

# Six Principles of DEMENTIA-FRIENDLY NEIGHBOURHOOD

Belinda Yuen, Md Rashed Bhuyan, Špela Močnik, Winston Yap



December 2020

## Acknowledgements

The suggestions and examples outlined in this document are based on literature review as well as the learning from the Innovative Planning and Design of Age-Friendly Neighbourhoods in Singapore project led by Dr Belinda Yuen at the Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design.

The Innovative Planning and Design of Age-Friendly Neighbourhoods in Singapore project was supported by the National Research Foundation, Singapore, Singapore's Ministry of National Development, Urban Redevelopment Authority, Housing and Development Board, Agency for Integrated Care, Ministry of Health Singapore and Building and Construction Authority, under the L2NIC Award No. L2NICTDF1-2017-2.

We would like to express our deepest appreciation to the Innovative Planning and Design of Age-Friendly Neighbourhoods in Singapore project research teams at the Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design, Geriatric Education and Research Institute; design teams at Lekker Architects, Tierra Design Studio Pte Ltd, CPG Consultants Pte Ltd; collaborators at Khoo Teck Puat Hospital, AIM & Associates; and agency partners: Urban Redevelopment Authority, Agency for Integrated Care, Building and Construction Authority, Housing and Development Board and Ministry of Health Singapore.

Any opinions, findings and conclusions or recommendations expressed in this document are those of the authors and do not reflect the views of the Singapore Ministry of National Development, National Research Foundation, or any of the agency collaborators. All photographs, images and diagrams are credited to the authors, if not stated otherwise.

## Foreword

*Ageing is not about getting old, it is about living well.*

With 1 in 4 Singaporeans aged 65 years and above by 2030, more seniors and caregivers will need support and care services in the community to age well and gracefully. The Agency for Integrated Care (AIC) supports the Ministry of Health (MOH) national efforts on this front by building a vibrant care community that supports and empowers seniors, their families, and caregivers.

A key focus for us in AIC is to support community mental health efforts within Singapore and to support persons living with dementia and other mental health conditions as well as their caregivers and families. Based on the Well-being of the Singapore Elderly (WiSE) study in 2015 by the Institute of Mental Health, dementia affects 1 in 10 people aged 60 and above. As part of the overall Community Mental Health Masterplan under MOH, AIC works with community partners to build a Dementia-Friendly Singapore. We encourage partners to make the built environment safer and easier for persons living with dementia to navigate. We are also developing more resources to educate Singaporeans on identifying the signs and symptoms of dementia, and where to seek timely help. Through these efforts, we strive to raise awareness of dementia and empower individuals and businesses to better support seniors living with dementia and their caregivers.

We are, thus, pleased to have participated in the study, “Innovative Planning and Design of Age-friendly Neighbourhoods in Singapore” under the Land and Liveability National Innovation Challenge (L2NIC) Research Programme. The Lee Kuan Yew Centre for Innovative Cities from the Singapore University of Technology and Design (SUTD) has pulled out useful recommendations and principles to form a guide for building age- and dementia-friendly neighbourhoods.

This guide is an important and useful publication that provides guidelines and recommendations from the study to build dementia-friendly communities across Singapore. We hope that this in turn will empower and inspire more like-minded community partners to build a supportive environment for both persons living with dementia and their loved ones.

Together, we can all contribute and work closely through partnership and collaborations to build a caring and inclusive society where persons living with dementia can live well and age gracefully with dignity and respect.

Let’s use this guide to build a Dementia-Friendly Singapore together!

Tan Kwang Cheak

Chief Executive Officer, Agency for Integrated Care

## About this Document

This document outlines some guiding principles and features that are useful for making outdoor spaces and environments more friendly and welcoming to people living with dementia in the community. Innovation and good practices of dementia-friendly interventions are offered for consideration. The goal of this collection of resources is to support those who wish to improve the neighbourhood built environment for people living with dementia in Singapore.

The suggestions and examples are based on literature review as well as the *Age-Friendly Neighbourhood Planning and Design Guidelines: A Singapore Case Study*<sup>1</sup> developed by Dr Belinda Yuen and colleagues at the Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design. These guidelines were developed as part of the Innovative Planning and Design of Age-friendly Neighbourhoods in Singapore project (2017-2019) funded by the Ministry of National Development and National Research Foundation of Singapore. Even though some planning and design features of the two concepts, such as safety and accessibility, might overlap, age-friendly and dementia-friendly neighbourhoods are not exactly similar. While much of the planning for age-friendly environments is applicable to dementia-friendly environments, there may be additional features to consider in dementia-friendly environments such as cognitive-supportive design for a greater sense of familiarity and safety.

## Setting the Context

The World Health Organisation has included dementia as a priority public health condition that contributes to the global non-communicable disease burden.<sup>2</sup> It is a burden that affects not just the individual but also the carer and community at large.<sup>3</sup> Globally, dementia is the second largest cause of disability among people aged 70 and over, the 7<sup>th</sup> leading cause of death with an estimated annual economic cost of US\$818 billion.<sup>4</sup> In Singapore, the annual economic cost of dementia is S\$1.4 billion.<sup>5</sup> As a syndrome of cognitive impairment, dementia can happen at any age, not just among older populations. There are different types and stages of dementia, and presently with no known cure;<sup>6</sup> all stages of dementia are progressive though affecting each person differently with some common symptoms.<sup>7</sup> The uniqueness of each individual is an important consideration to keep in mind when designing well for dementia.

As dementia progresses, there is deterioration in memory and cognitive abilities including the ability to perform everyday activities;<sup>8</sup> a person may gradually lose the skills needed to navigate the outdoor environment and often has difficulty moving around as well. These can make understanding and navigating everyday environments challenging. This and the uniqueness of individuals accentuate the

---

<sup>1</sup> Yuen, B., Bhuyan, M. R., Song, S., Moogoor, A., Yap, W., Mocnik, S. & Chua, R. (2021). *Age-Friendly Neighbourhood Planning and Design Guidelines: A Singapore Case Study*. Singapore, World Scientific.

<sup>2</sup> World Health Organisation (2012). *Dementia: A Public Health Priority*. Geneva, World Health Organisation.

<sup>3</sup> World Health Organisation (2018). *Towards a Dementia Plan: A WHO Guide*. Geneva, World Health Organisation.

<sup>4</sup> Ibid.

<sup>5</sup> Boh, S. (2016). Dementia costs Singapore \$1.4b a year. *The Straits Times*, 2 May 2016.

<sup>6</sup> Health Promotion Board, Singapore (2011). *Your Guide to Understanding Dementia*. Singapore, Ministry of Health; NHS (2018). Is there a cure for dementia. <https://www.nhs.uk/conditions/dementia/cure/> Accessed 23 September 2020.

<sup>7</sup> Grossman, M. (n.d.). Stages of dementia: The 3-stage and the 7-stage models. Carelinx, <https://www.kindlycare.com/stages-of-dementia/>. Accessed 18 September 2020.

<sup>8</sup> World Health Organisation (2018). Op cit.

need for collaborative design.<sup>9</sup> As each site and community are different, we suggest participatory and site-specific research with stakeholders (including people living with dementia and caregivers) to fully understand the aspirations, experiences and needs of people living with dementia before starting any design or development process.

Using the built environment to create comprehensible and meaningful environments for people living with dementia is not new. As Fleming et al recounted, environmental design principles for dementia have been developed and expanded since the 1980s, albeit largely on indoor environments.<sup>10</sup> While many people living with dementia stay in residential care or hospitals, the majority are living within the community. Like the majority of the population, most people living with dementia want to continue to stay at home and age in place.<sup>11</sup> This presents an opportunity to integrate well-established environmental design principles for dementia in community and neighbourhood settings. There are increasing efforts to create dementia-friendly communities to support and enable them to continue to live where they want to be and well for longer.<sup>12</sup>

Singapore is creating dementia-friendly communities across the country to support people living with dementia to age in place in its vision to make Singapore a dementia-friendly nation.<sup>13</sup> A dementia-friendly community is envisaged as a neighbourhood where there is public awareness of dementia and understanding of how to better support and care for people living with dementia, where they feel respected, able to move around safely and with ease, and can continue to lead independent and meaningful lives. The interpretation of dementia-friendly communities, as with environmental design principles, is often context-dependent.

Fleming et al. have identified design principles as one aspect of a broader schema that also comprises overarching goals, design approaches and design responses.<sup>14</sup> As principles, they do not stipulate how a neighbourhood design is to be realised. Furthermore, the principles and suggestions outlined in this document are not exhaustive. Nevertheless, we hope its use will prompt consideration of the why (goals) and how (design approaches and design details) outdoor environments and spaces can be responsive to the context and sensitive to the needs of people living with dementia in the community so as to make the vision of dementia-friendly neighbourhoods a reality.

Creating dementia-friendly spaces is urgent, especially in light of the increasing population living with dementia. Globally, 50 million people are living with dementia and the number is projected to be 82 million by 2030 and 152 million by 2050; the rate of growth is one in every three seconds.<sup>15</sup> In Singapore, the prevalence of dementia has been increasing, both in terms of absolute number (from 22,000 in 2005 to 40,000 by 2015 and projected to increase to 103,000 by 2030) and young-onset (symptoms are on the rise among younger people as early as in their 40s).<sup>16</sup>

---

<sup>9</sup> Hallsall, B. & MacDonald, R. (2015). *Design for Dementia Volume 1 – A Guide*. Liverpool: The Halsall Lloyd Partnership.

<sup>10</sup> Fleming, R., Zeisel, J. & Bennett, K. (2020). *World Alzheimer Report 2020: Design, Dignity, Dementia: Dementia-related design and the built environment*. Volume 1. Alzheimer's Disease International.

<sup>11</sup> Halsall, B. & MacDonald, R. (2015). *Op cit*.

<sup>12</sup> Mitchell, L. (2012). *Breaking new ground: The quest for dementia friendly communities*. Housing LIN Viewpoint, 25.

<sup>13</sup> Ching, S. Y. L. (2019). *The creation of a dementia-friendly community in Singapore*. *Journal of Aging and Geriatric Medicine*, 3, doi 10.4172/2576-3946-C1-005; *Dementia-friendly Singapore (2018)*. *Living with Dementia: A Resource Kit for Caregivers*. Book 1. Singapore, Agency for Integrated Care.

