

THE DIGITAL FRONTIER OF HEALTH PROMOTION AND PREVENTION

Post COVID-19 opportunities



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FOREWORD

COVID-19 has fundamentally changed every aspect of our lives. The world has learned many lessons that have forced sectors to reimagine their businesses and many to accelerate digital transformations. One of the most profound learnings will be the importance of health — most notably, health promotion and disease prevention.

Healthier populations experience a significantly lessened impact from the pandemic. In recent studies, for example, COVID-19 patients with chronic conditions were 12 times more likely to die compared to those without chronic conditions. Also, a reported 76 percent of patients who died from COVID-19 also suffered from hypertension or high blood pressure.

COVID-19 has reminded us of the “other” global pandemic in non-communicable diseases (for example, cardiovascular) and their risk factors (for example, obesity and diabetes). Furthermore, COVID-19 has triggered a decline in health for some individuals¹, due to restrictions in physical activity, poorer nutrition and greater mental stress. Efforts to contain and cure COVID-19 are critical. The underlying health crisis will continue on, having only become larger, now needing greater attention from communities, employers, and governments if COVID-19 is to be successfully overcome.

Singapore has been at the forefront of initiatives against COVID-19² and equally in health promotion and prevention at a national scale. Many factors have contributed to Singapore’s increase in life expectancy and relatively lower incidence of obesity, cardiovascular disease and diabetes, compared to OECD members. The Health Promotion Board in Singapore has been a key force and delivers a wide range of programmes from health education, policy measures, and health and wellness interventions and events countrywide.

However, the challenge in non-communicable diseases, including chronic diseases, continues to be fueled by sedentary habits, including sugary food trends, and overall societal ageing. The Health Promotion Board has continued to leverage digital technologies and implement innovative health programmes. Most notably, the annual National Steps Challenge has increased the physical activity of its citizens via the use of an app, step and heart rate tracker, points, and vouchers. In 2020, they teamed up with Apple to develop a new programme called LumiHealth that promotes a holistic path to health covering physical activity, nutrition, screening, and mental wellness and utilizes online and offline activities as well as personalized content and nudges.

COVID-19 has forced every sector to reimagine and accelerate their digital initiatives. Healthcare players such as the Health Promotion Board have renewed efforts in their strategy to Precision Public Health — delivering more personalized, proactive and predictive health interventions. At the heart is a transformational journey working with data, research and analytics while collaborating with partners across the healthcare system, research community, government agencies and private sector innovators. Looking forward, we foresee a continued ground swell of opportunity, partnership and innovation to meet the health challenge. We invite you to join our team in this significant and momentous chapter.

EXECUTIVE SUMMARY

- 1** Since the advent of the novel coronavirus disease (COVID-19), Singapore and the world have seen society and the way individuals live and behave change drastically, including in healthcare, health and wellness needs, and behaviours.
- 2** Over the past three decades, Singapore has observed a significant increase in life expectancy. Despite significant progress, health risks remain and there continues to exist a health and wellness “pandemic” — a rise of non-communicable diseases (such as cardiovascular diseases) and their health risk factors.
- 3** COVID-19 has amplified the importance and urgency of health promotion and disease prevention. Health promotion and prevention is critical to reducing virus spread and also shines a spotlight on the critical need for a healthy and well baseline population to lessen the impact of those vulnerable and infected by the virus.
- 4** COVID-19 has worsened health and wellness issues for many, including changes in needs, habits, and behaviours — with many here to stay. Consequently, health promotion faces challenges in meeting new population needs and programme delivery.
- 5** However, a silver lining from COVID-19 arose — healthcare saw an acceleration of the development and adoption of digital and technology — by citizens, organisations, and governments.
- 6** There is an urgent need to strengthen the focus in health promotion and disease prevention, and to build on the foundations and reimagine a new way forward, accelerated by technology.
- 7** Moving forward, to deliver measurable health outcomes, health promotion should continue its journey towards offering targeted and personalised interventions to the right users at the right time and channel — “precision public health”. This will result in a “closed loop” model that uses data, research, and analytics to push out evidence-based interventions (both online and offline) for measurable health outcomes.
- 8** The journey towards the “closed loop” model and ultimately, better health promotion, will require capabilities, including building a data and analytics-driven organisations, community activation, public trust, and close collaboration across sectors — communities, public health authorities, healthcare systems, and the private sector.

Chapter 1

THE “PANDEMIC” BEFORE COVID-19: HEALTH PROMOTION IS MORE IMPORTANT THAN EVER

Significant progress, but non-communicable diseases (NCDs) were and are the “pandemic before the pandemic”. Beyond containing the virus, there’s a critical need for a healthy and well baseline population, amplifying the importance for health promotion and prevention

Over the past three decades, Singapore has observed an increase in life expectancy at birth by almost nine years to 84.8 years — topping the charts in both life expectancy³ and healthy life expectancy⁴ among countries in the world. This is largely driven by several factors including decades of investment and improvements in public health and healthcare services. Inclusive of the improvements are also capabilities beyond traditional ‘sick care’ to include wellness, health education and disease prevention. Specifically, the Health Promotion Board (HPB⁵) plays a central role in advancing nation-wide health promotion and disease prevention education, policy and interventions.

Despite significant progress, NCDs continue to grow with societal ageing. While NCD rates are lower compared to its peer countries, Singapore still observed an increase in NCDs from 1990 to 2017, including cardiovascular disease (14.2 percent of total DALYs, or disability-adjusted life years), cancers (13.4 percent), musculoskeletal (12.6 percent) and mental disorders (10.2 percent⁶). The leading health risk factors continue to grow as well, including dietary risks, tobacco, high blood pressure, high blood sugar. For example, overweight and obesity rose by 141 percent in DALYs contribution in the past three decades.⁷

Individuals with NCDs and health risk factors (such as obesity) are more vulnerable with COVID-19. The impact of NCDs and COVID-19 is two-fold: Individuals with NCDs are more susceptible to becoming severely ill. They also have poorer recovery with COVID-19.⁸ Many studies have demonstrated similar evidence — both in Asia and globally.

Exhibit 1: Poorer recovery and outcomes of COVID-19 patients with pre-existing chronic conditions and associated health risks

Singapore

Overweight (BMI>25) COVID-19 patients¹

3.1x

compared to other COVID-19 patients who have BMI <25

6.3x

more likely to require supplemental oxygen

1.2x

more likely to require mechanical ventilation

Other developed nations

COVID-19 patients with chronic conditions

12x

mortality rate²

6x

hospitalisation rate²

76%

of patients who died from COVID-19 had hypertension or high blood pressure³

1. Singapore National Centre for Infectious Diseases: Sean Wei Xiang Ong, Barnaby Edward Young, Yee-Sin Leo, David Chien Lye, [Association of Higher Body Mass Index With Severe Coronavirus Disease 2019 \(COVID-19\) in Younger Patients](#).

2. CDC: Stokes EK, Zambrano LD, Anderson KN, et al. [Coronavirus Disease 2019 Case Surveillance — United States, January 22–May 30, 2020](#). Morbidity and Mortality Weekly Report (MMWR).

3. Italy National Institute of Health: Original study: [Report sulle caratteristiche dei pazienti deceduti positivi a COVID-19 in Italia. Il presente report è basato sui dati aggiornati al 17 Marzo 2020](#). Reported on The Centre of Evidence-Based medicine: [Global Covid-19 Case Fatality Rates](#).

Source: Oliver Wyman

Coined the “deadly interplay” — the observed disruptions of healthcare services for prevention and management of NCDs during COVID-19 — is also expected to result in a rise in incidence, poorer health outcomes, and more deaths from NCDs globally.⁹ In a global World Health Organisation (WHO) survey, nearly half of countries surveyed had partially or completely disrupted services for hypertension treatment, public screening, and diabetes and diabetes-related complications.¹⁰ In Singapore, during “circuit breaker” (the lockdown from 7 April to 2 June), all medical practitioners were asked to defer non-essential medical care — including screening and surveillance services, outpatient rehab and therapy services, other allied health services (for example, dietetics and counselling), and chronic disease management.¹¹ While some countries, including Singapore, have allowed for all care to resume, multiple waves of the virus may be present and could require cycles of contain and relax measures. Without a therapeutic breakthrough, healthcare services may continue to be disrupted at different times and intensity, globally. Even as care reopens, patients may still be reluctant due to factors such as fear of infection.¹² The long-term impact on NCDs from disruptions of healthcare services is yet to be quantified in Singapore; however, even delays as short as a week can have impact on health outcomes (for example, a diabetic foot infection, that is in early stages of cellulitis, and does not receive treatment in a week, creates a greater chance of osteomyelitis, requiring amputation¹³).

Lifestyle and health issues were also impacted, with some here to stay. Mandated government restrictions such as working from home or social distancing are leading to an increase in a sedentary lifestyle and deterioration of mental wellbeing, further increasing NCD risks. The long-term shifts and impact on health promotion will be further explored in the next chapter, Chapter 2: Changing Behaviours are Impacting Health Promotion.

