

A STUDY ON TEMPERATURE FOR THE ELDERLY IN THE OLD-FOLKS HOME

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Abstract

Among the main concerns of people growing old are staying and feel comfort in their living space. As elderly generally require more specialized care than the general population, many head for old-folks home because of the social security it offers. While staying put and tries to feel comfortable in the old-folks home, little is known about the type and amount of comfort that would satisfy the need of the elderly. Most importantly, in the temperate climate of the tropical countries like Malaysia, thermal comfort is a key to the satisfying comfort level the elderly could live for. This research is initiated to investigate the temperature comfort conditions of the elderly population in the old-folks home. The purpose is to find out range of suitable temperature of elderly aged between 60-80 years old who are living in old-folks home. The research hypothesizes that by having the right range of temperatures in the old-folks home, the quality of life can be improved and unnecessary suffering of residents during the hotter months can be mitigated. For this study, objective measurements and subjective measurements will be carried out. Empirical data will be collected using Thermal Comfort Data Logger. Also, part of the study is to investigate the elderly perception of the degree of comfort using questionnaire surveys. This research contributes to knowledge that will benefit the elderly in their quality of life. It further contributes to improvement in the planning, design, construction and operation of future facilities in the old-folks home. The results obtained with these measures also offer a new dimension to thermal comfort research.

Key words: Temperature comfort, elderly, old folk's home, quality of life, built environment

Introduction

When the writer was visiting old-folks home and met a few elderly, she posed some questions to enquire on their general well being, the climate, and whether they are happy to be there. The climate conditions especially interest her in that the usual answers would be “too hot” or “airy” or a simple “ok” and these are subjective remarks that suggest further objective enquiry on what thermal environments is best for the elderly. In the course of those interactions the writer learned to understand good subjective condition and preferences of the elderly in their quest for comfort. Some elderly complaints of thermal discomfort are limited to the four factors: too hot, too cold, draughts and variation in temperature. The ‘human thermal comfort’ is depending on indoor air temperature, humidity performance and on people adaptability to the climate condition. Published data by Parsons (1993), Givoni, (1976) and Zulkifli (2001) suggest that thermal comfort is influenced by seven factors: air temperature, radiant temperature, relative humidity, air movement across the body, clothing worn activities of the humans and the condition of the occupants. These factors lead to age related issues and the subject of healthy living and longevity. Longevity without happiness will be meaningless for the elderly.

In Malaysia, the needs of the elderly are put on a par with those of persons with disabilities and other disadvantaged group in the country (Usha S. Nayar, 1996). Whether this is advantageous or otherwise, the fact is that senior citizen in considerable good health condition look forward for an opportunity to live in a condition conducive to their peculiar beings. Thus, we must be cognizant of the fact that the elderly is a separate proportion of the population, with different needs, issues and problems.

Temperature environments in the old-folks home buildings and particularly in surrounding internal spaces are less understood. Because of the severely disproportional representation of the elderly groups in such studies, statements in indoor environmental standards (ASHRAE 1981, 1992, & 1999) are questionable at best. As a result, research should investigate thermal comfort requirements for 2 millions elderly by 2010 (Department of Statistics, Malaysia 2004) of the Malaysia population. As the population gets older, the need for revisiting and revising the standards to meet the temperature needs of the elderly becomes a vital area of thermal comfort. This research has been initiated to investigate the temperature comfort conditions of the elderly population in the old-folks home. Thus, finding the right temperature for improving the indoor thermal environment is of significant importance.

Issues of Concern.

The growth of the elderly population

In the last twenty years, the population of the elderly groups in Malaysia has been increasing steadily. Presently the number of elderly person aged 60 years above is 1.7 millions (Nik Omar, 2007). Malaysia, according to the United Nations has not yet reached the status of an aged population but will be in the year 2019 when those aged 65 years and over reaches the 7% level. According to the forecast, Malaysia will be categorized as an aged nation in 2023–2035 and the rapid changing in socio-economic environment has and will continue to have an impact on the situation of the present and future of elderly persons. Table 1 below suggests that Malaysia’s elderly population in post 2020 will constitute more than 10% of the whole nation. With better health care services and controlled environmental issues, the figure could be significantly higher. With the percentage, the elderly population’s needs and expectation simple cannot be ignored. Therefore it is imperative that proper planning and policies must be put in place to accommodate the challenges and the changing needs of the elderly person. Llyod-Sherlock, (2004) wrote that there is an urgent need for a stronger knowledge base and for coherent policy frameworks which address the effects of ageing and the needs of elderly people. Dato’ Seri Dr Siti Hasmah binti Hj Mohd Ali, (2001) noted that one of the strategic goals is to create the right environment that provides for the well-being of the elderly. It is a policy that aims to

promote improved quality of life for all elderly people irrespective of class, ethnicity and geographical location.