<sup>14</sup> Fleming et al (2020). *Op cit*.

<sup>15</sup> World Health Organisation (2018). *Op cit*; Alzheimer's Disease International (n.d.) *Dementia statistics*. <https://www.alz.co.uk/research/statistics>. Accessed 23 September 2020.

<sup>16</sup> *Dementia-friendly Singapore (2020)*. <https://dementiafriendly.sg/Home/GuidePre>. Accessed 6 November 2020.

## Dementia-Friendly Neighbourhoods

With the expected increase in the numbers, supporting people living with dementia to age in place in the community is a major urban planning and design challenge and opportunity at the neighbourhood level. Although there is a notable body of research on dementia care facilities and nursing homes that inform the planning and design of those settings,<sup>17</sup> there are comparatively fewer studies about the impact of built environment features on the health and wellbeing of people living with dementia within neighbourhood outdoor settings.

Earlier studies conducted in Europe, North America and Australia suggest that the urban neighbourhood can play an important role in improving the wellbeing of people living with dementia.<sup>18</sup> Being able to go outside and engage in outdoor physical and social activities can positively impact the quality of life of people living with dementia.<sup>19</sup> It helps them to avoid retreat into domestic confinement and social isolation that people living with dementia sometimes face following a diagnosis of dementia.<sup>20</sup>

Mmako et al. in their review of green spaces and community life of people living with dementia in the Netherlands, Norway, UK, US and Canada highlight the roles of community

gardens, care farms and green spaces for reinforcing identity, enabling meaningful engagement in activities, positive risk taking and engendering a sense of empowerment among people living with dementia.<sup>21</sup> Others such as the cohort study in Australia in 2020 suggest that increasing tree canopy cover within the residential environment may help to reduce the risk of dementia<sup>22</sup> while a participatory study by Houben and colleagues in Eindhoven, Netherlands, shows that soundscapes from everyday life (such as human, animal, water and background sounds in beach, forest, city and home settings) can trigger different personal associations, past memories, emotional responses and experience sharing among people living with dementia.<sup>23</sup>

Mitchel and Burton in the UK have argued for dementia-friendly neighbourhoods to offer welcoming, safe, easy access and enjoyable environments for people living with dementia and others to visit, use and find their way around.<sup>24</sup> Research in Sweden demonstrates the in-situ coping and innovation of memory aids and time-specific reminder devices when leaving home, familiar and easy routes to and from grocery shops, and safe traffic intersections to help people living with dementia and Alzheimer's disease to continue with their grocery shopping.<sup>25</sup> Caregivers of people living with dementia in Canada reiterate the importance of places to go for a

---

<sup>17</sup> Sun, J. & Fleming, R. (2017). Characteristics of the built environment for people with dementia in East and Southeast Asian nursing homes: A scoping review. *International Psychogeriatrics*. doi:10.1017/S1041610217002241.

<sup>18</sup> Marshall, M. & Gilliard, J. (2014). *Creating Culturally Appropriate Outside Spaces and Experiences for People with Dementia*. London, Jessica Kingsley Publishers.

<sup>19</sup> Duggan, S., Blackman, T., Martyr, A. & Van Schaik, P. (2008). The impact of early dementia on outdoor life: A shrinking world? *Dementia*, 7(2), 191-204.

<sup>20</sup> Alzheimer Society. (2013). *Dementia 2013: The Hidden Voice of Loneliness*. London, Alzheimer Society.

<sup>21</sup> Mmako, N. J., Courtney-Pratt, H. & Marsh, P. (2020). Green spaces, dementia and a meaningful life in the community: A mixed studies review. *Health & Place*, 63, 102344.

<sup>22</sup> Astell-Burt, T., Navakatikyan, M. A. & Feng, X. (2020). Urban green space, tree canopy and 11-year risk of dementia in a cohort of 109,688 Australians. *Environment International*, 145, 106102.

<sup>23</sup> Houben, M., Brankaert, R., Bakker, S., Kenning, G., Bongers, I., & Eggen, B. (2019). *Foregrounding everyday sounds in dementia*. Paper presented at the Proceedings of the 2019 on Designing Interactive Systems Conference.

<sup>24</sup> Mitchell, L. & Burton, E. (2010). Designing dementia-friendly neighbourhoods: Helping people with dementia to get out and about. *Journal of Integrated Care*, 18(6), 12-19.

<sup>25</sup> Brorsson, A., Ohman, A., Cutchin, M. & Nygard, L. (2013). Managing critical incidents in grocery shopping by community-living people with Alzheimer's disease. *Scandinavian Journal of Occupational Therapy*, 20, 292-301.

walk, community gathering places (e.g. cafe, restaurant, local library) and favourite places (e.g. garden, peaceful bench in local shopping mall) in the everyday lives of people living with dementia in Ottawa.<sup>26</sup> Many of the studies point to the importance of encouraging walking in the neighbourhood. As Dementia Australia explains,<sup>27</sup>

*Walking is a healthy activity that should be part of your everyday life. There is no need to stop walking even once you have been diagnosed with dementia. Walking has many psychological and physical benefits. It helps stimulate your senses and encourages connection with other people. Continuing to walk can help improve your overall quality of life.*

Central to this is a supportive dementia-friendly neighbourhood environment. Blackman has described the neighbourhood as a ‘walkable zone of experience’ based upon people’s ‘walking patterns to nodal points from the home’.<sup>28</sup> This perspective gives support for a person-centred approach and understanding of the environment. In particular, understanding the day-to-day neighbourhood-related practices of people living with dementia, learning from what they have to say about their visual, olfactory, acoustic, tactile, touch and other sensory experiences within the neighbourhood and suggest context-specific integration of built and natural features based on those insights.

*“A Dementia-Friendly Community is one where people **know** about dementia; persons living with dementia and their caregivers feel **included, involved** and **supported** in the community”.* (Agency for Integrated Care, Singapore)

<sup>26</sup> Silverman, M. (2020). Dementia-friendly neighbourhoods in Canada: A carer perspective. *Canadian Journal on Aging*, 1-12. doi:10.1017/S0714980820000252.

<sup>27</sup> Dementia Australia. (2019). Walking Safely with Dementia, p4. Retrieved from <https://www.dementia.org.au/resources>. Accessed 27 October 2020.

### Singapore Dementia-friendly Community



Dementia-Friendly Singapore has implemented a Dementia-Friendly Community framework with strategies to **Engage**, **Empower** and **Enable** people living with dementia including a Dementia Friends mobile app to seek community help for missing person with dementia.<sup>29</sup>

#### ENGAGE

Community by raising dementia awareness to keep a lookout for people living with dementia

Through:

1. Outreach activities (residents, constituency offices, faith-based groups, corporates, service partners and schools)
2. Targeted screening (mood and memory screening)
3. Go-To Points

#### EMPOWER

Caregivers, clients and at-risk individuals with services and support that cater to their needs

Through:

1. Preventive activities
2. Caregiver support network
3. Services (service linkages, care coordination, intervention, case management)

#### ENABLE

Community and partners in adopting dementia-friendly designs so that people living with dementia can live well in the community

Through:

1. Environment enhancements (business and built environment)
2. Technology and innovation (dementia friends app, DFSG portal, DFSG Facebook, etc.)

(Source: Agency for Integrated Care, Singapore)

<sup>28</sup> Blackman, T. (2006). Placing Health: Neighbourhood Renewal, Health Improvement and Complexity. Bristol, Policy Press, p33.

<sup>29</sup>See <https://www.aic.sg/mental-wellness-dementia/dementia-friendly-singapore>. Accessed 27 October 2018.

## Guiding Principles

We suggest 6 guiding principles for dementia-friendly neighbourhoods, drawing on the themes developed by Burton and colleagues,<sup>30</sup> later adopted by the Royal Town Planning Institute, UK,<sup>31</sup> and various urban design studies.<sup>32</sup>

Familiarity  
Legibility  
Distinctiveness  
Accessibility  
Comfort  
Safety

We add relevant urban design ideas and examples to these guiding principles based on our experience of developing the Singapore Age-friendly Neighbourhood Planning and Design Guidelines.<sup>33</sup> Needless to say, the principles and examples are not exhaustive; the design idea may address more than one guiding principle. As Pani illustrates, the provision of public seating with armrest and warm materials at every 100-125 metres may be designed to stimulate different senses and contribute to enhanced accessibility and comfort for people living with dementia. Similarly, using dementia-friendly symbols in shops might contribute towards enhancing both accessibility and safety as well as community awareness and assistance.<sup>34</sup>

The following sections present each guiding principle using a common schema covering,

- What the guiding principle is;
- Why it is important;

- Examples/cases highlighting its implementation; and
- Planning and design features for consideration in Singapore neighbourhoods.

In the final analysis, the need for integration of the guiding principles with neighbourhood built environments and the importance of site-specific research using comprehensive outdoor audit and evaluation tools before and after interventions are emphasised (see p25). A list of further readings is also suggested.

---

<sup>30</sup> See, Burton, E., Mitchel, L. & Raman, S. (2004). Neighbourhood for Life: Designing Dementia-friendly Outdoor Environments -- Checklist of Characteristics of Dementia-friendly Neighbourhoods. Inclusive Design for Getting Outdoors (IDGO); Mitchell, L. & Burton, E. (2006). Neighbourhoods for life: Designing dementia-friendly outdoor environments. *Quality in Ageing and Older Adults*, 7, 26-33.

<sup>31</sup> Royal Town Planning Institute. (2017). Dementia and Town Planning. Retrieved from

[http://www.rtpi.org.uk/media/2213533/dementia\\_and\\_town\\_planning\\_final.compressed.pdf](http://www.rtpi.org.uk/media/2213533/dementia_and_town_planning_final.compressed.pdf). Accessed 27 October 2020.

<sup>32</sup> Pani, B. (2016). Improving the lives of people with dementia through urban design. Retrieved from <https://www.urbandesignmentalhealth.com/journal1-dementia.html>. Accessed 19 October 2018.

<sup>33</sup> Yuen et al (2021). Op cit.

