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TO LIVE HIGH OR LOW: CASE STUDY OF SINGAPORE PUBLIC HOUSING RESIDENTS

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Abstract

The literature on tall buildings indicates both the terrible and great views of human response to tall buildings. The psychological reaction to living in tall buildings varies from resident to resident, depending on socio-cultural background. Given the dearth of literature on Asian cities, a study was initiated to examine the Singapore residents' living experience in tall buildings: their concerns, their appreciation and preference for high-rise living. Singapore, since the post-war years has continually built high-rise housing to accommodate its growing population within a limited land space of 647.5 sq km. Families have gradually moved from low-rise shop house living into high-rise public apartment blocks, which height has increased with time. Many of the public housing apartment buildings tower above 25-storey and plans have recently been announced to build taller: 40- and 50-storey public housing. The latter marks the tallest high-rise public housing development to be introduced yet in Singapore. In April 2002, an international architectural competition for the 50-storey public housing was concluded and the winning design selected. Tall building living is here to stay. What are residents' attitudes and perceptions of tall public housing building living?

The intent of this paper is to discuss the empirically derived research on Singapore residents' perceptions of building height and their reactions to super tall living. More specifically, it will seek to address: Do residents prefer high or low floor living? Why? What do they seek in tall building living? What concerns them most in tall building living? At what height do they think an apartment building began to be tall? Is there any relationship between how tall a person thinks a tall building is and the series of concerns he/she has about tall public housing living, for example, feelings about safety, fire risk and collapse of the building? The departing point for identifying the tolerance level is to explore the safety, efficiency and liveability of tall public housing. The paper will also discuss the wider implications for the planning and management of tall buildings and their performance in cities, especially in the wake of the Sep 11 2001, New York incident. Relevance for design strategies of tall buildings will be highlighted.

Keywords: supertall living, resident perception, Singapore

1. Introduction

This paper considers the design of high-rise living from the perspective of the residents. Using empirical data from Singapore, it seeks to address residents' tolerance and worries of high-rise living. High-rise living is a common phenomenon in modern day Singapore. Some 86% of its 3.2 resident population live in public housing characterised by its tall buildings. The dictate of land limitation (an area of 647.5 sq km) has compelled Singapore to adopt a development option that continually builds high-rise housing to accommodate the growing population (presently at 4m with projection to grow to 5.5m in 30-40 years). With resettlement, families have gradually moved from traditionally low-rise shop house living to high-rise public housing apartment buildings. Over the past 40 years, the building height of public housing has increased from 10-storey to the present 30-storey.

Development is underway to build taller. Buildings of 40-storey are under construction at Toa Payoh New Town and plans for 50-storey public housing have been announced. In Aug 2001, an 8-month 2-stage international architectural design competition was launched for the 50-storey public housing with an estimated project cost of S\$247 million. It attracted 202 entries from over 30 countries (*The Straits Times*, May 11 2002). Construction of the project is expected to commence in Sept 2003. Taller buildings appear to be the trend of the future. As the country's long-term development plan announced that,

More people will get to live on higher floors...In areas with less stringent height constraints, housing can rise to 30 storeys and higher. Currently, only about 35,000 people live above 20th storey. (Urban Redevelopment Authority, 2001)

With urbanisation and globalisation, many cities are building taller buildings for living. According to *The Bangkok Post* (17 July 2002), there is an increase in the number of high-rise buildings in Thailand's Chiang Mai city.¹ These buildings though not as tall as those in Singapore, are reporting to affect the health of the residents. Yusoff, Driscoll and Beedle (1986) have argued that a 'tall building' is not strictly defined by the number of stories or its height. Rather the relevant criterion is whether or not the design, use or operation of the building is influenced by some aspect of 'tallness'.

Clearly, with more people living in taller buildings, there is a need in research to go beyond the physical and engineering concerns to include the impact of that environment on its users. To borrow the words of Dr Beedle at the 1974 International Conference on Tall buildings, '...Planning and design of tall buildings is concerned with much more than the safe and economical structures or energy efficient systems that engineers deal with. It is also concerned with more than the aesthetic solutions of the architect. It is intimately concerned with the complete life system of our society that is becoming so rapidly urbanised.' (Conway, 1977) Those concerned with the design, building and management of tall buildings will need this knowledge in making their decisions. In this paper, the term 'tall buildings' refers to those multi-storeyed buildings 'constructed on a steel skeleton, provided with high-speed electric elevators and combining extraordinary height with ordinary room spaces such as would be used in low buildings' (Jencks, 1980, p6).

