Social Equity in Urban Transport: The Case of Metro Manila, Philippines

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Abstract: This study looks at how low-income (LI) and high-income (HI) groups view their transport experience in Metro Manila based on six dimensions: health, physical and mental integrity; senses, imagination and thoughts; reasoning and planning; social interactions; natural environment and sustainability; and infrastructure. The assessment makes use of a mobility desirability gap as viewed by each group. It is computed as a percentage difference of the groups' current mobility score and desired score for each of the assessment criteria. A single score is also computed for each group by summing up the weighted score of each component that is based on the degree of importance scored by the respondents. The study also looks at how the two income groups rate various transport modes according to: pleasure, efficiency, social status, and physical integrity, comfort and convenience.

Keywords: Social equity, Social classes, High and low income groups, Urban transport

1. INTRODUCTION

Incorporating social equity in transport refers to enabling mobility to all users, including disadvantaged groups constrained by physical, socioeconomic, and other characteristics. Transportation equity moreover involves progressive approaches wherein enabling mechanisms are provided to disadvantaged groups in order to promote fair access to transport services. Tackling the extent of how social equity is integrated into the transport system of Metro Manila is reflected through an investigation of the levels of stress in traveling between surveyed low-income (LI) and high-income (HI) households in the area. Physical disabilities of surveyed users were also considered in order to assess the ability of the transportation system of Metro Manila in providing adequate service to travelers requiring special transportation needs. The study thus treats equity with regard to income and mobility needs.

Social classes in Metro Manila may be distinguished according to the different types of settlements. Settlements in Metro Manila can be grouped into the following: (1) exclusive subdivisions which are communities of single detached residences (Figure 1); (2) old residential neighbourhoods (Figure 2); and (3) pockets of informal arrangements (Figure 3). Exclusive subdivisions provide higher quality service standards compared to old residential neighbourhoods and informal settlements.

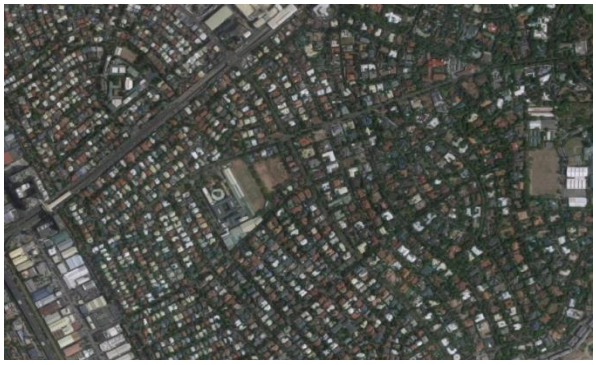

Figure 1. Forbes Park and Dasmariñas Village, Makati (exclusive subdivisions)

Figure 2. Old residential neighbourhoods in Malate, Manila

Figure 3. Informal settlers, Quezon City

This study adopts the typical identification of HI and LI classes based on their types of settlements, which is demonstrative of the capacity to afford a standard quality of living. This study then assumes HI respondents as settlers of exclusive subdivisions while LI respondents are identified as settlers of old neighbourhoods or under informal arrangements.

This study compared the high income (HI) group (residences living in exclusive subdivisions) and low income (LI) group (a mixture of the old neighborhood and informal settlers) about their assessment and desired level of need of the transportation system in Metro Manila and other related services.

Everyone has its own desired travel expectation and as much as possible would like to experience this. It is also hypothesized that social classes of people have different actual as well as desired travel experience. As one gets richer, one also has higher desired travel experience. This ideal design is being pursued since this will give commuters the most desirable travel experience.

This paper started with an introduction of how the residential location of the social income groups would be used in the sampling of respondents. This is then followed by the literature review, the framework and methodology. The statistical analysis of results then followed and is then wrapped up by the summary of findings and conclusion.

2. LITERATURE REVIEW

Transportation equity refers to the fairness of impact (benefits and costs) distribution across different categories of transport users (Litman, 2017a). Vertical models of equity or "social equity" factors in differences in mobility abilities and needs of various population categories, which are overlooked in traditional 'horizontal' equity models that treat mobilities and needs

of all individuals as equal (Di Ciommo and Shiftan, 2017; Litman, 2017a). Equity evaluation focuses on impacts internalised by disadvantaged groups compared to non-disadvantaged groups. *Social equity* in transport is thus concerned with the scope and extent of considerations for disadvantaged groups in the provision of transport services. Various factors are considered in social equity evaluations, which are: population groups which the impacts are distributed over; impacts; methodologies; and the distributive principle that defines the distribution as equitable.

Equity evaluation requires defining population groups to be assessed. Typical aggregations used in differentiating transport-disadvantaged groups are according to: income, car ownership, age, educational level, employment status, household composition, physical disabilities, and residential location. The more factors that apply, the more disadvantaged a group is treated. Low-income quintiles, which are also typically: unemployed, low skilled, no car ownership, and single-parent households, are recognised as transport-disadvantaged and are at a higher risk of social exclusion in transport (Lucas, 2012; Shirmohammadli, et al., 2016; DiCiommo and Shiftan, 2017). Physical impairment, which often also applies to children, the pregnant, and the elderly, poses limitations in the accessibility and use of particular transport modes, and is thus a major limitation to consider in transport equity evaluations (DiCiommo and Shiftan, 2017). Rural dwelling is also associated with lack of accessibility to key activities and is correlated with higher risk of social exclusion (Shergold and Parkhurst, 2012). Approaches in transport social equity assessments typically involve evaluating transport-disadvantaged groups vis-à-vis overall averages, or recognised or desired standards (Litman, 2011).

Literature review on transport social equity largely focuses on the accessibility or relative ease of reaching valued activities. Accessibility is widely distinguished and measured according to: spatial-based and person-based dimensions (van Wee et al., 2001; Bocajero and Oviedo, 2012; Fransen et al., 2016). Spatial-based approaches are focused on evaluating the volume and types of services or activities that are accessible as determined by travel time and distance. Gravity modeling allows accessibility assessments by assigning weights to activities based on the disutility experienced with increasing travel time, distance, and costs (Schuerer and Curtis, 2007; Papa and Coppola, 2012). Gutiérrez (2001), Manaugh and El-Geneidy (2012), and Ribeiro et al (2010) applied gravity modeling in measuring accessibility impacts of transport infrastructure. A major limitation of spatial- and gravity-based measures is the disregard for variations in individual budget, travel preferences, and behaviour, which are important for equity assessments. Person-based approaches are appropriate measures in analysing accessibility at the individual level, reflecting individual needs or profile (age, income, educational level, etc.), abilities and constraints (physical condition, travel budget, etc.), and opportunities that affect travel characteristics and behaviour (Geurs and van Wee, 2004; Recker et al., 2001;and Neutens et al.,2010). Despite its theoretical strength as a result of the comprehensive criteria considered in the assessment, person-based approaches in assessing accessibility require detailed activity-travel data.

