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Health Promotion Board, Singapore

eHealth and mHealth
Beyond COVID-19

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Health Promotion Board (HPB) empowers Singaporeans to take better ownership of their health, through delivery of policies and programmes that will help to educate and nudge behavioural changes, supported by healthy ecosystems in different settings where they could more easily engage in healthier behaviours.

**Priority areas**

- **Physical Activity:** flagship progs & community exercise sessions
- **Healthy Eating:** policy & progs
- **Tobacco Control:** policy & progs
- **Screening:** campaigns & accessibility
- **Mental wellbeing:** progs
- **Hygiene Campaigns**
- **Active Ageing Programmes**
- **Immunisation:** Campaigns & subsidisation

**Key Enablers**

- Building supportive ecosystems and amplifying efforts through sustainable partnerships
- Leveraging technology for better precision in health
- Scale up programmes to an unprecedented scale & measure effectiveness with higher fidelity
- Do near real-time tracking of health metrics
- Eventually deliver personalised interventions to individual citizens

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**Immunisation:**
- Campaigns & subsidisation

**Physical Activity:**
- Flagship progs & community exercise sessions

**Healthy Eating:**
- Policy & progs

**Tobacco Control:**
- Policy & progs

**Screening:**
- Campaigns & accessibility

**Mental wellbeing:**
- Progs

**Hygiene Campaigns**
- Campaigns

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**Active Ageing Programmes**
- Tomorrow, It’s ageing our towns, any where.

**Immunisation:**
- Stay one step ahead with vaccinations.

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**Building supportive ecosystems and amplifying efforts through sustainable partnerships**

- Regional Health System
- Government Agencies
- Community Partners
- Health Ambassadors & Volunteers

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**Leveraging technology for better precision in health**

- Scale up programmes to an unprecedented scale & measure effectiveness with higher fidelity
- Do near real-time tracking of health metrics
HPB collaborates with public agencies by harnessing complementary expertise to extend outreach efforts and build supportive ecosystems where Singaporeans study, work and live.

**Illustration: Physical Activity**

- **National Parks Board**: Purview of park connectors & park spaces for exercise programmes.
- **Sport Singapore**: Manage sports facilities and pool of high quality fitness trainers.
- **Urban Redevelopment Authority**: Control over central business district for mass activations (e.g. car-free Sundays).
- **Housing & Development Board**: Public spaces in housing estates for exercise programmes with close proximity to homes.
- **Land Transport Authority**: Infrastructure provision for active commuting.
- **People’s Association**: Good understanding of residents profile and needs within the community.
- **Ministry of Social and Family Development**: Inclusivity in programmes for lower income group outreach.
- **Ministry of Education Singapore**: Strong relations with school going children for building interest in sports & exercise.
- **Ministry of Defence**: Access to NS men and institutions for mobilisation of male population.
- **Key partner to bring exercise programmes to workplaces**.
- **Programme design, marketing & ground activation to mobilise intended population segments**.

**Encouraging regular physical activity in the population**
Since 2016, HPB has tapped on ubiquitous technology to gain greater capability in monitoring and delivering programmes that nudge citizens towards healthier behaviours.

**National Steps Challenge (NSC)**
- Encourage residents to reduce sedentary behaviour and increase physical activity
- **>1.7m participants cumulatively** over the past 5 seasons

**Eat, Drink, Shop, Healthy (EDSH)**
- Participants are incentivised with rewards through the use of digital platform (H365 app)
- Motivate retail partners to promote healthier items & encourage consumer participation via scanning of QR codes

**Scale up progs to an unprecedented scale & measure effectiveness with higher fidelity**

<table>
<thead>
<tr>
<th>NSC 1</th>
<th>NSC 2</th>
<th>NSC 3</th>
<th>NSC 4</th>
<th>NSC 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Users as of End Sure-Win</td>
<td>Regular Users as of End Sure-Win</td>
<td>Regular Users as of End Sure-Win</td>
<td>Regular Users as of End Sure-Win</td>
<td>Regular Users as of End March 2020</td>
</tr>
<tr>
<td>n = 36K</td>
<td>n = 264K</td>
<td>n = 364K</td>
<td>n = 352K</td>
<td></td>
</tr>
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</table>

**Trend of Daily Average Steps across 5 NSC Seasons:**

<table>
<thead>
<tr>
<th>Pre-Challenge</th>
<th>Sure-Win Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,512</td>
<td>8,463</td>
</tr>
<tr>
<td>6,221</td>
<td>9,007</td>
</tr>
<tr>
<td>7,432</td>
<td>9,119</td>
</tr>
<tr>
<td>7,591</td>
<td>8,096</td>
</tr>
<tr>
<td>9,010</td>
<td></td>
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</tbody>
</table>

**NSC Sign-Ups across the Seasons:**
- 129K | 365K | 697K | 811K | 913K

**Use of Healthy 365 (H365) App to scan QR codes**
- Users earn Healthpoints through QR-code scanning technology
- Enhancement of retailers’ POS system to automatically print a QR code on receipt when a healthier item is purchased

**“All year round” consumer engagement programme, allowing Singaporeans to earn Healthpoints through partners’ touchpoints daily**
- Over 808K consumers to-date have participated (i.e. reaching out to 1 in 3 Singaporean adults aged 20 – 49 yo)
HPB is moving from broad-based strategy towards Precision in Public Health (PPH) strategy, that aims to deliver the right intervention at the right time to the right population.