2. About High-Rise Living Concerns

A house that is adequate from the engineering or design perspectives may not necessarily be adequate or satisfactory from the inhabitant's point of view. The housing unit is but one in a chain of factors of housing habitability, which determine people's relative satisfaction with their accommodation (Bauer, 1951; Back, 1962; Michelson, 1970). The adequacy of the housing unit, as determined by the internal space, the structural quality, the household facilities and other such housing amenities and qualities within the housing environment will influence the extent to which the inhabitant is satisfied with the unit (Smith, 1967; Onibokun, 1973). How people feel about living in the tall buildings is important in the liveability index. The method is to identify the environmental features of tall building living, relevant to its residents.

The debate on the connection between residential space and satisfaction has been pursued in several studies on high-density living (Williamson, 1981; Odeleye and Jogun, 1983; Yeh, 2000). Williamson (1981), for example, studied 530 high-rise apartments in Germany and found that overall residential satisfaction was strongly related to the physical attributes of the building, especially spaciousness, room arrangement, and quality of construction. These points were picked up in Africa by Odeleye and Jogun (1983) who found that most of their respondents were not afraid of high-rise living. Odeleye and Jogun's (1983) conclusion is that high-rise living did not appear to affect the phenomena of privacy and loneliness or isolation. However, more than 65% of respondents also indicated that, if they had the choice, they would opt for low-rise living. The high-rise buildings in their study's context are 14-storey blocks and 12-storey blocks. An analysis of the reasons for floor choice indicated that there were three most important factors: poor lift service, security and safety, and children's welfare.

¹ Under the city's law, tall building is defined as constructions higher than 16 m or 4 storeys.

The lift is an essential but at the same time much disliked feature of high-rise living. Haber's (1977) findings indicated that the most disliked aspect of tall buildings was the elevator. Some 62% of his respondents said that they disliked waiting for the elevators. Residents must depend upon elevators everyday to get into and out of their homes. If something goes wrong, they are highly vulnerable. People are anxious of being trapped by a power failure, unable to escape and fearful of crimes in the lifts such as rape, murder, robbery (Herlyn, 1973). The catastrophe of the US World Trade Centre towers on 11 Sep 2001 further heightened concern about the lift and safety of tall buildings.

There is an obvious need to obtain and analyse information about the perceivers themselves. In terms of gender differences, Williamson (1981) found that men were generally more negative towards high-rise living than women. But, women were more concerned with specific problems such as security. Compared to men, women were more conscious of the poor design of entryways, hallways, and stairs. Haber (1977) studied a group of students and found that men are attracted by the feeling of height, whereas women by the view. Herlyn (1973) suggested that, generally, floor height is also a consideration. Findings showed that only 5% of residents wished to be on a lower floor than they were, whereas a third would like to have been on a higher floor. For the most part, as Greenbergs (1977) suggested, satisfaction is strongly related to the floor on which one lives, density within the apartment, and anticipated duration of residence. What begins to emerge is a number of considerations to those who would design and build tall buildings that satisfy the residents.

3. The Singapore Study

The objective of the Singapore study was to explore residents' attitudes towards tall building living. Much of the aforesaid literature is largely of western cities and little is known about residents living in Asian cities. Asia is one of the world's fastest urbanising regions. Many of its cities are building taller buildings to accommodate the growing urban population. Specifically, we explored what the Singapore residents liked and disliked about tall building living, their concerns and willingness to live in tall buildings: Do residents prefer high or low floor living? Why? What do they seek in tall building living? What concerns them most in tall building living? At what height do they think an apartment building began to be tall? Is there any relationship between how tall a person thinks a tall building is and the series of concerns he/she has about tall public housing living, for example, feelings about safety, fire risk and collapse of the building? This paper reports the findings from sampled residents living in Toa Payoh New Town.