<sup>34</sup> Pani (2016). Op cit.





**FAMILIARITY**



**ACCESSIBILITY**



**LEGIBILITY**



**DISTINCTIVENESS**



**COMFORT**



**SAFETY**

**Raise awareness:** Help the community to understand dementia, share information about dementia, encourage the community, organisations and businesses to become dementia friends, use dementia-friendly signs and symbols.

**Intergenerational spaces:** Create public spaces (e.g. void decks, playgrounds, community gardens) as intergenerational shared spaces that bring people of all ages together to support contact and activities that are mutually beneficial for the young and older participants, consider a lifespan approach to community interaction.

**Regular activities:** Activate a range of outdoor physical activities and social events in community and public spaces for different needs to help people with dementia maintain day-to-day routines, stay active and engaged, partner nearby schools, community groups, businesses, etc.

**Outdoor seating:** Preferably, spaced every 100-125m, shaded, with arm rest and recognisable structure and materials (e.g. materials that are comfortable to sit on, do not become hot or cold or splintering), consider wheelchair-accessible seating, familiar setting and different outdoor seating types to create different outdoor experiences..

**Landmarks at junctions:** Consider wayfinding cues and landmark recognition at decision points on a walking route to facilitate spatial navigation, colour and familiarity are important considerations in providing environmental support.

**Informal open spaces:** Identify and utilise informal open spaces (e.g. vacant lots, roadside verges, gaps between buildings) to expand outdoor walking opportunities.

**Avoid opaque boundaries:** Ensure access to the outdoors, good visibility and visual access to support wayfinding and minimise confusion, consider continuous circulation loops with destination points and no dead ends or opaque boundaries.

**Buffer zones for movements and activities:** Implement well-defined pathways of movement, free of obstacles to support outdoor walking and engagement with people (e.g. separated pedestrian paths from other movement lines like roads, PMD, bike lanes).

**Social spaces near home:** Provide a range of proximate outdoor spaces to offer choice, to be alone or with others.

*Interlinkages of dementia-friendly guiding principles and urban design considerations. Urban design considerations are based on Pani (2016).*

## 1. Familiarity

A familiar environment is important to people living with dementia as it can help them know where they are and find where they want to go, thus promoting independence and supporting wayfinding.<sup>35</sup> Familiarity in outdoor built environment can be maintained through continual assessment and planning.<sup>36</sup> Where change/modification is necessary, involve the people living with dementia in deciding on the environmental changes where possible, and introduce the modification in small measure and incrementally in order to minimise any confusion and disorientation.<sup>37</sup>

Architectural design (e.g. design features of buildings and street networks) and landscaping (e.g. local flora) can be creatively deployed to enhance familiar surroundings.<sup>38</sup> Public furniture or artwork (e.g. image or product of past landscapes) can be introduced as visual cues to trigger memory and help to minimise confusion and uncertainty. As might be expected, these cues need to be carefully selected and designed to avoid visual clutter and over-stimulation. Some people living with dementia may become disoriented and get lost in even previously familiar environments.

Familiarity is a dynamic process where active participation of people living with dementia in design can play a significant role. A 2020 review by Mmako and colleagues shows that outdoor spaces in the neighbourhood including gardens and horticulture programmes, parks and tree canopies positively influence the wellbeing and quality of life for people living with dementia. These

spaces engage them in meaningful activities, improving sense of empowerment, taking positive risks and reinforcing identity.<sup>39</sup>

### Examples:



*Proximate green spaces with local flora and recognisable public furniture, while providing aesthetics, can create a sense of familiarity and reference for people living with dementia as they move around the neighbourhood.*



*Murals on building facade, depicting landscapes of the past, can help reminiscence and serve as landmark.*

<sup>35</sup> Dementia Australia (2016). How to design dementia-friendly care environment. Retrieved from [https://www.dementiafriendly.org.au/sites/default/files/resources/Helpsheet-](https://www.dementiafriendly.org.au/sites/default/files/resources/Helpsheet-Environment03_HowToDesign_english.pdf)

Environment03\_HowToDesign\_english.pdf. Accessed 17 October 2018.

<sup>36</sup> Using, for example, post-implementation evaluation method, see Yuen, B., Bhuyan, M. R., Dietrich, A., Yap, W. and Chua, R. (2021). Singapore age-friendly

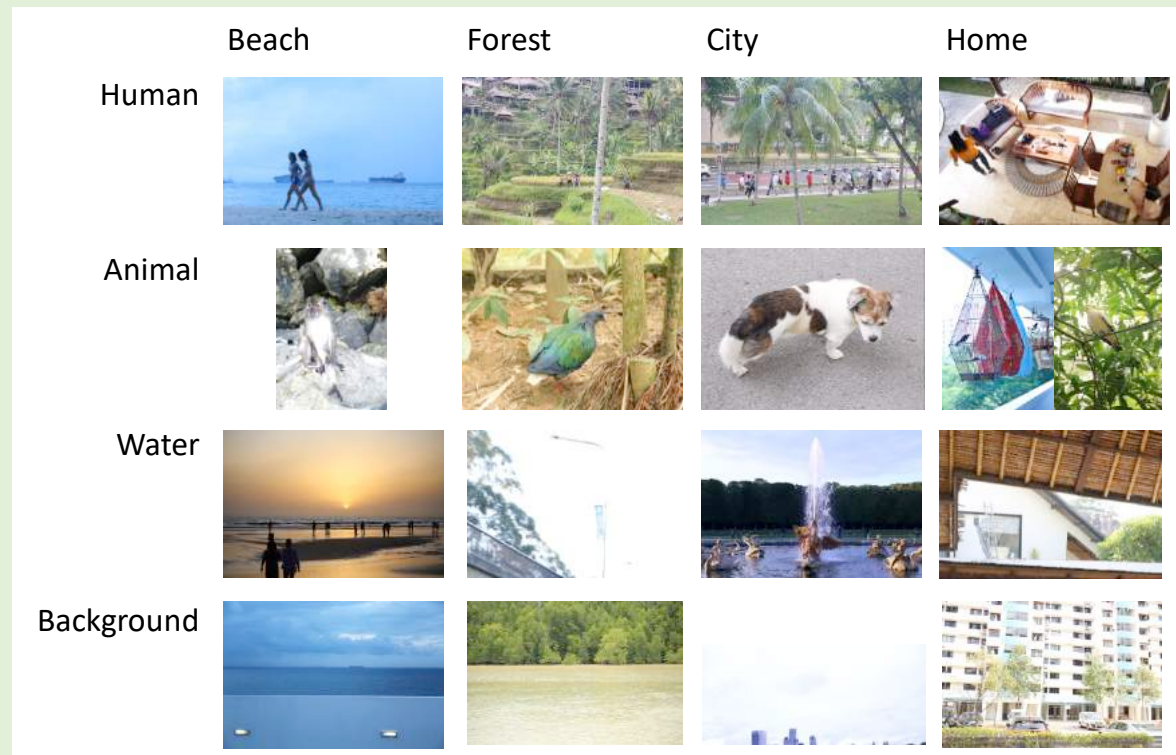
neighbourhood post-implementation review toolkit. In Yuen et al. Op cit.

<sup>37</sup> Royal Town Planning Institute. (2017). Op. cit.

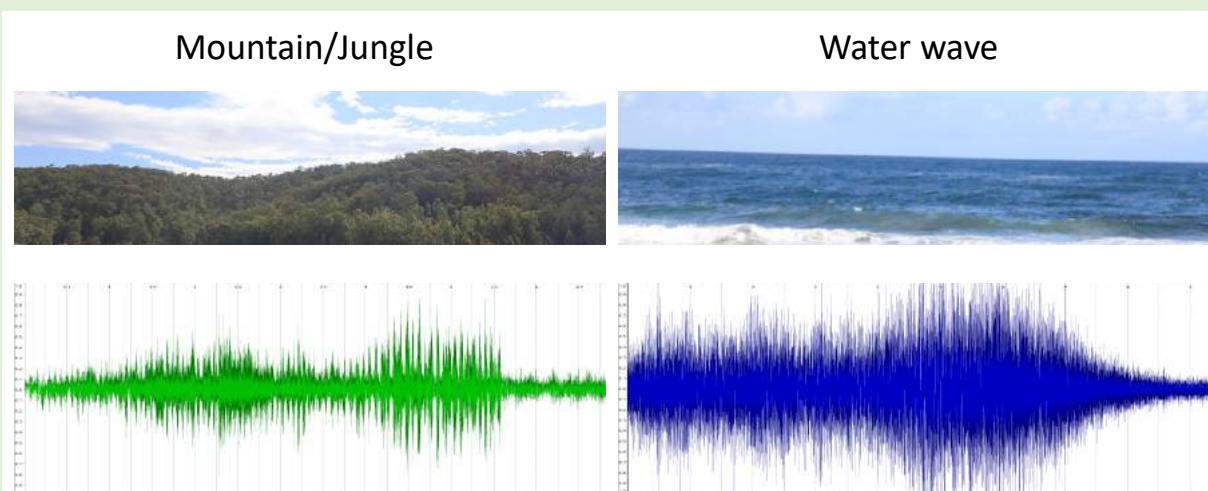
<sup>38</sup> Stimson, S. (2010). Benefits of daily outside walks and dementia gardens for persons with dementia. Retrieved from

<http://www.capcog.org/documents/Aging/Ombudsman/ContinuingEdu/BenefitsofDailyWalks-DementiaGardens.pdf>. Accessed 26 June 2019.

<sup>39</sup> Mmako et al. (2020). Op cit.



*Familiar and previously experiential soundscapes help trigger memories and create emotions among people living with dementia, e.g. a person with dementia who used to sleep with his/her windows open and wake up with bird singing in the past would likely recognise similar sounds in later life.<sup>40</sup>*



*Listening to environmental 'white noise', e.g. sound of mountain stream, ocean waves, helps to reduce agitation and wandering behaviour among people living with dementia.<sup>41</sup>*

<sup>40</sup> Houben, M., Brankaert, R., Bakker, S., Kenning, G., Bongers, I. & Eggen, B. (2019). Foregrounding everyday sounds in dementia. Proceedings of the 2019 Designing Interactive Systems Conference, San Diego, CA.

