Outline

1. Background of Singapore
2. Introduction to the Healthy Precinct Project
3. Healthy Precinct Framework
4. Applying the Healthy Precinct Framework
About Singapore

Size: 721.5km²

Total Population: 5.703mil

Population Density: 7,866 per Km²

Demography:
- Multi racial mix of Chinese, Malay, Indian, Others
- Rapidly ageing population

Housing distribution: 80% live in public housing

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Longer but not necessarily Healthier lives

- Singaporeans are living longer

- Between 1990 and 2017, life expectancy at birth in Singapore rose 8.7 years, to **84.8 years**. Healthy life expectancy at birth, however, rose only 7.2 years, to **74.2 years**.

- More years spent in poor health

The Healthy Precinct Project

Why Precincts?

1. A precinct-based approach can help focus the collective efforts of government agencies and the community on a smaller area with a targeted population

2. Engender a sufficiently high level of community engagement and partnership that would make interventions more sustainable

3. Testing evidence-informed health promotion priorities with the aim to scale efforts
PILOT SITE

Area: ~9.5km²

Total Population: ~250,000

Demography:
• Mature estate with higher proportion of elderly
• Large working population

Landuse description:
• Jurong Lake District (JLD): To be redeveloped into offices, retail, residential and recreation (completed after 2040)
• Greater JLD Region: High-rise, high-density residential area
‘The range of behavioural, biological, socio-economic and environmental factors that influence the health status of individuals or populations.’

–Adapted from the World Health Organization 1998.
DERIVING A FRAMEWORK

• Process:
  o Curated and prioritized key influences from a list of 30 Socio-environmental Determinants with an initial group of agencies through a workshop

• Outcome:
  o Prioritised Determinants & First cut of the Healthy Precinct Framework
**HEALTHY PRECINCT FRAMEWORK**

- **Description:**
  - Behaviour-driven framework that hypothesizes relationships between 9 socio-environmental determinants of health behaviours and 5 key health behaviours

- **Purpose:**
  - Provides structure for synergistic participation between multiple agencies that impact health promotion at precinct level (*Health in All Policies*)

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**OPERATING SYSTEM**

**HEALTH BEHAVIOURS**
- Physical Activity
- Healthy Eating
- Tobacco Use
- Socialisation
- Sleep

**ENVIRONMENT**
- Access to Healthy Foods
- Infrastructure
- Environmental Quality
- Transport
- Green & Blue Spaces

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MOHT HEALTHY PRECINCT FRAMEWORK
*(to be refined further)*
DERIVING THE 5 BEHAVIOURS

- Physical Activity
- Healthy Eating
- Socialisation
- Sleep
- Tobacco Use

Leading risk factors contributing to DALYS, Singapore, both sexes, 1990-2017

<table>
<thead>
<tr>
<th>2017 rank</th>
<th>% of total risk-attributable DALYS</th>
<th>total % change in risk-attributable DALYS 1990-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dietary risks</td>
<td>10.1%</td>
</tr>
<tr>
<td>2</td>
<td>Tobacco</td>
<td>7.9%</td>
</tr>
<tr>
<td>3</td>
<td>High blood pressure</td>
<td>7.6%</td>
</tr>
<tr>
<td>4</td>
<td>High blood sugar</td>
<td>7.0%</td>
</tr>
<tr>
<td>5</td>
<td>Obesity and overweight</td>
<td>6.4%</td>
</tr>
<tr>
<td>6</td>
<td>High cholesterol</td>
<td>4.2%</td>
</tr>
<tr>
<td>7</td>
<td>Occupational risks</td>
<td>4.0%</td>
</tr>
<tr>
<td>8</td>
<td>Air pollution</td>
<td>3.4%</td>
</tr>
<tr>
<td>9</td>
<td>Impaired kidney function</td>
<td>2.7%</td>
</tr>
<tr>
<td>10</td>
<td>Child and maternal malnutrition</td>
<td>1.7%</td>
</tr>
<tr>
<td>11</td>
<td>Drug use</td>
<td>1.6%</td>
</tr>
<tr>
<td>12</td>
<td>Alcohol use</td>
<td>1.2%</td>
</tr>
<tr>
<td>13</td>
<td>Low physical activity</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Leading causes of DALYS, Singapore, both sexes, 1990-2017

<table>
<thead>
<tr>
<th>2017 rank</th>
<th>% of total DALYS</th>
<th>total % change in DALYS 1990-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardiovascular diseases</td>
<td>14.2%</td>
</tr>
<tr>
<td>2</td>
<td>Cancers</td>
<td>13.3%</td>
</tr>
<tr>
<td>3</td>
<td>Musculoskeletal disorders</td>
<td>12.6%</td>
</tr>
<tr>
<td>4</td>
<td>Mental disorders</td>
<td>10.2%</td>
</tr>
<tr>
<td>5</td>
<td>Neurological disorders</td>
<td>6.6%</td>
</tr>
</tbody>
</table>