Past, Present and Future Trends of Older Persons, Malaysia 1960 -2020

Year	Number of older persons ('000)	Percent of total population	Growth rate of older persons
1960*	386.6	7.8	-
1970	546.1	5.2	3.5
1980	745.2	5.7	3.1
1991	1,032.3	5.9	3.0
2000	1,418.2	6.1	3.5
2010**	2,076.1	7.3	3.8
2020**	3,209.8	9.5	4.4

Table 1 Source : Department of Statistics, Malaysia

Number and Percent Age of Older Persons In “Young-Old” (60-74 Years) And “Old-Old” (75 Years and Over) Cohorts, Malaysia 1980-2020

Year	Total ('000)	Numbers ('000)		Percent (%)	
		Young-old	Old-old	Young- old	Old - old
1980	745.2	604.5	140.7	81.1	18.9
1991	1,032.3	813.1	219.2	78.8	21.2
2000	1,418.2	1,115.8	267.4	81.1	18.9
2010	2,076.1	1,688.4	387.7	81.3	18.7
2020	3,209.8	6,635.0	574.8	82.1	17.9

Table 2 Source: Department of Statistics, Malaysia

Life Expectancy At Birth By Sex Malaysia , 1970-2125

Year	Male	Female
1970	61.4	64.7
1980	63.5	67.1
1990	68.7	72.9
1995	70.0	74.4
2000	71.3	75.9
2005	72.3	76.9
2010	73.3	78.0
2015	74.3	79.1
2020	75.4	80.4
2025	77.7	83.1
2050	80.0	85.9
2075	81.2	87.5
2100	82.1	88.8
2125	82.4	89.2

Table 3 Source: Department of Statistics, Malaysia

Focusing on elderly persons

The rapid changing towards population ageing has led to various dimensions of impact that can be grouped into the following categories:

- Rising demand for health services
- Growing requirements for long term care
- Declining family support
- Increasing needs of income and social security

Countries world over had recognized that the significant number of elderly population growing at increasing rate will have to match national efforts to ease their entry into the special segment of the society. It is timely that the Second World Assembly on Ageing in Madrid on 12 April 2002 had made political declaration to consider three priority impacts and their directions:

- Older persons and development
- Advancing health and well being into old age
- Ensuring enabling and supportive environment

The cornerstone of policy responses to ageing was the formation of the National Policy for Older Persons which was formulated and approved in 1995 in compliance to Second World Assembly on Ageing in Madrid, Madrid Plan of Action 2002 and Shanghai Implementation Strategy (SIS). In order to achieve Policy Statement **“To ensure the social status, dignity and well being of older persons as members of the family, society and nation by enabling them to optimize their self-potential, have access to all opportunities and have provision for care and protection”** the Malaysian government has formulated and approve the National Action Plan for the Older Persons in 1998 for implementation of the Policy mentioned above. The Technical Committee of The National Policy for Older Persons under the Ministry of Women, Family and Community Development, Malaysia was formed in July 1996 to work on the plan of action. Under the Technical Committee six sub-committees were formed to work on the major concerns of the Plan of Action to ensure the integration and participation of the elderly in the country’s development as follows:

- Social and recreation
- Health
- Education, training and religion
- Housing
- Research
- Publicity

Who is Elderly Persons?

A common definition of ageing is the cut-off age of 60 years and over. In the Health of the Elderly Report (WHO, 1989) four definitions were noted. From the biological perspectives, ageing is a continuous process from birth to death. From the social perspective, the status and position of the elderly persons depends on the characteristics of members of the society that is perceived as old and it is different from generation to generation. From the economic perspective, the elderly persons are sometimes defined in terms of retirement from the work force, and lastly chronological age has been used as an indicator of life span for practical purposes. Chronological ageing is characterized by some structural and functional changes that lead to a reduction in optimal physical capacity. Changes in the cardiovascular, respiratory, renal and endocrine systems in particular, are relevant to the physician. Some of the physical decline and reduced physiologic reserve previously attributed to ageing is in fact due to the complex interactions of true genetically determined ageing, disease and disuse (Dr Philip Poi, 1997). Improvements in

medicine, public health, and nutrition have therefore mainly increased the numbers of people living beyond childhood, with less effect on overall average lifespan.

