

Analysis on Liveability of Multi-Family Housing Blocks in Seoul, Korea: A Focus on Comparison with Multi-Household Housings

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<http://dx.doi.org/10.5659/AIKAR.2017.19.3.63>

Abstract The purpose of this study was to examine the effect of housing units assembled as complexes on residential satisfaction. Two analyses were performed to examine residential satisfaction of Multi-Family Housing Blocks (MFHB; complex) and Multi-Household Housing (MH; non-complex). The residents from both housing types were surveyed on nine categories of questions regarding residential satisfaction and one on overall satisfaction from their experiences. First, the t-test results between MFHB and MH suggest that MFHB has insufficient effect in terms of improvement over MH, as their satisfaction differences are either insignificant or uncontrollable. Second, the common factors affecting Overall Satisfaction of MFHB and MH are Maintenance and Residential Environments.

Keywords: Urbanised Small Housing, Multi-Family Housing Block, Multi-Household Housing, Residential Satisfaction and Seoul

1. INTRODUCTION

1.1 Background and Objectives

The population dynamic and the change in household structure have led to changing demand in the Korean housing market. Until recently, the apartment complex has been the most popular and commonest type of housing. Liveable residential environment has been found in the complex housing type in Korea (Park, 2013).

However, household size has been shrinking, and the demand for decent small houses has increased compared to the past (Lee and Lee, 2016). In order to correspond to such needs, Ministry of Land, Infrastructure and Transportation (MoLIT) of Korea introduced an Urbanised Small Housing¹ policy in 2009,

and later eased building regulations to encourage Urbanised Small Housing supplies. The primary aim of Urbanised Small Housing was to provide quality small housing with decent living environments.

One type of Urbanised Small Housing (도시형 생활주택) is the multi-family housing block (MFHB: 단지형 다세대 도시형 생활주택), which basically has more than one multi-household building, forming a complex. It was expected that a multi-household complex would provide more a pleasant living environment, with basic services provided within a complex. On the contrary, Multi-Household Housing (MH: 일반 다세대 주택) was introduced in 1984 and currently is one of the popular quasi-housing types in Korea. It is defined housing with less than four storeys with total floor area less than 660m² in the Housing Act.

Unfortunately, the current focus of delivering MFHB shifted to quantity issues rather than the quality issues of housing. It is difficult for suppliers to avoid some criticism for reducing the quality of residential environment (Yoo and Shim, 2010; Lee et al., 2012; Han et al., 2014, etc.). Therefore, the perception and satisfaction of the actual residents need to be identified to evaluate the success of MFHB.

The majority of the previous studies have concentrated on the interior arrangement and facilities inside MFHB (Hong, 2012; Moon, 2015, etc.). The inner structure is certainly relevant to residents' well-being. However, building exterior and neighbourhood environment are also thought to be crucial

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¹ The English terms referring to Urbanised Small Housing and MFHB are not legally defined. The terms have been selected from the terms used in dissertations and academic articles previously with intended meaning and concepts.

factors affecting their satisfaction.

The primary aim of the present study is to examine if there is any effect on the residents' satisfaction when housing units are assembled as a complex. Specifically, this study aims to evaluate the effectiveness of MFHB by achieving three main purposes: (1) to examine residential satisfaction of both housing types by surveying residents, (2) to find out if housing and socio-demographical attributes result in statistical differences in residential satisfaction, and (3) to investigate the factors affecting residential satisfaction by regression analyses. Practical implications are expected for small housing supply policies based on the findings of this study.

1.2 Study Scope and Method

The type of Urbanised Small Housing considered in this study is MFHB, which contains more than one multi-household building with community and service facilities.

The spatial scope of the study includes the entire Seoul Metropolitan City, as the number of households per complex is relatively small for MFHB. In addition, MH units around MFHB were surveyed to make comparisons between the two housing types. The survey was completed in 8 gus and 13 administrative dong (Figure 1 and Table 1).