<sup>41</sup> Burgio, L., Scilley, K., Hardin, J. M., Hsu, C. & Yancey, J. (1996). Environmental "white noise": An intervention for verbally agitated nursing home residents. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 51(6), 364-373.

### Characteristics of a familiar environment include,<sup>42</sup>

- Long-established places and buildings, e.g. places with local history, markets, hawker centres, religious and other buildings that have been around for a long time.
- Places and buildings where the functions, e.g. entrances, doors, door handles, etc., are obvious.
- Architectural features and street furniture that are in familiar designs or easily understood by people living with dementia.
- Environmental improvements that consider incremental changes and human scale.

#### Planning a Dementia-Friendly, Familiar Neighbourhood

- Maximise easily relatable familiar visual design features that are used by people living with dementia to reflect the community and location, e.g. recognisable artwork, murals on building walls depicting history, greenery and landscape design with local flora and fauna, etc. that can serve as orienting landmarks, memory triggers, and facilitate spatial orientation within the neighbourhood.
- Retain and integrate old world charm of familiar neighbourhoods into new and future developments. Wherever possible, outdoor environment needs to be designed to offer a familiar, welcoming and therapeutic effect.

- Make incremental changes to the built environment rather than tabula rasa and encourage an emphasis on people, place and familiarity.
- Strengthen a sense of control and familiarity by providing unrestricted access to secure outdoor spaces with identifiable physical objects or points of orientation for people living with dementia.<sup>43</sup>
- Provide sensory stimulation and opportunities for social interaction, e.g. through use of colours, soundscapes, water features, textures, flowers, 70:30 ratio of green to hard surfaces, well placed benches and sheltered rest areas, secure and serene spaces that are large enough for meaningful exercise and participation in the community.<sup>44</sup>

<sup>42</sup> Mitchell, L. (2004). Neighbourhoods for Life: Designing Dementia-Friendly Outdoor Environments.

<sup>43</sup> Yuen et al. (2021). Op cit.; Mitchell, L., Burton, E. & Raman, S. (2004). Dementia-friendly cities: Designing

intelligible neighbourhoods for life. *Journal of Urban Design*, 9(1): 89-101.

<sup>44</sup> McAdams, K. & Williams, S. (2017). Dementia Friendly Design Features for Walking Paths: A Focused Practice Question.

## 2. Legibility

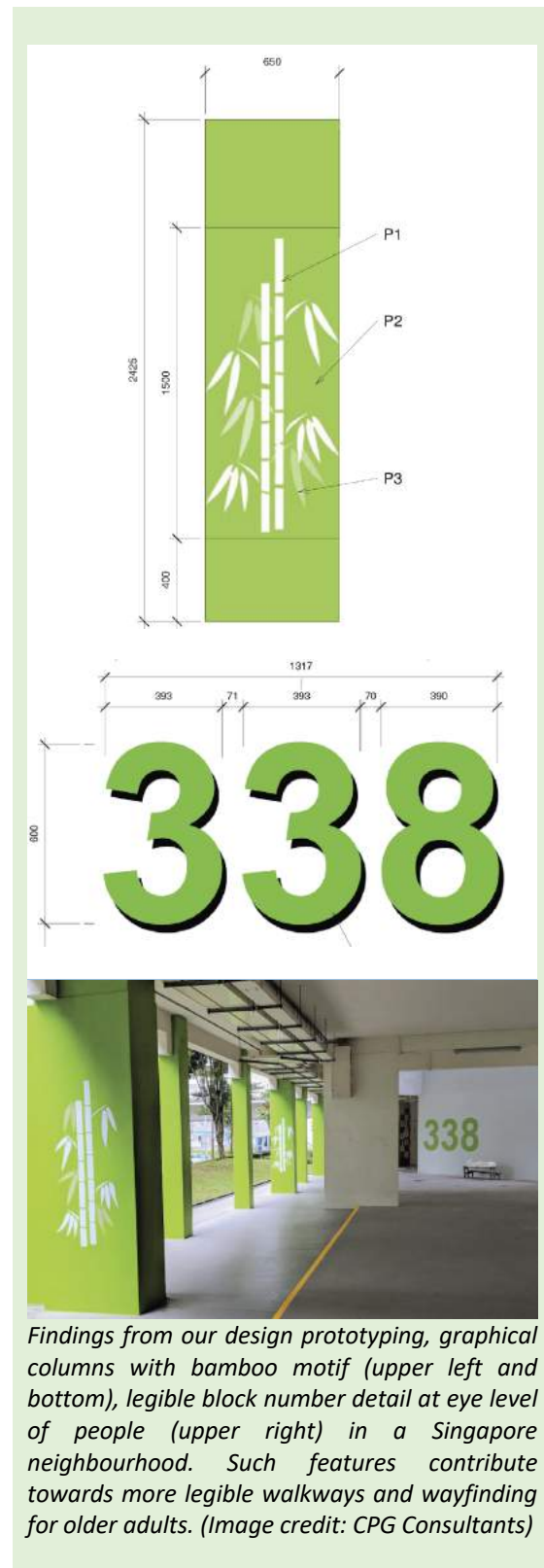
Legible spaces, path networks and public information displays are important, since they help people living with dementia to know where they are and to find their ways as they move around their neighbourhoods. Our 2018 resident survey findings suggest that legible transit points and facilities in neighbourhood environments encourage older people to take more trips and facilitate greater interactions with neighbours.<sup>45</sup>

A legible environment for people living with dementia can be facilitated by creating a simple, well-connected network of streets (minimal crossroads and uncomplicated road junctions) and footpaths with walking loops, and effective use of colour and contrast, and properly positioned signage with text and icons to assist wayfinding.<sup>46</sup> Avoid crowded, heavy traffic and noisy areas for the location of dementia-friendly walking paths.

### Examples:



*Findings from our community design workshops in Singapore suggest that older adults prefer colourful, legible wayfinding signage, in the form of signage posts, floor symbols, etc. Note: Green dot represents 'like', orange dot represents 'dislike' in above pictures. (Image credit: Tierra Design Studio)*



*Findings from our design prototyping, graphical columns with bamboo motif (upper left and bottom), legible block number detail at eye level of people (upper right) in a Singapore neighbourhood. Such features contribute towards more legible walkways and wayfinding for older adults. (Image credit: CPG Consultants)*

<sup>45</sup> See, Hou, Y., Yap, W., Chua, R., Song, S. & Yuen, B. (2020). The associations between older adults' daily travel pattern and objective and perceived built

environment: A study of three neighbourhoods in Singapore. *Transport Policy*, 99, 314-328.

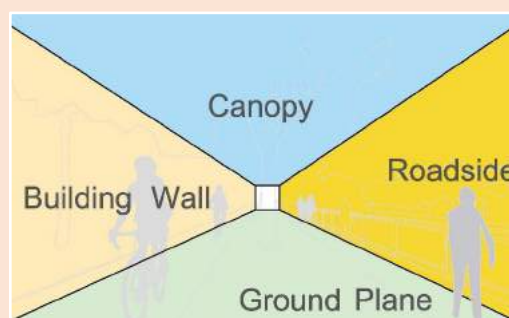
<sup>46</sup> Royal Town Planning Institute. (2017). Op. cit.

### Characteristics of a legible environment include,<sup>47</sup>

- Direct visual access to relevant landmarks, orienting reference points and latent cues are positioned where visual access ends to help people living with dementia with spatial orientation and wayfinding.
- Clear hierarchy of street types (e.g. main streets and side streets) and outdoor walking pathways that are welcoming and open to the whole community including people living with dementia.
- Continuous circulation loops with destination points, different route lengths to cater to different mobility ability, no dead ends to reduce cognitive demand and panic, pathways that allow for two wheelchairs to pass.
- Informed application of colours (e.g. avoid floor patterns and dark lines that may be confusing and even cause falls),<sup>48</sup> and materials (e.g. avoid materials that are glaring like light concrete or heat radiating like asphalt). Texture changes on path edges so that those with low vision can know when they are off the path, avoid raised edges that are tripping hazards.
- Visible signages accompanied with texts and icons, signages that provide easy to understand environmental cues.
- Pathways that include supportive amenities such as easily accessible toilets, benches, handrails, shelters and motion sensor lighting to provide option to rest, unobtrusive monitoring and opportunity for safe physical activity, social interaction, leisure and recreation.

### Planning a Dementia-Friendly, Legible Neighbourhood

- Consider all four planes of streets and footpaths to achieve legibility and enjoyable walking experience for people living with dementia.



- Avoid excessive visual clutter (e.g. a plethora of signs) to minimise disorientation or confusing choices for people living with dementia.<sup>49</sup>
- Enhance the clarity of wayfinding and waymarking signages (e.g. colour contrasts, larger fonts and formats, and easy-to-understand graphical elements) to better help people living with dementia to navigate and access the neighbourhood.
- Consider sensory stimulation to help people living with dementia to find their way (e.g. tactile paving surfaces, visual such as flowers and colours, audio such as familiar music or natural soothing sounds and olfactory such as pleasant smells along walking paths that trigger memories and provide directional cues).

<sup>47</sup> McAdam, K. & Williams, S. (2017). Op cit.

<sup>48</sup> Marquardt, G., Bueter, K. & Motzek, T. (2014). Impact of the design of built environment on people with dementia: An evidence-based review. *Health*

*Environments Research and Design Journal*, 8(1), 127-157.

<sup>49</sup> Burton, E., Mitchell, L. & Raman, S. (2004). Op cit.