Imperative to act on modifiable risk factors to reduce disease burden in the population
PRELIMINARY BEHAVIOUR GOALS*

PHYSICAL ACTIVITY
Increase no. of Singaporeans who:
- Achieve recommended steps/day
- Achieve recommended time spent performing moderate PA/week
- Reduce no. of hours spent sedentary

HEALTHY EATING
Increase no. of Singaporeans who:
- Achieve recommended daily caloric intake
- Achieve recommended servings/food group
- Reduce unhealthy snacking

SOCIALISATION
- Improved the quality and quantity of social relationships
  (To be defined further)

SLEEP
- Achieving recommended no. of hours of sleep
  (to be defined further)

TOBACCO USE
- Reduce the no. of Singaporeans who smoke
- Reduce the no. of cigarettes smoked/day per individual

*Goals are broad enough to be achievable for different socio-economic groups
WHY THE 9 DETERMINANTS?

- Health is influenced by factors beyond the domain of healthcare provision.
- The determinants are key social and environmental influences that have been identified to impact the 5 health behaviours at a precinct level in Singapore.

**Community Safety**
Low crime and a safe environment for all to live healthily.

**Community Support**
Forming inclusive, engaged and vibrant communities.

**Built Environment**
Built environment, including public spaces, that promote healthy living.

**Environmental Quality**
Minimise and control air & noise pollution.

**Education & Health Literacy**
Being able to make informed choices for healthy living.

**Health & Social Services**
Access to affordable, good quality services & programmes for all.

**Access to Healthy Foods**
Healthy food options that are readily convenient & affordable.

**Green & Blue Spaces**
Access to attractive green/blue spaces to relax, exercise and spend time.

**Transport**
Efficient, comfortable, & convenient modes of transport for end-to-end transport within a precinct.
APPLYING THE FRAMEWORK
Fleshing out the Framework into an Index

- Behaviour indicators worked out with health agencies

Illustrative Example

Physical Activity (PA) → Green & Blue Space

- Time spent walking among those with low activity levels
- Park density within precinct

Increase time spent walking amongst parks.

Socio-environmental determinant indicators worked out with non-health agencies
# Examples of Evidence-based Behaviour-Determinant Relationships

* Denotes evidence from local literature in Singapore

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Access to Healthy Foods</th>
<th>Built Environment</th>
<th>Health/social services</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Activity</strong></td>
<td>• Access to health-promoting facilities*</td>
<td>• Accessibility</td>
<td>• Availability</td>
</tr>
<tr>
<td></td>
<td>• Neighbourhood walkability</td>
<td>• Availability</td>
<td>• Accessibility</td>
</tr>
<tr>
<td></td>
<td>• Land-use diversity*</td>
<td>• Quality (targeted)</td>
<td>• Affordability (cost, incentives)</td>
</tr>
<tr>
<td><strong>Healthy Eating</strong></td>
<td>• Affordability*</td>
<td>• Accessibility* of fast-food outlets</td>
<td>• Availability of nutrition</td>
</tr>
<tr>
<td></td>
<td>• Availability*</td>
<td>• Density of fast-food outlets</td>
<td>programmes*</td>
</tr>
<tr>
<td></td>
<td>• Accessibility*</td>
<td>• Density of F&amp;B advertisements</td>
<td>• Access to healthcare</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>professional advice*</td>
</tr>
<tr>
<td><strong>Socialisation</strong></td>
<td>• Destinations (e.g. public spaces)</td>
<td>• Availability</td>
<td>• Availability of educational</td>
</tr>
<tr>
<td></td>
<td>• Population Density</td>
<td>• Availability</td>
<td>programmes</td>
</tr>
<tr>
<td></td>
<td>• Distance from home to street/public space</td>
<td>• Affordability</td>
<td>• Affordability</td>
</tr>
<tr>
<td><strong>Sleep</strong></td>
<td>• Road intersection</td>
<td>• Availability</td>
<td>• Availability of healthcare</td>
</tr>
<tr>
<td></td>
<td>• Population density</td>
<td>• Availability</td>
<td>professional advice*</td>
</tr>
</tbody>
</table>
### Examples of Evidence-based Behaviour-Determinant Relationships

