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Psychological Influences of Architecture on the Demented in Care Homes of Kerala

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***Abstract*--- The effects of built environment on our health are heightened with age, especially when the process of ageing entails psychological, and physical decline of the human body. Dementia is largely prevalent in Kerala, India, as it comprises of the fastest ageing population in the country. This paper discusses how an architect can create an environment that triggers positive neurological changes in its users by formulating guidelines, which help architects make more informed design decisions. This will improve the quality of life of the fading in Kerala, where there are no set standards for their living environment. The analysis of the experiential responses manifests the efficacious relationship between designed spaces and standard of living ergo guiding the development of design strategies.**

***Keywords*--- Architectural design, Dementia, Built environment, Inclusive design, Psychology of design, User-centred design**

I. INTRODUCTION

1.1 Background and Context

"While no one can change the outcome of dementia or Alzheimer's, with the right support you can change the journey."- (1)

The concept of care homes has considerable contemporary relevance for persons who are aged with debilitating conditions like dementia. Dementia, a neurodegenerative disease is one such illness of the old with high morbidity and considerable socioeconomic impact.

Life expectancy the world over has seen a marked improvement in the twentieth century. This is due to improvement in public health and medicine. There are currently an estimated 50 million people diagnosed with dementia worldwide, approximately two thirds of these people are living within LMICs (2). The numbers are expected to rise to over 152 million by 2050. Dementia is the 5th leading cause of death. Much of the burden of the disease will be on developing and highly populated countries such as India, China and countries in Latin America.

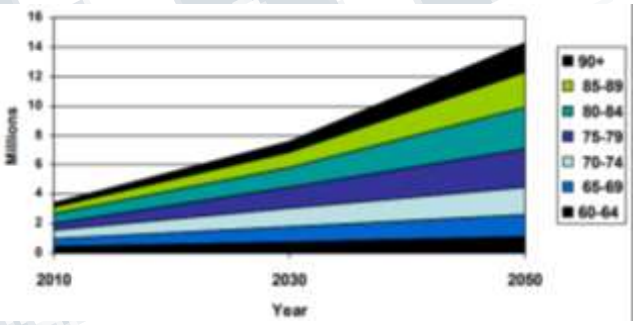

Figure 1 Estimation of number of people with Dementia, India (Source: ARDSI Report, 2010)

In 2010, there are 3.7 million Indians (2.1 million women and 1.5 million men) with dementia which is expected to double by 2030 and triple by 2050.The incidence of dementia doubles every five years from ages 65 to 90 years (2) . In India the growth of people living with Dementia will be 300% more in coming years. Kerala has now ended up with the fastest ageing population in the country. Population above the age of 60 is 13.1% in Kerala against the all-India average of 8.3% in 2015 (3). 2.2 lakh people are suffering from dementia in the state of Kerala (as of 2018) which has surpassed the 1.5 lakh projected prevalence of the disease by the latest Dementia-India (2010) (2) . The Alzheimer's & Related Disorders Society of India (ARDSI) has been integral to dementia awareness in our country and has been taking measures towards its care since 1992.

The creation of spaces for the elderly, euphemistically called as retirement homes at present, has to recognize the

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special needs of the elderly. This category with specific medical needs requires special features in care homes. Increasingly studies have suggested that design of spaces both indoor and outdoor, along with psychosocial interventions, have a positive impact on the quality of life of the demented (4) (5). Regardless, we still do not have clear or set protocols for the creation of spaces in the Care homes of the elderly with Dementia in India. In view of the contemporary relevance of the subject in the state of Kerala, this dissertation.

1.2 Research Questions

Central Research Question

How does incorporation of architecture in care homes create a positive difference in the lives of the elderly in Kerala coping with dementia?

Sub Research Question

- What is dementia and how does it affect the human mind and body? What is its incidence in Kerala?
- What is the psychological meaning of home and how is it translated into the living environment of care homes?
- What is the condition of care homes and dementia care in Kerala?
- How is architecture contributing to the psychology of ageing with dementia?

1.3 Aim and objectives

The aim is to develop architectural guidelines that aid in the design of a living environment for the elderly with Dementia so as to make their lives more meaningful.