Affordability is also a main indicator in transport social equity literature, which refers to the ability to apportion a transport budget relative to income. In equity analysis, transport user fees are evaluated considering the abilities of users to pay. Efficiency improvements in public transport, particularly in lower-cost and non-motorised alternatives, increase transportation affordability by reducing the option of private vehicle travel and significant expenditures on vehicle, fuel, and parking (Litman, 2017b). The built environment of households is thus also strongly linked with transportation affordability. Households in accessible, compact, multi-modal, public transit-oriented locations are found to have a positive and significant impact on transportation affordability (Ewing and Hamidi, 2014; Haas et al, 2006).Despite the ability to set a more substantial transport budget, high-income

households in locations with well-established public transport systems are found to spend less on transport than in locations that are automobile-oriented (Litman, 2017b; Handbury and Weinstein, 2014;McCann, 2000). Housing affordability and transportation affordability are also widely found to have trade-offs (Litman, 2017b).In selected cases, more evidence for lower-income households reveal the trade-off of higher-priced housing for low-cost and low quality housing to allow budget for transportation (Haas et al., 2006; Center for Neighborhood Technology, 2016).Input-Output modeling allows evaluating transportation affordability by predicting how changes in expenditures in an activity affect expenditures in other activities, i.e. transportation (Seneca et al., 2009; HDR Decision Economics, 2010; Litman, 2017b).Results from input-output modeling require more thorough interpretation since data is aggregated and averaged. More comprehensive techniques used in evaluating transportation affordability involve surveys on travel needs and patterns and actual expenditures (Mahadevia et al., 2013).

Other indicators covered in transport social equity assessments include (the distribution of): safety or risk to road accidents; inclusive design of infrastructure and facilities to accommodate mobility-disadvantaged groups; and quality of transport services (Litman, 2016).The Gini index and revenue to cost recovery ratio are widely applied in quantifying inequity by measuring the share of a trip cost (fares, user fees) and the trip benefit (trip length), and measuring thedisparity of the distribution of costs and benefits across entities (Bandegani and Akbarzadeh, 2016; Gómez-Lobo, 2011; Pérez et al., 2014; Lucas et al., 2015). Since the Gini index is limited to factoring in income differences, trip user surveys are more appropriate to account for mobility needs and abilities, which are essential in transport social equity assessments(Litman, 2016).

3. FRAMEWORK

An individual's decision and choices when traveling is affected by his/her physical and mental health as well as by events etched in the subconscious developed and stored through years of experience and sometimes due to unforgettable events during travel. These decisions and choices may also be altered or totally replaced when new information are available about transport such as when a new public transport service is available or given the natural and physical environment that one may experience along the journey.

Everyone has its own desired travel expectation but most often are disappointed by the actual experience itself. As earlier hypothesized different social classes of people have different assessment of the actual travel experience as well as the desired travel experience. As one gets richer materially, one has lower assessment of the actual travel experience but has higher desired travel experience compared to those in the lower income group. Figure 5 shows the conceptual framework of this study.

The actual and desired travel experienceare affected by the person itself, the physical environment and the available information. These factors are then considered in the decision making of the individual when he/she travels. Also, the factors are discussed which were used in the formulation of the questionnaire survey.

The Person

- Health, physical and mental integrity – assesses the level of stress one felt when using the primary transport mode and the reason for it. This also includes the level of physical activity one experience when using the primary mode. The personal space of an

individual is also being assessed of being physically close to other transport users as well as the level of air pollution experienced.

- Senses, imagination and thoughts – Under this experience, the individual's feelings associated with each of the transport mode used are being asked. These feelings are described by the following: freedom, insecurity, functionality, enjoyment, low cost, poverty, time consuming, unpunctuality, congestion, efficiency, luxury, environmental care, health, social interaction, discomfort, happiness, and status.

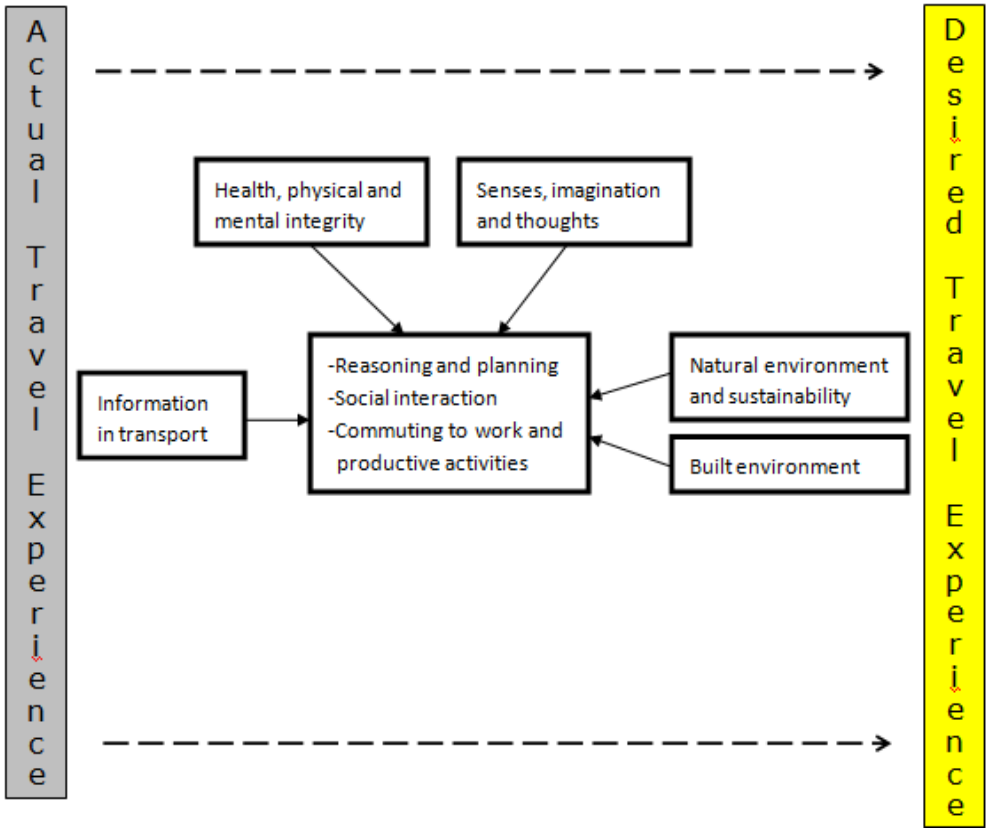

Figure 5. Conceptual Framework

The Environment and Infrastructure

- Natural environment and sustainability – The presence of the natural elements such as trees and parks are assessed while using the primary transport for both current and desired levels. The current and desired levels of access to sustainable transport modes (STM) were also assessed. The question whether he/she is willing to pay more for having more alternatives in using STM was also asked by how much. The relevance of the presence of trees, access to parks, access to STM, and affordability of STM were also rated.
- Information on transport – The individual is asked whether he does interchange between modes in his/her regular commute and rate the quality of this interchange as well as his desired level of quality when performing the interchange. If the assessment is low one is asked about the main reason.The individual is also asked if he/she owns technological tools such as smartphones, 3G or mobile applications where the most convenient travel options and/or transport modes can be chosen

- Built environment – The current conditions were assessed as well as the level of importance of improving the mobility infrastructures near one's home. These include the extent of road space for cars, parking availability, quality of highways, extent of pedestrian walkways, quality of pedestrian walkways, cleanliness of bus stops, comfort of bus seatings, bus stops climate protection, amount of bikeways, quality of bikeways, and bicycle parking at work.