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Transport</th>
<th>Environmental Quality</th>
<th>Green/Blue Space</th>
</tr>
</thead>
</table>
| Physical Activity | • Accessibility of active transport (e.g. walking, cycling)  
|               | • Availability of infrastructure for active transport  
|               | • Availability of facilities for active transport  
|               | • Accessibility of public transport  
|               | • Variety of public transport  
|               | • Frequency of public transport  | • Air quality  
|               |                                           | • Ambient temperature  | • Availability (park density) *  
|               |                                           |                       | • Accessibility (traveling distance/public transport access) *  
|               |                                           |                       | • Design of green space*  |
| Healthy Eating | • Accessibility to healthy food sources  |                       |                  |
| Socialisation | • Travel distance (barrier to visiting other facilities and participating in community programmes)  | • Air quality  
|               |                                          | • Ambient temperature  | • Availability of community programmes in green spaces  |
| Sleep         |                                           | • Traffic noise levels  | • Greener neighbourhoods  |
Examples of Evidence-based Behaviour-Determinant Relationships

* Denotes evidence from local literature in Singapore

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Education &amp; Health Literacy</th>
<th>Community Safety</th>
<th>Community Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>• Education levels</td>
<td>• Perceived neighbourhood safety * • Crime rate</td>
<td>• Perceived social support (older adults)* • Programmes with social elements*</td>
</tr>
<tr>
<td>Healthy Eating</td>
<td>• Parental influence*</td>
<td>• Perceived neighbourhood safety</td>
<td>• Family/household norms * • Workplace norms*</td>
</tr>
<tr>
<td>Socialisation</td>
<td>• Education levels (isolation)</td>
<td>• Perceived neighbourhood safety* • Crime rate</td>
<td>• Social support *</td>
</tr>
<tr>
<td>Sleep</td>
<td>• Education levels</td>
<td>• Perceived neighbourhood safety* • Crime rate</td>
<td>• Social norms (friends/family)</td>
</tr>
</tbody>
</table>

‘Healthy Precinct Framework’ Workshop, Sep 2019
Applying the Healthy Precinct Index in Precincts

- For the first pilot site, U-S-E will validate the Healthy Precinct Framework iteratively

  **Understanding**
  Provides a comprehensive overview of the precinct based on Healthy Precinct Framework

  **Solutioning**
  Collaborative design and implementation of integrated interventions

  **Evolving**
  Assessing the progress against the Healthy Precinct Index
Testing the Healthy Precinct Index

- **Using the framework in Jurong**: Focus and provide parameters for exploration through U-S-E

- **Two-pronged approach**: Evidence-based approaches to refine the index, using big data and groundsensing findings.

**Understanding**
- Provides an assessment of the precinct

**Solutioning**
- Collaborative design and implementation of integrated interventions

**Evolving**
- Assessing the progress against the Healthy Precinct Index

**Flesh out framework (workshop)**
- Refining through groundsensing

**Index Ver 1**
- Refine with data

**Index Ver 2**
- Scale up to other precincts
Testing the Healthy Precinct Index - Understanding Phase

- **Quick Groundsensing**: Mixed methodologies to refine indicators (e.g. do people actually perform physical activities in parks, why and why not?)

- **Big data analysis**: Relevant datasets helps to find associations between behaviours and determinants. (e.g. how does city walkability affect physical activity?)
Co-creating and implementing innovative interventions
- Solutioning Phase

- **Methodology:** Co-creating a contextual action plan and co-designing solutions with stakeholders (e.g. govt agencies and community)

- **Illustrative examples:**
  - Improving *wayfinding* and walking experience to increase prevalence for walkability in pilot site.
  - Implementing *food foraging* parks with healthy eating programmes

*Illustrative examples*

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Evaluating through:
- Short term (utilization, process evaluation)
  - Medium term (behaviour change)
  - Long term (health outcomes)
UNDERSTANDING
Groundsensing + Data analytics at Jurong (e.g. Visualization from Strava app heatmap on walking in Jurong)

Co-SOLUTIONING
Wayfinding with Jurong Lake Gardens as a shortcut destination between transport nodes

Evolving
Number of steps taken in Jurong Lake Gardens has increased

Health Behaviour:
Determinant: Built Environment

Physical Activity
How does neighbourhood walkability influence total number of steps/day?

Illustrative Envisioned Outcome

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Summary

Fleshing out Framework

Understanding

Solutioning

Evolving

Health Goals & Indicators

Determinant Goals & Indicators*

Health & behaviour prevalence

Asset Mapping & Determinant Audit (programmatic, social, environment)

Ground Observations

Community engagement (Interviews, FGD etc.)

Participatory planning methods*

Baseline assessment

Needs assessment

Co-created Action Plan

Co-created Solutions

Evolving phase:

How does confounding factors of healthy behaviours impact the way we measure and evaluate implemented solutions?

Healthy Precinct Index:

How prescriptive and specific should the Index be?

Healthy Precinct Dashboard:

What is the frequency and granularity of the data collection?

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SOME CONSIDERATIONS MOVING FORWARD

1) Diagnostic of JLD

2) Report on Gaps & Opportunities

4) Action Plan for Jurong Healthy Precinct

5) Implementation of Solutions & Guidelines

6) Healthy Precinct Dashboard (inform government agencies on decision making)

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Thank You