- To understand Dementia, the physical and mental condition associated with it and to notice its incidence in Kerala.
- To notice the living environment in care homes for the elderly.
- To study the role of architecture in bettering the living environment of persons with dementia.
- To develop an architectural protocol that aids in the design of care homes in the context of Kerala.

1.4 Scope & limitations

The topic is significant in terms of its relevance in today's world of increasing ageing population. In a state like Kerala with high social and medical indicators, the population is ageing. This brings with it the category of aged with dementia. The topic is being explored from an architectural perspective without ignoring human sensitivity. It is necessary to explore the key architectural and sensory aspects that improve their mental and physical health.

The study is limited to formulating architectural guidelines and basic scheme for the design of care homes. There is no intent to create a prototype or model for the same. It is also not a medical or sociological or technical study but more of an understanding of the correlation between psychology and architectural. The study will be regardless of the economic and social shortcomings of a patient and will be based only on their physical, mental and psychological needs. This also is not a paper on ideal care homes that already exist.

II. LITERATURE REVIEW

This chapter explores the current theories and literature on Dementia, Care Homes and architecture. It begins with an overall understanding of dementia. Further living environment and sense of home are studied and their relationship with architecture is discussed. Finally, the concept of architecture creating therapeutic environments for dementia and their status in Kerala is investigated.

2.1 Understanding Dementia

Dementia is a syndrome – usually of a chronic or progressive nature – during which there is deterioration in cognitive function (i.e., the capability to process thought) more than what might be expected from regular ageing. The impairment in psychological function is usually accompanied, and sometimes preceded, by deterioration in emotional control, social behaviour, or motivation.

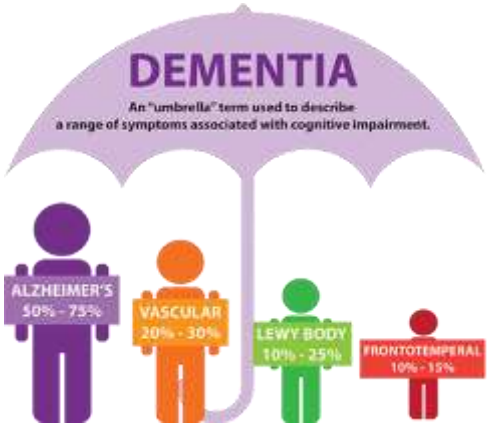

Figure 2 Types of Dementia
(Source: dfwsheridan.org)

Dementia symptoms vary depending on cause but common symptoms include: -

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The signs and symptoms linked to dementia can be understood in three stages.

- **Early stage:** forgetfulness, losing track of the time, becoming lost in familiar places.
- **Middle stage:** becoming forgetful of recent events and people's names (however remote memory can be left relatively intact. So, they're able to remember public and personal events many decades ago, but unable to recall what happened earlier that day), becoming lost at home, having increasing issue with communication, undergoing behaviour changes. Blurring of vision and increased vulnerability to glare. Noise disturbance causes distress. Difficulty judging distances.
- **Late stage:** becoming unaware of the time and place, having difficulty recognizing relatives and friends, having an increasing need for assisted self-care, having difficulty walking, experiencing behaviour changes that may escalate and include aggression. (6)

2.2 Principles of built environment for the demented

Environmental Audit Tool (EAT) handbook developed by *DPD (Designing for people with dementia, Australia)* contains information about key principles of designing for people living with dementia, outlines design considerations for each principle and provides directions for its use. (7)

The guide is organised around 10 key design principles.

1. Safety
2. Size
3. Visual access features
4. Stimulus reduction features
5. Highlighting useful stimuli
6. Provision for wandering and access to outside area
7. Familiarity
8. Privacy and community
9. Community links
10. Domestic activity (9)

Six key integrated design principles guide the book 'Design for Dementia' which are similar to the EAT.

The principles, when applied with culturally sensitive countries, can identify gaps in knowledge of the design for dementia enabling environments and suggest areas for improvement.

Figure 3 Key Design Principles. Source: (11)

Figure 4 Developing Location specific guidelines. Source: (15)

2.3 Kerala and its status on Dementia Care

The inadequacy of care centres for the aged with higher needs is a harsh reality. Creating awareness for Dementia is possible in an educated society like Kerala which also has a public health legacy. It is also possible to create a pool of care givers.

