HOW KEY RESIDENTIAL ATTRIBUTES DETERMINE THAI MIDDLE-AGED ADULTS' HEALTH AND WELL-BEING

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ABSTRACT

As a consequence of the COVID-19 outbreak, behavioural shift has been spotted among several groups of people globally. We incline to spend longer time at home doing various activities despite after lockdown. Key residential attributes consisting of size and space, lighting, location and neighbourhood quality, nature and greenery views, as well as colour design could potentially determine occupants' health and well-being. This research concentrates on Thai early to late middle-aged adults between 35 to 64 years old who permanently reside in Thailand. The motivation behind was derived from demographic shift with higher percentage of ageing society in Thailand, health and wellness megatrend, together with a capability to age-in-place.

Quantitative methodology has been conducted to test this study, with the sample size of 100 respondents after applying Taro Yamane formula, in which initially 135 respondents were acquired via online questionnaire. To obtain comprehensive understanding on respondents' demographic, behaviour and insights, both descriptive and inferential statistics including multiple regression plus ANOVA were employed to test the hypotheses on how key residential attributes determine Thai middle-aged adults' health and well-being, in which the assumption regarding colour design component is accepted

KEY WORDS: Ageing in Place / Residential Attributes / Health and Well-being / Housing Built Environment / Adults Housing Preference

35 pages

CONTENTS

CONTENTS (cont.)

LIST OF TABLES

LIST OF TABLES (cont.)

CHAPTER 1

INTRODUCTION

1.1 Background

Health and wellness megatrend has been remarkable as a result of an increase in life expectancy worldwide. Many people nowadays value health over wealth, career path or anything else during the livelihood of their lifetime. Businesses related to health such as clean food, wellness centres, anti-aging products and preventive care, for instance, have been established significantly over decades. Thailand is also considered as one of the top destinations for medical tourism with top-notch hospitality standards, yet affordable. Several groups of Thai citizens, as a consequence, are influenced by the megatrend, and are highly conscious about their health and wellbeing on a regular basis. With regards to the emergence of chronic diseases heavily found in seniors as they age, this brings about extra care concerning their physical plus mental conditions. According to global ageing statistics, 65 countries are projected to have a population of which citizens aged 60 and above accounting for 30 percent of the total population by the year 2050 (Engineer et al., 2018). The design of residential environments for seniors is one of the results of this demographic shift. With such a current set of requirements plus living conditions, interior designers and architects are discovering new prospects and overcoming fascinating obstacles to develop inventive solutions to promote seniors' health and well-being.

When it comes to creating buildings that promote health and well-being, it is critical to take resident behaviour into account. Deliberate architectural design can be used to promote the well-being of the elderly. Deliberate architectural design can be applied to promote the well-being of senior citizens. This study examines residences that incorporate the demands of a community with the health and well-being benefits that come from a strong connection to nature such as sunlight. Architectural design may be a powerful instrument to solve specific problems, responding to the demands of every community, and

establishing a safe plus secure environment for the elderly. Customers' willingness to buy are significantly driven by the assessment of their health and wellness. The findings of previous consumer research conclusively revealed that customers desire a residence that enhances their health and well-being. More than 30 percent of residents would be willing to spend more for this, as well as several tenants do, to spend more in rent for a property like this.

Everything from how well we sleep to how often we interact with others is influenced by where we live, and how safe and comfortable we feel. It is hard to conceive of a more vital place to begin improving the health and well-being of individuals, families, and communities than the home. Numerous studies have examined the relationship between inferior housing and poor health conditions, while more recent research has focused on the benefits of environmentally friendly, well-designed residences for people's health and well-being ("Health and wellbeing", 2016).

1.2 Research Motivation

Over the past 3 years since the outbreak of COVID-19, people unavoidably had to quarantine at home due to the pandemic regardless, whether to sleep, eat, exercise or work. The majority of the activities have been done at home ever since, leading to gradual changes in people's behaviour and lifestyles. Residence becomes an all-in-one place including living space, office, gym, restaurant, playground, etc. Residential design in both indoor and outdoor areas, therefore, is an aspect people pay attention and give importance to for the sake of their health and wellbeing. Retirees ageing 55 years old and beyond, in particular, spend double or triple times at home compared to other generations regardless of lockdowns according to their physical restrictions together with their lifestyles. The vast majority of seniors prefer to continue living in the community, as their residence and belongings represent their life's achievements and provide livelihoods that cannot be replicated. 'Ageing in place' refers to the capability to dwell in one's own home for as long as they feel confident and secure there (Kazak et al., 2018, 13).

The rapid global pandemic of coronavirus is provoking panic and anxiety to the great numbers of people, particularly the elderly and those with severe health issues. Lockdown as well as the impacts derived from routine activities and livelihood accerelate the rate of hopelessness, distress, alcohol and drug use, plus self-harm or suicidal behaviour. The COVID-19 outbreak stresses the significance of making the built environment resilient, everything from outdoor areas, houses, offices, entertainment amenities, public spaces, together with other indoor areas. Lockdowns have altered how humans and communities live, connect, and work. Nowadays, various groups of people globally work from home and spend all of their free time there at their own residence. Thus, it is crucial to examine several elements of housing key residential attributes while keeping the pandemic into considerations.