Toa Payoh New Town is where the first 40-storey public housing is being built. Developed in the 1960s, Toa Payoh is the first new town planned and developed by Singapore planners. It is approximately 8km from downtown Singapore and is connected to all parts of Singapore by an extensive network of roads, rapid transit and public transport. Modelled after the western neighbourhood unit principle, the new town provides a hierarchical and wide range of services and amenities (such as children's playground, swimming pool, shops, markets, cinema, library, schools) within convenient walking distance to the residents (generally within about 5 minutes' walking radius). The current (2001) population of the new town is 117,200. There are 36,107 dwelling units of various sizes, typically located in high-rise blocks. The tallest block is presently 30-storey. We visited a sample of 218 randomly selected households in their homes (0.6% of the population), and spoke to residents living on various floors from 3rd (every 3rd floor) through to the top floor in the tallest blocks of 30-storey and adjoining lower blocks of 12-16 storeys. As summarised in Table 1, about 26% of the respondents lived on 21st and above storeys.

Table 1: Current Floor Level

Current Floor level	No. of respondents (%)
26-30	24 (11)
21-25	32 (14.7)
16-20	27 (12.4)
11-15	46 (21.1)
6-10	60 (27.5)
1-5	29 (13.3)

N=218

Majority of them were living in 4-room (77%) and 5-room (16%) flats. Only 2% of these respondents were former residents of private housing, the rest had moved from another public housing unit. Many (75%) had moved to the present flat because of government public housing estate redevelopment policy² while 13% was prompted by personal preference and the remaining because of family decisions. Many of the respondents (82%) revealed that they had moved from smaller (3-room) public housing and 53% had lived on the 6th-10th floors in their previous public housing accommodation.

The sampled respondents reflected the general national proportions of the different ethnic groups; 80% were Chinese, 10% Malay and 9.6% Indian.³ About half (53%) were female; 23% were full-time home makers. Most of the respondents (41%) were in the age group of 35-54 years old; 77% were married and 97% owned the flats they lived in.⁴ In terms of income profile, 49% reported having monthly household incomes of S\$1000-\$2999, 35% with S\$3000-\$4900 and 9.6% earned more than S\$5000 a month. In terms of family size, majority were from 3-5 person households; 31% were 4-person households, 22% 3-person households and 21% 5-person households.

The household interview followed a questionnaire of closed and open-ended questions. In addition, we revisited several of the families in the 30-storey block for further discussions on residents' concerns, likes and dislikes about various kinds of existing designs and facilities in and around the blocks. During several of the discussions, the spouse and the rest of the family members also joined in. Several researchers have supported the combination of quantitative and qualitative methods to gain a better understanding of people's attitudes (Michelson, 1975; Ajzen and Fishbein, 1980; De Vaus, 1991).

4. Discussion Of Survey Findings

Most of the respondents (91%) expressed satisfaction with their present floor level. As summarised in Table 2, about 60% of the respondents stated that the present floor level was 'just right'.

Although there appeared no marked distinction among male and female respondents in their satisfaction with the present floor level, those in the older age group (65 years or over) generally felt that the present floor level was 'just right' while more young people (aged 15 to 24 years old) were of view that the present floor level was not high enough. There was a tendency among younger respondents to view living in tall buildings as a prestigious lifestyle. The elderly residents appeared to favour lower storey units, being generally slightly more concerned about the structural reliability of tall buildings, the soundness and stability of high-rise buildings. Respondents with higher income, earning more than S\$9000, were more inclined to express that their present floor level was too low compared to those earning less. This was thought to be due perhaps to the greater purchasing power the former group had over housing choice. Only a small proportion (5.5%) of respondents complained that their present floor level was too high. Of those who lived on the 26th to 30th floor, 8.3% felt that their floor level was too high. No one living on the 5th floor or below felt that their floor level was too high.

There appeared to be a general preference and willingness to live higher, attracted by the scenic view and breeze of higher storey units. Top floor residents appeared to prefer and were more willing to live on higher floors of taller buildings. Some of the respondents were prepared to live higher, on the 50th storey if they were satisfied with the safety feature (they questioned the smooth and safe evacuation of residents in the case of fire outbreak), the location and orientation of the unit. On closer analysis, we found that the majority of those living on the top floor of the 30-storey building had chosen the 30th floor as their preferred floor and all were satisfied with their present floor level. Among all things that attracted them to high floor living were the view, the breeze and the privacy they can get from high-rise living, that 'on top of the world' feeling. There was also no water drip of wet clothing/mop onto their washings from upper floors. The findings lend support to the importance of living experience in the choice of floor level.