Globally, healthcare has predominantly focused on “sick care,” rather than health promotion and prevention. COVID-19 is changing the narrative. Health promotion is even more important now — to combat COVID-19 and to better respond and support the growing NCD “pandemic.” At the heart of effective disease prevention (for example, to combat COVID-19) is health promotion, which educates, encourages, and enables the desired behaviour of individuals. Simply put, the principles of hygiene, social distancing, and wearing of masks can be policies — but it is individual compliance that lowers virus transmission.¹⁴ Mandatory wearing of masks is only effective if individuals adhere to it.¹⁵ Secondly, as important as the fight against COVID-19 is, the continued support to positively influence the behaviour of individuals to promote a healthy life is essential — including supporting individuals susceptible to NCDs or management for those with existing NCDs. Individuals will continue to face growing and greater health risk factors and NCDs, affecting their health and wellness. The continued investment in health promotion and prevention (including screening, treatment and NCD management) must be reinforced to support and manage the increased risk.

Chapter 2

CHANGING BEHAVIOURS ARE IMPACTING HEALTH PROMOTION

New ways of living are here to stay, impacting health needs and behaviours; health promotion faces challenges in meeting new needs and delivering interventions

Towards the end of March 2020, COVID-19 cases started to reach new highs in Singapore. This resulted in necessary government-imposed restrictions — introduced as a “circuit breaker.” For two months (beginning 7 April), drastic changes to lives were made, with individuals’ needs and behaviours changing accordingly. Many of the traditional physically- or location-specific based habits and routines that characterised healthy living — such as going to a gym or interacting with one’s social support system — were no longer possible.

Some restrictions and new ways of living are here to stay, whether driven by long-term suppression efforts or adapted consumer behaviours. For example, during Singapore’s “circuit breaker,” all workers had to work from home, unless they worked in essential services. However, more than four months after the “circuit breaker” ended, work-from-home continues to be the default arrangement for all companies, unless there is a “demonstrable need.” This arrangement is likely here for the long-term, with some companies already declaring support for working from home indefinitely (for example, Twitter and Square). In Singapore, companies like Facebook and Google are extending work-from-home policy until 2021. This new arrangement will change health behaviours — whether it’s decreasing physical activity, eating more meals at home, or changes in mental wellbeing tied to working from home for prolonged periods. The subsequent section highlights the new health behaviours here to stay across four health promotion domains: physical activity, nutrition, mental wellbeing and infectious disease management.

NEW HEALTH AND WELLNESS BEHAVIOURS

Exhibit 2: Long-term health behavior changes impacting health promotion

Long-term health behaviour changes

Physical activity	Nutrition	Mental wellbeing	Infectious disease management
<p>Increase in sedentary behaviours — decline in step count and daily moderate-to-vigorous physical activity even post- “circuit breaker”¹</p> <p>Shift of activity channel — centralised to “in” or around the home (e.g. online exercises²)</p>	<p>Changes in eating patterns (e.g. more/less healthy, shift in meal times³)</p> <p>Changes in channels to get food/meals, incl. increased usage of food delivery options (often less healthy⁴)</p>	<p>Negative impact on mental wellbeing (stress, anxiety and depression), with a lasting increase in risk-factors (anxiety from job/financial insecurity⁵)</p>	<p>Habits being adopted from mandated regulations, with initiatives focused on keeping these as long-term habits, for instance, mask wearing when sick, personal hygiene⁶</p>



Each population segment impacted differently (e.g. seniors, working youth, working parents, low-income segments and so on).

Impacting health promotion

Less emphasised areas of health promotion (mental wellbeing and infectious disease management)

“One-size-fits-all” approach is less effective in addressing segment-specific needs and lifestyles

Limitations of offline channels

1. HPB: Health Insights Singapore Study, 2020
 2. SensorTower: “Health & Fitness App Adoption Up Record 47% So Far in Q2 2020”, 4 June 2020
 3. Oliver Wyman: COVID-19 Impact on Singapore Survey, 2020
 4. Nielsen: “Asian Consumers are Rethinking How They Eat Post COVID-19 Survey”, 2020
 5. Oliver Wyman: COVID-19 Impact on Singapore Survey, 2020
 6. Ministry of Health: “Ministry of Health addendum to the President’s address”, 25 August 2020
 Source: Oliver Wyman

Physical activity

Even after Singapore's "circuit breaker," there has been a significant reported decrease in physical activity from pre-COVID-19 levels.¹⁶ In HPB's Health Insights Study (N=2,913), for example, all segments (including youth, adults, and seniors) saw a decrease in activity, even sustained after the "circuit breaker." The segment with the most change, youth (N=140), observed a 46 percent decrease in step count and a 44 percent decrease in moderate-to-vigorous physical activity more than one month post-"circuit breaker" (from one month prior to DORSCON orange.¹⁷) This could be due to several factors such as schools shifting to home-based learning or the cancellation of youth-centric physical activities and programmes.

While Singapore has been reopening, there remains an impact on physical activity behaviours and health promotion with policies such as work-from-home lasting for an extended period. Previously, some working professionals would generally go to exercises classes at and around their workplace, including gyms and exercise classes around the central business district. They would also generally commute into their workplace, which offered non-exercise activity thermogenesis (for example, walking to the metro or bus). With more time spent at home, they are also seeking exercise options in or around their homes, including online exercises.¹⁸ Another longer-term impact is social distancing — likely to be one of the last measures to be lifted.¹⁹ Social distancing has impacted capacity in gyms and group classes. As such, individuals who may no longer go to the gym (or go as often) have either stopped exercising or shifted to individual-based activities (for example, running, biking) or doing exercises online/via digital solutions. Health promotion efforts that have been traditionally anchored around work places (for example, HPB's Sunrise in the City programme aimed at working professionals) or offline (for example, HPB's workout sessions with industry gym partners) must be adapted. Similarly, regarding seniors — a "higher risk" segment prone to COVID-19 and other vulnerabilities, it is still recommended they stay home as much as possible. Seniors will likely be the segment that sees most recommended restrictions from a contact-perspective.²⁰ For example, while activity and day care centres have reopened, there are restrictions impacting activities, such as social distancing measures and thus, capacity limits.²¹ Therefore, health promotion efforts that have traditionally anchored around group activities and day care centres will need to adapt, too.

Exhibit 3: Day in the life of a senior

Example citizen journey #1



Name Melvyn
Age 68
Occupation Retired professional
Key health challenge Physical activity
Additional information Lives with his wife, also retired. Daughter, 35, son-law, 40, and two grandchildren, 5 and 7, who routinely visits on the weekends. Goes to the local community centre twice a week.

Morning	Wakes up later than usual and eats toast with chocolate spread for breakfast	Tries to follow some of the exercises shown on TV but stops as unsure if he's doing it right	Eats chicken rice for lunch, and takes his medication which his son-in-law reminds him to take as he has forgotten for a few days	Gets a call from his daughter asking him how he is doing and his day brightens as his grand-children show him their artwork over video
Afternoon	Attends a virtual gathering held by his community centre where attendees are encouraged to stay active with simple exercises	Finds the session hard to follow as it's going so quickly, the screen is so small and it's hard to hear		After the session, he Whatsapps his friends and catches up on the latest group chats
Evening	Wonders how his friends are doing. It's been a while seen he could meet up with them for a game of tennis. He feels a bit lonely	Has no appetite for dinner as he finds the food at home repetitive and boring. His wife forces him to have a few bites of rice and vegetables		Watches some TV before going to sleep

Source: Oliver Wyman

Nutrition

Obesity has been a key and growing concern in Singapore; COVID-19 is changing individuals' relationship and habits with nutrition. With long-lasting restrictions such as work-from-home, eating at home, and usage of food delivery apps, food e-commerce has become more prevalent, with individuals stating these new habits will remain post-pandemic (for example, 50% indicating eating at home would remain post-pandemic²²). Many Singaporeans are shifting away from physical restaurants (for example, in malls), particularly during the weekdays, and using food delivery apps (for example, Food Panda or Deliveroo), food e-commerce (for example, RedMart) and restaurant takeout.²³ In June, GrabFood, for example, saw an increase in orders by 60 percent (since October/November last year.²⁴) While not all delivered food is unhealthy, food delivery does create more options, including unhealthy choices. Therefore, the verdict is still out on which general nutrition habit changes are taking hold the most — with some individuals observing healthier habits (for example, cooking nutritious meals), while others have turned to poorer nutrition behaviours (for example, ordering fast food, or a rise in “do-it-yourself” videos for bubble tea recipes^{25, 26}). Food delivery companies and food and beverage brands also believe in this long-term shift — players such as Grab and Gojek, for instance, are further investing in cloud kitchens across Southeast Asia to tap on growing customer demands.²⁷ Since eating at home will likely remain, health promotion efforts will need to adapt. Today, efforts have been anchored around supermarkets or restaurants, including “Health Promoting Malls” which feature healthier dining options via Healthy Choice Symbols. Moving forward, health promotion must work more closely with food delivery apps and food e-commerce to adapt and deliver new interventions (for example, HPB's Healthy Choice Symbols for food delivery and food e-commerce businesses).

Therefore, the verdict is still out on which general nutrition habit changes are taking hold the most — with some individuals observing healthier habits (for example, cooking nutritious meals), while others have turned to poorer nutrition behaviours (for example, ordering fast food, or a rise in “do-it-yourself” videos for bubble tea recipes).