Decision Making and Actual Activities

- Reasoning and planning – assesses the access to transport in terms of accessing one's current employment location as well as the desired employment location. Other assessments of current access to public transport to perform such activities as visit relatives, recreational, cultural and sporty activities were also assessed including grocery shopping and social activities. The desired level of performance as well as the relevance to the current activities was also asked.
- Social interaction – The current level as well as the desired level of social interaction were also assessed when using the primary mode. The question about being discriminated when using the transport mode was also asked and what mode was used during this instance.
- Commuting to work and productive activities – This including the current level of access to work opportunities, the accessible range of employment the neighbourhood offers as well as the satisfaction one's get from his/her current employment. Opinion regarding whether access to transport has affected to better job opportunities, the desired level of accessible range of employment in one's neighborhood as well as whether one has been affected by the available range of jobs in one's neighborhood for one to be employed are also asked. Furthermore, the regular commuting time from home to work as well as the monthly spending on transportation to get to work were also asked

4. METHODOLOGY

This study is largely based from a questionnaire survey of urban travelers which has two parts: (1) the individual's physical and socio-economic characteristics and (2) assessment of one's current and desired situations during the daily urban travel. Two types of respondents were asked using different methods of questionnaire survey. For the low income residential neighborhood, a face-to-face interview survey was conducted to obtain their answers to the questions while for the high income groups, an online questionnaire survey was conducted using google documents.

For the low income residential neighborhood, the area of Sampaloc, Manila was the study location and in the area of the old residential neighborhood where houses are cramped and with a mixture of informal settlements. For the high income group, respondents were gathered from exclusive subdivisions. To make sure respondents do live in these exclusive subdivisions, several students were recruited as facilitators of the online survey who are also living in these subdivisions. A total of at least a hundred respondents were gathered for the questionnaire survey.

Most of the questions use a five-level likert scale, for example, with 1 as bad and 5 as

good rating, 1 as low access and 5 as high access rating, among others.

Hypothesis testing is done using F-test (Figure 6) on the variances of the two sample sets (i.e. their ratings) whether they are equal or unequal and then t-test (Figure 7) for the means between the two sample ratings is then conducted. A one-tailed t-test for equal means of the ratings is applied to determine whether the LI and HI respondents have the same assessment and desired level of public transportation services. The numerator, $\bar{Y}_1 - \bar{Y}_2$, in the test statistic of the t-test is made sure to be always positive and hence the higher mean value in the two groups is always assigned to $\bar{Y}_1$.

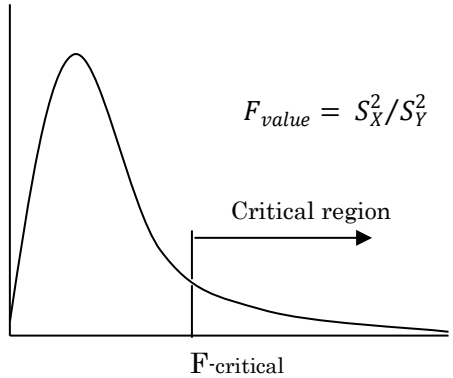

Figure 6. F-test for variance between two samples

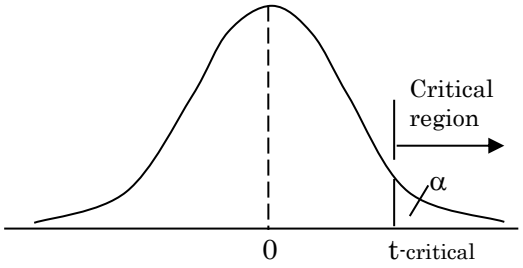

Figure 7. One-tailed t-test for means between two samples

5. RESULTS AND ANALYSIS

5.1 Socio-Economic and Travel Characteristics

Shown in Figure 8is the distribution of respondents in Metro Manila. The 105 low income respondents were highly concentrated in several clustered barangays in Sampaloc, Manila and do not respresent the whole of the city of Manila while for the 102 high income respondents these are spread out in 10 cities of Metro Manila since an online survey was used but it was made sure they came from exclusive subdivisions since students helped recruit online respondents in the subdivisions where they live. Furthermore, the income levels of the HI respondents in these cities do not represent the average income levels in those cities.

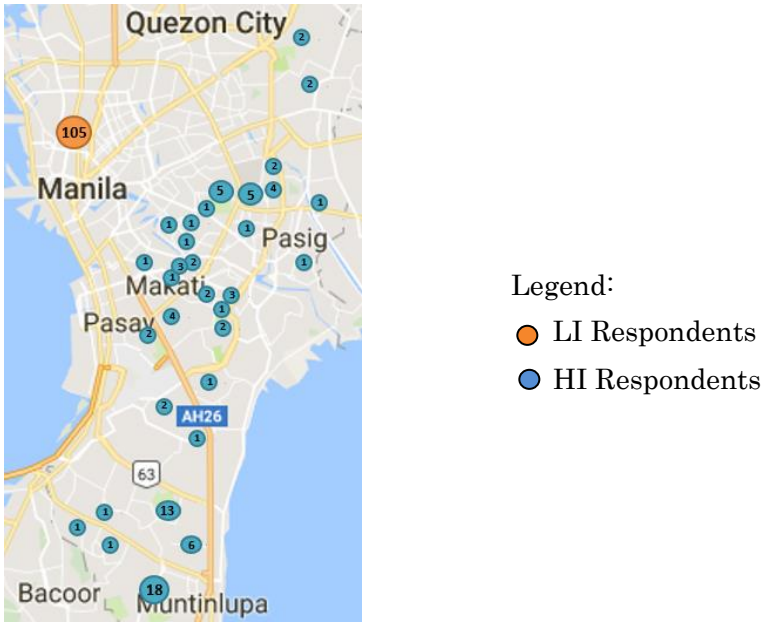

Figure 8.Location of HI and LI respondents in Metro Manila

Table 1. Socio-economic profile of respondents

Socio-economic characteristics		Low Income (N=105)	High Income (N= 102)
Gender	Male	43(40.95%)	58(56.86%)
	Female	62(59.05%)	44(43.14%)
Mean Age (years old)		33.12	31.00
Mean Weight, kgs		60.34(s.d.=16.84)	69.54(s.d.=22.31)
Mean Height, cm		161.77(s.d.=8.42)	166.36(s.d.=15.66)
Mean No. of Adults in HH		3.69(s.d.=2.03)	5.27(s.d.=2.76)
Mean No. of Children in HH		1.63(s.d.=1.91)	1.24(s.d.=1.39)
Mean Income/Allowance, Php		12,786	41,691
Driver's License	With License	26(24.76%)	85(83.33%)
	W/Out License	79(75.24%)	17(16.67%)
Highest Educational Attainment	Primary Education	5(4.76%)	2(1.96%)
	Secondary Education	48(45.71%)	26(25.49%)
	Professional Technical Education	8(7.62%)	3(2.94%)
	Professional Universitarian Education	42(40.00%)	59(57.84%)
	Postgraduate (MSc or PhD)	2(1.90%)	12(11.76%)
Physical Disability	With	3(2.86%)	0(0.00%)
	Without	102(97.14%)	102(100.00%)
Employment	Full Time Employee	47(44.76%)	46(45.10%)
	Student	23(21.90%)	34(33.33%)
	Others (part time, unemployed, retired, others)	35(33.33%)	22(21.57%)