The definition for active ageing according to WHO is “the **process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age.**” Older persons can realize their potentials for physical, social and mental well being and participate in society according to their needs, abilities and desires. At the same time older persons must be provided with adequate protection, care and security when required. This vision can be achieved through active ageing. Active ageing, according to the Active Ageing Policy Framework of the WHO, means continuing participation in social, economic, cultural, spiritual and civic affairs. ‘Health’ as defined by the WHO refers to physical, mental, psychological and social well-being. As suggested by the World Health Organization WHO), ‘healthy older persons remain a resource to their families and communities.’ Ageing seems to be purely physiological, at least in its obvious manifestation, and is a process that every living being has to, and will, definitely experience.

Elderly and Old-folks home

Old Folk’s Home is defined as “...a residential complex comprising dwelling for one or more types established to provide accommodation for retired person or the aged and may include provisions for community facilities such as recreational or medical facilities and the life for the person comprising such community; but does not include an institutional home or a hospital” (Thorne, R., 1986). The definition can be elaborated as follows:

“Home is much more than a mere building. It is a place where one has possessions and memories and where one feels comfortable and secure” (Heintz, M.K 1975).

The provision of old-folks homes for the purpose of long-term care will soon become a necessity, as the ageing phenomenon becomes more prevalent in Malaysia. Old-folks home come under the auspices of the Ministry of Women, Family and Community Development, Malaysia who can go into a Home and investigate complaints as well as doing random and planned checks.

The present old-folks home have raised questions whether these homes for the elderly are designed to fit its purposes. The living conditions are often beyond acceptance, with thermal discomfort during the day and even at night. The designs are often with low ventilations which made it difficult for the elderly to live comfortably, to provide a decent comfort and healthy air to the occupant. Hence, there is an urgent need to address these problems in making old-folks home more sustainable.

Pretlove and Oreszczy (1998) observed that many existing buildings will no longer be able to provide thermal comfort under changing climatic conditions and new design standards that allow buildings to operate over a range of climatic conditions might be required. Aronin (1953), Givoni (1976), Olgyay (1963) also found the interaction between the indoor and outdoor environment, and the relationship between buildings, climate and culture is also relevant. The ‘climate’ of a given region is determined by the pattern of variations of several elements and their combination. The principal climatic elements, when human comfort and building design are being considered, are solar radiations, long wave radiations to the sky, air temperature, humidity, wind and precipitation (rain, snow, etc) (B. Givoni. 1976). The indoor climate is synthetically affected by different factors such as climate character, the allocation of the building, the planning and design solution on envelope structure, the system of indoor furniture’s and equipment and the space arrangements. Researchers should understand about the temperature comfort performance in the old-folks home in order to achieve a satisfactory design with sustainable living conditions to the comfort. The research will study the parameters affecting the level of temperature comfort in these types of old-folks home.

Temperature comfort and Elderly persons

The issue of whether improved qualities of life, provision of temperature and thermal comfort, have a positive impact on the health and quality of the elderly is still an open question. There is significant anecdotal evidence supporting the notion that health and quality of life of the elderly can be improved by improving the quality of the indoor temperature, but there are actually few published studies to substantiate this contention. There is substantial evidence which links specific aspects of the indoor environment to health and temperature comfort issues in old-folks home. A number of reviews of physiological and psychological work on thermal comfort already exist (Brager and de Dear 1998, Humphreys 1976, Oseland and Humphreys 1994). It is clear from a recent survey of the literature that there is a link between both temperature and comfort, and the quality of the indoor environment, and that many aspects of the indoor environment appear to be significant. One of them is said to be temperature. Field studies of the thermal performance of buildings and the comfort perceptions of occupants also abound and offer further insights into the physiological and psychological variables that influence definitions of comfort in the real world (Busch 1992, Nicol et al 1999, Stoops 2000). Less clear is how strong the links between the potential temperature factors has impact on the quality of life and the health of elderly has to do with it in the old-folks home. The writer identified recent work on the relationship between comfort, energy conservation and climate change. Since the 1970s environmental economists and sociologists have been concerned with the long term implications of changing comfort expectations and practices of heating and cooling for patterns of energy consumption and demand (Cooper 1982, McGeevor 1982). Despite the large amount of data available in the literature on thermal comfort, there are actually few studies of the links between the elderly comfort and the temperature. There is insufficient information to accurately and confidently predict the elderly quality of life which will arise from specific changes to the comfort temperature.