### 3. Distinctiveness

A neighbourhood built environment is distinctive for people living with dementia when there are distinguishing landmarks and structures that are of unambiguous design, varied and interesting.<sup>50</sup> A variety of practical or aesthetic urban form and architectural features including plants and trees, heritage buildings, and street furniture can help to achieve neighbourhood distinctiveness.<sup>51</sup> People living with dementia recognise distinctive spaces more and tend to use landmarks and other visual cues (rather than maps and written directions) for wayfinding.<sup>52</sup> Distinctive spaces such as memory and therapeutic gardens can offer respite from dense urban structures by providing a sense of place and orientation for people living with dementia in high-density neighbourhoods.<sup>53</sup>

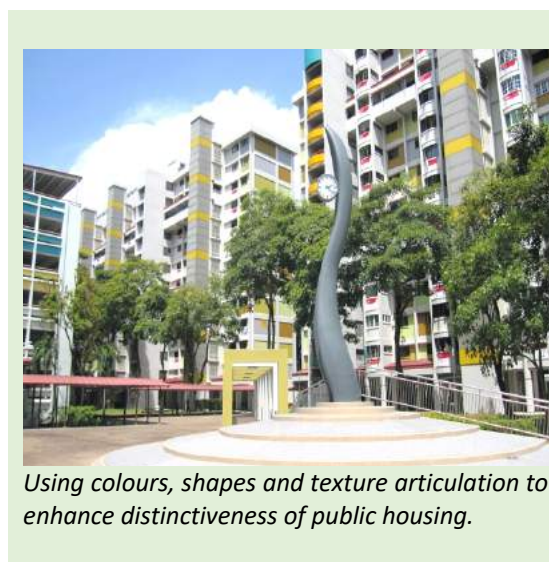
#### Examples:



*Distinctive features such as tree plaza and challenge trail designed for prototyping in a neighbourhood park in Singapore. (Image credit: Tierra Design Studio)*



*Highly relatable and instantly recognisable seats are more visible, identifiable and easy to find for people living with dementia and reduced vision.*



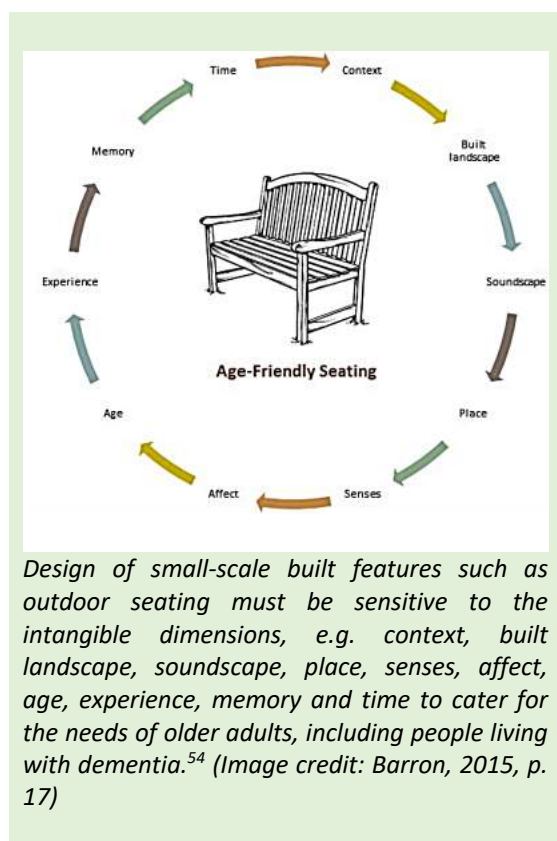
*Using colours, shapes and texture articulation to enhance distinctiveness of public housing.*

<sup>50</sup> Royal Town Planning Institute. (2017). Op. cit.

<sup>51</sup> Rappe, E. & Topo, P. (2007). Contact with outdoor greenery can support competence among people with dementia. *Journal of Housing for the Elderly*, 21(3-4), 229-248.

<sup>52</sup> Mitchell, L. (2004). Op. cit.

<sup>53</sup> Maller, C., Townsend, M., Brown, P. & St Leger, L. (2002). *Healthy Parks Healthy People: The Health Benefits of Contact with Nature in a Park Context*. Melbourne: Deakin University and Parks Victoria.



Characteristics of a distinctive neighbourhood include,<sup>55</sup>

- Varied urban and building forms.
- A variety of landmarks including historic and civic buildings, distinctive structures and places of activity.
- A variety of welcoming open spaces including parks, gardens and playgrounds.
- Architectural features with a range of styles, colours and materials.
- A variety of aesthetic and practical features, e.g. trees and street furniture.

### Planning a Dementia-Friendly, Distinctive Neighbourhood

- Consider creating urban and building form and landmarks, with architectural features using the palette of styles, colours and materials, including historic and civic buildings, unique and especial structures and activity places.
- Activate a range of welcoming and differentiating open spaces, e.g. therapeutic parks and intergenerational playgrounds.
- Use material aesthetics (e.g. texture, shape, colour) to help people living with dementia to experience the beauty of design, e.g. activate the ground floor space of buildings along street frontages and footpaths to create interesting facades that encourage them to stop and interact with nearby amenities and people.
- Design walking paths with creative architectural features, e.g. colour variation in pavement materials, sculptural walls, activity paths, water fountain, murals/artworks etc., to help people living with dementia to better navigate, orientate and feel a sense of place.

<sup>54</sup> Barron, A. (2015). Age-Friendly Seating and Sense of Place (p.17). Retrieved from <https://www.manchester.gov.uk/download/downloads/>

id/23615/age-friendly\_seating\_and\_sense\_of\_place.pdf. Accessed 28 September 2017.

<sup>55</sup> Mitchell, L. (2004). Op cit.



## 4. Accessibility

An accessible neighbourhood offers easy to reach and convenient access to essential services and amenities. A dementia-friendly neighbourhood would ensure easy and walkable access (within 5-10 minutes walking distance) to essential services and facilities (e.g. post office, supermarket, bank, clinic, green space, bus stop). Seamless accessibility helps to facilitate outdoor activities and trips, increase time spent outdoors and promote physical, social, and mental health for people living with dementia.

People living with dementia continue to plan for outdoor activities, visualise proposed routes but tend to limit their outdoor activities to relatively undemanding situations such as going for a walk to nearby community gardens, and green spaces<sup>56</sup> or to the corner shops.<sup>57</sup> Empirical evidence suggests that these amenities be placed within 500 metres and secondary services and facilities (library, recreation facility, place of worship) within 800 metres from the residence of a person living with dementia.<sup>58</sup> Universally accessible, safe and enjoyable routes with supportive wayfinding signages are crucial for people living with dementia to access those places frequently, with or without assistance.

Besides physical space access, social inclusion and access to community and group activities, e.g. art, music and story-telling programmes, group exercise, gardening, volunteering, etc., are equally important for people living with dementia.

### Examples:



*Social interaction facilitated by the Kopitiam-on-the-Move design prototype at a public housing 'void-deck' in Singapore. (Design credit: Lekker Architects). Community activities can bring everyone together including people living with dementia, citizens, businesses, and institutions.<sup>59</sup>*



*Easy access to community gardens, shops and playgrounds can encourage people living with dementia to spend more time outdoors, e.g. having spaces for nature contact, calm and quiet times as well as people watching and meeting other residents in the neighbourhood.*

<sup>56</sup> Mmako et al (2020). Op cit.

<sup>57</sup> Mitchell, L. (2004). Op cit.

<sup>58</sup> Mitchell, L. & Burton, E. (2006). Op. cit.

<sup>59</sup> Yuen et al (2021). Op cit.

### Characteristics of an accessible environment include,<sup>60</sup>

- Mixed land uses, e.g. retail shops, hawker centres/food courts, markets, medical care facilities, recreational and exercise facilities, near home.
- Services and facilities within 5-10 minutes walking distance of housing.
- Wide and flat footpaths.
- Pedestrian crossings and public toilets at ground level.
- Obvious and easy to use entrances to places and buildings.
- Doors and gates with less than 2kg of pressure to open and have lever handles.

#### **Planning a Dementia-Friendly, Accessible Neighbourhood**

- Create safe, familiar, and compact spaces with mixed land uses, shops and essential neighbourhood facilities within 5-10 minutes walking distance of housing.<sup>61</sup>
- Ensure entrances to places/buildings are obvious and easy to use and conform to universal access regulations.
- Provide clear, easy to navigate, people-centred environments.
- Support and raise awareness about dementia-friendly communities among diverse stakeholders (including business owners, frontline staff and general public).

<sup>60</sup> Mitchell, L. (2004). Op cit.

<sup>61</sup> Royal Town Planning Institute. (2017). Op. cit.

## 5. Comfort

A comfortable environment is a welcoming and unthreatening outdoor environment that is serene, quiet and pleasant to use and help the person living with dementia feel at ease. Background and traffic noises are minimised through planting and fencing.<sup>62</sup> Comfortable environment is particularly important to people living with dementia as they rely primarily on their senses rather than on cognitive capacities to understand the environments around them; this makes them highly sensitive to the outdoor environment, e.g. crowds and sudden loud noises. Many of them may experience declining visuo-perceptual competencies, affecting their ability to perform tasks such as judging distance effectively. Unnecessary audio and visual stimulations such as loud noises from common areas or overly bright lights can result in sensory overload, potentially causing them to panic and fall. Findings from our walking interviews with caregivers of people living with dementia in Singapore suggest that greenery can offer a sense of comfort among older people within neighbourhoods.<sup>63</sup>

Many cities including Singapore have started to develop specifically designed green spaces, e.g. memory gardens and therapeutic parks with pleasant auditory, olfactory, tactile and visual stimuli for ageing populations and those living with dementia. Research suggests that appropriately designed gardens can help people living with dementia lower agitation, anxiety and depression, and increase interest and pleasure.<sup>64</sup>

### Examples:



*Design of comfortable, weather-sensitive outdoor features, e.g. benches and fitness equipment with heat resistant materials that are pleasant to the touch and comfortable to sit on any time of the day, open areas that provide both shade, natural lighting and weather protection.*



*Layout plan of Portland Memory Garden, USA. (Image credit: East PDX News. n.d.)*

**Portland Memory Garden, USA** – Portland Memory Garden is an innovative and purposeful place where people living with dementia and their caregivers can spend some outdoor time and rest. Many of the garden's features are especially designed for people with memory problems. The park has a circular design with a landmark at its centre. This landmark can be seen from anywhere in the park, making navigation for visitors with memory problems easier. The gates of the garden can be locked so that visitors

<sup>62</sup> Mitchell, L. (2004). Op. cit.

<sup>63</sup> The Innovative Planning and Design of Age-Friendly Neighbourhoods in Singapore project.