Another research indicates that quarantined people are highly inclined to exhibit emotional instability, depressing and anxious symptoms, sleep deprivation, as well as chronic and post-traumatic mood disturbances (Amerio et al., 2020). Even three years after lockdown, acute depression, alcohol misuse, self-harm, and avoidance behaviours have been recorded as long-term impacts. In addition to social isolation and financial difficulty, quarantine appears to exacerbate suicide thinking. This paper will present the designer with recommendations, supported by previous studies, for creating environments in which our older population can age-in-place with purpose and fulfilment.

1.3 Research Objective

1. To conduct quantitative study on how key residential attributes determine Thai middle-aged adults' health and well-being.
2. To provide involved real estate stakeholders' recommendations regarding Thai middle-aged adults' key residential attributes preferences based on their health and well-being.

1.4 Expected Benefits

Prior to and during the outbreak, wellness real estate attained the greatest rate of growth in the wellness industry at 22.1 percent ("The global wellness", 2022) . "COVID-19 has accelerated the growing understanding among consumers and the building industry about the critical role that external environments play in our physical and mental health and well-being." As a result of the outbreak, customers actively searched for solutions, services, and products to assist them handle the immense stress they encountered. In 2020, mental wellness sales increased by 7.2 percent. Numerous mental wellness activities take place at home or via technological platforms, such as meditation, online self-help gatherings, and stress relief exercises, which helped maintain high expenditures despite COVID disruptions.

The outbreak has highlighted the significance of nature to our health and well-being. During lockdowns, we sought refuge in public parks and green areas, causing many of us to realise that nature is beneficial to our physical and mental health. People even sought to bring extra greenery indoors, as indicated by the increase in sales of houseplants. Our residences have turned to be the hub for a variety of activities, including workplace, classroom, fitness, restaurant, playground, etc. There are numerous options to redesign our residences to facilitate physical and mental well-being. For instance, kitchen design can promote healthy cooking, healthy eating, as well as food waste reduction. Balconies, terraces, and courtyards can enhance social interaction between residents and their neighbours. A tranquil, peaceful corner could inspire us to take some time out of our busy schedules for mindful meditation.

CHAPTER II
LITERATURE REVIEW

2.1 Size and Spacing

According to Jackson, over 90 percent of our lifetimes are spent inside our homes, and the term "sense of place" has become a global health concept that encompasses a wide range of health outcomes. Simply stated, the quality of one's living environment can have an impact on one's mental health and well-being. Since there are more people living together in a room, social isolation and the loss of supportive relationships are more likely to develop. Studies show that when children and parents engage in the more crowded households, there is more confrontation and less attentive parenting (Ma, 2018). When individuals are in an area with low ceilings, they will be able to concentrate on the activities like working and studying, while high ceilings are believed to promote creativity and are more suitable for social interactions ("Health and wellbeing", 2016).

To evaluate the influence of COVID-19 lockdown on psychological health and well-being, it is necessary to look at integrated information on dwelling as a determinant of health. According to the findings, those who live in substandard housing are more prone to undergo depressive symptoms when the authorities announce a lockdown. The likelihood of having moderate to severe symptoms of depression are increased when a person lives in a 60-square-foot or smaller apartment (Amerio et al., 2020). A single-person should have a living space that is between 80 and 90 square feet, as indicated by several state guidelines (Mohammed, 2016).

2.2 Nature and Greenery Views

Given that we stay more than 90 percent of our days indoors, housing that optimises the restorative powers of nature are more vital than before. Study on visual desire and responses to natural scenery indicate less tension, more positive mental function, and enhanced focus and recovering periods contributed to the development of the Visual Connection with Nature (Browning et al., 2014). Reductions in heart rate and blood pressure; reductions in emotional exhaustion; and improvements in mental engagement. Well-being overall has been correlated to visual connections with nature. Both surrounded by nature and looking at natural images shown to provide a favourable effect on stress levels. Previous research indicates that exposure to natural sounds speeds up physiological and psychological recovery up to 37 percent while lessens cognitive exhaustion and encourages inspiration plus motivation. Another study found that after listening to stream waves and watching a nature video containing river sounds, participants have greater energy and drive than those who merely remain in silence during the post-work restoration phase.

The majority of people agree that natural scenery such as trees, rivers, or seas are peaceful and healing. People have sought specific components to feel at ease, secured, and psychologically well-balanced ("Designing for homeowner", 2019). Real greenery, patterned cloth on cushions, quilts, and wallpaper may all be used to carry such themes into decoration. Natural hard materials like wood and granite, which are commonly used for tables and counters, can also be used to mimic repeated or wavelike patterns (Weeks, n.d.). Window views, burning fires, or diverse displays are just a few examples of architectural elements such as moving water that can attract interest (Evans & McCoy, 1998, 85). Therapeutic horticulture (TH) is an illustration of a desirable engagement with nature for seniors. Since numerous research has demonstrated its positive impacts on the physical plus mental wellbeing of the elders, it has been speedily increasing across many residential care communities. Several researches have connected TH to decrease levels of psychological distress as well as diminished feelings of isolation (Ghaeeni, 2021, 6).