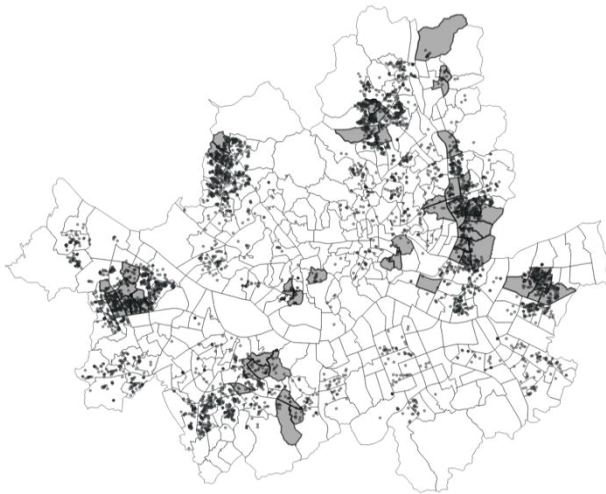


Figure 1. MFHB Surveyed in the Present Study

Table 1. Surveyed Gus and Households
Unit: No. of Households

MFHB	Nowon (10), Gangbuk (8), Eunpyeong (1), Jungnang (6), Dongdaemun (4), Gwangjin (19), Seongdong (2), Gangdong (23), Yongsan (9), Yeongdeungpo (8), Dongjak (8), Gwanak (8)
MH	Nowon (9), Gangbuk (13), Eunpyeong (1), Gangseo (1), Jungnang (8), Dongdaemun (16), Gwangjin (10), Gangdong (19), Yongsan (5), Yeongdeungpo (4), Gwanak (14)

The remainder of the study is organised as follows. Firstly, previous studies are reviewed to understand (1) the concept

and supply of MFHB and (2) evaluation criteria for residential satisfaction. On that basis, the analysis framework is then described, as well as data collection and survey preparation protocols.

In order to collect data on satisfaction, the residents of MFHB (control group) and MH (comparison group) were surveyed. The data are analysed by SPSS 21.0 to investigate if there are any statistical differences between groups. Lastly, the implications of the study results are provided.

2. RESEARCH BACKGROUND

2.1 Urbanised Small Housing

The legal definition of Urbanised Small Housing is: housing with less than 300 households in size, built in an urban area, as defined by the *National Land Planning and Utilization Act*. Urbanised Small Housing is divided into three types according to the description in the *Building Act*: MFHB, Multi-Family Row Housing Block and Studio Housing. MFHB, the main target of this study, is classified under multi-household housing in the *Building Act*, and can have a total floor area up to 85m². The legal specification of MFHB and MH is summarised in Figure 2.

Urbanised Small Housing was introduced by a *Housing Act* amendment in 2009, followed by MFHB in 2010. The number of regulations in Housing Construction Standards, including sales, community facilities and building regulations, have been alleviated to provide pleasant, safe and affordable housings to small households (MoLIT, 2013). In particular, MFHB aimed to supply decent, safe and affordable housing depending on the needs of both suppliers and residents. The needs include mortgages, parking lots and ease of Housing Construction Standards. There were 4,946 MFHB buildings distributed in Seoul as of December, 2015 (Figure 1).

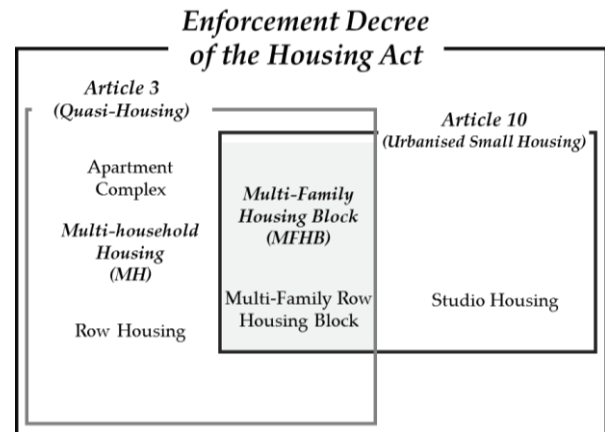


Figure 2. Legal Specification of MFHB and MH

2.2 Previous Studies

For the purpose of this review, the previous studies are divided into three categories: (1) Urbanised Small Housing, (2) Residential Satisfaction and (3) Residential Preferences.