Preliminary results show that the majority of the research in this area has been conducted; however there are very few studies of the impact of temperature on elderly. Table 4 shows the breakdown of the literature for thermal comfort studies and identifies the studies conducted. Please refer to the table below.

RESEARCH GAP

Researchers	Comfort, indoor and outdoor environment	Comfort, health and well being	Comfort, temperature and the elderly	Comfort and temperature	Comfort of physiological and ergonomic	Comfort and climatic change	Comfort perception
Busch 1992, Nicol 1999, Stoops 2000		√					√
Markam 1947				√			
Nicol 1999							√
Aronin 1953, Givoni 1976, Olgyay 1963	√						
Havenith 2002, Parsons 2002		√			√		
Brooks 1950				√		√	
World Health Organisation 1946		√					
Bruce 2000, Ezzati and Kammen 2001	√	√					
Klinenberg 2002, Semenza and Rubin 1996							√
Vernon and Bedford 1936				√			
Houghton and Yaglou 1924		√					√
Saini 1980							√

*Table 4
Research Gap*

Quality of life, Comfort and the Elderly

Quality of life is easy to define but at the same time very hard to measure. Comfort is also associated with human health, defined not just as the absence of disease but in terms of a total sense of physical, mental and social well-being (World Health Organisation 1946). One of the fundamental theories of motivation is Maslow's Hierarchy of Needs, illustrated in Figure 1, in which individuals satisfy lower order needs before they move onto higher order needs.

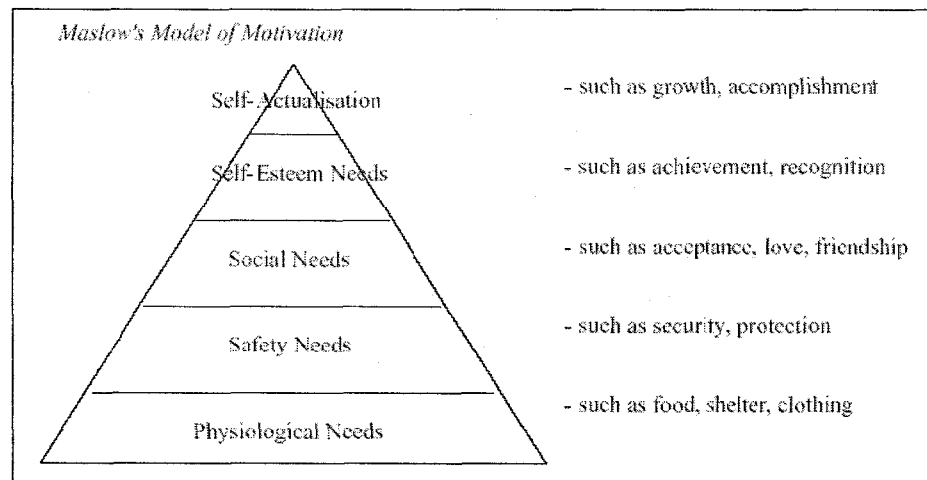


Figure 1. Maslow's Hierarchy of Needs

In the context of ageing gracefully, and feeling comfort in living home, the indoor environment meets the lower level needs that is physiological and safety. To some extent can affect the social needs, through the design of the space and the connectedness of people in buildings. As such the measurement of peoples comfort is difficult, because even if the lower level needs are met; negative impacts on self-esteem due to poor environment can lead to reductions in active ageing. Therefore the problem is probably best represented by focusing on the impacts of the indoor environment on health (physiological and safety needs) and well-being (or psychological perceptions of safety, physiological comfort and social needs).

Using this conceptual framework allows researcher to move towards a view of well being in which there are certain key impact factors (related to the individual occupant of a building) which influence quality of life. These will be identified through the study as 'well-being' and 'health' in this context can be introduced by good temperature of the indoor environmental quality that can lead to well being of the elderly. The factors over which the old-folks home have control over the thermal and temperature comforts in turn are subject to influences will be discussed.

Potential intensification of the urban heat-island effect

Removal of vegetation, construction of buildings, roads, pavement and other human transformations of the natural environment, together with direct heat generation from human activity, are known to cause the temperatures of urban areas to rise above those of surrounding rural areas. Heat-island effect has tended to enter into global climate discussions largely in the context of whether some of the observed global temperature rise may be ascribed to the placement of some thermometers in urban areas. The rapid urbanisation of Kuala Lumpur and Selangor are likely to effectuate a profound alteration in the local climate. It is quite possible that considerable temperature amplification in many such areas, attributable to the heat-island effect alone, might be added to heat-stress impacts on health, human discomfort and aggravation of urban air-pollution problems.