2.3 Natural and Artificial Lights

Light can be used to promote a sense of calmness and concentration. Human internal body clock and well-being rely on sufficient exposure to sunshine (Ghaeeni, 2021, 6). It has been shown that exposure to natural light improves one's mood as well as one's level of motivation and enthusiasm (Weeks, n.d.). After the eyes are awakened by the sunshine, a surge of the hormone cortisol floods the system, giving the body a stimulant and effectively rousing it up. A setting that is dark or is built with artificially light cannot deliver a certain amount of energy boost. Moreover, artificial light stimulates the brain and makes it even more difficult to feel drowsy. ("Health and wellbeing", 2016) Consequently, designing places to optimise the daylight that can penetrate has a significant biological impact on humans.

A decent balance of serotonin and melatonin could improve sleep patterns, emotion and mental clarity, as well as anxiety plus breast cancer (Browning et al., 2014). Serotonin is produced when there is a high concentration of blue light, but melatonin is produced when there is a low concentration of blue light. Warm light is preferable for bedrooms, in which dimmable light bulbs provide greater lighting flexibility, allowing individuals to simulate natural light levels indoors. As it has been demonstrated that blue light from electronic devices delays the melatonin secretion, it should be eradicated from sleeping spaces.

Another research comparing the lengths of hospitalizations of 174 depressed patients randomly allocated to bright or dark hospital rooms revealed that those in bright rooms spent an average of 16.9 days, while those in dark rooms spent19.5 days on average (Engineer et al., 2018). The presence of natural light within a building is also connected with residents' perceptions of the environment's cheeriness and greater pleasant impact. In addition, seniors are more likely to develop circadian disorders in the form of sleep disruptions. In this regard, forms of energy giving greater circadian simulations throughout daylight hours have the capacity to encourage sleep in seniors and those with Alzheimer's disease.

2.4 Location and Neighbourhood Quality

The implications of ageing in place for seniors extend further than the house. They are significantly affected by the geography in which a person decides to age. The health and well-being of an individual is more likely to improve in regions with greater social capital. It has been discovered that growing old in a remote community puts people at double risk, because they have to deal with the problems of old age and live in a remote, sparsely populated area where healthy amenities and access to healthcare may not be available (Engineer et al., 2018).

There is a proven association between excessive noise and undesirable behaviour. Residents' behaviour and well-being may increase as a result of pleasant sounds and desired room settings. Stress-related cortisol and catecholamine levels have been linked to the level of noise exceeding 55 to 60 decibel, and exposure to noises beyond 40 to 50 decibel has been linked to unfavourable effects (Wrublowsky, 2018).

2.5 Colour Design

Interior necessitates a range of colours, brightness and contrasts in order to maintain harmony, alleviate tension, and promote a sense of well-being ("Health and wellbeing", 2016). The degree of colour intensity influences how a space is perceived. Highlights in a pleasant common space such as a living room can be generated with the usage of orange. It reduces the height of the ceilings, resulting in more intimate and confined spaces. Colours like yellow, which are empowering and enlightening, are ideal for kitchens and living rooms. Yellow rooms are produced cosier and warmer by this addition. When used to create a passionate atmosphere, the colour purple is a great choice. If misuse, it might be a powerful force . For bedrooms and bathrooms, lilacs and lavenders can inspire a sense of peace and tranquillity. The colour blue is ideal for concentration spaces. If applied predominantly, it can be dull and lonely. A cooling quality of blue colour can be advantageous in a hot environment.

Colour discernment declines with age, therefore several seniors need more variance to see the distinctions among colours. A study indicated that by the age of 75, a person's demands for variance was three times more than it was when they were youthful (Engineer et al., 2018). It is difficult for an elderly to differentiate between cool-toned pastel colours like blues and greens since these colours tend to blend together into a single grey. Overly strong contrasts like black and white or black and yellow might cause a visual illusion in the elderly, thus they should be eliminated. When walking, many senior citizens will check down to ensure their feet are in the proper positions. As a result, it is recommended to reduce colour contrasts on the floor.

2.6 Hypotheses

Hypothesis 1: Appropriate residential size and adequate private space in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 2: Suitable amount of both natural and artificial lights in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 3: Residential location and neighbourhood quality determine Thai middle-aged adults' health and well-being

Hypothesis 4: Nature-like areas and greenery views in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 5: Colours design and decoration in a residence determine Thai middle-aged adults' health and well-being

CHAPTER III
RESEARCH METHODOLOGY

3.1 Population and Samples

The population of a quantitative study is 135 respondents aged between 35-44 and 45-64 years old. The questionnaire was conducted in July 2022. To determine the proper sampling method, Taro Yamane formula with 95% confidence level has been applied.

$$n = N / (1+Ne^2)$$

N = Number of people in the population (135)

n = Sample size

e = Allowance error of 0.05

$$n = \frac{135}{1 + 135 (0.05)^2}$$

$$n = \frac{7135}{1 + 135 (0.0025)}$$

$$n = \frac{135}{1 + 0.3375}$$

$$n = \frac{135}{1.3375}$$

$$n = 100.93$$

Based on the calculation, the number of samples is 100.93 persons. Researcher has decreased the sample size to 100 persons to obtain reliable data by utilising questionnaire technique with probability sampling and sample random sampling to gather data from the population.