In 2014, for the first time, the State government took notice that dementia care needed a distinct care strategy, separate from prevalent geriatric care. ARDSI now has care homes in Thiruvananthapuram, Ernakulum, Kumbalangi, Kunnamkulam, Tripunithra and Kozhikode. (8)

"Dementia friendly communities" – state wide campaigns, staging plays etc. as part of ADI Conference, Kyoto 2017.

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The campaign, distributed messages through pamphlets and displayed notices. (9) However, none of the other components of SIDC — memory clinics in districts, creating a brigade of trained care-givers for dementia patients etc. — have moved forward. A set of architecture solutions would go a long way to make Kerala a Dementia friendly state with improved quality of spaces instead of just provision of structures for the purpose.

2.4 Literature Review Analysis

From multiple reviews (10) (11) (12) (13) (14) it's clear that architecture of care homes is closely linked to the psychology and mental health of the demented. It is difficult to develop or design a complete model of a care home based on the conclusions drawn by the authors. However, the elements that have to go into a good care set out and this gives a key start to the basic requirements.

Some limitations, gaps and differences in the previous studies to this study is outlined below:

- The background and preferable living conditions of elderly with dementia in Kerala varies greatly from the above studies.
- Emphasis on private spaces is not paramount in Indian conditions. Public and quasi-public places are more important in Indian culture.
- Living environment relating to memory would require use of traditional construction material which evoke memories so that the aged can relate to it.
- Modern equipment for safety and medical purposes has to be judiciously used but a technological overload may disorient the aged in Indian conditions, as he may not have been exposed to such technology earlier and therefore cannot relate to it.
- This study attempts to bridge the gap of a lack of a proper study and absence of design principles to suit Indian conditions, especially in the state of Kerala.

Nevertheless, there are significant elements of practical and utilitarian value that can be derived from these studies. The research can take a holistic based on the needs of elderly and create guidelines that are context specific as previously done in these articles.

In particular the broader guidelines along which this research shall be based are:

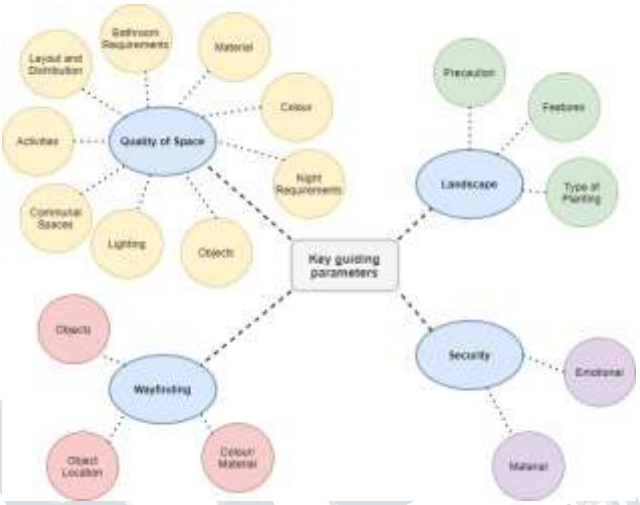

Figure 5 Guiding Principles. Source: (Author, 2020)

III. RESULTS

This chapter discuses and compares the data collected from the literature case studies adding up to obtain the required suggestions and the conclusions to form the architectural guidelines.

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IV. RESULTS

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3.1 Literature Case Study

Table 1 Comparative study of case studies. Source: (Author,2020)

Factors	De Hogeweyk	The Orchard	Harmony home
No. of demented & staff to demented ratio	180 residents, 1:7	11 clients and day care facilities for up to 25	10 patients, 1:1
Location	Within the city of Weesp,	Within existing 18th century walled garden.	lush green village of Kottapady