The proportion of male to female respondents for the LI group is around 41 : 50 while for the HI group it is 57 : 43. The mean age of the LI group is 33 years old as compared to the HI groups which is 31 years old. The HI group weighs heavier at 69.5 kgs as compared to 60.3 kgs for the LI group in the same manner as to the height of respondents, the HI group

stands higher at 166.4 cm as compared to LI's 161.8cm. There are more adults in the HI's household at 5.27 while only 3.69 for the LI group. There are however more children in the LI's HH at 1.63 as compared to that of the HI at 1.24. The mean monthly income or allowance of the LI group is 12,786 pesos while for the HI group it is more than three times higher at 41,691 pesos. Around 85% of the HI group have a driver's license while for the LI group only round 25% have it. A big number of the LI at around 46% only earned a secondary education while around 58% of the HI group earned a college degree. Three out of the 105 LI respondents have disability while there is none in the HI group. Around 45% of the LI and HI groups are full time employee. The rest of the statistics are shown in Table 1 above.

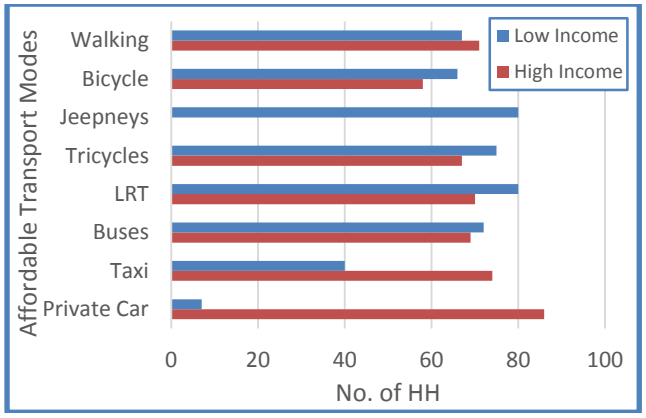

Figure 9. Affordable transport modes to the family

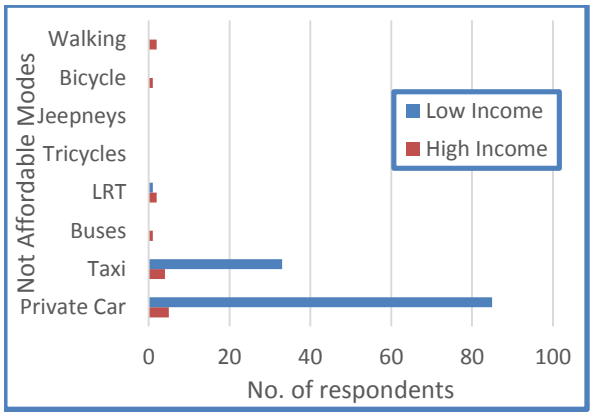

Figure 10. Not affordable modes to the family

As shown in Figure 9, there is significant contrast between the affordable modes between the HH of the HI respondents to the HH of the LI respondents. The private car and taxi were chosen as the mostly affordable to the HI's HHs while for the LI's HHs the top four choices are the jeepneys, LRT, tricycles and buses, with these also the most common available public transport modes in Metro Manila's streets. While walking and bicycling are also considered affordable or can be a way of travel in Metro Manila by both groups. On the other hand, the private car and taxi are considered not affordable by most LI's HHs (see Figure 10).

With regards to the primary transport mode used by the LI respondents (Table 2), around 32% of them use jeepneys followed by rail (23%) and tricycles (21%). In the case of the HI respondents, a great majority use the private car (79%) as the primary mode of transport, and far behind is the FX Taxi (7%) and rail (6%). For the secondary mode of transport, walking (24%) and tricycles (20%) are the top two choices of LI group while for the HI group, the top two choices are the Taxi (38%) and private car (27%). The HI

respondents' travel time to work is nearly 10 minutes longer than the LI respondents at 50.49 minutes and 40.59 minutes, respectively. There were more HI respondents (26 out of 102) who felt being discriminated while traveling using a given mode to only 8 out of 105 for the LI respondents. A big number (9 out of 26) of the discrimination occurred in the private car as the mode used for the HI respondents followed by taxi (4 out of 26). Most of the LI respondents who felt being discriminated occurred when using public transport (2 for buses, 2 for LRT, 2 for taxi and 1 for jeepney). More HI respondents interchange mode at 64% compared to only 29% of LI respondents. Walking (24%) and tricycles (20%) are the top two secondary modes used by the LI respondents the top two are the taxi (38%) and the private car (27%) for the HI respondents. The high private car usage as a secondary mode may mean that they are being fetched from where they have disembarked from the primary mode when going to the office. An overwhelming majority of HI respondents (91%) and LI respondents (75%) use technological tools while traveling. Both respondents are willing to pay more for the use of STM with 79% of HI respondents and 75% of LI respondents. Around 80% and 50% more of LI and HI respondents, respectively, are willing to pay 15% to avail of the STM services. Also, 29% of HI respondents are even willing to pay 30% more to avail of the STM services.

Table 2. Travel characteristics of respondents

		Low income (N=105)		High Income (N=102)	
		Primary(%)	Secondary(%)	Primary(%)	Secondary(%)
Transport Mode Used	Private Car	4(3.81)	2(1.90)	81(79.41)	28(27.45)
	Motorcycles	7(6.67)	7(6.67)	0(0.00)	0(0.00)
	Taxi	1(0.95)	1(0.95)	1(0.98)	39(38.24)
	FX Taxi	0(0.00)	1(0.95)	7(6.86)	5(4.90)
	Buses	11(10.48)	5(4.76)	2(1.96)	10(9.80)
	Rail	24(22.86)	13(12.38)	6(5.88)	4(3.92)
	Tricycles	22(20.95)	21(20.00)	0(0.00)	4(3.92)
	Bicycle	1(0.95)	2(1.90)	0(0.00)	2(1.96)
	Jeepney	34(32.38)	15(14.29)	0(0.00)	0(0.00)
	Walking	0(0.00)	25(23.81)	5(4.90)	10(9.80)
	Undefined/None	1(0.95)	13(12.38)	0(0.00)	0(0.00)
Travel time, minutes		40.59 (s.d. = 24.08)		50.49 (s.d.=24.27)	
Felt being discriminated while traveling	Yes	8 (7.62)		26(25.49)	
	No	96(91.43)		76(74.51)	
	No answer	1(0.95)		0(0.00)	
Mode used when discriminated	Private car	1(12.5)		9(34.62)	
	Taxi	2(25.0)		4(15.38)	
	Buses	2(25.0)		2(7.69)	
	Light Rail Transit	2(25.0)		1(3.85)	
	Jeepneys	1(12.5)		0(0.00)	
	Bicycle	0(0.00)		1(3.85)	
	Walking	0(0.00)		3(11.54)	
	Not indicated	0(0.00)		6(23.08)	
Do you interchange mode?	Yes	30(29.41)		67(63.81)	
	No	72(70.59)		38(36.19)	

Do you use technological tools (smartphones, 3G, etc.) when you travel	Yes	76(72.38)	93(91.18)
	No	10(9.52)	9(8.82)
	No answer	19(18.10)	0(0.00)
Would you pay more for STM?	Yes	79(75.24)	81(79.41)
	No	24(22.86)	21(20.59)
	No answer	2(1.90)	0(0.00)
How much more for STM?	15%	84(80.00)	51(50.00)
	30%	1(0.95)	30(29.41)
	Not indicated	20(19.05)	21(20.59)

5.2 Assessment of Current and Desired Situations during Daily Urban Travel

Health, physical and mental integrity. Using a 5-point likert scale, the respondents were asked to rate the actual and desired levels of travel characteristics related to health as well as physical and mental integrity. Using F-test for equal variances of the mean ratings, a one-tailed t-test for mean ratings is then conducted between the assessed and desired levels with the hypothesized mean difference varying from 0 or 1 point scale.