Exhibit 4: Day in the life of a working young adult

Example citizen journey #2



Name Jason
Age 26
Occupation Banker (first year)
Key health challenge Nutrition
Additional information Lives with his mother, 55, father, 60, and grandmother, 84. Slightly obese due to late dinners and snacking during work. Increased smoking and drinking frequency since starting work. Used to play competitive soccer in school.

Morning	Wakes up just in time for daily catch-up call over Zoom with boss	Skips breakfast and orders a sweet iced latte on delivery app	Suddenly feels hungry at 11 am; eats leftover noodles from last night's dinner	Has another video call with clients; added pressure from boss to perform as their portfolio companies struggle
Afternoon	Goes for a smoke break to destress	Goes back to work and snacks on potato chips	By mid-afternoon, realises he had skipped lunch and orders two burger and coke combos to get free delivery (a convenient option — repeated order the day before)	Changes into workout clothes but his manager just moved up the deadline, so he focuses on work instead
Evening	Has another coffee to help himself focus for the last video call of the day; feels neck pain from hunching over all day		Has an evening check-in with his manager and is assigned more work. He microwaves a frozen meal of chicken biryani	Finally wraps up work at 1 am, spends two hours watching Netflix before falling asleep

Source: Oliver Wyman

Mental wellbeing (stress, anxiety, and depression)

Before COVID-19, mental wellbeing issues were increasing in prevalence in Singapore.²⁸ COVID-19 has amplified these issues, as individuals suffer from new and unprecedented psychological and social effects such as anxiety, stress, and depression.²⁹ In an Oliver Wyman survey (n=289, largely workforce participants in Singapore), 40 percent of respondents stated their overall mental wellbeing had deteriorated during COVID-19.³⁰ Social listening also saw a ten-fold increase in “mental wellbeing” discussions from first half-year (HY1) 2019 to HY1 2020.³¹ Half of the respondents of the same Oliver Wyman survey also attributed the deterioration to more stress factors, including financial difficulties, social distancing, social isolation, and fear of contracting the disease.³² Other risk factors have been observed in Singapore such as lower levels of physical activity and poorer nutrition³³, an increase in panic buying³⁴, binge-watching television³⁵, alcohol purchase and usage³⁶, and domestic violence.³⁷ Differences in mental wellbeing issues or degree of impact also vary by segments. While stress, anxiety and loneliness can affect all groups, youth may feel increased stress from home-based learning, working adults could face anxiety from financial security, and seniors may feel greater social isolation and loneliness. Lower economic segments tend to also be more prone to stressors and face greater mental wellbeing challenges.³⁸ Although resources were quick to emerge to support Singaporeans, the supply gap remains³⁹, due to several factors including deep-seated stigma⁴⁰, and a lack of resources and awareness.⁴¹

While the full impact on mental wellbeing is yet to be known, long-term impact is expected given risk factors likely to last beyond COVID-19. For example, economic consequences such as financial and job security may take much longer to recover from. The ramifications of extended stress, anxiety, depression and social isolation may also see a prolonged effect on mental wellbeing. While the world has evolved since a century ago, a study conducted on the impact of the Spanish influenza (1918-1924) on mental wellbeing in Norway may provide a similar cautionary tale — the number of first time hospitalised patients with psychological issues caused by the influenza increased by an average annual factor of 7.2 in the six years following the outbreak.⁴²

Exhibit 5: Day in the life of a working mother and caregiver

Example citizen journey #3



Name Justine
Age 40
Occupation Full-time sales at boutique advertising agency
Key health challenge Mental wellbeing
Additional information Married to oil and gas professional. Two children, Derek, 4 and Teng, 6. Both enjoy swimming at local community centre. Mother, 76, lives in a nursing home. Likes to go to the gym on weekdays and runs half-marathons at the nature reserves.

Morning	First to rise to make breakfast. Wakes children and prepares them for school	Starts work by checking emails. Flooded inbox from lengthy exchange that occurred overnight	Check in with boss and was told her numbers are 40 percent behind target	Texting friends and reads that another friend in sales has been laid off
Afternoon	On a conference call when she receives a call from Teng's teacher that Teng got into a fight with a classmate	Video calls her mother during down-time at work to check in if her mom is feeling better from her cold. Worried if her mother is properly taken care of in the nursing home		After her last meeting, she leaves work and takes the kids to the park for a walk. Asks husband to take out dinner on his way home
Evening	Anxious and overwhelmed, she considers calling the National Care Hotline but spent one hour coaxing Derek to bed. Hotline call postponed		While doing the dishes, she opens up an app to do a ten minute guided meditation	Wakes up in a jolt at midnight, remembered she forgot to send out an important email to client

Source: Oliver Wyman

Infectious disease management

New infectious disease management habits are forming due to government restrictions but will likely continue to be important and part of the society moving forward. With the global roll-out of vaccinations likely continuing well into 2022⁴³, the fight against COVID-19 has been, and will likely remain, one of infectious disease management. Previously, while Singapore did have campaigns around infectious disease management (for example, HPB's F.I.G.H.T. campaign against the spread of infectious disease), the adoption was not as widespread. For example, Singapore (compared to some other Asian peers) has less of a mask-wearing culture when sick.⁴⁴ COVID-19 government-mandated regulations, such as mask wearing, social distancing, and quarantines have now been in place for more than half a year and could last well into 2021. Even when imposed mandates are lifted, many of these new habits are likely to stay. For example, while masks may not be mandatory forever, the culture of mask-wearing when ill to prevent transmissions of other flu-like diseases is likely to be encouraged. The education and culture around vaccinations will also likely be further encouraged, including the COVID-19 vaccination. The Ministry of Health (MOH) and HPB are already emphasising the importance to "strengthen our healthcare system for the long term," such as enhancing subsidies for vaccinations.⁴⁵

IMPACT TO EXISTING HEALTH PROMOTION EFFORTS

Some elements of traditional health promotion have been and are being challenged.

The impact on health promotion can be summarised by the three observations below:

1. Needs in less emphasised areas of health highlighted (mental wellbeing and infectious disease management)

Previously, health promotion efforts were largely focused on physical activity and nutrition with fewer flagship interventions in mental wellbeing and infectious disease management. With COVID-19, mental wellbeing and infectious disease management come to the forefront.

2. A "One-size-fits-all" approach is less effective in addressing segment specific needs and lifestyles

Previously, health promotion programmes have focused on different segments but the large marquee programmes have been broad-based, attracting more than 1.5 million citizens for National Steps Challenge (NSC — a physical activity initiative) and close to 1 million citizens for Eat Drink Shop Healthy (EDSH — a nutrition initiative). While these programmes have helped to improve health outcomes, COVID-19 has demonstrated that high-risk segments are more disproportionately impacted, whether its directly by COVID-19 (for example, those with NCDs) or other health domains (for example, low-income segments face greater stress from financial insecurity). In addition, COVID-19 has also further demonstrated health needs and behaviours continue to greatly vary by different segments (for example, seniors, working young adult, working mothers, and caregivers).

3. Limitations of offline channels for citizen reach and engagement

Previously, many health promotion programmes were run in-person (for example, offline channels: in-person physical activity group classes, shopping for healthy food at supermarkets or restaurants, screening programmes at clinics). With COVID-19 government restrictions such as working from home, in-person activities have been limited or cancelled, with a surge in demand for digital health and technology solutions (for example, online workouts, online food delivery).

Health promotion must adapt to provide the necessary solutions for citizens to develop and maintain healthy habits and behaviours. With new health needs and behaviours, the importance of investing and reimagining health promotion is imperative.

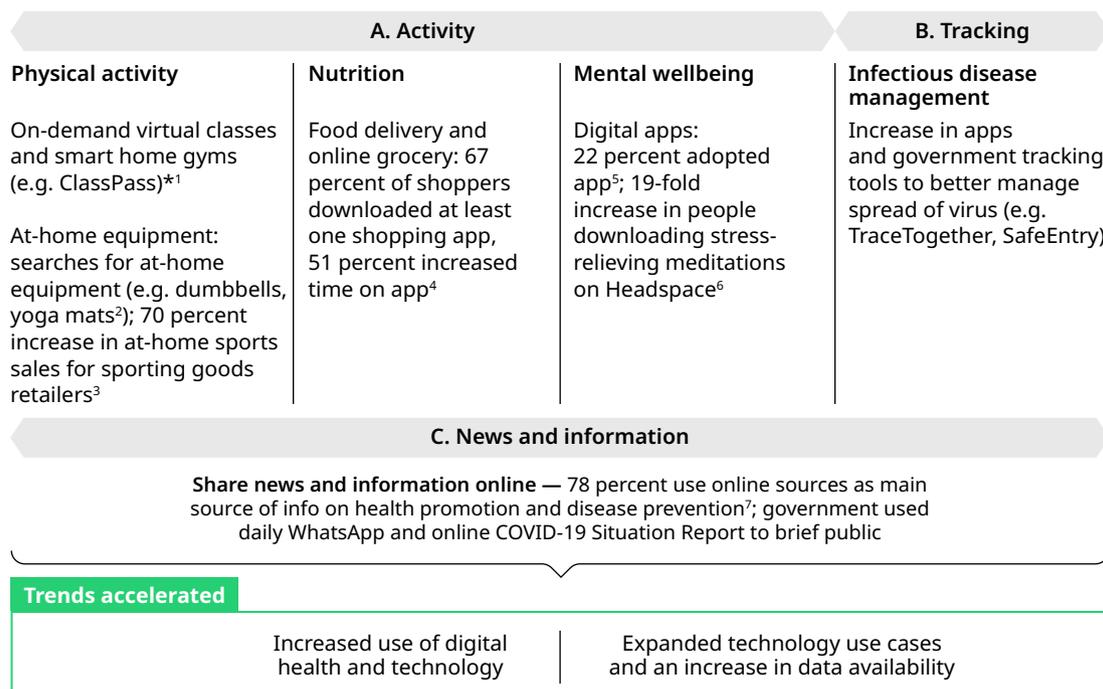
Chapter 3

SILVER LINING: DIGITAL AND TECHNOLOGY ACCELERATED

Healthcare lags other industries in digital transformation, but adoption has sped up during COVID-19