² As Singapore's oldest public housing estate, Toa Payoh new town was the first to benefit from the Estate Renewal Strategy, an integrated and systematic approach to rejuvenate older public housing estates, making them more compatible with the newer estates. For further details of the Estate Renewal Strategy, see Lau (1998).

³ Singapore has a multi-racial population comprising Chinese, Malay and Indians as the main ethnic groups.

⁴ Singapore enjoys high home ownership under a home ownership scheme introduced since 1964, see Low and Aw (1997) for details of the home ownership scheme.

Table 2: Opinion about the present floor level

Present Floor Level	Perception of the present floor level						
		Too high	Not high enough	Too low	Just right	Don't care/never thought about it	Total
1st-5th floor	No. (%)	0 (0)	5 (17.2)	13 (44.8)	7 (24.1)	4 (13.8)	29 (100)
6th-10th floor	No. (%)	1 (1.7)	15 (25)	9 (15)	33 (55)	2 (3.3)	60 (100)
11th-15th floor	No. (%)	0 (0)	9 (19.6)	0 (0)	34 (73.9)	3 (6.5)	46 (100)
16th-20th floor	No. (%)	4 (14.8)	4 (14.8)	2 (7.4)	16 (59.3)	1 (3.7)	27 (100)
21st-25th floor	No. (%)	5 (15.6)	3 (9.4)	1 (3.1)	21 (65.6)	2 (6.3)	32 (100)
26th-30th floor	No. (%)	2 (8.3)	3 (12.5)	0 (0)	19 (79.2)	0 (0)	24 (100)
TOTAL	No. (%)	12 (5.5)	39 (17.9)	25 (11.5)	130 (59.6)	12 (5.5)	218 (100)

4.1 What are residents concerned with? How can we improve tall building liveability?

The array of issues mentioned as concerns of high-rise living offers a general index of how tall building liveability may be enhanced. As summarised in Table 3, respondents' 5 biggest worries of high-rise living were the lack of neighbourhood facilities, lift breakdown, crime in the lift, who they have as their neighbours and fire risk.

Table 3: Concerns about high-rise living

Concerns	No. of respondents (%)
Lack of neighbourhood facilities	52 (26)
Lift breakdown	41 (20)
Crime in the lift	28 (14)
Who you have as your neighbours	28 (14)
Fire risk	18 (9)
Accidental falling off of family members	11 (5)
Travelling time in lift	5 (2.5)
Collapse of the building	5 (2.5)
Power failure	5 (2.5)
Walking along the common corridor to reach your flat	4 (2)
Height of the building	2 (1)
Other worries	3 (1.5)

N=202

Relatively fewer appeared concerned about the collapse of the building (2.5%), power failure (2.5%), travelling time in the lift (2.5%) or height of the building (1%). They generally expressed good faith in the provisions. As one respondent summed it up, if I were concerned with the collapse of the building, I would not have chosen to live in high-rise buildings. The drift of the responses indicated that view was an important motivating factor of high-rise living.

As the lift is an essential liveability component in high-rise living, the survey further asked respondents to rate on a scale of 1-5 (with 1 being not at all) several aspects of the lift service to tall building living. About a third of respondents: 42% were not at all concerned about travelling time in lift, 33% about crime in lift and 34% about lift breakdown; the remaining expressed some degree of worry as shown in Table 4.

Table 4: Worry About Lift

Statement about lift	1 (%) not at all	2 (%) a little	3 (%) fairly	4 (%) much	5 (%) very much	Mean	Standard deviation
Travelling time in lift	41.7	6	21.6	18.8	11.9	2.53	1.478
Crime in lift	33	12.8	19.7	17.5	17	2.72	1.496
Lift breakdown	33.9	13.8	11.9	17.9	22.5	2.78	1.580

N=218

The ANOVA tests indicated that concerns about lift breakdown and crime in the lift were not the same for all respondents with different income levels. One respondent living on the middle floor shared her concern over travelling time in the lift. The respondent’s argument was that crime risk might increase with longer travelling time in taller buildings. All emphasised the importance of providing good and reliable lifts as an essential element of high-rise living. They were appreciative of the current provision of three lifts servicing one apartment block as it was unlikely that two or all three of the lifts would breakdown at the same time, and of the current design of lifts which stopped on each floor and were installed with window panels on lift door, a much desired safety feature against crime in lift.