3.2 Data Collection

The online survey has been distributed via Facebook page as well as LINE application through various groups. Since the utilisation of social media and online applications facilitates the distribution of the questionnaire to a diverse set among responders, non-target groups were eliminated during the first screening part of the questionnaire. Within the constrained time frame, the projected target sample size is 100 respondents. The analysis will focus primarily on two groups of individuals: Thai early and late middle-aged adults ranging between 35-44 and 45-64 years old respectively.

3.3 Research instrument

Questionnaire is used as the research instrument for this quantitative study, consisting of 5 parts as follows:

Part 1 : Beginning with screening questions

Part 2 : Defining respondents' behaviour toward dwelling selections

Part 3 : Following by demographic information questionnaires of the respondents by gender, status, number of children, occupation and monthly income

Part 4 : Residential attributes including size, lighting, location, nature and colour

Part 5 : A question to determine Thai middle-aged adults' health and well-being

The questionnaire has been scored by five-point of Likert scale which are strongly agree, agree, neutral, disagree and strongly disagree.

5-Point	determines	Strongly agree level
4-Point	determines	Agree level
3-Point	determines	Neutral level
2-Point	determines	Disagree level
1 Point	determines	Strongly disagree level

In addition, the scale rating of class interval has been applied to this study in order to interpret the mean score of respondents' perception into 5 criteria.

$$\text{Class interval} = \frac{\text{Maximum - Minimum}}{\text{Class number}}$$

$$= \frac{(5-1)}{5}$$

$$= 0.8$$

According to the calculation, it can be interpreted as follows:

Average of 4.21 - 5.00	means	Strongly agree
Average of 3.40 - 4.20	means	Agree
Average of 2.61 - 3.40	means	Neutral
Average of 1.81 - 2.60	means	Disagree
Average of 1.00 – 1.80	means	Strongly disagree

Standard deviation (SD) can be analysed by a relationship with mean scores. SD between 0.000-0.999 interprets that data are clusters around the mean, whereas SD from 1.000 and above means data are more spread out.

Researcher conducted a questionnaire as a tool for this quantitative study based on the following processes:

1. Studied the information related to the research area by using academic books, researches, journals and articles as tools and guidelines to implement a proper set of questionnaires to serve the research objective.
2. Defined the scope and area of questionnaire along with the research objective
3. Consulted with advisor for any further improvement of the questionnaire
4. Completed the questionnaire after receiving comments and suggestions, reviewing and improving with aforementioned steps before implementing a complete questionnaire to a sample 135 persons.

5. Prove that the set of questionnaires is reliable by testing with the sample of 30 persons between the age of 35 - 64 years and analyse the data as a result.

6. Completed this study with the research objective and relevant data collection by analysing data obtained from questionnaires and to be reviewed by an advisor.

Applying Cronbach's alpha to determine Reliability in order to measure the strength and the consistency of the questionnaire by obtaining a value between $0 < \alpha < 1$ which can be identified by the following statements:

0.00 – 0.20	refer to	Less reliable
0.21 – 0.40	refer to	Rather reliable
0.41 – 0.70	refer to	Relatively reliable
0.71 – 1.00	refer to	Very reliable

The acceptable reliability, however, should be more than 0.70.

3.4 Data Analysis

1. Using descriptive statistics with number of frequency and percentage to analyse Thai middle-aged adults' behaviours in terms of residential selection.

2. Descriptive statistical methods including number of frequency and percentage are also applied to analyse respondents' demographics consisting of gender, status, number of children, education level, occupation and level of income.

3. To analyse five potential residential attributes which are inclusive of size and spacing, lighting, location and neighbourhood, natural area and colour design, descriptive statistics with mean and standard deviation are calculated.

4. Inferential statistics are applied as a study method to analyse and compare data with T-test independence plus one-way analysis of variance for the sake of identifying how key residential attributes determine Thai middle-aged adults' health and well-being.

CHAPTER IV
RESEARCH FINDINGS

4.1 Screening Questions

      This section contains two questions. The analysis of the number of frequency plus percentages are shown in tables 4.1 and 4.2.

Table 4.1 Respondents profile group by country of origin

Living in Thailand	Frequency	Percentage (%)
Yes	100	100
No	0	0
Total	**100**	**100**

      Table 4.1 reveals that all of the respondents are currently living in Thailand.

Table 4.2 Respondents profile group by age range

Age range	Frequency	Percentage (%)
35-44	13	13.0
45-64	87	87.0
Total	**100**	**100**

      Based on table 4.2, 13 respondents are in between the age of 35 to 44 years old (13%) while the remaining are in the age of 45 to 64 years old (87%).

4.2 Respondents' Behaviour towards Residential Selection

      This section contains 12 questions. The analysis of the number of frequency plus percentages are shown in tables 4.3 to 4.13.

Table 4.3 Respondents' behaviour towards residential selection by type of dwelling

Type of dwelling	Frequency	Percentage (%)
Single house	69	69.0
Townhome	11	11.0
Condominium (owned)	10	10.0
Apartment (rented)	3	3.0
Other	7	7.0
Total	**100**	**100**

69 respondents are mostly living in a single house (69%), followed by townhome (11%). Rental apartment is the least residential selection type of dwelling at 3% solely.