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Designed/Adaptive reuse	Built for the purpose	Built for the purpose	Adaptive Reuse
Quality of	**Space**		
Layout /Distribution	27 houses.6-8 sharing.	Campus-type model.11 Long term care rooms, large respite care spaces, along with Alzheimer's Society Office.	8 Acre plot with porch, backyard Bungalow- 1 ward 3 rooms, no attached bathroom and an outhouse- 1 ward. Dispensary and check-up room.
Light	Maximum light from windows, minimum corridors	Tall windows allow even light. No glare or shadow.	well lit- Multiple windows
View	View of courtyards, gardens, streets with activity.	Views of the gardens.	Calm, lush green view
Colour /Material	Clinker brick facing exterior with colour change. Colour change from room to room, pastel shades, coloured patterned tapestry. Decorated typology wise.	Floor, skirting and walls are different colours, no patterns on floors. Doors are colour coded. No dark corridors. Timber pavilions held within a series of brick walls.	Woodwork, tiled roof, traditional architecture.
Objects	bouquet of flowers, chandelier, plants, classic floor lamps, old cuckoo clock, light curtains, paintings, photo frames	Paintings, photo frames, plants	Basic Req. only
Bathroom Requirement	Handicap friendly. Attached bathrooms to each room.	Handicap friendly. Attached bathrooms to each room.	Shared bathroom.
Communal activities	Daily chores – washing, cooking. Walking club, arts space, classical music room, personal hobbies.	Music singing and dancing, games, gardening, baking, arts, crafts, excursions, flower arranging, personal hobbies.	Prayer, music, Reading, TV, Gardening, Rearing pets, art, games, puzzles.
Therapies	Music, art, walking, cognitive therapy etc. Therapies disguised in the form of daily village activities. Encouraged contact with public.	cognitive stimulation therapy, pet therapy, light exercise	Reminiscence therapy, Aroma therapy, Yoga, Dance, music
Communal spaces	theatre, supermarket, restaurant, pub, courtyards, gardens, hairdresser	Activity room, Contemplation room, Seating room	Semi open Activity Space, Dining Room (capacity 15)
Landscape	Six different 'courtyard' spaces, Formal/informal/symmetrical, a pond, several big trees, curved paths	Terraced gardens, each oriented in a different direction and planted accordingly. Wide walkways, ramps.	Large lush green plot with backyard and land for conducting events. Not designed specifically.
Security	Two access points. No restriction to wandering. A peaceful mind in a safe village with supervision.	Two access points. No restriction to wandering. Maximum indoor outdoor connect.	No restrictions for wandering. Secure home like feeling without grills and locks.

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Way finding	Different materials, change in proportions, iconography on the façade, Looping Paths. Encourage walking.	Pathways naturally loop back on themselves. contrast between the labyrinthine walls and the framed gardens	Spaces flow into each and are not ordered- confusing. Signboards present. Large outdoor spaces to wander safely.

I. DISCUSSION

This chapter discusses the observations elaborated in the previous chapters to complete the dissertation objectives. The theories and literature reviews studied to achieve certain objectives are discussed. The primary and secondary data collected are analysed and compared with one another to form the result from this research all of which are discussed below.

4.1 Analysis of Studies

Table 2 Inference from Case Studies. Source: (Author, 2020)

SL NO.	Factors	Inferences
1	**No. of demented sharing their space**	Single sharing to up to 6 sharing in an entire two storeyed cottage/ward. Ideally a maximum of 3 sharing a room.
2	**Location**	Ideally in the outskirts off the city surrounded by lush green calm environment, less commotion along with proximity to hospital.
3	**Quality of Space**	
3.1	Layout/Distribution	Campus or village model with maximum two storey high buildings dispersed around gardens & open spaces to promote walking, wandering & socialising.
3.2	Light	Maximum daylight through large windows, courtyards and balconies. Reduce glare & shadows.
3.3	View	View of gardens, farms, courtyards with activity
3.4	Colour, material	Different pastel colours from buildings, rooms, doors. Colour difference in wall, skirting, floor with no pattern on floors. Purple in therapeutic spaces. Anti-skid flooring Use of roof tile, wood detailing, iconography to evoke sense of home according to context.
3.5	Objects	Paintings, photo frames of family & context. Plants. Personal Belongings. Small curiosities from the past like clocks, lamps.
3.6	Night requirement	24x7 supervision, caretaker sharing a cottage, handrails barricades on walls & beds. Switches for help.
3.7	Bathroom requirement	Attached bathroom, handicap friendly with grab bars & roll in showers.
3.8	Communal Activities	Personal Hobbies, Music, Art, Gardening, Cooking, TV, prayer, games &puzzles.
3.9	Therapies	Music, art, walking, yoga & community meeting. Cognitive, aroma, pet, validation and reminiscence therapy.
3.10	Communal Spaces	Large recreational space. Semi Open or Open like gardens/courtyards. Common practices of life from their past like reading space, eateries, clubs.
4	**Landscape**	Looping paths that lead to the start. Trees and flowering gardens. Multiple courts with different characteristics of design and planting based on orientation.
5	**Security**	No restriction on wandering. Minimum grills and bars to reduce a caged feeling. Maximum indoor outdoor connect. Reduce access points, maximise visibility of caregivers allowing the demented to be carefree without feeling restricted.
6	**Way finding**	Different Materials, iconography, contrasting colours on building exteriors. Signboards. Clear hierarchy of spaces. Looping outdoor paths always leading to start.