It is expected that the assessment of the actual travel experience for both groups are lower than the desired level of travel experience. Comparing the two groups' assessment of the actual travel experience, at 95% level of confidence, the mean rating of the HI respondents on the *air pollution experience*, *level of security* and *comfort* when using the primary transport is different than that of the LI respondents (see Table 3). This is understandable since the HI respondents are mostly using the private car and taxi compared to the LI respondents who are using the public transport modes. The LI respondents however have higher mean ratings in terms of levels of *physical activity* when using the primary modes than the HI respondents since they are using public transport. There was no difference however in terms *of levels of stress* and *being physically close to others* when using the primary mode for both groups.

Table 3. Health, physical and mental integrity related to health

Assessment	Groups	Mean Assess.	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)			
			F-value	F-critical (one-tailed)	Decision	t-value	T-critical (1-tailed)	Hypothesized mean diff.	Decision
Level of stress when using primary transport mode	HI	3.36	2.365	1.385	Unequal Variance	1.413	1.654	0.0	No Diff.
	LI	3.16							
Levels of physical activity for main transport	HI	2.28	2.722			5.219	1.654	0.0	With Diff.
	LI	3.00							
Being physically close to other transport users	HI	2.87	5.284			1.791	1.656	0.0	No Diff.
	LI	3.12							
Air pollution experience for transport service	HI	3.16	2.042			5.491	1.653	0.0	With Diff.
	LI	2.27							
Level of security for primary transport	HI	3.83	1.731			6.716	1.653	0.0	
	LI	2.90							
Level of comfort for primary transport	HI	4.06	1.599	1.388		8.506	1.653	0.0	
	LI	2.93							
Desired									
Level of stress when using primary transport mode	HI	4.40	1.492	1.385	Unequal variance	1.516	1.653	0.0	No Diff.
	LI	4.21							
Levels of physical activity for main transport	HI	2.15	0.783	0.720		6.622	1.653	0.0	With Diff.
	LI	3.25							
Being physically close to	HI	2.36	12.0	1.972		12.015	1.653	0.0	

other transport users	LI	3.95	15						
Air pollution experience for transport service	HI	4.62	0.939	0.721		5.928	1.652	0.0	
	LI	3.81							
Level of security for primary transport	HI	4.71	0.849	0.721		5.495	1.652	0.0	
	LI	4.09							
Level of comfort for primary transport	HI	4.75	0.516	0.720	Equal variance	6.519	1.652	0.0	
	LI	4.08							

The desired levels of *air pollution experience*, *security*, and *comfort* are different when using the primary mode for the HI respondents than those of the LI respondents at 95% level of confidence. While the LI respondents desired level of *physical activity* (i.e. high level) and *being physically close to others* (i.e. do not mind being close) are different than those of the HI respondents. While both respondents aspires to have *low levels of stress when traveling*, with both ratings not being different.

Using a one-tailed t-test at 95% level of confidence, the HI respondents have higher mean rating of the five issues that need to be improved in the transport systems with *stress levels*, *air pollution* and s*ecurity* have at least 1.0 higher rating than that of the LI respondents.

Senses, imagination and thoughts. The respondents were asked to indicate the feelings that they associate with the following transport modes. They can also choose as many as they like. For the HI respondents (Table 4), the most used description is *Low Cost* (406), with buses and jeepneys having the highest scores among the modes, this is followed by *Discomfort* (286) with the LRT and jeepneys being the top two modes having this description, and third is *Freedom* (268) which is being associated with private car use and walking.

Table 4. Feelings that the high-income group associate with the transport modes

Feelings	Private Cars	Taxi	Buses	LRT	Tricycle	Jeepneys	Bicycle	Walking	**Total**
Freedom	87	18	2	3	13	4	69	72	268
Insecurity	1	38	36	34	33	41	8	15	206
Functionality	62	34	20	31	18	13	41	24	243
Enjoyment	57	1	1	1	4	2	56	46	168
Low Cost	9	14	76	66	68	73	51	49	406
Poverty	0	4	17	26	24	39	0	2	112
Safety	89	16	8	14	12	10	14	11	174
Time Consuming	11	16	39	39	15	33	22	43	218
Unpunctuality	1	19	36	35	20	41	6	17	175
Congestion	28	29	54	53	20	66	2	3	255
Efficiency	53	24	12	19	18	8	25	13	172
Luxury	50	8	0	0	0	0	3	1	62
Environmental Care	8	2	8	15	11	11	60	50	165
Health	30	5	3	4	3	5	49	62	161
Social Interaction	8	16	19	22	4	19	4	15	107
Discomfort	0	36	56	66	45	64	7	12	286
Happiness	56	4	0	0	3	0	33	37	133
Status	0	0	0	0	0	0	0	0	0
Total	550	284	387	428	311	429	450	472	3311

Table 5. Feelings that the low-income group associate with the transport modes

Feelings	Private Cars	Taxi	Buses	LRT	Tricycle	Jeepneys	Bicycle	Walking	**Total**
Freedom	73	64	34	35	52	35	59	58	410
Insecurity	1	5	37	34	33	41	21	35	207

Functionality	30	10	1	27	4	2	4	3	81
Enjoyment	64	43	3	8	22	5	56	54	255
Low Cost	2	5	65	42	84	80	45	37	360
Poverty	0	0	2	0	1	1	0	2	6
Safety	88	47	3	23	11	5	5	0	182
Time Consuming	24	16	30	32	4	29	35	3	173
Unpunctuality	0	1	8	1	0	4	0	1	15
Congestion	2	6	37	12	0	37	0	0	94
Efficiency	54	30	1	47	18	0	16	2	168
Luxury	15	32	1	1	0	0	1	1	51
Environmental Care	20	8	0	34	2	1	61	66	192
Health	17	10	0	6	2	2	78	88	203
Social Interaction	21	8	3	4	2	4	5	13	60
Discomfort	0	15	73	46	17	65	1	4	221
Happiness	45	35	1	23	27	1	50	43	225
Status	1	3	0	1	0	0	0	0	5
Total	457	338	299	376	279	312	437	410	2908

The transport mode having the most scores by the HI respondents is the *private car* (550) with *safety* as the number one feeling associated with the private car having a score of 89. This is then following by walking (472) and bicycling (450). It can be seen that the public transport modes have lower scores than these three and this is understandable knowing that only 14.7% and 22.54% of HI respondents use public transport as their primary and secondary modes, respectively.