Kim (2013) examined the factors of residential satisfaction and affection by surveying actual MFHB residents in Daegu. Han *et al.* (2014) conducted importance-performance analysis and focus group interviews to investigate importance, satisfaction and effectiveness of living environment in Urbanised Small Housing neighbourhood. Yoo and Shim (2010) reviewed policies, current condition, planning characteristics and actual cases of MFHB to provide policy implications.

The studies investigating residential satisfaction based on different housing types have generally focused on their different physical features. Lee (2012) conducted a survey on residential satisfaction according to housing types as well as investigating the relationship between household attributes and residential satisfaction using labour panel survey data.

Kim (2015) compared the general perception (public) and residential satisfaction (current residents) of MH. Jung and Jung (2015) examined residential satisfaction and values considered in housing selections using National Housing Survey data.

Based on a review of the previous studies, three main findings are drawn. Firstly, the results on residential satisfaction of MFHB have suggested that building exterior and other external factors are more closely related to satisfaction of the residents than are the interior factors of each unit. Secondly, they have suggested that related policies focus more on provider’s perspective and surveying residents about housing cost, satisfaction and performance of MFHB for objective evaluation. Lastly, although a huge number of MH units are distributed throughout Seoul Metropolitan City, the studies evaluating the well-being of the residents are scarce in number.

In consequence, this study focuses on complexes of MFHB, by comparing residential satisfaction between MFHB and MH (non-complex). Through the analysis result, the effectiveness of supplying MFHB could be evaluated more practically. The residential survey consists of individual household and housing attributes (e.g. number of children, ownership status, size and parking, etc.) to draw more practical conclusions.

3. ANALYSIS

3.1 Analysis Framework

1) Data Collection

The survey questions were formed on the basis of previous studies (Lee, 2011; Hong, 2012; Lee *et al.*, 2012; Lee and Koh, 2012; Lee and Kim, 2013; Kim, 2013; Moon, 2015 and Kim and Yang, 2015). The final questionnaire consisted of three parts: satisfaction (43 questions in 9 categories), overall satisfaction, and socio-demographic and housing information (6 and 4 referred to as *General Satisfaction (GS)*, asking the questions, respectively). There are seven questions comprehensive satisfaction for each category. Satisfaction items are measured by 5-point Likert scale.

The survey was conducted from April to June 2016, targeting MFHB in Seoul, as well as MH located nearby. Consequently, 106 valid responses were collected from MFHB and 100 from MH. Table 2 shows a summary of respondent characteristics.

Table 2. Respondent Characteristics

Classification		MB	MH	Classification		MB	MH
Gender	Male	43.4	57.0	Ownership Status	Owned	55.7	47.0
	Female	55.7	42.0		Jeonse	32.1	21.0
	No Response	0.9	1.0		Rent	9.4	32.0
			Others		2.8	-	
Age	20-29	18.9	39.0	Number of Rooms	1	8.5	16.0
	30-39	34.9	12.0		2	34.9	41.0
	40-49	17.9	17.0		3+	54.7	43.0
	50-59	16.0	13.0		No Response	1.9	-
	60+	12.3	19.0				
No. of Cars	No Cars	22.6	60.0	Size	< 10py [†]	4.7	15.0
	1 Car	71.7	33.0		10-29py	42.5	39.0
	2+ Cars	5.7	7.0		20-29py	48.1	46.0
Children (Age < 13)	No child	50.0	54.0	Household Size	1 person	13.2	18.0
	1	17.9	8.0		2 people	33.0	25.0
	2+	28.3	38.0		3+ people	51.9	56.0
	No Response	3.8	-		No Response	1.9	1.0