Survey was conducted to understand how the built environments and the parameters of design affect the elderly with dementia through experiential responses from doctors/nurses/counsellors who have attended to or nursed 3 or more of this special group of elderly. It is understood specifically in the context of Kerala. The questions are constructed based on the design elements which help create a common basis for analysing both case studies and surveys

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thereby resulting in the formulation of design guidelines. 17 responses have been recorded. They are combined from both online surveys and personal interviews.

Table 3 Inferences from Survey Source: (Author, 2020)

SL NO.	Factors	Inferences
1	**No. of demented sharing their space**	1-3 sharing -acceptable. 2 Sharing -most preferred. Strongly recommended to allow for similar natured elderly to share
2	**Difficulties in Existing Environment - Kerala**	Need for Dedicated designed facility which is a community/village. Feeling of being caged, lack of space. Lack of opportunity for personalization Lack of communication/empathy
3	**Quality of Space**	
3.1	Time in personal space	They spend majority time in personal space (up to 16 hours). But this may strongly be influenced by their stage of dementia. During early/middle stages it is only used for sleep (8 hours)
3.2	Improvements in personal space of current care facilities	Need for more space, lighting and ventilation. Importance of personalizing space, lack of TPP like color coding.
3.3	Objects in Personal space	Apart from the necessities, memory evoking objects were highly recommended. Personal belongings, old wood furniture, pencil/slate/pen, contextual décor (paddy hanging, paddle boat), murals and pictures of traditional dance forms.
3.4	Lighting	Bright daylight during day and dim night light - indicating time. Maximum light for tasks, dimmer daylight at other times.
3.5	Views from the room, specification of windows	View – greenery, sky, stars or Moving vehicles/ people/children/pets. Windows – large windows with grills and mosquito net, safe opening system. Seating near window with a view.
3.6	Special Night Requirements	Dim light, presence of caretaker, alarm switch, handrail, snacks & water. Sponge bath, music, mild fragrance, comfortable temperature for calming.
3.7	Color, Material	Color – Bright contrasting yet pastel shades of red, blue, green, brown. Contrast in color between room-door- verandah- bathroom and between floor- furniture Material – Contextual & vernacular – wood, roof tiles, clay walls with relief work. Presence of courtyards. Typology of housing / roofing/material according to previous livelihood.
3.8	Special bathroom requirements	Handrails/grab bars, anti-skid mats/floor, Spacious, ventilated & well lit. Easily operable fixtures with clear marking. Positioning of closet- visible at entrance yet private. Floor-toilet seat cover (red, black) contrast.
3.9	Community activities & space	Games/ puzzles, Music – old songs, bhajans, Exercises/yoga, Cooking, Art, Newspaper reading and healthy discussions in a large hall which may be partially divided or form niches for small groups.
3.10	Individual Activities	TV, personal hobbies (stitching, gardening), daily routine, walking
4	**Landscape**	Trees that provide shade, Memory Evoking/Contextual– Banyan tree, Ashoka tree, Coconut Tree, Plantain. Straight pathways-wheelchair friendly, no forks, and loop back to the start. Flowers -different colors and mild smell. Niches, Seating, Gazebos every 20 ft. Shallow, protected water bodies with fishes and waterfalls

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5	**Security**	Personal belongings, photos - dedicated space Human Company Ambience of an old home/Nalukettu- old furniture, normal windows, prayer space, old artifacts adapted to facility.
6	**Way finding**	Signage's with colors, pictures, finger indications instead of numbers Picture of youth self on door to room Color coding spaces Object's indicative of room type Single story spacious facility with orderly planning

4.2 Design Guidelines

This research process is fulfilled with the construction of design guidelines, formulated based on the analysis and comparison of the literature studied and the surveys conducted. The guidelines are segmented under four broad parameters with sub elements where necessary. These are developed keeping in mind the culture and context of Kerala.