In the case of the LI respondents (Table 5), *Freedom* (410) is the most important feeling with private cars (73) having the highest score. After freedom, the second most favored is *Low Cost* (360) but being related to the tricycle (84) having the most score. The third feeling is *Enjoyment* (255) and greatly associated to the *Private car* with a score of 64, followed by *Bicycle* (56) and *Walking* (54). With regards to the transport mode of the LI respondents, the *Private car* (457) is the most considered, followed by *Bicycle* (437) and *Walking* (410). LI respondents aspire to own a car and they see it as an ultimate alternative to the current public transport mode they are using.

Reasoning and planning. The respondents were then asked how they would assess their access to transport in terms of accessing their current employment. Also, they were asked whether their access to transport allow them to access their desired employment.

Table 6. Access to employment of HI and LI respondents

Access to employment	Groups	Mean Rating	F-Test Two-Sample for Variances(α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances(α = .05)			
			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Hypothesized mean difference	Decision
Assessment of access to transport to access current employment	HI	3.95	4.491	1.401	Unequal variance	5.726	1.655	0.0	With Diff.
	LI	3.27							
Access to transport to access desired employment	HI	4.07	3.299			2.499	1.654		
	LI	4.37							

As the statistical results (Table 6) would show the HI respondents have a higher mean

rating of their transport needs to *access their current employment* compared to the LI respondents. This would show that the HI respondents have better access to transport or are satisfied with their transport service going to their current employment compared to the LI respondents. So that when *access to transport to access desired employment* was asked, at 95% level of confidence the difference in means is not zero with the LI respondents having a higher rating (4.37) than the HI respondents mean rating of 4.07. It should be noted that in the numerator of the test statistic, the higher mean is always used for $\bar{Y}_1$.

The respondents were then ask how they assess their current access to public transport in terms of allowing them to perform the activities listed in Table 7. Comparing the assessment of the access to current public transport system when doing the mentioned activities, only when *Visiting relatives* is not statistically different at 95% level of confidence. The rest of the activities like *recreational activity*, *cultural activities*, *sports activities*, *grocery shopping* and *social activities* are statistically different between the two respondents, with the HI respondents having higher rating than the LI respondents at hypothesized difference of zero (0). This results may be confusing since most HI respondents do not use public transport as primary mode, they may be simply putting a higher rating to the access to public transport without really using them.

Table 7. Comparison between high income and low income groups on their assessment of access to public transport to perform the activities and the desired level of performance of doing the activities.

	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances(α = .05)		
Assessment			F value	F-critical (one-tailed)	Decision	t-value	t-critical 1-tailed)	Decision
Visit relatives	HI	3.49	1.997	1.389	Unequal variance	1.491	1.653	No Diff.
	LI	3.25						
Recreational activities	HI	3.80	2.078	1.389		4.031	1.653	With Diff.
	LI	3.22						
Cultural activities	HI	3.46	2.889	1.388		3.031	1.654	
	LI	3.00						
Sport Activities	HI	3.65	2.713	1.388		3.672	1.654	
	LI	3.10						
Grocery shopping	HI	3.92	2.108	1.388		2.589	1.653	
	LI	3.54						
Social activities	HI	3.84	2.331	1.388		3.389	1.654	
	LI	3.34						
Desired								
Visit relatives	HI	4.31	1.571	1.388	Unequal variance	0.104	1.653	No Diff.
	LI	4.30						
Recreational activities	HI	4.45	1.179	1.388	Equal variance	2.136	1.652	With Diff.
	LI	4.21						
Cultural activities	HI	4.23	1.409	1.388	Unequal variance	1.663		
	LI	4.01						
Sport Activities	HI	4.36	1.326	1.388	Equal variance	2.236		
	LI	4.09						
Grocery shopping	HI	4.50	1.299	1.388	Equal variance	0.382		No Diff.
	LI	4.46						
Social activities	HI	4.46	1.214	1.388	Equal variance	0.919		No Diff.
	LI	4.36						

They were then asked their desired level of performance when performing the said activities. *Visiting relatives*, *Cultural activities*, *Grocery shopping*, and *Social activities* have no statistically significant difference between the HI and LI respondents. Only *Recreational* and *Sports activities* have statistically different mean rating with HI respondents having a higher rating than the LI respondents.

Table 8. Comparison of high income and low income groups ratings of the assessment and desired level of transport modal options that can be accessed to perform daily activities

	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (1-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Assessment of modal options' accessibility to perform daily activities	HI	3.48	7.275	1.389	Unequal variance	0.932	1.657	No Diff.
	LI	3.35						
Desired level of modal options' accessibility to perform daily activities	HI	4.29	3.910	1.388	Unequal variance	1.780	1.655	With Diff.
	LI	4.50						

Both groups' rating of their assessment of transport modal options that can be accessed to perform their daily activities have no difference (Table 8) but with HI respondents' ratings more spread out compared to that of the LI respondents' rating as shown in Figure 11, hence having unequal variance. However, the desired level of transport modal options to perform the daily activities of LI respondents are significantly different at 95% level of confidence than that of the HI respondents (see also Table 8). This would mean that the LI respondents felt that currently their transport modal options are much more limited when performing the daily activities. In Figure 12, the LI respondents' rating are more clustered than that of the HI respondents.

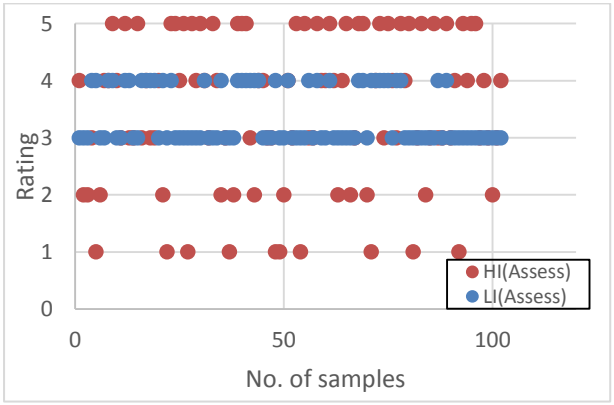

Figure 11. Scatterplot of HI and LI respondents' on actual assessment of modal options' accessibility

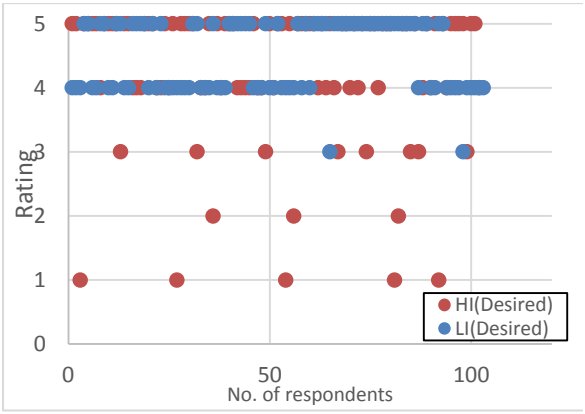

Figure 12. Scatterplot of HI and LI respondents' on desired level of modal options' accessibility

Table 9. Relevance of improving issues on transport system

Issue	Respondent	Mean Rating	F-Test Two-Sample for Variances			t-Test for Means: Two-Sample Equal/Unequal Variances		
			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Access to activities	HI	4.66	0.513	0.720	Equal variance	5.085	1.652	With Diff
	LI	4.07						
Range of modal	HI	4.51	0.953		Unequal	3.019		

options	LI	4.14			variance			
Quality of modal options	HI	4.71	0.480		Equal variance	5.386		
	LI	4.11						
Affordability	HI	4.53	0.902		Unequal variance	2.415		
	LI	4.23						

As shown in Table 9, using a likert scale of 1 (low importance) to 5 (high importance), the four issues of *access to activities*, *range of modal options*, *quality of modal options* and *affordability*, the HI respondents' rating are significantly different than that of the LI respondents at 95% level of confidence. This would mean that the HI respondents have higher expectations on these issues than the LI respondents.