For the analyses on residents’ perception of building tallness against their concerns of lift, the authors did not find a definite relationship between respondents’ perception of building tallness and their worries (Table 5).

Table 5: Perception of building tallness and worry of lift breakdown

Perception of building tallness and worry of lift breakdown	Not at all	A little	Fairly	Much	Very much	Total
30-storey	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Not a tall building	15 (30.6)	8 (16.3)	12 (24.5)	9 (18.4)	5 (10.2)	49 (100)
Tall building	32 (30.8)	10 (9.6)	7 (6.7)	22 (21.2)	33 (31.7)	104 (100)
Very tall building	27 (41.5)	12 (18.5)	7 (10.8)	8 (12.3)	11 (16.9)	65 (100)
TOTAL	74(33.9)	30 (13.8)	26 (11.9)	39 (17.9)	49 (22.5)	218 (100)
Perception of building tallness and worry of lift breakdown	Not at all	A little	Fairly	Much	Very much	Total
40-storey	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Not a tall building	1 (12.5)	0 (0)	2 (25)	5 (62.5)	0 (0)	8 (100)
Tall building	29 (38.7)	9 (12)	12 (16)	9 (12)	16 (21.3)	75 (100)
Very tall building	44 (32.6)	21 (15.6)	12 (8.9)	25 (18.5)	33 (24.4)	135 (100)
TOTAL	74 (33.9)	13.8 (26)	26 (11.9)	39 (17.9)	49 (22.5)	218 (100)

The results seem to indicate that residents’ concerns with tall building living were not necessarily the result of whether a person thinks a building is tall. Rather as the data on what respondents liked about their present floor living indicated, there are several factors of consideration: environmental factors (like block cleanliness and openness), convenience and individual dwelling characteristics (such as flat layout and orientation). Several of these considerations concern building performance, its liveability that may be improved through design strategies. Table 6 listed respondents’ suggestions to enhance tall building liveability.

Table 6: Suggestions to improve quality of high-rise living

Changes	No.	%
Environmental factors	24	6.9
Design consideration and construction	135	38.8
Provision of facilities	89	25.6
Social environment	8	2.3
No answer	92	26.4
TOTAL	348*	100

Note: * multiple responses

The greatest number of the responses was for changes in flat design consideration and construction (38.8%) and provision of facilities (25.6%). Respondents valued and requested for the provision of facilities such as more car parking lots to cater to the higher number of residents in tall buildings and landscaping with appropriate facilities for the different age groups (such as foot reflexology path for the elderly, playground for the young and rooftop garden with barbeque pits for social gathering purposes). Other suggested facility provisions include:

- To improve security with more police controls;
- To improve cleanliness of lifts and common areas.

Regarding flat design consideration and construction, one suggestion was the design of enclosed (rather than common) corridors on high floors to lessen the height phobia of some residents. As one respondent elaborated, this could be of a block design that did not allow 'direct view of height' as a way to help overcome her height phobia and feeling of insecurity while walking along common corridors on high floors. Other design suggestions to enhance the safety of taller buildings include:

- Design effective fire escape routes
- Provide anti-falling devices
- More fire escape stairways
- Improve security design of windows along corridors
- Enforce tough penalties against killer litter offenders
- Conduct regular spot checks to remove potential killer litter items
- Safety precautions for hanging of clothes
- Install sprinklers
- Provide fire extinguishers
- Back-door for fire evacuation
- Employ security guards
- Provide higher window grills
- Provide bomb shelters
- Install window grills.

Many of these suggestions are a direct response to their living experience and concerns. In addition to safety, suggestion was also made with regards to privacy. As buildings go taller, the suggestion was for an acceptable and reasonable distance between the public housing blocks to protect the privacy of residents and prevent overlooking.