4.2.1 Quality of Space

This section sets out the guidelines for achieving necessary quality of built space and personal space inside a care facility for the aged with dementia. The broad principle of quality of space is divided based on multiple facets of architecture to form guidelines under each as listed below.

4.2.1.1 Layout & Distribution

- ✓ The care facility should ideally be located near a landmark, in the calmer edges of the city with connectivity to hospitals. Mixed community environment without feeling segregated.
- ✓ Campus/ village model (maximum 2 access points), single storied, spacious living environments interspersed with gardens & courtyards.
- ✓ Maximize frontage permeability to encourage flow of people. Incorporate visitor's area.
- ✓ Simple design layouts. Active areas to form core of village/building. Scale of private and public spaces to reflect spatial hierarchy.
- ✓ Living room to be an important node but not the primary node around which everything is planned.
- ✓ Ideally 2-3 sharing rooms accommodating similar natured elderly
- ✓ Noise insulation in all spaces using acoustic material, carpets, trees as barriers etc.
- ✓ Spacious, familiar, well lit and ventilated space with view of the outdoors from all spaces.

4.2.1.2 Personal Space

According to Indian culture, most elderly spend only their time of rest in personal space unless they are bedridden.

- ✓ Freedom to personalize space with few objects and furniture of value. Space to display photos and to enjoy personal hobbies.
- ✓ Décor of personal space to resonate with their lifestyle from their youth.
- ✓ Presence of reality orientation techniques-calendar, clock. Provision to play music and radio.
- ✓ Direct view of the bathroom.
- ✓ Alarms, list of medicines, emergency contact of family at immediate reach. Board to mark daily routine.

4.2.1.3 Objects

Set of guidelines discussing the type of objects to be present inside the facility to aid the demented.

- ✓ Object of medical and technical help – wheelchairs, switches/alarms, handrails
- ✓ Large calendar, large clock with clear marking, flowers and indoor plants in common areas.
- ✓ Memory evoking objects - Personal belongings (perfume, towel), old wood furniture (easy chair/armchair, teak cot), pencil/slate/pen, kitchen mud pots.
- ✓ Contextual décor- paddy hanging, classic lamps, old football/frond, nilavilakku, paddle boat, old dolls (wooden elephants), murals of traditional dance forms. Objects to be adapted to facility.

Figure 6 Paddy Hanging. (Source: pinkpepper.in)

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Figure 7 Antique Lamp. (Source: amazon.in)

- ✓ Reversible mirrors with murals/pictures to avoid confusion.
- ✓ Open shelves/glazed cupboards to reduce anxiety of losing objects.

4.2.1.4 Special Bathroom Requirements

- ✓ Handicap friendly. Attached bathrooms to each room.
- ✓ Indirect lighting to avoid glare from shower area.
- ✓ Handrails/grab bars, anti-skid mats/floor, Locks – operable from outside when in need. Bell at floor and standard height
- ✓ Avoid all white bathroom. Contrast - Floor brown/ mud colored, toilet seat cover (red, black).
- ✓ Familiar fixtures which are arthritis friendly with clear HC marking.
- ✓ Placement of closet- visible at entrance yet positioned to provide privacy. Position of mirror to not cause glare or be confusing.

4.2.1.5 Special Night Requirements

- ✓ Dim light/sensory lights
- ✓ 24x7 supervision by caretaker from adjacent room, alarm by bedside.
- ✓ Snacks & water. Temperature controlled to be comfortable.
- ✓ Sponge bath, music- nature sounds, mild fragrance for calming.

4.2.1.6 Lighting

- ✓ Bright daylight during day and dim night light - indicating time.
- ✓ Courtyards, balconies and skylights to allow more daylight in common areas.
- ✓ Maximum light for tasks– either daylight/task light, dimmer daylight at other times
- ✓ The elderly with dementia to never be left in the dark. No dark/dim lit corridors.
- ✓ Windows to provide even light with less to no glare or shadows.

