effect, giving an opportunity to pathogens to contaminate the water [14].

Relevant WELL Strategy includes WELL Feature W01 - Fundamental Water Quality, W02 - Water Contaminants, W04 - Enhanced Water Quality, and W05 - Water Quality Consistency.

"Because drinking does matter"

5) Build Organisational Resilience

Organisational resilience can be built by developing Emergency Preparedness and Response Plan (EPRP) as a part of risk management. Leadership should regularly re-evaluate their emergency preparedness and response plans; adaptability and agility are essential elements to ensure faster recovery [15]. One of the key things to deliberate over during time of COVID-19 is support for working parents. As schools around the globe shut, many professionals are now full-time caretakers at home while working from home, struggling to balance responsibilities [16].

One might conduct occupant survey to understand and assess people's perceptions of indoor environmental conditions, wellness policies, and their own health and well-being [17]. Policy makers can use survey results to measure progress, identify response priorities, and put plans in action to shape healthier, safer, and virus resilient workplace [18]. Moreover, the occupants' feedback enables organisations to have basis policies and protocols, and customised surveys to address specific needs, during and after time of remote work. It also allows to help identify mental state of employees who are returning to work and inform new support strategies.

Relevant WELL Strategy includes WELL Feature C03 - Occupant Survey, and C04 - Enhanced Occupant Survey, C10 - Family Support, and C15 - Emergency Preparedness.

"We will be back"

6) Support New Movement

Current lockdowns across the globe have turned COVID-19 into the world's largest Work-From-Home (WFH) experiment with many companies scrambling to set up their staff remotely [19]. In contrast, prior to the outbreak of COVID-19, up to 44% of organisations globally rejected the idea of remote work, which perhaps could have been the cause of organisations' unpreparedness to provide guidance on how to remain functional and comfortable during WFH experience [20].

With more people working remotely than ever, it is important to understand the role of ergonomics in home office and support for physical activity and movement. While WELL does not explicitly address remote work scenario, many strategies can be adopted after careful review.

Relevant WELL Strategy includes WELL Feature V02 - Visual and Physical Ergonomics, V07 - Active Furnishings, V10 - Enhanced Ergonomics, and V12 - Self-Monitoring.

"Work anywhere, comfortably"

7) Strengthen Immune System

As seen earlier, the fatality rate of COVID-19 is much higher for those who have weakened immune system; hence, it is important to develop good immune system. A healthy immune system can help fight infections and reduces co-morbidities associated with an increased risk for infection [21]. Providing individuals with access to health promotion strategies, education, and resources can help them to cultivate healthy habits and resilience in response to physical and mental health stressor.

The consumption of fruits and vegetables is a key part of a healthy dietary pattern for the prevention of chronic disease [22]. Also physical inactivity is attributed to premature deaths and chronic diseases, among many others [23]. In addition, ample amount of hydration is necessary to maintain overall health. Lastly, poor quality sleep has been associated with a multiple negative health outcomes, including impaired immune function [24]. This could be improved by circadian light design [25].

Relevant WELL Strategy includes WELL Feature C05 - Health Services and Benefits, C06 - Health Promotion, A02 - Smoke-free Environment, M03 - Mental Health Support, M13 - Tobacco Prevention and Cessation, N01 - Fruits and Vegetables, and W06 - Drinking Water Promotion.

“Bye-bye to junk food”

8) Foster Mental Wellbeing

According to the World Health Organization (WHO), “wellness is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity.” Hence, to look after and take care of mental wellbeing is just as important as physical and social wellbeing. Having access to health services, mental health support, and restorative programming are crucial before, during, and after any health crisis.

Biophilic design provides a connection with nature through plants, water, light, and views, as well as an indirect connection through natural materials, patterns, colours, and images, has found to improve mood, recovery from stress, and concentration [26]. Studies have also shown that micro-breaks from work are linked to employee well-being, higher life satisfaction and mood, sustained workplace performance, lower burnout, and fewer health complaints [27].

Relevant WELL Strategy includes WELL Feature M01 - Mental Health Promotion, M02 - Access to Nature, M04 - Mental Health Education, M05 - Stress Support, M06 - Restorative Opportunities, M08 - Restorative Programming, M09 - Enhanced Access to Nature, L01 - Light Exposure and Education, and L05 - Enhanced Daylight Access.

“I feel free”

Conclusion

In conclusion, now more than ever, not only we need healthier places but also places that are virus resilient. Starting with forecasting, the report shows how Japan's exposure to highly infectious disease outbreaks is greater then any other country, followed by prevention and mitigation themed strategy to design and shape virus resilient workplace, with the support of WELL Building Standard. However, there are a few points that WELL Building Standard do not cover; nonetheless, crucial to stop and/or minimise the spread of the virus and lower the infection rate.

Table 1: Prevention and Mitigation Strategy

Sr. No.	Key Theme	Relevant WELL Features
1	Promote Superior Hygiene	W08 Handwashing; X09 Cleaning Products and Protocol
2	Enhanced Indoor Air Quality (IAQ)	A03 Ventilation Effectiveness; A06 Enhanced Ventilation; A07 Operable Windows; A12 Air Filtration; A14 Microbe and Mold Control
3	De-densification for Physical Distancing	N/A
4	Maintain Water Quality	W01 Fundamental Water Quality; W02 Water Contaminants; W04 Enhanced Water Quality; W05 Water Quality Consistency
5	Build Organisational Resilience	C03 Occupant Survey; C04 Enhanced Occupant Survey; C10 Family Support; C15 Emergency Preparedness
6	Support New Movement	V02 Visual and Physical Ergonomics; V07 Active Furnishings; V10 Enhanced Ergonomics; V12 Self-Monitoring
7	Strengthen Immune System	C05 Health Services and Benefits; C06 Health Promotion; A02 Smoke-free Environment; M03 Mental Health Support; M13 Tobacco Prevention and Cessation; N01 Fruits and Vegetables; W06 Drinking Water Promotion
8	Foster Mental Wellbeing	M01 Mental Health Promotion; M02 Access to Nature; M04 Mental Health Education; M05 Stress Support; M06 Restorative Opportunities; M08 Restorative Programming; M09 Enhanced Access to Nature; L01 Light Exposure and Education; L05 Enhanced Daylight Access

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