Table 4.4 Respondents' behaviour towards residential selection by period of stay

Period of stay	Frequency	Percentage (%)
Less than 1 year	3	3.0
1 – 9 years	22	22.0
10 – 19 years	27	27.0
20 – 29 years	27	27.0
More than 30 years	21	21.0
Total	**100**	**100**

According to the findings, 27% of the respondents have been living in their current residence for 10 to 19 years, similarly 27% have been residing there for 20 to 29 years. Followed by a residence that has been occupied for 1 to 9 years, which can be counted as 22%, while there are merely 3 respondents who have resided at their current residence for less than a year, which is unlikely compared to their age range.

Table 4.5 Respondents' behaviour towards residential selection by time spending at home before COVID-19 outbreak

Time spending before COVID-19 outbreak	Frequency	Percentage (%)
Less than 5 hours	1	1.0
5 - 9 hours	21	21.0
10 - 14 hours	56	56.0
15 - 20 hours	17	17.0
More than 20 hours	5	5.0
Total	**100**	**100**

56 respondents usually spent 10-14 hours a day at their residence prior to the covid-19 outbreak (56%), followed by 21 respondents who spent 5-9 hours a day (21%). Surprisingly, there is also a respondent spending his or her time at home for less than 5 hours on an average, which is unexpected when calculating the usual or appropriate sleeping hours of an individual.

Table 4.6 Respondents' behaviour towards residential selection by time spending at home after COVID-19 outbreak

Time spending after COVID-19 outbreak	Frequency	Percentage (%)
Less than 5 hours	1	1.0
5 - 9 hours	7	7.0
10 - 14 hours	38	38.0
15 - 20 hours	33	33.0
More than 20 hours	21	21.0
Total	**100**	**100**

Following the COVID-19 pandemic, the aforementioned table demonstrates that 38 respondents have spent an average of 10-14 hours daily at their residence, followed by 33 respondents who have spent 15-20 hours per day, and 21 respondents spent more than 20 hours per day at their home. This can be interpreted that COVID-19 has an impact on

people's behaviour since they stay 3.3 hours longer as a consequence of the quarantine despite the elimination of lockdown policy in Thailand.

Table 4.7 Respondents' behaviour towards residential selection by size

size of dwelling	Frequency	Percentage (%)
Studio	2	2.0
One-bedroom	3	3.0
Two-bedroom	10	10.0
Three-bedroom	41	41.0
Four-bedroom	26	26.0
Five-bedroom	14	14.0
Other	4	4.0
Total	**100**	**100**

According to table 4.7, the majority of respondents which accounts for 41% reside in a three-bedroom size of dwelling, 26% own a four-bedroom residence, while only 2% and 3% stay in a studio and one-bedroom apartment respectively. This can be considered as a Thai culture when parents, grandparents and children would normally reside in one accommodation, especially those Chinese families residing in Thailand.

Table 4.8 Respondents' behaviour towards residential selection by number of family member

Number of family member	Frequency	Percentage (%)
All by myself	6	6.0
2 persons	14	14.0
3 persons	20	20.0
4 persons	33	33.0
5 persons	14	14.0
Others	13	13.0

Table 4.8 Respondents' behaviour towards residential selection by number of family members (cont.)

Total	100	100

Most of the respondents have 4 family members, accounting for 33%, and 20% of the respondents have 3 family members, whereas 6% of them are living by themselves. Overall, the numbers of family members in each category align with the size of the residence demonstrated in the table 4.7, meaning the majority of them have sufficient private room or space per head.

Table 4.9 Respondents' behaviour towards residential selection by private room

Private Room	Frequency	Percentage (%)
Yes	82	82.0
No	18	18.0
Total	**100**	**100**

To ensure the adequacy of residential privacy based on table 4.10, 82 respondents own a private room or space in their dwelling, whereas the rest do not have.

Table 4.10 Respondents' behaviour towards residential selection by location

Location	Frequency	Percentage (%)
Bangkok downtown	24	24.0
Bangkok suburban	26	26.0
Bangkok metropolitan: Nonthaburi, Pathum Thani, Nakhon Pathom, Samut Prakan and Samut Sakhon	29	29.0

Table 4.10 Respondents' behaviour towards residential selection by location (cont.)

Other provinces in Thailand	21	21.0
Total	**100**	**100**

Respondents' location of residence in Thailand are diverse. There are 29 respondents living in the Bangkok metropolitan region including Nonthaburi, Pathum Thani, Nakhon Pathom, Samut Prakan and Samut Sakhon, 26 respondents living in Bangkok suburban, 24 respondents living in Bangkok downtown and the rest which accounts for 21% living in other provinces in Thailand.

Table 4.11 Respondents' behaviour towards residential selection by price

Price	Frequency	Percentage (%)
Less than 5 million Baht	35	35.0
5 - 9 million Baht	25	25.0
10 - 15 million Baht	21	21.0
16 - 19 million Baht	7	7.0
20 - 24 million Baht	5	5.0
25 - 29 million Baht	1	1.0
More than 30 million Baht	6	6.0
Total	**100**	**100**

The majority, counting for 35%, are willing to purchase a residence priced below 5 million Baht, followed by 5-9 million Baht for 25% and 10-15 million Baht for 21% of the total respondents respectively. Merely 6 respondents are willing to pay more than 30 million Baht for their future residence.