Figure 8 Light from Skylight & Courtyard. (Source: allegradesigns.in)

4.2.1.7 Colour & Material

- ✓ Bright contrasting colours to be used to differentiate spaces. Pastel yet vivid varieties of red, green, blue, yellow, brown etc. Warmer hues are clearer. Shades of purple can be therapeutic.
- ✓ Contrast in color between room-door-verandah-bathroom, floor- furniture-cutlery, and wall-skirting. Contrasting handrails and aids.
- ✓ Matte finishes of paint. Reduce whites/greys to avoid institutional appearance.

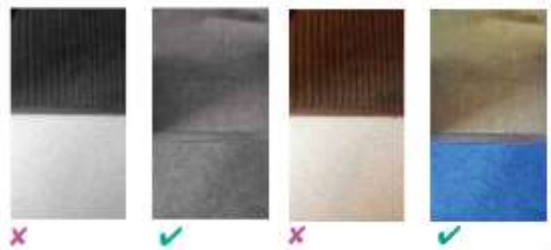

Figure 9 Colour, Material finish at junctions. Source: (11)

- ✓ Patterns should be avoided in flooring. Subtle patterns with tonal difference can be incorporated in curtains/furniture fabric according to scale of the space.
- ✓ Change colour or material finishes (Anti-skid material) at level differences, sharp edges, risers &treads. Avoid giving the impression of the same in other areas.
- ✓ Context specific materials to be integrated – wood, brick, roof tiles, clay walls. Iconography and familiar textures (wood panelling) to evoke sense of Kerala.
- ✓ Typology of cottages/ roofing/material according to previous livelihood.

4.2.1.8 View

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- ✓ Green views of gardens, farms, courtyards or views of playing children/pets.
- ✓ Unhindered view from all key rooms and seating.
- ✓ Large windows with grills and mosquito nets. Smaller windows without grill if needed but with size control to discourage escape attempts.

Figure 10 Traditional Windows. (Source: pinterest.com)

- ✓ Windows/louvers with wooden detailing and familiar traditional appearance.
- ✓ Easy, familiar opening mechanism – sliding/hinge.

4.2.1.9 Communal Activity & Communal Spaces

- ✓ Activities - Games/ puzzles, Music (old songs, bhajans), Exercises, Cooking, Art,
- ✓ Gardening, Daily chores, Excursions, Newspaper reading and healthy discussions
- ✓ Dedicated decorated rooms and outdoor/indoor clubs like walking club, games club, art space, classical music room, small theatre, market, tea stall/hotel inside village can encourage active living.
- ✓ Communal spaces stand out by the use of different colours/materials, change in proportions, and iconography on the façade.
- ✓ Informal spaces and courtyards incorporated to prevent loneliness. Avoid hidden corners. Large hall made to look smaller using furniture or by forming niches.
- ✓ Therapies disguised in the form of daily activities supported by peaceful calming spaces with dimmed light, reclining chairs and mild infused oil fragrance.
- ✓ Therapies to also include innovative techniques to keep them motivated and relaxed like pet therapy, Ayurveda massages, community meeting, etc.

4.2.2 Landscape

This section defines a few specifications on landscaping for the outdoor areas of a facility housing the elderly with dementia. These are in accordance with the natural climate and vegetation of Kerala.

Figure 11 Althara. (Source: quora.com)

- ✓ Memory evoking trees that provide shade with seating under them– Banyan tree, Red bead tree, Mango tree. Trees to be planted without overcrowding.
- ✓ Sensory attention- flowers of different colors with mild smell (rose, jasmine, champa) which also attracts butterflies, bamboo for sound, traditional bird house/bird bath.
- ✓ Multiple courts with different characteristics/principles of design and planting based on orientation and season. Raised bed for gardening with wider coping as seating.
- ✓ Gardening tools in a shed visible and positioned near the garden.
- ✓ Shallow well protected water body with fishes and waterfalls to be visual focus with seating arranged around.
- ✓ Wide wheelchair friendly paths with defined edges Routes interspersed with activities, social interaction and rest.
- ✓ Open break out spaces with even ground/gentle gradient for seating in small groups under indirect daylight. Niches, Seating, Gazebos every 20 ft. seating with back and armrest.
- ✓ Contrast between path, furniture and planting. Terracotta /clay sculptures, planters as decor.
- ✓ Boundary fence to be concealed by climbers.