Due to recent warming, changes in temperature patterns can have adverse change of weather condition that contributes to health consequences. Increased frequency and severity of heat waves may lead to an increase in illness and death, particularly among the elderly, especially in urban center (Climate Change, 2001). Higher temperatures appear to be an important factor in increasing the frequency of hospitalization for acute myocardial infarction and congestive heart failure, and are associated with a decrease in the frequency of visits for coronary atherosclerosis and pulmonary heart disease (EHP, USA, 2003). For many elderly who stay at old-folks home they are more prone to heat stress than younger people for several reasons:

- Elderly people do not adjust as well as young people to sudden changes in temperature.
- They are more likely to have a chronic medical condition that upsets normal body responses to heat.
- They are more likely to take prescription medicines that impair the body's ability to regulate its temperature or that inhibit perspiration (CDC, Atlanta).

Recommended Temperature

RESEAR-CHER/ TEMPERATURE (°C)	L H	14.5 21.1	15.6 24.0	16.7 19.0	17.2 21.7	18.0 21.0	18.9	20.6 26.7	23.0 26.0	23.4 29.5	28.0 30.0	31.1 33.9
Indoor Design Condition ASHRAE (2003)									X			
Brooks (1950)	U.K							U.S		Tropical		
Saini (1980)												X
Markam (1947)			X									
Vernon and Bedford (1936)				X								
A. P. Gagge, J. A. J. Stolwijk and J. D. Hardy (1967)											X	
World Health Organiza-tion (WHO)						X						
Houghton and Yaglou (1924)					Men		Women					
(Nicol 1999)											28.2	

Table 6 Suggested Temperature by some scholars on ordinary people

Studies on the recommended temperature have been carried out to determine the comfort zone for general population as in Table 6 above. Markam (1947) concluded and suggested that the ideal temperature should be in between 15.6 °C – 24.5 °C. Researched by Vernon and Bedford (1936) pointed out that ideal temperature, with little air movement is 19 °C in summer and 16.7 °C in winter.

Different parts of the world offer different temperature comfort level. Brooks (1950) find that comfort zone for United Kingdom is between 14.5 °C - 21.1 °C, 20.6 °C - 26.7 °C for United States and for tropical region is between 23.4 °C – 29.5 °C. Houghton and Yaglou (1994) also formulated that comfort zone among men and woman are 17.2 °C – 21.7 °C and effective optimum temperature is 18.9 °C. Saini (1980) have studied that thermal comfort for dry climate is between 31.1 °C – 33.9 °C. However, Nicol (1999) found that 28.2 °C is best temperature suggested for thermal comfort and many people use ASHRAE and WHO standard.

A further refinement is therefore required to address the level of comfort zone for the elderly given the facts that they react differently both to the extreme variation between temperatures and the level or ranges of those temperatures.

Research Area

It is generally accepted that air temperature, radiant temperature, relative humidity and air movement across the body are the environments factors which affect the human thermal responses. In addition, the clothing worn and activities of the humans are also important. In the old-folks home situation, environments often involves the interaction, sometimes close, with other occupants. The elderly will determine whether he or she is too hot, too cold or whether they are in comfort. Even relatively minor problems in keeping warm or cool can lead to discomfort. Humphreys in his Adaptive Principle stated that: “If a change occurs such as to produce discomfort, people react in ways which tends to restore their comfort (Humphrey 1997) but Fanger and Toftum (2002) claimed that thermal responses are relatively constant among individuals.

In temperate climates being and feeling warm is essential to health and quality of life and an inability to keep preferring temperature can have major effects on both physical and mental health. Being in comfort has also been conceptualised as a psychological phenomenon. Under this view, it was described as the subjective feeling of unpleasantness. Having looked at this research, it is reasonable to say that temperature has significant impact to the elderly health and well-being. However, what is unclear is whether the temperature and its variables could directly produce comfort to the elderly. This study is therefore formulated as an initiative towards understanding this phenomenon. As it is recognised that in a thermal comfort, there are various factors interrelated with each other that could impose discomfort on elderly, it is therefore assumed that if these factors could be identified and consequently integrated, the level of comfort among elderly in that particular temperature could be measured or predicted. To realize this hypothesis, the study postulated that by combining the subjective experiences as well as the objective evaluations of elderly preferred temperature, these measurements could be identified and incorporated to build the quality of life in the elderly. Elderly persons show enormous variability in their interests, capacities and competencies. This study rationalizes and dedicated toward this population and to address the need that represent these variability.