Table 10. Assessment of the actual and desired level of social interaction when using primary transport mode between high income and low income groups

	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (1-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Assessment of actual level of social interaction when using primary transport mode	HI	2.75	5.006	1.387	Unequal variance	2.012	1.656	With Diff.
	LI	3.03						
Desired level of social interaction when using primary transport mode	HI	2.93	2.492			5.182	1.654	
	LI	3.75						

Social interaction. In terms of social interaction (Table 10), the LI respondents have higher rating, in terms of social interaction when using the primary transport mode in both the actual and the desired level than the HI respondents. With a hypothesized mean difference of 0.0 at 95% level of confidence, the LI respondents mean rating is significantly different than that of the HI respondents. This is expected since the LI respondents use public transport as their primary mode where social interaction is more prevalent.

Natural environment and sustainability. As shown in Table 11 the assessment of access to STM of the two groups of respondents have no difference and with ratings near the middle value of 3 would mean they are just neutral to the situation. While the desired level of access of the two groups are more than 1.0 higher ratings than their assessment and with the HI respondents having higher desired level of access to STM than the LI respondents.

Table 11. Comparison of high income and low-income groups ratings of the assessment and desired level of access to sustainable transport modes (STM)?

	Respondents	Mean Rating	F-Test Two-Sample for Variances(α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances(α = .05)		
			F value	F-critical (1-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Assessment of access to sustainable transport modes (STM)?	HI	3.25	6.508	1.387	Unequal variance	0.498	1.657	No Diff.
	LI	3.19						
Desired level of access to STM	HI	4.55	1.048	1.388	Equal variance	2.524	1.652	With Diff.
	LI	4.29						

Table 12. Comparison of decision between the HI and LI groups regarding the relevance of improving issues of the transport systems.

Issue	Respondent	Mean Rating	F-Test Two-Sample for Variances (α = .05)	t-Test for Means: Two-Sample Equal/Unequal Variances(α = .05)

			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Presence of trees	HI	4.31	0.837	0.717	Unequal variance	3.530	1.653	With Diff.
	LI	3.84						
Access to parks	HI	4.27	0.986		Unequal variance	4.031		
	LI	3.73						
Access to STM	HI	4.46	0.658		Equal variance	5.302		
	LI	3.78						
Affordability of STM	HI	4.43	0.845		Unequal variance	4.523		
	LI	3.85						

They were then ask about the relevance of improving the following issues (*presence of trees*, *access to parks*, *access to STM*, and *affordability of STM*) of the transport systems (Table 12). We can see that at 95% level of confidence we can say that for all issues, the difference between the mean ratings of the HI and LI respondents is not zero. The mean ratings of HI respondents are always higher than that of the LI respondents. Since these issues can be considered as added value to the transport system, it is understandable that the HI respondents' rating are higher since most are already secured when they travel using their private vehicles.

Information in transport. In the case of the use of information for use in choosing alternative transport modes (Table 13), both groups have equal ratings in both the actual and desired level of access. This may mean that both groups are users of information, most likely using technological tools like mobile phones, when they travel.

Built environment. Under the built environment, the mobility infrastructures were assessed with a rating of 1 for very bad and 5 for very good. Those mobility infrastructures (see Table 14) include *extent of road space for cars*, *parking availability*, *quality of highway*, *extent and quality of pedestrian walkways*, *bus stop facilities* (e.g. cleanliness, comfort and climate protection) and *bikeway facilities* (amount, quality, parking availability).

Table 13. Assessment of the actual and desired levels of information available to choose alternative transport modes between high income and low income groups

	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (1-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Assessment of actual level of information available to choose alternative transport modes	HI	3.31	4.306	1.388	Unequal variance	0.283	1.655	NoDiff.
	LI	3.35						
Desired level of access to information to choose alternative transport modes	HI	4.33	2.587			0.789	1.654	
	LI	4.42						

Table 14. Assessment of current conditions of mobility infrastructure near home between respondents.

Assessment	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Extent of road space for cars	HI	3.14	1.929	1.388	Unequal variance	3.067	1.653	With Diff.
	LI	2.67						
Parking availability	HI	2.95	1.853			3.345	1.653	
	LI	2.42						
Quality of highways	HI	3.11	1.682			2.313	1.653	
	LI	2.80						
Extent of pedestrian	HI	2.88	2.056			2.210	1.653	

walkways	LI	2.52						
Quality of pedestrian walkways	HI	2.72	2.139			0.339	1.653	No Diff.
	LI	2.66						
Cleanliness of bus stops	HI	2.41	2.903			0.530	1.654	
	LI	2.49						
Comfort of bus seatings	HI	2.49	1.519			0.315	1.653	
	LI	2.45						
Bus stop climate protection	HI	2.37	3.058			1.701	1.654	With Diff.
	LI	2.59						
Amount of bikeways	HI	1.98	2.076			3.064	1.653	
	LI	2.42						
Quality of bikeways	HI	2.07	2.487			3.259	1.654	
	LI	2.54						
Bicycle parking at work	HI	2.54	2.278	1.395		0.580	1.654	No Diff.
	LI	2.45						

The mean ratings of the respondents are mostly below the value of 3.0 which may mean that the respondents are neutral or not satisfied with these mobility infrastructures. The assessments of the HI and LI respondents have unequal variances in all items hence testing for equal in mean ratings under an unequal variance situation were conducted. Since the HI respondents are mostly car users, their mean rating of car-related infrastructures like *extent of road space for cars*, *parking availability*, *quality of highways* as well as *extent of pedestrian walkways* where the latter is also important when they walk from the car park to their offices are significantly different than that of the LI respondents. On the other hand, the LI respondents mean rating of *bus stop climate protection*, *amount and quality of bikeways* are significantly different than that of the HI respondents. However, the mean rating difference between the two groups is not significant for *quality of pedestrian walkways*, *cleanliness of bus stops*, *comfort of bus seatings*, and *bicycle parking at work.*

With respect to the level of importance of improving the same mobility infrastructure issues on the transport system (Table 15), the HI respondents mean ratings are significantly different to that of the LI respondents at 95% level of confidence on all issues. This would mean that the HI respondents demand higher level of importance on the current transport systems than the LI respondents.