4.2.3 Security

This section contains recommendation regarding the security of the residents, focusing more so on the mental security than the physical as there are existing regulations concerning the same.

- ✓ Acknowledging personal belongings and photos by providing dedicated space. Promoting them to be independent as long as possible.

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- ✓ Human Company, interaction with children and pets to make the elderly feel loved and supported.
- ✓ Creating a familiar ambience of an old home/Nalukettu with wooden furniture, prayer altar with burning incense, sacred tulsi thara and old familiar artifacts adapted to facility.
- ✓ Allowing them to wander securely without feeling restricted. Central placement of nurse station. Maximum indoor outdoor connect.
- ✓ Minimum grills, bars, locked doors to reduce a caged feeling. Concealed technical/medical appliances to not feel alienated or institutionalized.

4.2.4 Way finding

Way Finding is one of the governing criteria's in designing both the built and unbuilt spaces in a facility. The resident forgetting the way and feeling lost can increase anxiety and can indicate poor organization. The following are guidelines to improve way finding in dementia care facilities.

- ✓ Both graphic and text signage which are well lit and at a lower height than normal (1.2-1.4m). Picture of youth self on door to room. Training with memory cards to understand signage.
- ✓ Memory object shelves/boxes at entrances indicative of room type.

Figure 12 Colour Coding. Source: (11)

- ✓ Corridors should be short and wide with seating. No repeating elements. Number of doors and corridors should be kept to a minimum and colour coded. Restricted spaces should have doors matching the colour of the walls.
- ✓ Single story spacious facility with orderly planning. Visual link between spaces. Less furniture - less obstruction.
- ✓ Change colour, material and scale of each building. Relief work on façade indicative of functionality.
- ✓ Exterior paths that loop back to the start without dead ends/forks.
- ✓ Creating landmarks with sculptures, iconography (lion at gate post), large banyan tree, tulsi thara, prayer alter etc.

V. CONCLUSION

This chapter presents the conclusion of this research and presents its implications and limitations. The guidelines presented here by no means replace existing theories that healthcare professionals' practice today. These guidelines, rather, are designed to help architects, or any caretaker, to make better, more informed design decisions. They are formulated based on experiential responses from around Kerala and published studies in this topic. As stated earlier, these guidelines address the general population of those with dementia, but may not work with every individual as each person's circumstances and experiences differ. They also focus more on the psychological and nursing aspect of a care facility rather than the cost.

So where do we go from here? The first step in establishing guidelines for designing facilities is to educate the public. Communities, individual residents, and organizations must work together to help create the change. Architects and designers should receive training and need to understand not only that current design methodologies do not always work and may have the opposite effect, but also the reasons why. Next, existing facilities must adopt these guidelines and new designed facilities must come up in the state as an example for the country. Finally, in order to achieve the goal of establishing these guidelines at the state level, the government must get involved.

The fulfilment of this project, from research to the creation of Kerala's standards for building Dementia Care Facilities, needs to be advocated by the local community first. It is with the help of our communities that this project can truly be realized and become more than a dissertation.

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VII. APPENDICES

Survey questionnaire

1. In your experience with dementia patients, how much time do they spend in their personal space or bedroom?
2. What should be different in present rooms of care facilities to help support dementia patients better?

Comment on the following: -

3. Objects in personal space (memory related artifacts, objects specific to Kerala)
4. Lighting (Bright, dim, maximum daylight)
5. Views from the room and specification of windows (sliding window, grills on windows large or small windows)
6. Special Night requirements (for example presence of bystander, dim light)
7. Color and material (preferred generally and specific to Kerala - elements of traditional architecture)
8. Special bathroom requirements other than what is usually present for differently able.
9. Can the demented share a cottage with the other elderly in the Care home? If so how many can share?
10. What kind of community activities keep the aged with dementia active, healthy and at peace? Would a large hall for such activities intimidate them?
11. On which of the following do the aged with dementia spend their personal time most

TV/Phone/Books/Routines/Other

12. What features in landscaping the gardens would soothe the aged with dementia? What precautions should be taken while landscaping gardens?
13. What architectural elements can be added to make way finding easier
14. What can be incorporated in living environments to make the aged with dementia feel at home and secure (mentally)?
15. In existing care home environments in Kerala what are the difficulties faced by the elderly with dementia?

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