The acceleration of digital health and technology in response to COVID-19, will manage and improve citizens' health and wellbeing. Historically, the broader healthcare industry has lagged in terms of development and adoption — for example, only seven percent of healthcare companies said they had gone digital, compared to 15 percent in other industries.⁴⁶ Although there have been significant technological advances in healthcare, the focus has largely been on advancing treatments and equipment, instead of innovations in consumer engagement and interactions. COVID-19 has accelerated technology and digital adoption, with clear indication that the healthcare industry, including individuals, companies, and governments, can overcome these perceived barriers. Digital health (including mobile health and wearable devices) has observed a particularly strong adoption with digital solutions supporting physical and mental health. For example, the global smartwatch industry observed a 20 percent growth in the first half of the year.⁴⁷

Exhibit 6: Observed digital health and technology trends



1. Euromonitor, Global, 2020
 2. Google Trends, Singapore
 3. Between January and April 2020, The Straits Times, Singapore, 2020
 4. WARC, Singapore, 2020
 5. COVID-19 Impact on Singapore Survey, Oliver Wyman, 2020
 6. MIT Health Review, Global, 2020
 7. COVID-19 Impact on Singapore Survey, Oliver Wyman, 2020

Source: Oliver Wyman

INCREASED USE OF DIGITAL HEALTH AND TECHNOLOGY — CITIZENS AND PRIVATE AND PUBLIC SECTOR

In the second quarter of 2020, there were more than 650 million downloads of mobile health applications (apps) globally versus 446 million in the same quarter in 2019.⁴⁸ This was the largest ever increase in growth, indicating that consumers are eagerly seeking digital tools to manage their health.⁴⁹ Digital and technology solutions for consumers were aplenty across health domains and types, including activity, tracking and news and information (see Exhibit 6). Consumer adoption is at an all-time high and is expected to stay even after the pandemic.⁵⁰

Encouragingly, both private and public sectors have also adopted digital health and technology solutions. In Singapore, different government agencies built various digital health tools to support individuals, including the community-driven contract tracing app, TraceTogether and the national digital check-in system, SafeEntry. Some of HPB’s programmes were already online but they also created new solutions, including online tools to share health information (for example, the “coolest handwashing” video, garnered over 692,000 views and a mental wellbeing resource site, “Brave the New” was made in partnership with the Ministry of Culture, Community and Youth).

EXPANDED TECHNOLOGY USE CASES AND AN INCREASE IN DATA AVAILABILITY

Technology has rapidly expanded use cases, from COVID-19 detection to new digital health initiatives. For example, Apple, Fitbit, Garmin and OuraRing are all studying whether sensor data (such as breathing rate, heart rate) can be used to predict COVID-19 even before symptoms develop. Another expanded use case is with mobility data. Apple aggregates data from Apple Maps to show trends in mobility (for example, driving, transit, and walking) to support health authorities with mitigating the spread of the virus. While built prior to COVID-19, LumiHealth — a first-of-its-kind personalised digital health programme developed by HPB and Apple — was launched in Singapore during the pandemic and aims to use data to better personalise health and wellness interventions for individuals.

With the proliferation of digital health and expanded technology use cases, large amounts of varied data are being collected, including data related to health, personal, location and interaction. Public and private organisations alike are leveraging data from different interconnected technologies such as smartphones and apps, connected devices (for example, wearables, trackers and sensors) and online data sets (for example, social media). While in the short-term it is used to understand and manage COVID-19, in the long-run, this data may also be leveraged to better understand individual needs and behaviour in order to improve health and wellness interventions.

With good momentum of digital engagement coupled with a renewed need to focus on health promotion, it is now the opportune time to rethink health promotion and the role of data and technology. WHO has called for the world to not waste an opportunity from a crisis and to rebuild health systems that have a greater focus on prevention and are stronger, better and more resilient for the future.⁵¹

Chapter 4

REIMAGINING THE WAY FORWARD IN A POST-COVID-19 WORLD

Way forward for health promotion underpinned by different principles

Health promotion in Singapore has evolved from public health education and outreach to providing broad-based programmes across health promotion areas, such as physical activity and nutrition. Many of the programmes are implemented through an app (such as Healthy365 or HealthHub) but most of the interventions and activities are still in-person. For example, the largest physical activity programme, NSC, encourages all citizens to walk 10,000 steps a day, measured on a tracker or wearable, with thematic challenges to further motivate citizens to meet their goals and gain more rewards. EDSH is also a broad-based nutrition programme focused on incentivising healthy food purchasing at supermarkets or restaurants, using the app to scan. In the past couple of years, health promotion has started its journey towards more holistic, personalised and “health anywhere, anytime.” This has translated into initiatives such as building a research cohort for deeper data and insights, designing interventions for specific groups (for example, exercise programmes for seniors only) as well as recently launching a holistic and “health anywhere, anytime” programme (for example, LumiHealth and Healthy365 — HPB’s health and diet tracking mobile app).

Exhibit 7: Health promotion today vs way forward

	Principles
Today Focused on single health domains Ongoing: Integrating through app (for example, Healthy365)	Way forward Whole-person approach to health promotion “Whole is greater than sum of its parts”
Broad-based programmes Ongoing: Initial efforts to personalise (for example, programmes for seniors, ethnic minorities)	Targeted, personalised, and tailored interventions for individuals and communities “Different strokes for different folks”
Anchored on in-person programmes supported by health apps Ongoing: Building new programmes to support with seamless delivery (such as, LumiHealth)	Seamless integration of wide range of physical and digital platforms “Health anywhere, anytime”

Source: Oliver Wyman

Health promotion in Singapore has come a long way and should continue to leverage the momentum of the pandemic to imagine what the way forward can be. Chapter 2 identified challenges faced in health promotion, while Chapter 3 recognised the silver linings of the pandemic (such as the acceleration of technology). Health promotion should use the lessons learned and trends identified to improve and reimagine health promotion in the future. Emerging from Chapter 2 and 3, the way forward is anchored on three key principles as the foundation for transitioning into a future “normal”.

Exhibit 8: Three key principles that underpin the future

Impacting health promotion	Trends accelerated		Principles
Chapter 2 Changing behaviours impacting health promotion	Chapter 3 Silver lining: Digital and technology accelerated		Chapter 4 Key principles for the future of Health promotion
Needs in less emphasised areas of health highlighted	—	>	Whole-person approach to health promotion “Whole is greater than sum of its parts”
“One-size-fits-all” approach less effective for segment-specific needs	Increased use of digital health and technology	>	Targeted, personalised, and tailored interventions for individuals and communities “Different strokes for different folks”
Limitations of offline channels	Expanded technology use cases and increase in data availability	>	Seamless integration of wide range of physical and digital platforms “Health anywhere, anytime”

Source: Oliver Wyman

1. Whole-person approach to health promotion — “Whole is greater than sum of its parts”

Interventions today are usually designed to address one specific health need only (for example, an intervention solely for mental wellbeing). While effective for the standalone health area, these interventions traditionally do not interact with other interventions. However, health and wellness are dynamic and interrelated. For example, physical activity is positively associated with improved mental wellbeing.⁵² In the future, health and wellness needs should be addressed holistically.

2. Targeted, personalised, and tailored interventions for individuals and communities — “Different strokes for different folks”

COVID-19 has shone a light on the vulnerabilities of higher risk segments, such as individuals with existing NCDs or seniors, or both. It also demonstrated how different segments may have differing health needs and behaviours (for example, mental wellbeing stressors are different for youth, working adults, and seniors). The pandemic serves as a timely reminder to tailor interventions to suit constantly evolving situations and lifestyles and to keep ensuring an inclusive health promotion approach across society.