<sup>64</sup> Ibid; Cohen-Mansfield, J. & Werner, P. (1998). Visits to an outdoor garden: Impact on behavior and mood of

nursing home residents who pace. *The Journal of Nutrition, Health and Aging*, 26, 369-372; Westphal, J. (2002). Shared wisdom: A doctor's diagnosis. *Landscape Architecture*, 92(12), 82-84.

cannot wander off. The plants are specially chosen for their therapeutic value and to stimulate pleasant memories (e.g. seasonal botanical features and perennial plants such as hydrangeas). The flowering plants are located close to seating areas to create a sensory experience as people sit.<sup>65</sup> Flower beds are raised to accommodate people with physical abilities.



**Therapeutic garden in Hortpark, Singapore.** This therapeutic garden in Singapore is designed in consultation with medical professionals. The garden, comprising of a restorative zone and an active zone, has plants featuring a variety of coloured flowers, scents and texture. The garden is wheelchair-friendly and has exercise equipment catering to older adults.<sup>66</sup>

### Recommended planning process for a dementia-friendly garden,<sup>67</sup>

- Investigate and plan for a dementia-friendly garden: Consider location of the garden, reduced gradation of footpaths, circular or figure eight footpath, shaded areas, variety of plants (tropical plants, flowers, trees, bushes, herbs), focal points, ramps and directional cues.
- Considerations for developing a dementia-friendly garden: Consider visibility, accessibility, familiarity, quiet, comfort, unambiguously positive art, items that spark memory, opportunities for physical movement and exercise, privacy areas, and access to nature.

### Characteristics of a comfortable environment include,<sup>68</sup>

- Comforting, welcoming and unthreatening outdoor environment.
- Small, well-defined open spaces with toilets, seating, shelter and lighting in the neighbourhoods.
- Quiet side roads as alternative routes away from crowds and traffic.
- Tree-lined or pedestrianised footpaths to offer protection from heavy traffic.

<sup>65</sup> East PDX News. (n.d.). Year round, Portland Memory Garden Provides Refreshing Experiences. Retrieved from <https://eastpdxnews.com/general-news-features/year-round-portland-memory-garden-provides-refreshing-experiences/>. Accessed 16 August 2018; Center of Design for an Ageing Society (n.d.). Retrieved from <https://www.centerofdesign.org/pages/memorygarden.htm>. Accessed 16 August 2018.

<sup>66</sup> National Parks Board (2017). Design Guidelines for Therapeutic Gardens in Singapore. Retrieved from [https://www.nparks.gov.sg/~media/nparks-real-content/gardens-parks-and-nature/therapeutic-gardens/designguidelines\\_for\\_therapeuticgardens\\_in\\_sg.pdf](https://www.nparks.gov.sg/~media/nparks-real-content/gardens-parks-and-nature/therapeutic-gardens/designguidelines_for_therapeuticgardens_in_sg.pdf). Accessed 14 August 2018; Ministry of Health (n.d.).

5 things that make the new Therapeutic Garden @ HortPark ideal for seniors. Retrieved from [https://www.moh.gov.sg/content/moh\\_web/ifeelyoungsg/how-can-i-age-in-place/enjoy-public-spaces/5-things-therapeutic-garden-hortpark.html](https://www.moh.gov.sg/content/moh_web/ifeelyoungsg/how-can-i-age-in-place/enjoy-public-spaces/5-things-therapeutic-garden-hortpark.html). Accessed 25 May 2018.

<sup>67</sup> Stimson, S. (2010). Benefits of Daily Outside Walks and Dementia Gardens for Persons with Dementia. Retrieved from <http://www.capcog.org/documents/Aging/Ombudsman/ContinuingEdu/BenefitsofDailyWalks-DementiaGardens.pdf>. Accessed 26 June 2019.

<sup>68</sup> Mitchell, L. (2004). Op cit.

- Acoustic barriers (e.g. planting and fencing) to reduce background noise.
- Minimal street clutter (e.g. signs, advertising hoardings and bollards).
- Bus shelters with proper enclosure, easy to view oncoming bus services and seating.
- Seating with sturdy arm, back rests and materials that do not conduct heat or cold, e.g. wood, synthetic resin.

### Planning a Dementia-Friendly, Comfortable Neighbourhood

- Ensure all public spaces and infrastructure are accessible (easy to reach), barrier-free, comfortable and safe for people living with dementia.
- Create attractive and interesting places that appeal to users' abilities, needs and interests (e.g. offer a range of meaningful activities like gardening, playing with children, reading a book; use planting and landscaping to create an attractive outdoor environment, all-year interest and opportunity to observe or talking points).
- Know the needs of people living with dementia and provide different spaces to meet different needs (e.g. small seating spaces/areas to observe, pathways offering different lengths of walks).
- Consider comfortable and moderately stimulating sensory environments with appropriate level of stimulation to manage cognitive

load and address all senses – sound, sight, touch, smell and taste. Optimise helpful stimulation (e.g. using plants that give scent during different times of the year, that produce fruit, which can be picked while walking or using different materials like timber, metal or stone to create different feel qualities such as warm, cold, smooth, rough, etc.).

- Reduce unhelpful stimulation. Minimise unpleasant views and loud noises in areas frequented by people living with dementia as they could be easily startled by loud noises, crowd or traffic, causing confusion, disorientation, and stress.<sup>69</sup>

<sup>69</sup> Burton, E., Mitchell, L. & Raman, S. (2004). Op cit.

## 6. Safety

A safe neighbourhood is one, which invites people living with dementia to spend time outdoors, and allays their fears of falling, traffic accidents, and crimes. Neighbourhood safety is important in enabling persons living with dementia to age in place. Older people tend to see objects less clearly, both close-up and at a distance. The contrast sensitivity of persons living with dementia can be impaired and they may have three times as many falls as healthy older people. There are differences in traffic judgements between young and older pedestrians, and traffic-related behaviours such as kerb delay, gap acceptance, time-of-arrival judgements.

People living with dementia tend to be less aware of physical and social dangers in the outdoor environment and need more safety measures and support with the outdoor environment. The Alzheimer’s Society in Manitoba, Canada, provides a set of protective considerations and guidelines for dementia-friendly external environment to prevent falls and promote safety and security.<sup>70</sup>

**Examples:**



Well-lit open spaces provide natural surveillance and might prevent incidents of crime and fall among people living with dementia.

<sup>70</sup> Alzheimer Society Manitoba (2014). Retrieved from <https://www.alzheimer.mb.ca/wp-content/uploads/2013/09/2014-Dementia-Fall-Risk-Checklist-template.pdf>. Accessed 6 July 2018.

<sup>71</sup> Süzer, Ö. K. & Olguntürk, N. (2018). The aid of colour on visuospatial navigation of elderly people in a virtual

Warmer colour hues with high saturation, such as orange – in contrast to tinted blue, stay visible to people living with dementia.<sup>71</sup> (Image credit: Yuen et al. 2021)


Choice and qualities (non-slip, glare-free, clearly defined edging) of finish materials to be used (left) or avoided (right) for paving of footpaths in outdoor environments used by people living with dementia.<sup>72</sup> (Image credit: National Parks Board, Singapore, 2017)

polyclinic environment. *Color Research & Application*, 43(6), 872-884.

<sup>72</sup> National Parks (2017). Design Guidelines for Therapeutic Gardens in Singapore. Retrieved from <https://www.nparks.gov.sg/-/media/nparks-real-content/gardens-parks-and-nature/therapeutic->

### Characteristics of a safe environment include,<sup>73</sup>

- Pedestrian crossings with audible cues at a pitch and timing suitable for people living with dementia.
- Separated cycling/personal mobility devices and walking lanes.
- Wide, well maintained and clean footpaths.
- Flat, smooth, non-slip, plain and non-reflective paving with clear colour and textural contrast to walls.
- Clearly marked and well-lit level changes with handrails and non-slip, non-glare surfaces.
- Spaces and buildings orientation, avoiding dark shadow or bright glare.
- Adequate street lighting for people living with visual impairments.
- Trees close to footpaths have narrow leaves that do not stick to paving when wet.

#### Planning a Dementia-Friendly, Safe Neighbourhood

- Unobtrusively reduce risks (e.g. ensure wide, flat and non-slip footpaths,<sup>74</sup> check and maintain footpaths to ensure that surface/tiling is not cracked or uneven to reduce fall risk, ensure that railings and grab bars are provided where needed).
- Create outdoor spaces that are safe and support movement and engagement. Avoid creating dark

shadows or bright glare. Use colours to make spaces more inviting and visible, ensuring consistent colours on paths and avoiding patterns that may be confusing to people living with dementia<sup>75</sup>.

- Review traffic junction pedestrian crossing time to allow for longer crossing/waiting buffer time to support judgement gaps of people living with dementia.
- Work towards implementing a neighbourhood dementia-friendly community watch network to enlist community volunteers such as Dementia Friends to ‘watchover’ and lookout for people living with dementia and de-stigmatise dementia in the wider community.

## Bringing it Altogether

The 6 design principles – **Familiarity, Legibility, Distinctiveness, Accessibility, Comfort, and Safety** serve as a reminder of certain key strategic considerations for creating and sustaining dementia-friendly neighbourhoods and cities. These places are dynamic. It is important to study the context and develop physical environment that supports and fosters meaningful engagement with dementia of all ages and in all stages. What follows are but one illustration of how these principles may be applied spatially using Kevin Lynch’s 5 design elements of paths, edges, districts, nodes, and landmarks for making the city’s image more vivid and memorable to its residents<sup>76</sup> as well as suggestions for pre- and post-implementation evaluation of the outdoor environment.

gardens/therapeutic-garden-in-singapore-book\_forview\_digital.pdf. Accessed 12 June 2018.