[†] Pyung (py) is a traditional Korean area unit. One Pyung corresponds to 3.3m²

Table 3. Research Hypotheses

	Hypothesis	Method
H1	There is statistically significant difference between the resident groups of MFHB and MH on Overall Satisfaction.	t-test
H2	There are statistically significant differences between the residents of MFHB and MH on the Residential Satisfaction items.	
H3	General Satisfaction (GS) in MFHB residents have positive effects on Overall Satisfaction.	Regression Analysis
H4	General Satisfaction (GS) in in MH residents have positive effects on Overall Satisfaction.	

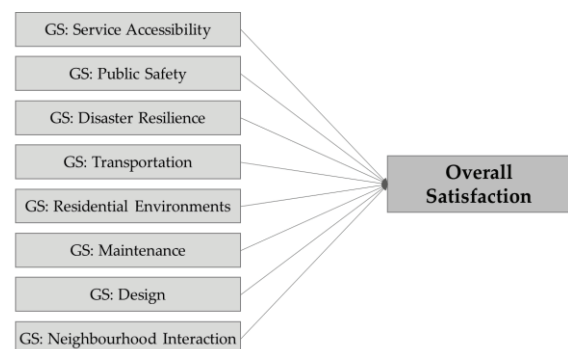


Figure 3. Conceptual Model for Regression Analysis

2) Hypotheses

Based on the findings of previous studies, four hypotheses are set (Table 3). *Hypotheses 1* and *2* are verified if there is statistically significant difference between the resident groups of MFHB and MH on *Overall Satisfaction and Residential Satisfaction* items by sets of t-tests. *Hypotheses 3* and *4* are tested to confirm if GS in MFHB and MH residents have effects on Overall Satisfaction by regression analyses.

3.2 Comparing the Residential Satisfaction between MFHB and MH

To compare the differences in overall and specific satisfaction types by housing type, sets of t-test are conducted to examine any statistical differences between MFHB and MH. As *overall satisfaction* between the two groups of residents shows no significant differences, *Hypothesis 1* is rejected, and satisfaction differences are investigated in sub-categories to test *Hypothesis 2*.

1) Service Accessibility

It is remarkable that MH residents displayed greater satisfaction with service facility accessibility than residents of MFHB. This is most likely to do with their land-use characteristics. Generally, MFHB requires larger size of land as it is constructed as a complex (Hong, 2012). It would be difficult to find such size of available land around commercial areas, especially in Seoul. MH, on the other hand, has more possibilities to be located near commercial areas or main streets, as the required lot size is relatively small, with better accessibility to service facilities.

Table 4. Satisfaction Differences in Service Facilities

	Mean		SD		t	sig
	MB	MH	MB	MH		
Commercial facilities	3.64	4.08	1.14	0.77	-3.25	0.00***
Sports facilities	3.00	3.02	1.25	0.92	-0.13	0.90
Childcare facilities †	3.74	3.28	1.02	0.94	2.10	0.04**
Elderly care facilities†	3.30	2.96	1.13	0.83	1.49	0.14
Health facilities	3.44	3.50	1.05	0.98	-0.41	0.69
GS: service accessibility	3.54	3.73	0.95	0.75	-1.62	0.11

† applicable respondents only
 ***: p < 0.01, **: p < 0.05, *: p < 0.10

2) Public Safety

Level of Crime in the Neighbourhood. The t-test result seems to suggest that MFHB residents have experienced relatively fewer crimes in the neighbourhood, as the average score is statistically significantly higher. It is noted that newly built MFHB contribute to protecting residents as they are mostly furnished with security systems at the main entrance.