3. Seamless integration of wide range of physical and digital platforms — “Health anywhere, anytime”

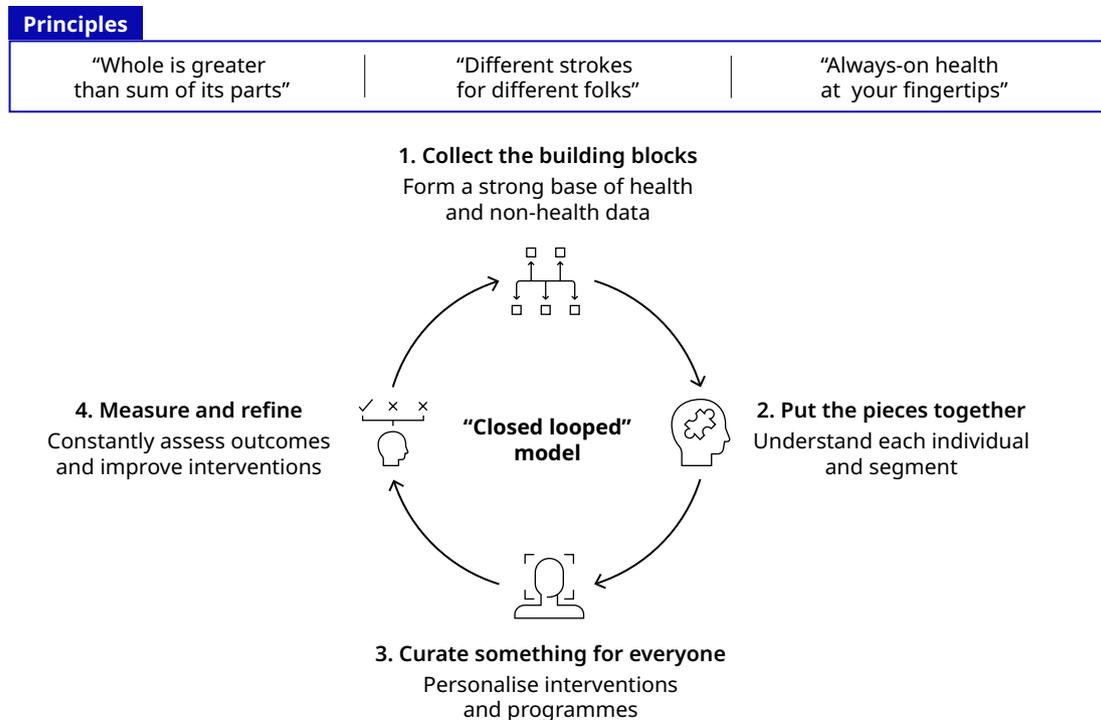
With COVID-19, digital and technology have already permeated the lives of citizens — young and old. COVID-19 highlighted the need and potential for health promotion to become accessible and convenient for all, particularly as individuals face new lifestyle changes (for example, working from home). This will require an interconnected ecosystem of both offline and traditional interventions (for example, in-person, community-based) with digital solutions and technology. Individuals should be able to access health, whenever and however required, which may require integrated offline and online solutions. It is important to strike the right balance between traditional and digital to ensure all individuals are not left behind and can continue to conveniently access health interventions that are most suited to them.

THE WAY FORWARD FOR HEALTH PROMOTION: TECHNOLOGY AND DATA AT THE HEART OF A “CLOSED LOOP” MODEL

These three key principles (such as a holistic, personalised, health anywhere, anytime) necessitates a “closed loop” model for health promotion. The “closed loop” model is a framework to support health promotion organisations in designing and implementing evidence-based and effective interventions and programmes that improve the physical and mental health of Singapore citizens. Founded on the principles, the “closed loop” model should distil key information from individuals (such as health habits and preferences) into targeted and personalised interventions, continuously improving and evolving based on further inputs and outcomes — ultimately creating a “closed loop” model of health promotion.

There are four key steps in the “closed loop” model with each step building each other, with data and technology at the heart of it.

Exhibit 9: “Closed loop” model is the way forward of health promotion



Source: Oliver Wyman

1. Collect the building blocks

The first step in translating individual information into insights and interventions is to build a foundation of data. This translates to collecting a large and diverse set of relevant data from an individual, ranging from hard demographic data (for example, race, gender, age, education) and soft demographics (for example, lifestyle, health behaviours, health needs). Data should ideally be collected in real-time and automatically, where possible.

A comprehensive and accurate dataset is crucial to form fact-based view of the individual and the population. This is where technology plays an increasingly significant role as the latest advancements allows for increased depth, breadth, timeliness and accuracy of data collection. Connected devices such as smartphones and wearables can enable an ongoing “autopilot” of data collection across a range of health data such as heart rate, calories burnt, steps and sleep, with specialised devices even able to measure blood glucose levels, skin temperature and electrocardiogram. Beyond connected devices, other sources of information such as electronic medical records, disease registries or even, supermarket purchases can further contribute. Data collected is not only real-time but also longitudinal and cross-cutting (for example, tied to a specific person across metrics) enabling insights to be increasingly precise and predictive. Equally as important to collecting data is building public confidence on data privacy. Data collected will only come if individuals allow it. As such, a “human-driven” approach and empowered end users will need to go hand-in-hand with collecting data.

2. Put the pieces together

The next step is to combine and analyse data to better understand the individual through health needs and risks, habits and behaviours. Drawing links between different types of data can define more granular population segments beyond traditional filters such as age or gender. For example, a comprehensive health risk score can be developed based on a combination of health factors and identify “high-risk” individuals. This concept is already used in the medical field — clinical risk scores, for example, are assigned to patients based on medical history and demographic data, allowing providers to more efficiently and appropriately manage “high-risk” patients. Further, as analytic tools continue to become more powerful, analysis will shift from descriptive and retroactive to predictive, allowing for segmentation to be increasingly more granular and precise.

Green shoots of more advanced analytics exist today. For example, in the hiSG cohort, HPB can use data collected to segment individuals by sleep profiles, including sleep duration and timings. With these profiles, HPB can draw further connections with other types of data and lifestyle indicators such as weight, physical activity, alcohol consumption and working hours to uncover deeper insights and patterns within the segments.

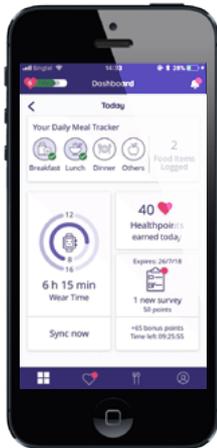
Exhibit 10: HPB example of collecting the building blocks, and putting the pieces together

Two-year study following a cohort of ~3,000 individuals¹ through wearables and self reporting/ journaling (Youth=ages 16-20; Adult=ages 21-40; Senior=ages 50-74)

 **Health Insights SG:** A tech-enabled population health study by HPB



1. Collect the building blocks



Today: Collected via wearable

- Sociodemographic data (e.g. age, gender, ethnicity)
- Biometrics (e.g. height, weight, health status)
- Lifestyle and habits (e.g. activity level, diet, sleep, mental wellbeing, meal patterns)
- Perceptions and preferences (e.g. attitudes to health, life priorities)
- Psychographics

Tomorrow: Deepen base of data

- Deeper phenotype and clinical



2. Put the pieces together

Draw links and identify patterns

Investigate relationship between:

- Sleeping patterns and chronic conditions (e.g. obesity)
- Walking patterns and frailty amongst seniors

**Deeper segmentation
beyond basic
demographics**

Source: Health Promotion Board, Singapore

3. Curate something for everyone

With a deeper and better understanding of the individual, evidence-based interventions can be developed and precisely tailored. This will translate to individuals having the flexibility of accessing healthy lifestyle interventions and options beyond traditional channels, drastically increasing the ease of access and frequency of touchpoints. Better granularity will also enable activating specific communities around key health issues. A simple yet powerful example is personalised nudges and interventions for individuals to increase physical activity. Instead of fixed reminders to clock 30 to 45 minutes of moderate to vigorous physical activity each day, goals recommended to an individual can be adjusted based on a multitude of factors such as age, fitness level, health goals, working and waking hours as well as stress levels. Messages can also be tailored based on what is most likely to motivate the individual (for example, weight loss, fitness, stress relief, and the like). A young working adult may be nudged to do strength training at the gym after work, while a grandmother with diabetes may be nudged to go for a morning walk with a friend.

Leveraging technology and data inevitably requires citizen adoption. Some segments of a population, such as seniors, may be less comfortable adopting digital tools, which may limit the effectiveness of data collection and interventions. However, some of these “harder to reach” segments may actually benefit most from the “closed loop” model (for example, remote monitoring for seniors). These segments need to be given the necessary tools and support to ensure they are not left behind.

In addition, it is imperative to note existing programmes and non-digital interventions will continue to play a major role in the “closed loop” model. For example, data on seniors’ nutrition needs and habits could be collected through a combination of traditional channels (for example, grocery stores purchases) and digital channels (for example, food delivery platforms). The data analysed may determine that the most effective interventions is an offline and/or existing programme. For example, based on data, the intervention may be to purchase healthy foods at supermarkets through EDSH or to take a cooking classes at a day care centre.

4. Measure and refine

The final step of the “closed loop” model is arguably the most important. At the core of the model is to improve health outcomes of the individual which means measurement is imperative. The interventions will need to be assessed against measurable and consistent benchmarks. By evaluating the outcomes of the interventions, health promoters will be able to better understand what works and what doesn’t and recalibrate accordingly. These findings and results create yet another source of data, further growing the base of data and information available for analysis and development of interventions — thereby closing the loop and creating a virtuous cycle of health promotion.

HPB has made early strides towards employing personalised interventions in real-time. HPB collaborated with KenSci (machine learning powered risk prediction platform for healthcare), for example, to launch personalised nudges on individuals within unique segments. Early experiments showed promising results, with marked differences between the treatment and control groups in terms of the effectiveness of some interventions.