Research Methodology

This study is designed to determine through systematic research and analysis the temperature comfort requirements for population groups 60 years or higher. Humphreys M.A, (1995) has reported that thermal comfort temperatures can be established from field study data without using thermal physiology or the theory of heat exchange. For naturally ventilated old-

folks home located in the tropical regions, hot and humid environmental conditions throughout the year and personal adaptation have an effect on expectation and perception about temperature comfort. Data will be gathered through an extensive field survey conducted in the old-folks home through observation and questionnaires. The data analysis will be used to predict thermal perception as compared to what the elderly actually felt using Thermal Comfort Data Logger. The methodology would comprise the combination of field measurements and survey methods.

This approach uses instruments to measure the environmental variables. A set of carefully list of questions about the elderly responses to the indoor environment is handed to elderly simultaneously with the field measurements. The compiled data from the questionnaire is then compared for correlation to the field measurements resulting in a better understanding of the role of the overall environmental conditions on the temperature comfort. The availability of test subjects for field studies has limited the results in most cases, to age groups between 60 – 80 years.

The study investigate the elderly temperature preferences which creating a more thermally comfortable living environment. The reciprocal effects of elderly thermal perception and behavioural adaptation will be explored. The purpose of this study is to identify the most important factors that influence temperature comfort in the old-folks home. For this reason, an exploratory research will be constructed that consisted of four types of factors that influence the elderly. These factors are: (1) temperature; (2) preference and knowledge; (3) building orientation; and (4) factors describing the physical environment. For many thermal comfort researchers, the challenge is to develop culturally and climatically appropriate opportunities for people to make themselves comfortable (Nicol et al 1999).

Classifier	Keywords
Geographic Location	Klang Valley, Selangor
Building Type	Old-folks Home
Data Type	Quantitative/Qualitative Survey/Interview/Focus Group Thermal Comfort Data Logger Measurements, Field Study
Outcome Focus	Occupant comfort, Quality of life, Health/Productivity/Well-being, Environmental Satisfaction
Building Attribute	Temperature

Using this classification of the literature, the writer can identify sub-groups of papers which focus on specific issues, building types and locations. This classification system has enabled a breakdown of the studies which focus on well being and elderly comfort issues.

Scope and limitations

A principal difficulty in constructing studies of the likely impact of thermal comfort on human habitat is the fact that many other factors largely independent of thermal comfort, such as demographic trends, technological innovation, evolving cultural tastes, employment opportunities

and transportation modes, may significantly shape where and how people will choose to live in the future. For purposes of elderly comfort, it is convenient to hold all other factors equal while varying only on temperature.

The study had four major limitations. First, it relied on a self-selected, convenience sample and therefore represents these individuals exclusively. Second, the findings are limited because the participants were healthy young-old and oldest-old aged between 60-80 years old. Thirdly, the study was limited in that only a limited number of socio-demographic variables were available for the analyses. Finally, the study will be conducted in selected old-folks home and will be in Klang Valley and Selangor.

Old-folks home where the writer wanted to study generally have occupants who are more active elderly, perhaps be able to care for themselves and not dependant on a carer for their personal and/or medical needs.

Conclusion

One of the characteristics of daily life is the fact that, as long as life is proceeding normally, there is nothing to reflect about. Things are simply taken as given. Daily recurrent activities which initially demanded attention and care eventually become habits and routines. It is only when something occurs which shakes up our daily existence that our habits can be observed and reflected on. This is the process by which we develop the fundamental sense of security which is part of our daily lives. There are link between temperature and health of occupants in the old-folks home and the indoor environment. Therefore it is important to establish not only that there is a link between these impact factors and occupant well being, but also how strong this link is. The strength of the link will have a direct bearing on the value any changes in old-folks home design and construction but will have value to the occupants of quality of life increases. This is critical to establish under Malaysia conditions. The key issue which remains to be established before a viable research strategy can be developed is the strength of elderly health in indoor environment.

Finally, the research hopes to provide some design recommendations for improving thermal comfort in Malaysia. The probe in these studies will show that there is a direct relationship between elderly comfort and successful ageing of the elderly.

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