However, *public security and order* and *GS: Public Safety* do not show statistically significant difference between MFHB and MH. Despite the presence of advanced security systems, in

MFHB, a gap between level of crime and perception of residents towards their safety is found. While conducting the survey for this study, we were often able to find the password written on the main entrance safety system for parcel delivery and other services. This could be one of the possible explanations for residents not being satisfied with their security system.

Table 5. Satisfaction Differences in Public Safety

	Mean		SD		t	Sig.
	MB	MH	MB	MH		
Public security and order	3.30	3.10	1.05	1.12	1.36	0.18
Level of crime in the neighbourhood	3.23	2.90	0.99	0.97	-2.40	0.02**
Privacy	3.00	2.91	1.08	1.05	0.61	0.54
GS: public safety	3.16	3.10	0.95	1.12	0.43	0.67

***: p < 0.01, **: p < 0.05, *: p < 0.10

3) Disaster Resilience

Three items in the category of disaster resilience have statistically significant differences.

Fire Protection. It is mandatory for Urbanised Small Housing to be equipped with fire protection devices, as defined by the *Fire Services Act, Article 41*. However, MH was excluded from the regulation. As the *Fire Services Act* was revised in 2012, it is now compulsory for newly constructed MH to have fire protection devices. Still, pre-existing MH units are not covered by the *Fire Services Act*, and are relatively vulnerable to fire damage. In this perspective, it is noted that the Urbanised Small Housing residents are more likely to feel more protected with visible fire protection devices in their buildings.

Table 6. Satisfaction Differences in Disaster Resilience

	Mean		SD		t	sig
	MB	MH	MB	MH		
Fire protection	3.35	3.07	0.90	0.95	2.15	0.03**
Flood protection	3.71	3.56	0.99	1.00	1.07	0.29
GS: Disaster Resilience	3.51	3.30	0.84	1.03	1.63	0.11

***: p < 0.01, **: p < 0.05, *: p < 0.10

4) Transportation

Parking Lot. One of the aims of MFHB is to provide adequate parking facilities to the residents to improve liveability. Therefore, MFHB are required to provide at least 0.7 parking spaces per household. As there has been no regulation for MH regarding parking facilities, this improvement might have resulted in different satisfaction by housing types.

Entry from Main Street: Roadway. It is required by law for MFHB to have an access road from the block to the main street,

with a width of 4m or more (in case of larger blocks, minimum 6m). As more than 70% of residents in MFHB own their vehicles, this could have increased convenience for moving in and out of the complex.

Table 7. Satisfaction Differences in Transportation

	Mean		SD		t	sig.
	MB	MH	MB	MH		
	Access to public transport	3.80	4.29	1.15		
Proximity to work	3.56	3.69	1.01	1.20	-0.88	0.38
Parking lot [†]	3.28	2.61	1.28	1.34	2.83	0.01***
Street maintenance	2.97	3.06	1.14	1.26	-0.53	0.60
Street condition	2.84	2.61	1.22	1.05	1.44	0.15
Pedestrian Safety	2.73	2.73	1.08	1.06	-0.02	0.98
Entry from main street: sidewalk	3.41	3.40	0.94	0.90	0.04	0.97
Entry from main street: roadway	3.50	2.89	1.05	0.96	3.25	0.00***
GS: Transportation	3.55	3.75	0.89	0.83	-4.88	0.00***

[†] applicable respondents only
 ***: p < 0.01, **: p < 0.05, *: p < 0.10

5) Residential Environments

The category of *Residential Environments* is about living environment of each household according to the condition of surrounding neighbours. For most of the items, MFHB residents have relatively greater satisfaction regarding residential environments, but not statistically significantly.

Noise. Although there is no statistical significance between the two groups for *Noise Caused by Surrounding Households* and *Noises in the Neighbour*, the average score for both housing types is in a low range (around 2.5). It is inferred that lack of soundproof regulation for both housing types could be the cause of relatively low scoring. Housing Construction Standards for Urbanised Small Housing have been eased to encourage the supply in the market. There have been no guidelines regarding soundproofing for MH.