Exhibit 11: HPB examples of curating, measuring, and refining



Personalisation at scale through data science platform: Converting citizen data and preferences into interventions (e.g. type of nudge that is most effective to a micro segment)

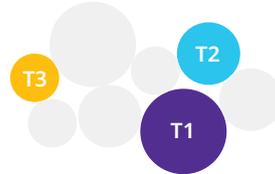


3. Curate something for everyone

Integrated citizen data across multiple sources and platforms

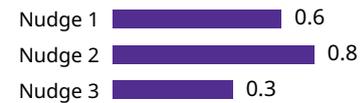
- Demographics
- Steps
- Heart Rate
- Scans
- Sleep
- Events
- Mood

Distinct micro segments (“tribes”) identified through cluster analysis



Propensity scoring to predict what intervention (e.g. type of nudge) to use

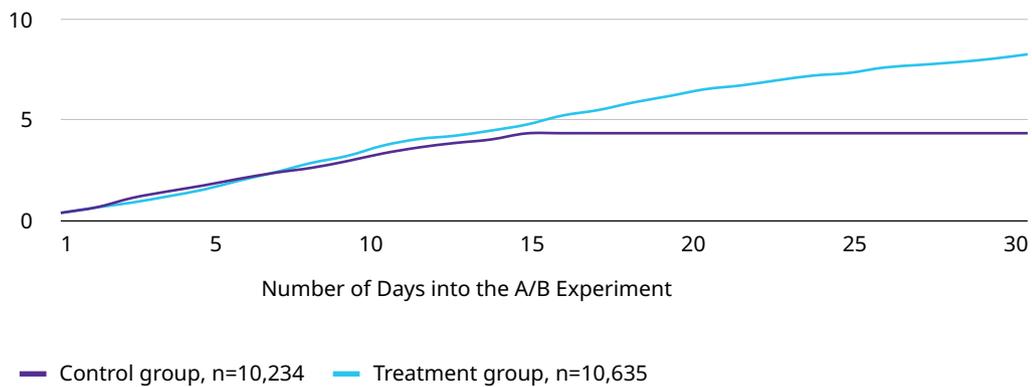
T1 citizen



4. Measure and refine

Assess efficacy and refine intervention/nudge

Cumulative % of participants who responded with the intended behaviour



Source: Health Promotion Board, Singapore

Chapter 4a

CITIZEN-VIEW: “CLOSED LOOP” APPLIED TO CITIZENS’ LIVES AND HEALTH

While the “closed loop” model applies to the health promotion organisation, it will impact how health and wellness is delivered to individuals. Taking the citizen journey examples in Chapter 2 (Melvyn, Jason and Justine) — there is tremendous potential for each citizen to achieve a healthier lifestyle across health domains in the future, enabled the “closed loop” model.

Background

In the future, Melvyn has started to use basic digital health tools — a wearable provided for free as part of the National Steps Challenge. He uses the wearable mainly to tell the time, but it is also collecting basic data such as steps, heart rate and gait. He frequents the community centre where he participates in community programmes for physical activity and social interaction with fellow seniors. He has downloaded basic health apps and while he does not actively use them, nudges are sent to him, reminding him that simple healthy lifestyle habits such as walking, stretching and proper meals can go a long way in maintaining his health. Melvyn still prefers traditional channels of receiving health information such as newspapers and television but has started to read online articles and watch videos shared by his friends.

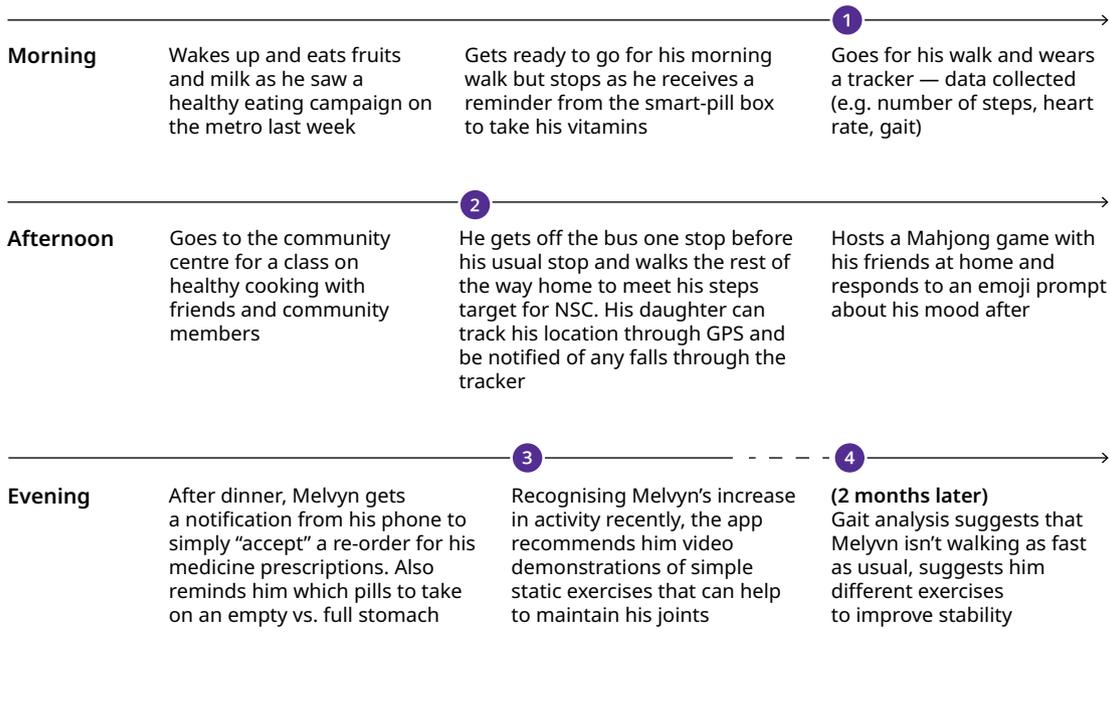
Exhibit 12: Day in the life of a senior, post-COVID-19



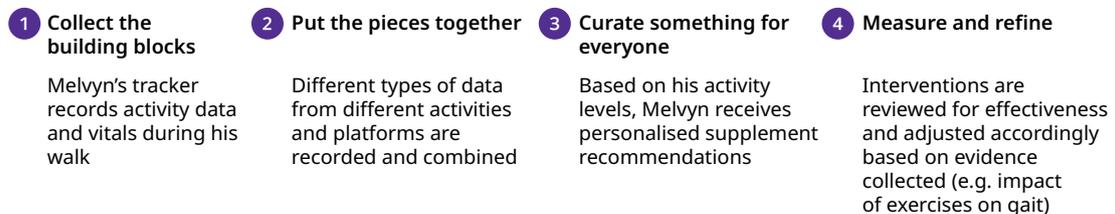
Melvyn, 68

Wears a basic tracker as part of the National Steps Challenge.

Uses simple health and social apps, mainly for reminders and to access basic health information.



“Closed loop” model



Source: Oliver Wyman

Background

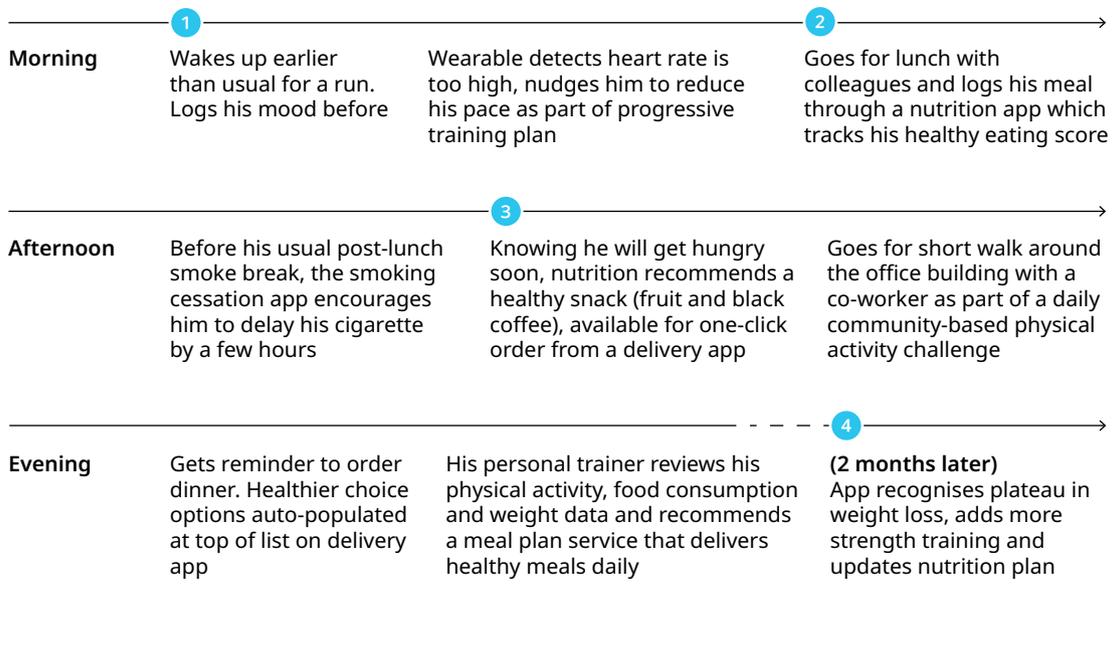
In the future, Jason is focused on achieving and maintaining a healthy weight. He uses his wearable which includes a combination of physical and mental wellbeing interventions. Jason’s wearable collects data ranging from his mood to food intake and nudges him accordingly. The wearable knows Jason is not an evening person, so the nudges are usually in the afternoon. His wearable (connected to his phone and medical records) continues to gather data and learns as Jason’s health outcomes changes. Jason also shows this longitudinal data to his personal trainer at the gym, who then helps refer a meal plan service that delivers healthy meals daily to his home, making it convenient to eat healthy and take out the guess work out of planning macros. When his weight loss plateaus, the interventions shift and adapt. Jason gets holistic, personalised and an “always-on” experience that supports his ongoing health and wellness needs and behaviours.