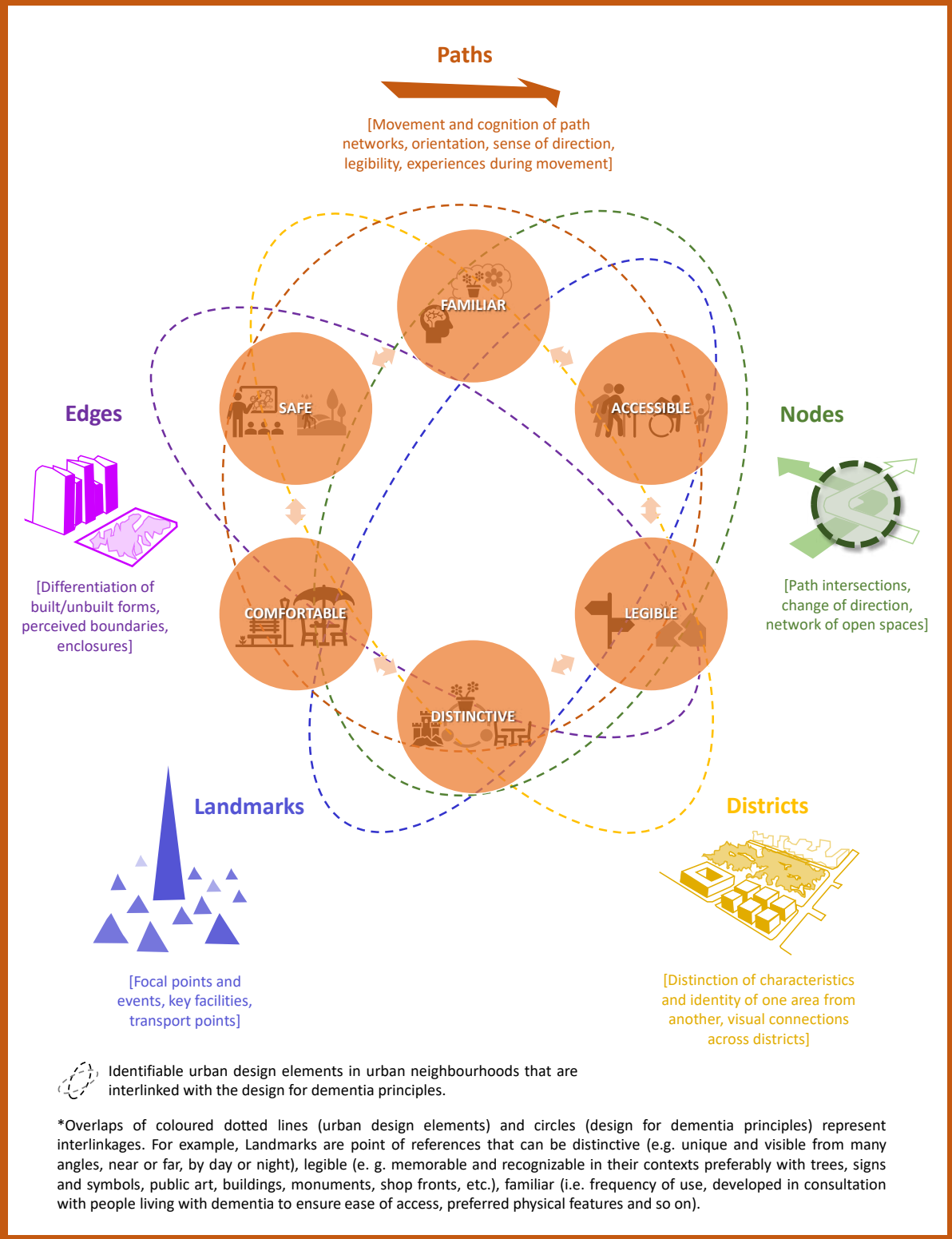
<sup>73</sup> Mitchell, L. (2004). Op cit.

<sup>74</sup> Royal Town Planning Institute. (2017). Op. cit.

<sup>75</sup> Marquardt, G., Bueter, K. & Motzek, T. (2014). Op cit.

<sup>76</sup> Lynch, K. (1960). The Image of the City. MIT Press.

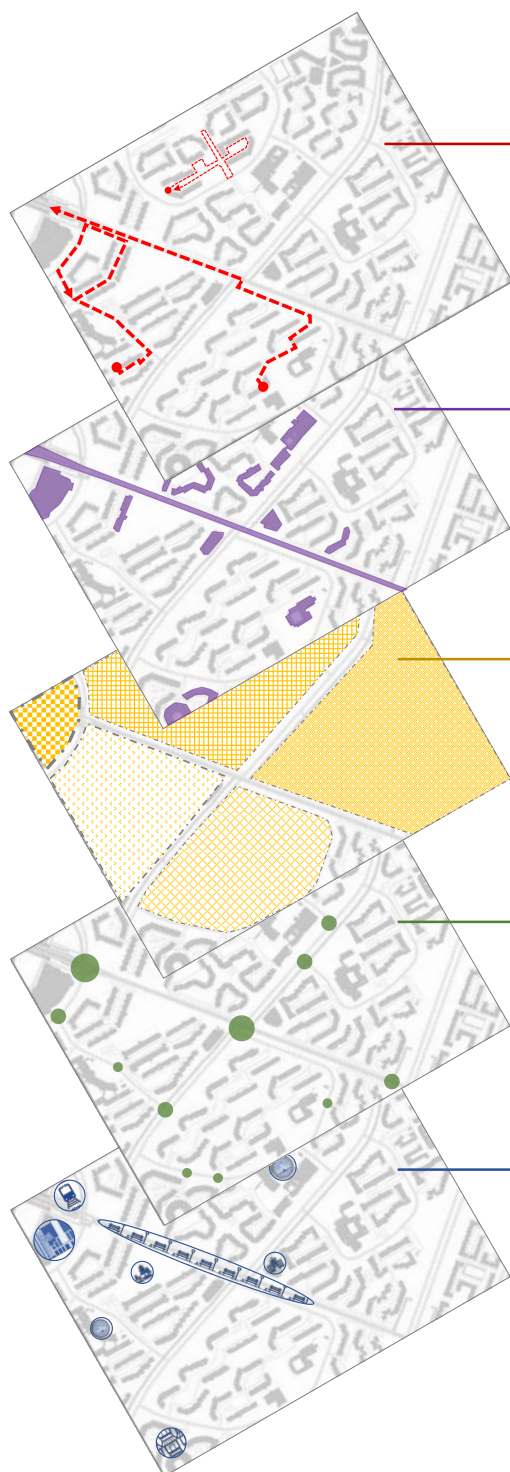
*Integrating dementia-friendly design principles with neighbourhood elements*



*Kevin Lynch (Image of the City) showed that people recognise and organise their mental maps of neighbourhoods and the city using five key elements: edges, districts, paths, nodes and landmarks.*



### Where to look at during urban planning, design, and retrofitting?



**Paths** - these are channels for people to travel through, e.g. streets, footpaths, park connectors. Paths with clear and well-known origins and destinations, specific spatial quality (e.g. unique paving material, route design) have stronger identities.

**Edges** - these are boundaries, real or perceived, e.g. walls, buildings, kerbstones, streets, overpasses. Edges provide a sense of enclosure. Edge elements could be defined to provide a safe space for physical activity, leisure and recreation.

**Districts** - these are medium to large areas with common identifying characteristics (e.g. building type, use, activity, inhabitants, space, etc.). An individual enters into and out of these areas, e.g. precincts, neighbourhoods, town centres, commercial districts. Districts of differing visual character can be created to strengthen uniqueness of place and be recognized immediately.

**Nodes** - these are strategic foci, primarily junctions or concentrations that offer people in the node multiple visual perspectives and decision points, e.g. MRT/Bus stations, path intersections, plazas. Nodes can be highly differentiated and visually contrastive to the general character of the neighbourhood. Provide wayfinding cues at decision points but refrain from confusing the user with too many choices in navigation.

**Landmarks** - these are place references that can be visible from near or far, by day or night, big or small physical objects, e.g. monuments, buildings, public arts, shop fronts, signs. Landmarks are distinctive and memorable. Involve people living with dementia to identify the landmark that they frequently use as clues of place identity -- where they are/going.



**The 5 elements exist in combination, not in isolation** - They may complement or conflict each other and are best considered together to provide satisfying urban form. Neighbourhood spaces that integrate these design elements with the principles of familiarity, accessibility, legibility, distinctiveness, comfort and safety might enable people living with dementia to use outdoor spaces more.

*Examples of paths, edges, districts, nodes, and landmarks highlighted on a neighbourhood layout map in Singapore.*

## Pre- and Post- Implementation Assessment of Outdoor Environments

In order to improve and maintain person-environment fit, it is important to systematically investigate and identify areas of the neighbourhood that work well and that which need improvement. Comprehensive post-implementation review is necessary to evaluate and learn from the successes and failures of neighbourhood improvements, retrofitting and redevelopment works.

A range of environmental audit tools are available for understanding how older people use the outdoor environment.<sup>77</sup> The SUTD age-friendly neighbourhood planning and design project team has developed two comprehensive instruments: An Environmental Audit Toolkit and a Post-Implementation Review Toolkit.<sup>78</sup>

The Environmental Audit Toolkit holistically evaluates the quality of outdoor spaces (streets, paths, spaces of various kinds as they exist within neighbourhoods) and identifies potential action areas for a more age-friendly place along seven key domains: mobility, access, maintenance, legibility, safety, imageability and social connections.

The Post-Implementation Review Toolkit is a flexible instrument that assesses physical interventions, before and after their

implementation. The toolkit applies multiple methods to cover diverse types and scales of interventions in the outdoors.

For more information, please contact project Principal Investigator, Dr Belinda Yuen at the Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design.

---

<sup>77</sup> E.g. Curl, A., Thompson, C. W., Aspinall, P. & Ormerod, M. (2016). Developing an audit checklist to assess outdoor falls risk. *Proceedings of the Institution of Civil Engineers. Urban design and planning*, 169(3), 138–153.

<sup>78</sup> The electronic copies of the toolkits are available at Yuen, B. et al. (2021). Op cit.

## Further Readings

### Alzheimer Scotland

Alzheimer Scotland developed an 8-pillar model of community care for people living with dementia in 2012. Environment is an important pillar of the community care model; the other pillars are: dementia practice coordination, support for carers, personalised support, community connections, mental health and care treatment, general health and care treatment, and therapeutic interventions.