**Past:** Public Health Education

Promoting mass awareness for healthy living across whole of population

**Present:** Healthy Eco-systems

Establishing contextualised eco-systems to nudge citizens to live healthily

**Future:** Precision Public Health

 Delivering more personalised programmes to individuals
Understanding Citizens

Health Insights Singapore (hiSG): Creating a knowledge base to study interconnectedness of health behaviours and nest studies to test hypotheses

Young working adults aged 21-40 identified as pilot population segment

- Period of life stage transitions (marriage, parenthood) which has impact on lifestyle and health behaviours
- Age group where obesity rate spikes up
- Technologically-savvy

10,000 individuals followed-up for at least 2 years

- New Workforce Entrants
- Working Adults
- Youths
- Seniors
- Mature Workers

Sociodemographics
- Gender, Age, Ethnicity, Occupation, Life stage, Residential Area

Biometrics
- Height, Weight, Health Status, Cardiovascular Fitness

Lifestyle & Habits
- Activity Level, Commuting, Meal Patterns, Sleep, Mental Wellbeing

Perceptions & Preferences
- Attitudes to health, Life Priorities, personal likes and dislikes

Psychographics
- Personality traits, motivators, values.

hiSG Mobile App

- Clock wear time as much as possible
- Log meals regularly

Data transmitted to hiSG mobile app

Complete short surveys on health topics

Issued smart wearable

fitbit
Use case 1: Harnessing multi-dimensional lifestyle data to trial digitally-enabled care pathways combining telemedicine and lifestyle management for post-AMI patients

The enhanced digital protocol aims to leverage technology to:
(1) Empower patients to better manage their condition and track lifestyle modifications
(2) Provide feedback loop to clinicians on patient's post-recovery condition for timely follow-up

Use case 2: Collecting and analysing multi-dimensional data to deepen understanding of key health concerns, and pilot interventions to prevent pre-frailty

<table>
<thead>
<tr>
<th>Survey and Validated Scales Data</th>
<th>Lifestyle Data</th>
<th>Frailty Measurement Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>50+ Variables</td>
<td>100+ Variables</td>
<td>200+ Variables</td>
</tr>
<tr>
<td>Frailty status</td>
<td>Heart Rate</td>
<td>Gait variability</td>
</tr>
<tr>
<td>Fall risk factors</td>
<td>Steps</td>
<td>Walking speed</td>
</tr>
<tr>
<td>Functional health</td>
<td>Sleep</td>
<td></td>
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Examine gait profiles to facilitate early detection and frailty prevention of pre-frailty among adults

Profile comparison across different frailty stages to build risk profile for frailty (BMI)
Observe shifts in frailty status and/or fall incidence to verify frailty risk-profile (9-12mo)
Tailored interventions targeting identified risk factors
LumiHealth: a personalised health programme that helps and rewards participants for improving overall health and wellbeing through their Apple Watch and iPhone.

**Gamification for users to:**

- **Singapore residents** with SingPass account, aged 17 years or older
- Participants can be **rewarded** with up to $380 worth of HPB eVouchers, over a 2-year period.

**Components:**
- **Activity challenge** - physical activity
- **Wellness challenge** - physical activity, healthy eating, mental health, sleep
- **Just for you actions** - screening, vaccination, seniors' health

**Longer term goal is to enable health research leveraging on the LumiHealth platform**
- Programme participants may choose to contribute their data for research and agree to join further research programmes
- Programme data may be combined with other data (e.g. clinical or phenotypic data) to facilitate deeper research
LumiHealth has diversified HPB’s reach, actively engaging younger adults and improving physical activity, especially among the least active.

**Age profile of Activated Participants**

LumiHealth has been successful in **attracting and engaging the youth segment** (below 35 yo).

This **complements** HPB’s **National Steps Challenge**, where drop-outs tend to be higher among the youths, although **engagement among the seniors had been good**.

**LumiHealth Participants’ Pre-onboarding Activity Levels**

LumiHealth attracted a **diverse group** of participants across **different baseline activity levels**.

Majority of the **longest cohort** who joined in Oct 2020 were less active adults at baseline.

**Key programme indicators at 10 month mark**

**Strong retention** across all LumiHealth cohorts vs National Steps Challenge

**Strong engagement** in completing daily activity goals and wellness challenges

**Improvement in physical activity**, particularly for sedentary group
H365+: Applying learnings to HPB’s next generation integrated programme to enable seamless integration of health programmes across settings for all Singaporeans

To citizens

- Access to a more integrated online-to-offline journey, bringing together all pillars of holistic health
- Personalised goals, use cases & recommendations based on individual motivations and progression
- Access to a wider diversity of programmes from HPB and partners
- Earning of HPB rewards across a wider range of lifestyle programmes beyond HPB to stay healthy
- Ability to consent to share their lifestyle data across providers to receive more personalised and relevant offerings, regardless of which provider they use

Feedback loop to drive machine learning and enable smart nudging / personalised programming

<table>
<thead>
<tr>
<th>CENTRAL DATA BACKBONE</th>
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<tbody>
<tr>
<td>Average Steps, Average MVPA, Gym classes taken, Sports Facilities booked</td>
</tr>
<tr>
<td>HCS scans, Groceries purchased, Food &amp; Beverages purchased</td>
</tr>
<tr>
<td>Registered address, Frequent supermarket, Gym outlet visited, Ethnicity, Gender, Family history, Family unit</td>
</tr>
</tbody>
</table>

Feedback loop back to HPB H365+ to track attendance @ partner’s programme and update user preferences
While technology helps to gain insights and deliver targeted interventions at scale, healthy ecosystems remains crucial to empower citizens to lead a healthy lifestyle.

**Understanding Citizens**

**Delivering to Citizens**

**Establish contextualised ecosystems to nudge citizens to live healthy**

**Workplace:** create a health promotion working environment

**Schools:** equip schools with the right tools to build a health environment for students

**Community:** bring healthy living closer to residents

**Food Environment:** ensuring easy access to healthy food in & outside of homes
Thank you