Exhibit 13: Day in the life of a working young adult, post-COVID-19

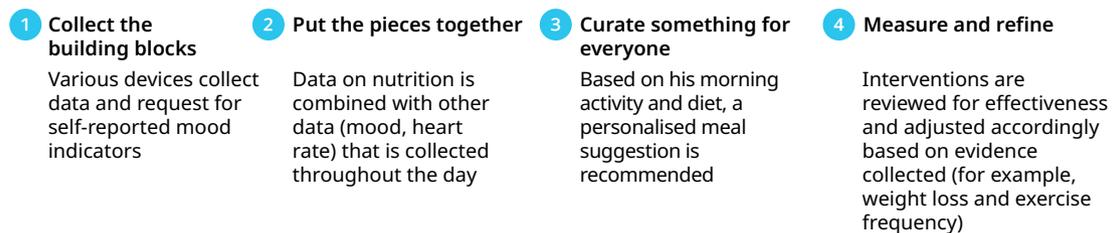


Jason, 26

Determined to get back in shape — purchased a wearable and signed up for a wearable-based health programme.
Wants to quit smoking but needs support.



“Closed loop” model



Source: Oliver Wyman

Background

In the future, Justine is focused on maintaining her mental wellbeing amidst her busy schedule across work and family commitments. She uses a mindfulness app to keep track of her mood and to prompt her to perform short breathing exercises or meditation when she is stressed. She takes a holistic approach to her personal health — making sure to eat healthily and to participate in community exercise classes. Her daily activity, mood, sleep quality and diet are tracked and integrated from various sources, allowing her and her therapist to identify any positive or negative trends, which can then be addressed accordingly. With these data inputs and tools available, Justine finds it easier to lead a healthier lifestyle.

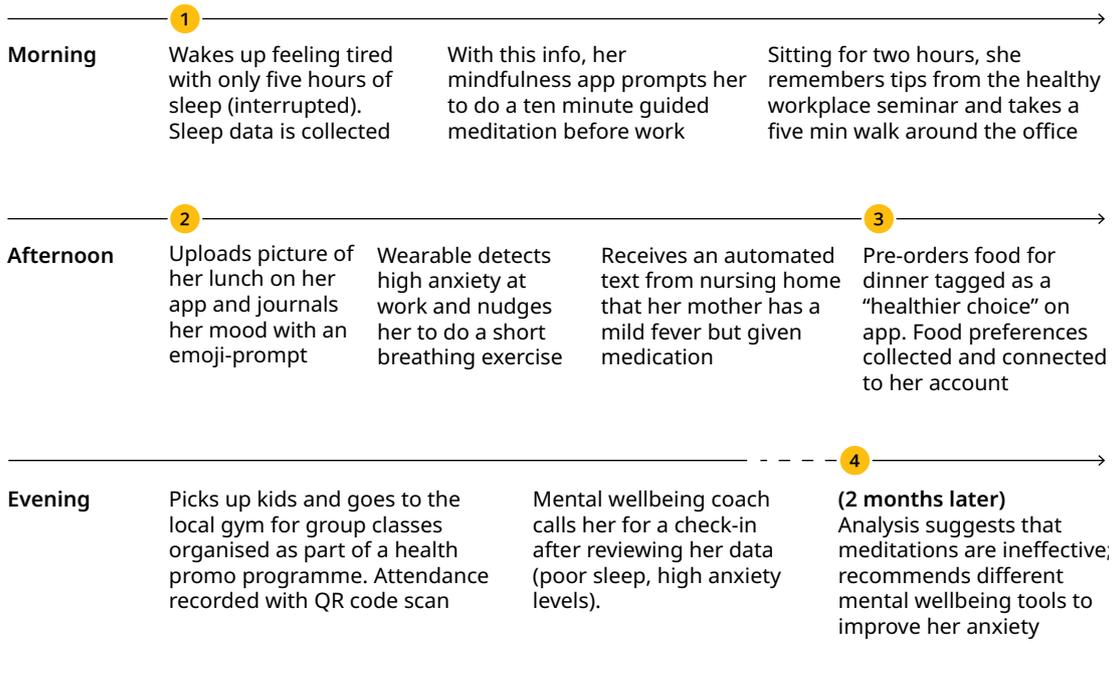
Exhibit 14: Day in the life of a working mother and caregiver, post-COVID-19



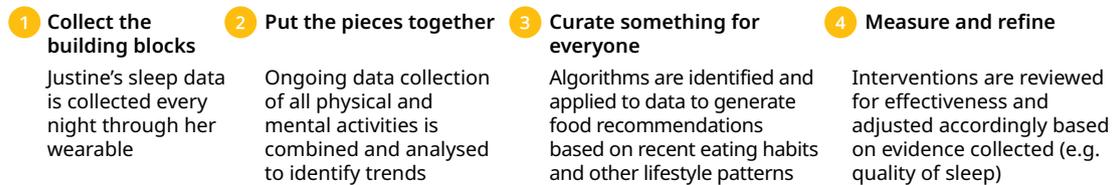
Justine, 40

Owns and wears a wearable 24/7 — uses it for physical health.

- Increased awareness of how to lead a healthy lifestyle, supported by nudges
- Uses a mindfulness app



"Closed loop" model



Source: Oliver Wyman

Chapter 4b

BRINGING THE “CLOSED LOOP” MODEL TO LIFE: CAPABILITIES REQUIRED

The way forward for health promotion is ambitious and will require transformation. Data sources and digital tools may sit in silos within health promotion organisations or will come from different stakeholders in the ecosystem. For the “closed loop” model to reach its full potential, silos and solutions should ideally be integrated or at least synchronised to facilitate the flow of data and sharing of best practices. Ensuring community activation will also be key to improve understanding of key segments and ensure interventions are well deployed. Building trust with citizens will also be imperative, particularly with the increase in public concern on data privacy. Finally, COVID-19 has shown us innovation can happen everywhere. The importance of leveraging different types of partnerships and extending beyond the public sector will be key. These four capabilities are further elaborated in the following section.

1. Transform organisation, including building data and analytics

The “closed loop” model will require organisations to operate differently. New systems, competencies, functions and tools will be required. Moreover, the way different teams or functions interact will likely need to also adapt to encourage data and best practice sharing.

Technology infrastructure, including agile and robust systems must be in place to automate data sourcing, storing, cleaning, integrating, and even analysing. This should be coupled with data quality processes and policies (including common set of data definitions, data delivery, quality management and workflow management). Systems should extend beyond internal data but also incorporate external data. This means clear quality controls on data management, processes and policies, integrating future-proof controls necessary to maintain regulatory and privacy compliance. Governance (including clarity on data strategy, data permissions on sharing) will also need to be part of the organisation’s DNA.

Beyond having a mature data and analytics system and management framework, organisations must live and breathe data. This goes beyond having the latest tools or massive databases, but most importantly, it is about creating a data-centric organisation, founded on people. The organisation should empower its talent to use data for decision-making, including to understand segments, build interventions and measure impact. This means consistent skills and talent recruitment definitions, agile mix of talent but also frequent opportunities to upskill employees with a suite of training and knowledge sharing tools as well as established incentive schemes. This requires a fundamental mindset shift and culture of innovation in the way of work and will require the constant tone at the top to permeate through the entire organisation.

2. Activate community

As health promotion becomes more targeted and segment specific, interventions will be developed for certain sub-segments. This requires building a strong understanding of the

sub-segments' health needs and behaviours. While different types of data (for example, medical, genetic, psychographic) can be collected from digital health and technology tools, anthropologic and sociology datasets are less prevalent but are just as important to develop a strong understanding of individuals and their relevant segments. Anthropologic and sociology data can come from activating communities.

Engaging with communities will allow for better understanding of sub-segments at a nuanced and contextualised level, beyond just data and statistics. Developing interventions based on community knowledge and know-how can optimise the benefits and improve health outcomes too. Buy-in for interventions can also be more easily attained if influential leaders are on board early to support the promotion of the intervention. This may also apply to the longevity of interventions as community input may correlate to having more responsibility to see it through. By incorporating community and cultural elements to health promotion, this allows for the concept of holistic and person-centric health to be brought to the next-level.

3. Build trust with the public

Health promotion in the future is anchored heavily on collecting individuals' data. Privacy concerns have been at the forefront of public debate, with heightened sensitivity and growing lack of trust in governments associated with tracking and monitoring tools implemented during COVID-19. For example, TraceTogether faced low adoption rates in the beginning — only 17 percent of the population had downloaded it after two months of its launch⁵³, whereas at least 60 percent adoption is required for it to be effective.⁵⁴ The pushback largely stemmed from fears of surveillance overreach and suspicions pertaining to monitoring of personal movements beyond the purpose of contact tracing.⁵⁵ A separate Oliver Wyman survey found 73 percent of respondents were concerned about the privacy of their health and related data.⁵⁶ Social listening results during first half-year 2020 showed a net negative sentiment towards contact tracing apps, with 41 percent of posts associated with negative sentiments. The worry is to be expected particularly as health data is sensitive and irreplaceable, thus making it particularly vulnerable to cyberattacks and theft.