*Eight pillars of community care for people living with dementia by Alzheimer Scotland. Image source: [https://www.alzscot.org/sites/default/files/2019-07/FULL\\_REPORT\\_8\\_Pillars\\_Model\\_of\\_Community\\_Support.pdf](https://www.alzscot.org/sites/default/files/2019-07/FULL_REPORT_8_Pillars_Model_of_Community_Support.pdf)*

**Ang, A. (2020). Integrated community support for people with dementia. *Journal of Alzheimers Disease and Parkinsonism*, 10(485).**

This study reviewed the applicability of Alzheimer Scotland 8 pillars of support for people living with dementia in Singapore. The author conducted 20 in-depth interviews among caregivers, professionals and subject matter experts and proposed a ground-up model of 'integrated community support'. Results highlighted the consideration of both medical care and non-health aspects, such as care coordination, public education, assistive technologies, caregiver support, funding, building and design, and leveraging community support.

**Astell-Burt, T., Navakatikyan, M. A. & Feng, X. (2020). Urban green space, tree canopy and 11-year risk of dementia in a cohort of 109,688 Australians. *Environment International*, 145, 106102.**

This 11-year-long longitudinal cohort study in Australia suggests that increasing 'tree canopy cover' within 1.6 kilometre of a person's house might 'help reduce the risk of dementia'. Risk of having dementia syndromes, measured as hospital and death record, was lower (incidence hazard ratio was 0.86 with 95% confidence interval) among people living in areas with more (10% versus 30% tree canopy) tree canopy in Sydney, Wollongong and Newcastle. Impact of tree canopy was consistent, in contrast to 'total green space', after adjusting for six individual-level factors: age, sex, educational qualification, economic status, couple status, and annual household income.

**Burton, E. & Mitchell, L. (2006). *Inclusive Urban Design: Streets for Life*. London: Architectural Press.**

This book includes information on designing dementia-friendly streets. The authors introduce six principles: familiarity, legibility, distinctiveness, accessibility, comfort, and safety, and outline key aspects of street design that contribute to achieving each of the principles. They also provide specific design recommendations to realise dementia-friendly streets.

**Cooper Marcus, C. (2007). Alzheimer's Garden Audit Tool. *Journal of Housing For the Elderly*, 21:1-2, 179-191. DOI: [10.1300/J081v21n01\\_09](https://doi.org/10.1300/J081v21n01_09)**

This presents a simple audit tool that can be used by designers or non-designers to evaluate whether a garden incorporates dementia-friendly design elements and qualities that serve the needs of people with Alzheimer's and other forms of dementia.

**Crampton, J., Dean, J. & Eley, R. (2012). *Creating a Dementia-friendly York*. York: Joseph Rowntree Foundation.**

This book details the research, development and ongoing efforts to redesign the city of York in UK to become more friendly for people living with dementia. It outlines the rationale and priorities towards dementia-friendliness in the community while highlighting case studies of initiatives such as the "Dementia Without Walls" project. The book speaks to a multi-sectoral and multi-stakeholder approach that is based on inclusion and assets to build on what people living with dementia can still do and the contributions they can still make. It proposes a 4-cornerstone model (people, networks, place and resources) towards achieving a dementia-friendly community while the last chapter of the book highlights urban design considerations towards dementia-friendliness.

**Fleming, R., Zeisel, J. & Bennett, K. (2020) *World Alzheimer Report 2020: Design, Dignity, Dementia: Dementia-related Design and the Built Environment. Volume 1*. Alzheimer's Disease International.**

This report outlines a set of design principles and examples as tools for designing well for people living with dementia so they may reach their full potential as human beings. The ten principles are: unobtrusively reduce risks, provide a human scale, allow people to see and be seen, reduce unhelpful stimulation, optimise helpful stimulation, support movement and engagement, create a familiar place, provide opportunities to be alone or with others, link to the community, and design in response to vision for way of life. A range of settings are reviewed including residential care, hospital care, domestic homes, day care and public buildings. The review is supported by a survey of 84 case studies from 27 countries, which are presented in Volume 2 to illustrate the design principles and approaches. The report also discusses the impact of COVID-19 on environmental design for dementia.

**Fung, J. C. (2015). *Dementia Design Sourcebook: Design Guide, Design Elements*. Department of Architecture, National University of Singapore.**

This book offers a reading in two volumes (design guide and design elements) for the design of environments for dementia in Singapore. Besides examining the myriad aspects of environmental design for people living with dementia and older adults in general, the book includes an infographics and dementia design palette to show how design can respond to disabilities arising from dementia.

**Goto, S., Shen, X., Sun, M., Hamano, Y. & Herrup, K. (2018). The positive effects of viewing gardens for persons with dementia. *Journal of Alzheimer's Disease*, 66(4), 1705-1720.**

This study extends the evidence base on the benefits of the exposure to Japanese and other types of gardens for people living with dementia. The study found that observation of gardens relieved physiological stress, instigated verbal communication and improved memory retrieval among people living with dementia from different ethnic groups.

**Greasley-Adams, C., Bowes, A., Dawson, A. & McCabe, L. (2014). *Good practice in the design of homes and living spaces for people with dementia and sight loss*. [https://dementia.stir.ac.uk/system/files/filedepot/12/good\\_practice\\_in\\_the\\_design\\_of\\_homes\\_and\\_living\\_spaces\\_for\\_people\\_living\\_with\\_dementia\\_and\\_sight\\_loss\\_final.pdf](https://dementia.stir.ac.uk/system/files/filedepot/12/good_practice_in_the_design_of_homes_and_living_spaces_for_people_living_with_dementia_and_sight_loss_final.pdf).**

**Accessed 22 Sep 2020.**

This booklet by the School of Applied Sciences at Stirling University, UK, presents living space design guidelines for people living with dementia and sight loss. These guidelines were developed based on the review of research reports, interviews and focus groups with professionals and caregivers, and a survey of 360 respondents that included people living with dementia and sight loss. For outdoor spaces, the guidelines suggest easy access to gardens with seating; well-defined, well-maintained looped paths; adaptable garden tools, appropriate and differentiated lighting, contrasting colours in stairs, steps and hazard-prone areas in the outdoors.

**Halsall, B. & MacDonald, R. (2015). *Design for Dementia. Volume 1 -- A Guide*. Liverpool: Halsall Lloyd Partnership.**

This guidebook is an outcome of a collaborative project, Innovate Dementia Europe. It uses a living lab approach to involve caregivers and people living with dementia, health and social care professionals, academics, designers, and business to develop and test innovative design solutions that enable people to live well with dementia. Six principles: familiarity, distinctive environment, legibility, accessibility, comfortable and stimulus environment, and safety were considered and elaborated from an experiential design perspective. The book provides planning and design insights and guidance for the public realm, built form and private domain. The complementary Volume 2 presents the research projects and outcomes that supported the recommendations in Volume 1. It also describes the participatory philosophy and approaches used in facilitating the living lab projects.

**Lien Foundation. (2020). HACK CARE: Tips and tricks for a dementia-friendly home. Retrieved from <https://hackcare.sg/about.php>**

HACK CARE is an interactive idea catalogue developed by the Lien Foundation, Lekker Architects and Lanzavecchia + Wai Studio in Singapore. The catalogue adopts economic, simple and easy-to-assemble design model of IKEA® products to make home spaces friendlier for people living with dementia. The instructional and illustrative manual includes supportive products and furniture (such as accessories, beds, chairs and tables,) within micro-environments of day-to-day experiences (e.g. living, eating, cleaning, sleeping and fidget play). The catalogue is supplemented by advice and tips from experts, professionals and caregivers.

**Ministry of Health Singapore. (2013). *Dementia: MOH Clinical Practice Guidelines*. Retrieved from <https://www.moh.gov.sg/docs/librariesprovider4/guidelines/dementia-10-jul-2013---booklet.pdf>. Accessed 22 September 2020.**

This booklet presents the revised dementia clinical practice guidelines developed by the Singapore Ministry of Health (MOH). The purpose is to provide guidance to healthcare professionals in Singapore to assess, evaluate and manage dementia in their patients. Based on best available evidence, the guidelines cover pharmacological as well as nonpharmacological aspects of management for different types of dementia patients, from mild cognitive impairment to severe dementia. There is discussion and recommendations about dementia diagnosis and screening, pharmacological management, behavioural and psychological symptoms management, ethical and legal issues, palliative care, young onset dementia, and community resources as well as self-assessment questionnaires.

**Mitchell, L. (2012). *Breaking new ground: The quest for dementia-friendly communities. Housing LIN Viewpoint, 25.***

This Viewpoint highlights key lessons and considerations in designing inclusive and dementia-friendly housing and neighbourhoods. Drawing from empirical evidence, 17 key urban design features that encompass dementia-friendly neighbourhoods, including and not limited to, streetscape, urban form, land-use mix, buildings and signages are proposed. The document also highlights short case studies where the designs have been realised.

**Nurjono, M., Yoong, J., Yap, P., Wee, S. L. & Vrijhoef, H. J. M. (2018). *Implementation of integrated care in Singapore: A complex adaptive system perspective. International Journal of Integrated Care, 18(4).***

This paper contains case studies of two integrated care networks in Singapore. The authors emphasise the significance of building effective collaboration based on “*a common focus, responsiveness to emergent behaviours, simple rules, the ability to self-organize and adapt in response to unexpected situations*”.

**Yuchi, W., Sbihi, H., Davies, H., Tamburic, L. & Brauer, M. (2020). *Road proximity, air pollution, noise, green space and neurologic disease incidence: a population-based cohort study. Environmental Health, 19(1), 8.***

This study conducted based on data from administrative health database cohorts of 45–84 year old residents (n= 678,000) in Metro Vancouver, Canada, suggests that less than 50 metre proximity to major roads was associated with incidence of non-Alzheimer’s dementia (odds ratios = 1.03 [0.91, 1.16], controlled for age, sex, comorbidities, household income, education and ethnicity, and Alzheimer’s disease (odds ratios = 1.19 [0.74, 1.91], controlled for comorbidities, household income, education and ethnicity). Participants’ annual noise exposure, measured using dB(A) for 10m x 10m grids, did not affect these associations.

Six Principles of Dementia-Friendly Neighbourhood