Conclusions

High-rise living is an everyday experience of many Singaporeans. Under its public housing programme started in 1960, 86% of Singapore's resident population have moved from traditional 2- to 3-storey shop houses in the city to live in tall buildings all over the island. Many of these buildings are of 25- to 30-storeys. The trend is to build taller. Are people willing to live in taller buildings? Our study of households in Toa Payoh New Town seemed to indicate a general preference and willingness to live higher, attracted by the scenic view and breeze of higher storey units. Some of the respondents were

prepared to live on the 50th storey if they were satisfied with the safety features (they questioned the smooth and safe evacuation of residents in the case of a fire outbreak), the location and orientation of the unit. Their living experience and suggestions offer tall building designers some clues to enhancing the liveability of taller buildings. Implications derived from the findings are that designers might recognise and take account of the different preferences among age groups and not just the physical but also social aspects of high-rise living: the importance of neighbourhood facilities and concerns about lift breakdown, crime in the lift, who they have as their neighbours and fire risk, when offering better designs for taller buildings.

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Reference

- Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes And Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, New Jersey.
- Back, K. (1962), *Slums, Projects And People: Social Psychological Problems Of Relocation In Puerto Rico*, Duke University Press, Durham.
- Bauer, C. (1951), *Social Questions in Housing and Community Planning*, Journal of Social Issues, 7, pp. 1-34.
- Conway, D J. (1977), (ed) *Human Response To Tall Buildings*, Dowden, Hutchinson and Ross Inc, Stroudsburg.
- De Vaus, D A. (1991), *Surveys In Social Research*, Allen and Unwin, London.
- Greenberg, J. and Greenberg, C.I. (1977), A Survey of residential responses to high-rise living in D J Conway (ed) *Human Response to Tall Buildings*, Dowden, Hutchinson and Ross Inc, Stroudsburg.
- Haber, G.M. (1977), The impact of tall buildings on users and neighbors in D J Conway (ed) *Human Response to Tall Buildings*, Dowden, Hutchinson and Ross Inc, Stroudsburg.
- Herlyn, U. (1973), Human Problems In Tall Buildings, Report I—Tall Buildings, *Proceedings of Conference* held in Zurich, Switzerland, Oct 18-20, *SIA-Fachgruppen fur Bruckenbau Und Hochbau (FBH) und fur Architektur (FGA)*, Zurich, Switzerland.
- Jencks, C. (1980), *Skyscrapers-skyprickers-skycities*. Rizzoli, New York.
- Lau, W. C. (1998), Renewal of public housing estates in B Yuen (ed) *Planning Singapore: From Plan To Implementation*, Singapore Institute of Planners, Singapore.
- Low, L. and Aw, T. C. (1997), *Housing A Healthy, Educated And Wealthy Nation Through The CPF*, Times Academic Press, Singapore.
- Michelson, W. (1970), *Man and His Urban Environment: A Sociological Approach*, Addison-Wesley, Reading, Massachusetts.
- Michelson, W. (1975) (ed), *Behavioural Research Methods In Environmental Design*, Dowden, Hutchinson and Ross, Stroudsburg, Pa
- Odeleye, W. and Jogun, D. (1983), Some Social Significance of high-Rise Living on Lagos, Nigeria in High-Rise, *High Density Living SPC Convention 1983 Selected Papers*. Singapore Professional Centre, pp. 203-207.
- Onibokun, A.G. (1973), Environmental Issues in Housing Habitability, *Environment and Planning* 5, pp. 461-476.
- Smith, Kenedy Associates (1967), *Housing Study, Isolated Communities and Indian Reserves, Prairied Province*, Kenedy, Smith Associates, Winnipeg.
- Urban Redevelopment Authority (2001) *Concept Plan 2001*, Urban Redevelopment Authority, Singapore, pp16.
- Williamson, R.C. (1981), Adjustment to the High-Rise Variables in a German Sample, *Environment and Behavior*, 13(3), pp. 289-310.
- Yeh, A G O (2000) The planning and management of a better high density environment in A G O Yeh and M K Ng (ed) *Planning For A Better Urban Living Environment In Asia*, Ashgate, Aldershot.