Table 4.12 Respondents' behaviour towards residential selection by attribute

Residential attribute	Frequency	Percentage (%)
Price	21	21.0
Size / Space	10	10.0
Location / Neighbourhood	66	66.0
Design / Decoration	3	3.0
Total	**100**	**100**

Table 4.12 indicates that over half of the respondents which accounts for 66% would consider residential location and neighbourhood quality as a significant factor towards their residential selection. 22 and 10 respondents would take price and size or space into their residential selection criteria respectively.

Table 4.13 Respondents' behaviour towards residential selection by valuable space

Valuable space	Frequency	Percentage (%)
Bedroom	41	41.0
Bathroom	6	6.0
Living room	37	37.0
Kitchen	8	8.0
Garden	7	7.0
Rooftop	1	1.0
Total	**100**	**100**

41 and 37 respondents value their bedroom and living room area heavily, as the most precious space in a residence when it comes to dwelling selection. Meanwhile solely 1% would consider the rooftop as the most significant area in order to choose a residence. This can be interpreted that private space where Thai middle-aged adults could relax themselves physically and mentally are the most valuable area after all.

4.3 Demographic

Table 4.14 Demographics of respondents' profile by gender

Gender	Frequency	Percentage (%)
Male	56	56.0
Female	44	44.0
Total	**100**	**100**

56% of the respondents are male, while 44% are female.

Table 4.15 Demographics of respondents' profile by marital status

Marital Status	Frequency	Percentage (%)
Single	13	13.0
Married	79	79.0
Widowed	2	2.0
Divorced	3	3.0
Separated	3	3.0
Total	**100**	**100**

From table 4.15, 79% of total respondents are married, 13% are single and only 2% are windowed.

Table 4.16 Demographics of respondents' profile by number of children

Number of Children	Frequency	Percentage (%)
None	21	21.0
A Single Child	27	27.0
Two Children	42	42.0
Three Children	9	9.0
Four Children	1	1.0
Total	**100**	**100**

Aforementioned table illustrates that 42 respondents have 2 children (42%), followed by 27% who have a single child, 21% have no child and 1% have four children.

Table 4.17 Demographics of respondents' profile by employment status

Employment Status	Frequency	Percentage (%)
Employed full-Time	48	48.0
Employed part-Time	24	24.0
Retired	25	25.0
Other	3	3.0
Toal	**100**	**100**

The majority of respondents are full-time employers, which represents 48%, followed by retirees accounting for 25% and part-time employment of 24%.

Table 4.18 Demographics of respondents' profile by monthly income

Monthly Income	Frequency	Percentage (%)
Less than 20,000 Baht	12	12.0
20,001 - 50,000 Baht	24	24.0
50,000 - 90,000 Baht	19	19.0
More than 90,000 Baht	45	45.0
Total	**100**	**100**

45% of the respondents receive a monthly income of more than 90,000 Baht, followed by 24% who earn between 20,001 - 50,000 Baht of the salary, while the group of the Thai middle-aged adults with less than 20,000 Baht of their monthly income represents 12% of the respondents.

4.4 Key Residential Attributes

The fourth section of the questionnaire demonstrates key residential attributes which are size and space, lighting, location and neighbourhood, nature and colour design by analysing descriptive statistics consisting of frequency, percentage, mean, together with standard deviation to determine sample characteristics as follows.

Table 4.19 Mean and standard deviation of key residential attributes affecting Thai middle-aged adults' health and well-being

Residential attributes	Mean	S.D.	Result
Area / Space	4.07	.823	Agree
Lighting	4.06	.785	Agree
Location / Neighbourhood	4.26	.672	Strongly Agree
Nature	3.89	.923	Agree
Colour design	4.24	.665	Strongly Agree
Total	**4.20**	**.873**	**Agree**

From table 4.19, respondents agree that key residential attributes have effect towards their health and well-being in an overall ($\overline{X}$ = 4.20). Nevertheless, considering thoroughly at each component, location and neighbourhood quality obtain the highest mean ($\overline{X}$ = 4.26) followed by colour ($\overline{X}$ = 4.24) while the last component is nature or greenery space with a mean score of 3.97.

Table 4.20 Mean score and standard deviation of size and space affecting Thai middle-aged adults' health and well-being

Size / Space	Mean	S.D.	Result
The importance of private room	4.28	.965	Strongly Agree
Space is sufficient for everyone	4.26	.970	Strongly Agree

Table 4.20 Mean score and standard deviation of size and space affecting Thai middle-aged adults' health and well-being (cont.)

A layout of living area to spend time or do activities with family members	3.90	1.185	Agree
Private spacing	3.86	1.045	Agree
Total	**4.07**	**.823**	**Agree**

Data indicates that size and space have an impact on Thai middle-aged adults' health and well-being as a result of the agree level of the $\overline{X} = 4.07$ when the importance of a private room has the highest mean score of 4.28.