Daylighting and Ventilation. It is suggested that lighting and ventilation depend on the arrangement and separation distance of buildings (Choi and Cho, 2010). There have been planning strategies for improving lighting and ventilation of MFHB by enhancing building arrangements (Yoo and Sim, 2010). On the other hand, MH is excluded from regulations defining minimum building distance and position of windows (*Enforcement Decree for the Building Act*). In this sense, the statistically significant differences in satisfaction regarding lighting and ventilation could have arisen from planning issues.

GS: Residential Environments. Although there have been statistically significant differences in the number of items within the category, the *GS: Residential Environment* item shows no

statistically significant differences. It could be concluded that there has been no visible improvement from MH to MFHB other than lighting and ventilation.

Table 8. Satisfaction Differences in Residential Environments

	Mean		SD		t	sig.
	MB	MH	MB	MH		
	View	2.88	2.62	1.26		
Degree of narrowness within household	3.31	3.30	0.87	0.95	0.11	0.91
Noise between households	2.65	2.87	1.25	1.32	-1.23	0.22
Noise: neighbourhood	2.52	2.41	1.14	1.26	0.65	0.52
Lighting	3.63	3.08	1.05	1.17	3.56	0.00***
Ventilation	3.51	3.12	1.11	1.17	2.45	0.02**
Position of harmful facilities for youth	3.52	3.39	1.08	1.07	0.86	0.39
Position of unwanted facilities	3.98	3.79	1.12	0.96	1.31	0.19
Parks and natural settings	3.18	3.08	1.14	1.03	0.66	0.51
GS: Environments	3.52	3.34	0.86	1.00	1.41	0.16

***: p < 0.01, **: p < 0.05, *: p < 0.10

6) Maintenance

In all items, MFHB residents are more satisfied with their building maintenance, and the satisfaction differences are statistically significant. The average construction year of each housing type is one of the key issues. MFHBs have been built after the policy was introduced in 2009, whilst MH has been constructed for about 30 years. This would have great impact on the degree of deterioration, and hence the maintenance cost.

In addition, the majority of MFHB are managed by professional companies, whilst MH is managed by building owners most of the time. Therefore, the quality of maintenance services in MFHB would likely be better.

Table 9. Satisfaction Differences in Maintenance

	Mean		SD		t	sig.
	MB	MH	MB	MH		
	Maintenance services	3.14	2.91	1.10		
Maintenance cost	3.15	2.88	1.04	1.03	1.88	0.06*
Degree of deterioration	4.13	2.84	0.97	1.12	8.87	0.00***
GS: maintenance	3.51	3.08	0.99	0.97	3.14	0.00***

***: p < 0.01, **: p < 0.05, *: p < 0.10

7) Design

MFHB residents have greater satisfaction in terms of building design. The two items *Building Exterior Design* and *GS: Design* have statistically significant differences. As Urbanised Small Housing units are relatively newer than MH units, it is more likely for MFHB to have aesthetically better looking exterior designs compared to MH.

Table 10. Satisfaction Differences in Design

	Mean		SD		t	sig.
	MB	MH	MB	MH		
Building exterior design	3.54	2.81	0.89	0.86	5.95	0.00***
Interior design and arrangement	3.32	3.13	0.89	0.98	1.46	0.15
GS: Design	3.42	2.99	0.82	1.00	3.43	0.00***

***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.10$

8) Expense Factors

In terms of the housing cost, MH residents show statistically significantly greater satisfaction. This could be the result of rent rate difference in the two housing types. It is suggested that if a 1–2 adults' household would move to Urbanised Small Housing, the rent rate would increase by at least KRW 200,000 (Lee *et al.*, 2012).

Despite the rent rate differences, the two housing types do not show statistically significant difference in *Housing Cost against Residential Satisfaction*. It could be comprehended that the residents in MFHB are not satisfied to a degree that the rent rate fails to compensate.