Building trust with the public should be a cornerstone of any organisation's mission. However, building trust on data privacy-related matters is not so much a public campaign as it is proactively and pre-emptively safeguarding data through a robust and holistic data privacy programme and culture. In short, a data breach can create more negative impact than a campaign can create positive impact. As such, organisations should have four effective data privacy strategies, including strengthening accountability, focusing on key teams that have significant influence on privacy management, embedding privacy into the business (for example, define privacy principles, increase awareness at senior executive levels and establish a data protection office) as well as increasing transparency and disclosure for consumers and citizens. Transparency and disclosure for consumers and citizens can be translated into a number of actions, including putting the customer in control and giving them transparency and control over their data, giving customers back value of their data and delivering reliable experiences and services that are only based on what the customer needs and in a non-intrusive way.

4. Forge public-private partnerships

Public-private partnerships have proven to be an effective method for accelerating change and advancements to any industry as they bring together the expertise and resources of both the sectors. In effective partnerships, both parties bring something to the table to create a solution that neither party could effectively create alone.

Government entities can bring access to data, a strong understanding of nation's health promotion needs, operational expertise and scale. Furthermore, they are committed long-term to enhancing population health. By collaborating with the private sector, doors open for innovative opportunities with advanced technological capabilities and "know-how" in development of solutions to the market. If executed correctly, public-private partnerships can accelerate the development of capabilities to turn the future of health promotion into a reality.

Not all partnerships may be valuable. Adapted from WHO, there are several ingredients required for a successful partnership. Strategic alignment with clear links that both the public and private organisation's mission and priority actions are aligned. The engagement should demonstrate value for public health (over and above what could be achieved without the engagement). The engagement should also maintain objectivity, integrity, independence and impartiality. Other important elements can also make the partnership valuable and successful, such as exclusivity, fair financing, governance and monitoring and evaluation. Above all, the partnership must be built on trust. While there are several ingredients required for successful partnership, it is also important to build proper capabilities to reap the benefits, including building a framework for partner identification, partnership due diligence as well as project management.

COVID-19 HAS CREATED THE NECESSARY CASE FOR CHANGE — THE JOURNEY AHEAD SHOULD BUILD ON THE MOMENTUM

COVID-19 has created an opportunity for health promotion to be reimagined with the "closed loop" model as the foundation for the future. Change should start now, building on the momentum of the crisis but also leveraging what already exists. Capabilities required for each step of the "closed loop" model should be leveraged from existing and developed in parallel, instead of focusing on "perfecting" one step before proceeding to the next. For example, instead of trying to collect all the different data sources available, health promotion should start analysing and developing interventions based on existing data sets collected. Pilot projects are an effective way to kickstart the transition too, focusing on small sub-populations across a narrower scope of data fields and interventions. These pilots will rapidly identify what works and key lessons, as well as attain buy-in from stakeholders through proofs of concept and benefits observed. HPB, for example, has already embarked on this journey of building the "closed loop" model and will continue to do so in small steps moving forward.

CLOSING REMARKS: ACTIVATING THE ECOSYSTEM

The way forward brings various implications to different stakeholders

Health promotion and public health authorities will become even more front and centre as there is an even stronger need for deeper and smarter investment of resources into health promotion, including to build the “closed loop” model. While each country is at a different stage of the health promotion journey, the principles and “closed loop” model can be applicable at any stage.

Healthcare systems also have a part to play in the transformation as a key patient touchpoint for data collection and patient interventions. They also stand to gain from bending of the cost curve and reduction in preventable admissions through more effective health promotion and disease prevention measures.

Private sector players are presented an opportunity to scale through partnerships with the public sector. While they often have best-in-class technology solutions in digital health, they may not have the requisite public health knowledge, strategies and policies as well as reach to expand beyond their existing user base or have access to a larger population to deploy their technologies or solutions. The private sector can also benefit from strengthening their brand by meeting public needs and improving health education and conditions worldwide. Thus, the development of a symbiotic relationship between private and public sectors can be beneficial for the entire population.

APPENDIX

Purpose of report

The purpose is to share learnings and offer possibilities with the hope of engaging others, both public and private, on defining what the future looks like — a tangible vision that could translate to healthier populations — and an invitation for collaborations on a new way forward.

This report provides a view on the immediate and long-term implications of COVID-19 on health promotion and disease prevention, with a focus on Singapore based on the first six months of COVID-19. The study captures the health risks and challenges before COVID-19 and the progress Singapore has made in health promotion and disease prevention. The experience and lasting impact of COVID-19 in Singapore is explored, including accelerated digital and technology adoption, to ultimately provide the way forward for health promotion in the future. The study is divided into four chapters:

1. The “pandemic” before COVID-19: Health promotion is more important than ever
2. Changing health behaviours are impacting health promotion
3. Silver lining: Digital and technology accelerated
4. Reimagining the way forward in a post-COVID-19 world
 - a. Citizen-view: “closed loop” model applied to citizens’ lives and health
 - b. Bringing the “closed loop” model to life: Capabilities required

Background: First six months of COVID-19, in context

The novel coronavirus, COVID-19, is perhaps the defining global health crisis of our time. The pandemic is largely seen as one of the greatest challenges since World War II, with over 17.5 million confirmed COVID-19 cases and over 675,000 confirmed COVID-19 related deaths within the first six months of the World Health Organization (WHO) declaring a Public Health Emergency of International Concern (PHEIC) on 30 January 2020. In Singapore alone, in the first six months, there were over 51,000 confirmed COVID-19 cases and 27 deaths confirmed to be COVID-19 related.⁵⁷ Beyond pure numbers, countries have imposed unprecedented actions that would have seemed unimaginable to citizens in the past: strict lockdowns, closed borders and suspended economic and social activities, to name a few. Singapore was no exception — it closed borders to Hubei province where the virus originated within 30 days of the first cluster reported in Hubei. By 7 April, a “circuit breaker” (nationwide partial lockdown) was imposed after nearly 1,500 confirmed cases. Mobility was restricted to inside the home, unless for essential activities (for example, food shopping, essential care, or exercising alone).

Method and disclosures

The study focuses on the first nine months of COVID-19, with the first case in Singapore confirmed on 23 January 2020. Given the novelty of COVID-19, research and studies on the total direct and indirect impact to citizens and society will require more time to develop. As such, this study uses a combination of secondary research, expert interviews and primary sources, including a proprietary Oliver Wyman citizen voice survey (n=289) conducted from 28 July to 4 August and social listening of forums from January 2020 to June 2020.

This report was written by Oliver Wyman, with inputs by the Health Promotion Board (HPB) in Singapore. HPB is a statutory board under the Ministry of Health (MOH) that is focused on national health promotion and disease prevention programmes.

Snapshot of Singapore

Metric	Details	Value ¹
Population	Total population	5,768,817
Population age split	Ages 0-14	14.5%
	Ages 15-64	71.2%
	Ages 65 and above	14.3%
Race mix	Chinese	76.0%
	Malay	15.0%
	Indian	7.5%
	Others	1.5%
GDP per capita	Nominal	US\$64,496
	Real	US\$59,923
GDP growth	Five-year real GDP growth	12%
	Ten-year real GDP growth	40%
% GDP spent on healthcare	Health expenditure as % of GDP	4.90%
Top ten causes of death	Cancer	28.4%
	Pneumonia	20.7%
	Ischaemic heart disease	18.8%
	Cerebrovascular disease	5.8%
	External causes of morbidity and mortality	4.0%
	Nephritis, nephrotic syndrome and nephrosis	3.1%
	Hypertensive diseases	2.6%
	Urinary tract infection	2.3%
	Other heart diseases	2.0%
	Chronic obstructive lung disease	1.4%
Top ten Disability-Adjusted Life Years (DALYs)²	Others	14.0%
	Cardiovascular diseases	14.0%
	Cancers	13.0%
	Musculoskeletal	13.0%
	Injuries	11.0%
	Mental disorders	10.0%
	Neurological disorders	7.0%
	Diabetes meatus	5.0%
	Sense organic disease	4.0%
	Lower respiratory infections	4.0%

1. 2019 stats, unless stated otherwise

2. 2017 (Latest available data)

Source: Oxford Economics, Singapore Government Statistics (Gov.sg), The Economist Intelligence Unit, Ministry of Health Singapore, Global Burden of Disease 2017 Study

ENDNOTES

- 1 Chapter 1 and Exhibit 2 summarises the impact of COVID-19 on Singaporeans.
- 2 Ministry of Health: [Updates on COVID-19 \(Coronavirus Disease 2019\) local situation](#).
- 3 Institute for Health Metrics and Evaluation, 2019. Life Expectancy refers to the number of years that a person at a given age can expect to live: 84.8 years.
- 4 Institute for Health Metrics and Evaluation, 2019. Healthy Life Expectancy refers to the number of years that a person at a given age can expect to live in full health, considering mortality and disability: 74.2 years.
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