Table 4.21 Mean score and standard deviation of lighting affecting Thai middle-aged adults' health and well-being

Lighting	Mean	S.D.	Result
Daylight sufficiency	3.96	1.053	Agree
Artificial light sufficiency	3.58	1.139	Agree
Internal light has impact on sleep	3.63	1.002	Agree
Internal light has impact on vision	4.15	.880	Agree
Total	**4.06**	**.785**	**Agree**

Overall, mean score and standard deviation of lighting influencing Thai middle-aged adults' health and well-being is in an agree level ($\overline{X} = 4.06$). The measurement demonstrates that respondents consider the impact of internal light on their vision or eyesight ($\overline{X} = 4.15$), followed by daylight sufficiency ($\overline{X} = 3.96$).

Table 4.22 Mean score and standard deviation of location and neighbourhood affecting Thai middle-aged adults' health and well-being

Location / Neighbourhood	Mean	S.D.	Result
The size of street and footpath along the entry and exit points	4.64	.689	Strongly Agree
Low external disturbance and pollution	4.62	.749	Strongly Agree
Decent neighbourhood relationship	4.11	.886	Agree
High security in the surroundings	3.87	1.022	Agree
Total	**4.26**	**.672**	**Strongly Agree**

Location and neighbourhood achieve the highest mean score in the strongly agree level ($\overline{X}$ = 4.26), while the size of road and footpath ($\overline{X}$ = 4.64) as well as external disturbance ($\overline{X}$ = 4.62) are considered as significant factors towards Thai middle-aged adults' health and well-being.

Table 4.23 Mean score and standard deviation of nature affecting Thai middle-aged adults' health and well-being

Nature	Mean	S.D.	Result
Garden or backyard	3.79	.967	Agree
Fountain or waterfall for relaxation	4.37	.761	Strongly Agree
Nature-like decorations	4.56	.641	Strongly Agree
Relaxing environment both internally and externally	3.98	1.035	Agree
Total	**3.89**	**.923**	**Agree**

Table 4.23, respondents are agree that nature has an effect on their health and well-being ($\overline{X}$ = 3.89). Nature-like decoration in a residence such as wallpaper, pillows,

and pictures has the strong agreement at ($\overline{X}$ = 4.56), followed by fountain or waterfall as a part of relaxation ($\overline{X}$ = 4.37).

Table 4.24 Mean score and standard deviation of colours determining Thai middle-aged adults' health and well-being

Colours	Mean	S.D.	Result
Colour tone has impact on feelings	4.37	.734	Strongly Agree
Colour tone is essential for selection	4.14	.841	Agree
Colour tone has impact on sight vision	4.19	.861	Agree
Material and decoration are in nature tone	4.11	.963	Agree
Total	**4.24**	**.665**	Strongly Agree

Based on the data derived from table 4.23, respondents are strongly agree that colour is one of the key residential attributes that could determine Thai middle-aged adults' health and well-being ($\overline{X}$ =4.24), in which colour tone of a residence has a drastic impact on their moods and feelings ($\overline{X}$ = 4.37).

4.5 Thai Middle-aged Adults' Health and Well-being

Table 4.25 Mean score and standard deviation of Thai middle-aged adults' health and well-being

Health and Well-being	Mean	S.D.	Result
Respondents' health and well-being	3.04	1.317	Neutral

A result from the aforementioned table indicates that respondents' health and well-being are at an average level at the mean score of 3.04.

4.6 Hypothesis Testing

Hypothesis 1: Appropriate residential size and adequate private space in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 2: Suitable amount of both natural and artificial lights in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 3: Residential location and neighbourhood quality determine Thai middle-aged adults' health and well-being

Hypothesis 4: Nature-like areas and greenery views in a residence determine Thai middle-aged adults' health and well-being

Hypothesis 5: Colours design and decoration in a residence determine Thai middle-aged adults' health and well-being

Table 4.26 ANOVA table; Variables affecting Thai middle-aged adults' health and well-being

ANOVA					
	Sum of Square	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	76.245	5	15.249	23.924	.000[*]
Within Groups	59.915	94	0.637		
Total	136.160	99			

*statistic of 0.05

Table 4.2, four variables have been calculated with the following hypothesis.

H0 means All 5 factors have no effects towards Thai middle-aged adults' health and well-being.

H1 means at least 1 factor has an effect towards Thai middle-aged adults' health and well-being.

According to ANOVA test, F Test = 23.924 and Sig. 0.000 which is less than 0.05 and can be summarised as H0 Rejection indicating that at least one factor has an effect

towards Thai middle-aged adults' health and well-being. Therefore, additional tests are required to determine the factor.

Table 4.27 Multiple Coefficient of Determination determine Thai middle-aged adults' health and well-being

R	R Square	Adjusted R Square	Std. Error of the Estimate
.748	0.560	0.537	0.798

From table 4.27, it demonstrates that 5 variables including size and space, lighting, location and neighbourhood, nature and colours design have Adjusted R Square score at 0.537. This can be concluded that all of the 5 variables have an impact on Thai middle aged adults' health and well-being at 53.7% while the remaining are influenced by other factors.