Table 11. Satisfaction Differences in Economic Factors

	Mean		SD		t	sig.
	MB	MH	MB	MH		
Local cost of housing	2.63	2.99	1.02	0.89	-2.67	0.01**
Property value	2.74	2.61	0.78	1.03	1.02	0.31
Housing cost against residential satisfaction	3.18	3.17	0.79	0.94	0.07	0.95

***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.10$

9) Neighbourhood Interaction

In terms of *Neighbourhood Interaction*, residents in both housing types present low satisfaction for *Interaction with Neighbours and Interaction Frequency*. It could be explained by the residents deliberately avoiding interacting with neighbours, as many residents do not want to be interrupted from others (Kim, 2013).

Table 12. Satisfaction Differences in Local Interaction

	Mean		SD		t	sig.
	MB	MH	MB	MH		
Neighbourhood interaction frequency	1.91	1.89	0.96	0.91	0.17	0.85
GS: Neighbourhood interaction	2.64	2.66	0.92	0.99	-0.18	0.86

***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.10$

3.3 Comparing the Residential Satisfaction between MFHB Residents by Their Personal Attributes

1) Car Ownership Status

Mainly considering car ownership status, *Transportation* items are analysed. Residents are split into two groups: with/without vehicles.

Parking Lots. The average score difference between two groups is statistically significant. Having secured parking lots within their building blocks would be very attractive to the vehicle owners. However, for those without cars, the presence of parking lots would not be among their main interests. The interview with MFHB residents also revealed that, in most MFHB, the same maintenance fees (including parking charges) are imposed for all the households, even those without car ownership.

Table 13. Satisfaction Differences in Transportation by Car Ownership Status

	Mean		SD		t	sig.
	O	X	O	X		
Easy access to public transport	3.78	3.88	1.16	1.15	-0.35	0.73
Proximity to work	3.62	2.00	1.05	1.00	1.24	0.22
Parking Lot [†]	3.36	2.83	1.26	1.24	2.38	0.02**
Street Condition	3.01	2.46	1.12	1.22	0.67	0.50
Street Maintenance	2.95	2.50	1.21	0.98	1.76	0.08*
Pedestrian Safety	2.79	3.33	1.11	1.09	1.17	0.25
Ease of entry from main street: sidewalk	3.43	2.60	0.90	1.34	0.43	0.67
Ease of entry from main street: roadway	3.56	3.75	1.01	1.03	2.02	0.05**
GS: Transportation	3.49	2.88	0.84	1.26	-1.25	0.22

[†] applicable respondents only

***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.10$

Entry from Main Street: Roadway. Interestingly, the group without vehicles shows more satisfaction in this item concerning the roadway entrance. It is quite reasonable for both drivers and pedestrians to experience uneasiness in narrow streets. However, the difference in satisfaction may have arisen from drivers slowing down constantly to avoid unexpected pedestrian

movements (Lee, 2012).

2) Property Ownership Status

Property Value. Although there is statistically significant difference between the two resident groups, neither of them are satisfied with the property value of MFHB. It could imply that MFHB do not have merit as an asset to invest in. The survey result (targeted specialists in the field) suggested that the lack of profitability of Urbanised Small Housings is another concern of the suppliers (Lee, et al., 2012).

Overall Satisfaction. The home owners show greater *Overall Satisfaction* than the residents tenants.

Table 14. Satisfaction Differences by Car Ownership Status

	Mean		SD		t	sig.
	O	X	O	X		
Local cost of living	2.93	2.26	1.09	.79	3.45	0.00***
Property value	2.96	2.46	.73	.78	3.19	0.00***
Housing cost against residential satisfaction	3.30	3.00	.76	.82	1.91	0.06*
Neighbourhood interaction frequency	2.15	1.55	.98	.82	3.33	0.00***
GS: local interaction	2.77	2.43	.82	1.00	1.82	0.07*
Overall Satisfaction	3.66	3.18	.82	.68	3.19	0.00***

***: p < 0.01, **: p < 0.05, *: p < 0.10

3.4 Regression Analysis

Two sets of regression analyses have been carried to determine the variables affecting overall residential satisfaction in MFHB and MH. For the regression analyses, the variables for GS (*General Satisfaction*) are used to represent each category. The conceptual model for the regression analysis is shown in Figure 3. Stepwise method is used in the analysis process, which produces a number of different models to find the model with the line of best fit.