Table 4.28 Multiple Regression

Variables affecting Thai middle-aged adults' health and well-being	Unstandardized Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-0.582	0.434		-1.343	0.182
Size / Space	0.006	0.161	0.004	0.037	0.971
Lighting	0.237	0.197	0.190	1.199	0.233
Location / Neighbourhood	-0.001	0.215	0.000	-0.003	0.998
Nature	0.023	0.169	0.018	0.134	0.894
Colours	0.803	0.199	0.573	4.033	0.000*

Referring to table 4.28, Colour has the highest Beta score at 0.573. It is the only factor that could determine Thai middle-aged adults' health and well-being based on multiple regression analysis methods (sig. 0.000).

Table 4.29 A result of hypothesis testing

Hypothesis	Statistic	Results
Hypothesis 1: Appropriate residential size and adequate private space in a residence determine Thai middle-aged adults' health and well-being	Multiple Regression	Rejected
Hypothesis 2: Suitable amount of both natural and artificial lights in a residence determine Thai middle-aged adults' health and well-being	Multiple Regression	Rejected
Hypothesis 3: Residential location and neighbourhood quality determine Thai middle-aged adults' health and well-being	Multiple Regression	Rejected
Hypothesis 4: Nature-like areas and greenery views in a residence determine Thai middle-aged adults' health and well-being	Multiple Regression	Rejected
Hypothesis 5: Colours design and decoration in a residence determine Thai middle-aged adults' health and well-being	Multiple Regression	Accepted

CHAPTER V
CONCLUSION

5.1 Summary

The online survey was conducted in July 2022, data were gathered and translated into useful information and knowledge. Several statistical techniques were employed to test the hypothesis and apply with 100 respondents sample size. The descriptive statistics were used to describe demographic profiles of the respondents to have more understanding on nature, behaviour and solid background. Inferential statistics are also applied as a method to analyse and to compare data with T-test independence while using multiple regression via ANOVA to test five hypotheses in the table 4.32 Residential attributes determine Thai middle-aged adults' health and well-being.

The result of the study in all 5 aspects, namely size and space, lighting, location and neighbourhood, nature, plus colour design. Respondents perceive location and neighbourhood quality as the highest level of significant factor as a result of housing demand in Bangkok area, especially that of without disturbance from external noise and air pollution in the surroundings. Similarly, colour which is an impactful residential element affecting respondents' mood and feeling, leading to relaxation, calmness, restoration and the likes. Housing components such as location aspect also determine residential purchasing intention for Thai middle-aged adults, followed by reasonable and affordable prices. Next is facilities including style, decoration and design which align with this research result in the residential attribute of colours and design.

5.2 Recommendations

For commercial purposes, real estate and development companies may utilise these insights derived from the study to develop projects using these five residential attributes which are size and space, lighting, residential location and neighbourhood quality plus colour design to influence customer's decision to purchase real estates based on the attributes that they perceive significant.

Creating private space, for example, is the key attribute that they give importance and attention to. Thus, developers should utilise insights to design residences that attract and align with Thai middle-aged adults' demand. Providing a secured and peaceful neighbourhood with less noise and disturbance and security over the property and dwellers' life and healthiness will provide much more comfortableness of living towards healthy well-being. Homes should foster a sense of connection to the outdoors by providing views of residential neighbourhood, community or green spaces through windows or other intermediary spaces including window seats, entryways, balconies, terrace, etc. Working from home has become a significant issue that demands the appropriate conditions. It will be essential for future residences to exhibit resource efficiency over their entire life cycles following COVID-19 (Kaklauskas et al., 2021). Since further restrictions were enforced, a number of daytime activities occurred within the residence. These activities are better conducted with a clearer separation of areas. The importance of property size increased, and houses were required to have versatile, adaptable spaces. There was an increase in demand for garages, fitness, and shared spaces. After the lockdown, the three-bedroom apartment adjacent to key services like public transportation, grocery stores, pharmacies, and restaurants, with patios, balconies, and green spaces was the most in-demand housing type after the lockdown (Toro et al., 2021, 23). Increasing the quantity of sunlight in the residence is vital for providing a sense of well-being (Mohammed, 2016). The windows in both the living room and the bedroom should be wide and appropriately positioned to the sun hence natural sunlight could penetrate at some stage throughout the day.

5.3 Limitations

1. Due to the limited sample size of this research, only a certain range of responses can be studied, which could potentially influence the study's findings.

2. The conducted age range between 35–64 is probably too generic, as adults in their middle and later years might have a vast range of preferences and requirements from a hospitality standpoint.

3. Specific location, which is Thailand. In order to study broadly about middle-aged adults' health and well-being the study could be done on a global scale.

4. Variety of key residentials attribution and specification of factors should be added, such as satisfaction and marketing to retrieve and develop the study in accordance to the objective.

5. Questionnaires are the only tool for this research with limited information and data for analysis, other tools such as in-depth interview and focus group could be alternative tools to apply for further comprehensive study.

5.4 Further Research

1. Additional attributions and determining factors to evoke more detailed responses from respondents in order to conduct a more accurate data analysis.

2. Utilising qualitative research techniques, such as in-depth interviews and focus groups, to gain a deeper knowledge of each respondent's preferences and mental models on the residential attributes that impact their health and well-being.

3. Investigate the issue of significant elements on dwellings selection in order to have a thorough understanding of how each residential feature influences

occupants' accommodation purchasing decisions.

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