The results of regression analysis for *Overall Satisfaction* as the dependent variable are summarised in Table 14.

In case of MFHB, the four variables that have effects on *Overall Satisfaction* have average scores around 3.5, including: *Design* (3.42), *Residential Environment* (3.52), *Maintenance* (3.51) and *Disaster Protection* (3.51). The categories in which some improvements have been made in MFHB seem to have positive effects on Overall Satisfaction by MFHB residents. This result is also similar to the result reported by Kim (2013), as *Maintenance*, *Design* and *Residential Environment* were included in the factors affecting *Overall Residential Satisfaction*.

On the other hand, the variables that affect *Overall Satisfaction* of MH are *Residential Environment* (3.34), *Maintenance* (3.08), *Service Accessibility* (3.73) and *Local Interaction* (2.66).

Table 15. Regression Analysis Results for Overall Satisfaction as Dependent Variable

	Independent Variable (General satisfaction)	B	β	t	Sig.
MFHB	(constant)	.633		1.839	.069*
	Design	.244	.258	2.585	.011**
	Surrounding Environment	.211	.220	2.459	.016**
	Maintenance	.171	.218	2.227	.028**
	Disaster mitigation	.171	.190	2.166	.033**
	R=.660, R ² =.436, adj R ² =0.411, F = 17.580, p = .000				
MH	(constant)	.229		.681	.497
	Surrounding Environment	.366	.456	5.974	.000***
	Maintenance	.181	.220	2.855	.005***
	Service Accessibility	.232	.218	3.091	.003***
	Local Interaction	.163	.201	2.759	.007***
	R=.739, R ² =.546, adj R ² =.527, F = 28.571, p = .000				

***: p < 0.01, **: p < 0.05, *: p < 0.10

4. CONCLUSION

The objectives of this study are (1) to evaluate the effectiveness of Urbanised Small Housing and (2) to examine the statistical difference in residential satisfaction between housing types. A residential satisfaction survey was conducted, targeting the residents of MFHB (control group; complex) and MH (comparison group; non-complex). Utilising the survey results, sets of t-tests and regression analyses were conducted.

First, the t-test results seem to suggest that the effectiveness of MFHB, in terms of providing better quality housing, is insufficient. Apart from *Level of Crime in the Neighbourhood*, *Fire Protection*, *Parking Lots and Entry from Main Street: Roadway*, the satisfaction differences are either statistically insignificant or due to more satisfaction from HB residents. In particular, for *Overall Satisfaction*, the two housing types do not have a statistically significant difference. Some items with clear statistical differences resulted from construction year of buildings, which cannot be controlled for in this case. Although, underlying intention could be meaningful, the actual effect derived from providing adequate housing for small households is considered as minor.

Second, the common factors affecting *Overall Satisfaction* of MFHB and MH are found to be GS: *Maintenance* and GS: *Residential Environment*, which mean that the residents prioritise these kinds of quasi-housing in these factors of housing. Therefore, it is suggested that these factors should be considered more thoroughly to provide better and more

adequate housing in the future.

Limitations of this study include having a relatively small size of respondent samples. In terms of statistical analysis, Structural Equation Modelling (SEM) could have been used if the sample size was greater. Instead, this study has conducted regression analysis with representative variables from each category. Nevertheless, the results of this study may be applicable as elemental data for future housing policy for small households.

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(Received Jul. 1, 2017/Revised Aug. 21, 2017/Accepted Sep. 19, 2017)