Table 15. Comparison between HI and LI respondents about level of importance of improving issues on the transport system

Desired	Respondents	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Extent of road space for cars	HI	4.42	1.323	1.388	Equal variance	5.336	1.652	With Diff.
	LI	3.74						
Parking availability	HI	4.53	1.158	1.388	Equal variance	4.327		
	LI	3.98						
Quality of highways	HI	4.66	0.573	0.720	Equal variance	5.195		
	LI	4.03						
Extent of pedestrian walkways	HI	4.57	0.861	0.720	Unequal variance	4.986		
	LI	3.83						
Quality of pedestrian walkways	HI	4.53	1.162	1.388	Equal variance	3.214		
	LI	4.16						
Cleanliness of bus stops	HI	4.40	1.054	1.388	Equal variance	3.451		
	LI	3.95						
Comfort of bus seatings	HI	4.41	0.950	0.720	Unequal variance	3.367		
	LI	3.98						
Bus stop climate protection	HI	4.41	1.077	1.389	Equal variance	2.693		
	LI	4.07						
Amount of bikeways	HI	4.24	2.255	1.388	Unequal variance	5.242	1.974	
	LI	3.57						

Quality of bikeways	HI	4.28	1.789	1.388	Unequal variance	2.827	1.653	
	LI	3.92						
Bicycle parking at work	HI	4.19	2.250	1.400	Unequal variance	4.436		
	LI	3.61						

Comparing the assessment of current conditions of facilities near the home, the HI respondents have significantly higher mean rating for all (e.g. *Park and squares*, *Cinemas, theatres, and museums*, *Health facilities*, *Grocery, shops and trade*, and *Educational facilities*) compared to that of the LI respondents (see Table 16). In terms of improving these facilities, the facilities needed for basic necessities like *Health facilities*, *Grocery shops, malls and trade* and *Educational facilities*, no significant difference between the two set of respondents was observed. In the case of *Park and squares* and *Cinemas, theatres, and museums*, the HI respondents mean rating are significantly different than that of the LI respondents at 95% level of confidence.

Commuting to work and productive activities. In a positive way (Table 17), the HI group has significantly different mean rating for *Current level of access to work opportunities*, and *Neighborhood assessment in terms of accessible range of employment*, while in a negative way the HI group has significantly different mean rating for *Access to transport affected possibilities to have better job opportunities* and *have been affected by available range of jobs in neighborhood to get one* compared to the LI group. In terms of the *Desired level of accessible range of employment* and *Degree of satisfaction with current employment* there is no significant difference between the two groups and their mean ratings are generally higher compared to the other items.

Table 16. Comparison of assessment of current conditions of facilities near home and the level of importance of improving these facilities between the HI and LI groups.

Assessment	Respondents	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (one-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Parks and squares	HI	3.54	3.709	1.387	Unequal variance	7.125	1.976	With Diff.
	LI	2.63						
Cinemas, theatres, museums	HI	4.05	1.149		Equal variance	8.688	1.972	
	LI	2.95						
Health facilities	HI	4.02	2.256		Unequal variance	5.129	1.974	
	LI	3.45						
Grocery shops, malls and trade	HI	4.20	1.704		Unequal variance	3.244	1.973	
	LI	3.85						
Educational facilities	HI	3.91	2.775		Unequal variance	3.050	1.974	
	LI	3.55						
Importance								
Parks and squares	HI	4.14	1.934	1.387	Unequal variance	4.034	1.973	With Diff.
	LI	3.64						
Cinemas, theatres, museums	HI	4.25	1.332	1.387	Equal variance	3.955	1.972	
	LI	3.80						
Health facilities	HI	4.73	1.529	1.387	Unequal variance	0.574	1.972	No Diff.
	LI	4.67						
Grocery shops, malls and trade	HI	4.57	1.368	1.387	Equal variance	0.908	1.972	
	LI	4.65						
Educational facilities	HI	4.59	2.005	1.387	Unequal variance	1.374	1.973	
	LI	4.72						

Table 17. Actual and desired level of assessment of commuting to work and productive activities

Work and commuting	Groups	Mean Rating	F-Test Two-Sample for Variances (α = .05)			t-Test for Means: Two-Sample Equal/Unequal Variances (α = .05)		
			F value	F-critical (1-tailed)	Decision	t-value	t-critical (1-tailed)	Decision
Current level of access to work opportunities	HI	3.93	3.640	1.400	Unequal variance	7.374	1.655	With Diff.
	LI	3.19						
Access to transport affected possibilities to have better job opportunities	HI	3.89	0.815	0.716		2.122	1.653	
	LI	3.52						
Neighborhood assessment in terms of accessible range of employment	HI	3.61	6.784	1.400		5.499	1.656	
	LI	2.98						
Desired level of accessible range of employment	HI	4.12	2.679	1.403		0.083	1.654	No Diff.
	LI	4.11						
Have been affected by available range of jobs in neighbourhood to get one	HI	3.13	1.232	1.400	Equal variance	2.910	1.653	With Diff.
	LI	2.83						
Degree of satisfaction with current employment	HI	3.97	1.529	1.404	Unequal variance	1.280	1.653	No Diff.
	LI	4.12						

6. SUMMARY OF FINDINGS AND CONCLUSION

The following are the findings of the study:

1. A greater majority of the HI respondents use the private car as primary mode in their daily travel while for LI respondents, the top three primary public transport mode being used are the jeepney, rail, and tricycle.
2. On the average, the HI respondents travel almost 10 minutes longer than the LI respondents.
3. More than half (67%) of the HI respondents need to change mode compared to only 30% of LI respondents when they travel.
4. Around 25% of the HI respondents felt being discriminated when they are riding their primary modes compared to only around 8% of the LI respondents.
5. More than 80% of both respondents are willing to pay 15% to 30% more of the current fare just to avail of an STM.
6. The assessment of existing transport infrastructures by the HI respondents are generally higher than that of the LI respondents. These may not mean that the former are generally satisfied with the current transport infrastructures (i.e. roads) as they use them since most are using private cars.
7. The HI respondents' rating of the desired level of access to transport infrastructures are also generally higher than that of LI respondents which would mean the former desire for a much better transport infrastructures since the current level are still not satisfactory for them.

The following can be concluded about the study:

- The mean ratings of the HI respondents on *air pollution experience, level of security,* and *comfort* are on the positive end given that they are using mostly the private car as their primary transport mode while the LI respondents have higher mean rating of *physical activities* since they are using the public transport mode. Both respondents, however, aspires to have *low level of stress* when traveling.
- With regards to the feelings the respondents associate with the available modes, the HI respondents considered *Low Cost*, the most, and associate it with buses and jeepneys. This is followed by *Discomfort* and associated it to LRT and jeepney. In the case of LI respondents, *Freedom* is the most important consideration and associated it with the private car and this is followed by *Low Cost* but associated it with tricycles. Both respondents considered *Private car*, the most, as a transport mode of choice and both associated it with *Safety* as the number one feeling. This shows that most LI respondents aspire to own a car, being the mode with the highest number of positive feelings associated with it.
- The HI respondents have higher expectations than the LI respondents on the following transport system issues: (a) *access to activities*, (b) *range of modal options*, (c) *quality of modal options,* and (d) *affordability*. Furthermore, the HI respondents put higher relevance compared to LI respondents to the following: (a) *presence of trees,* (b) *access to parks*, (d) *access to STM*, and (e) *affordability of STM*.
- However, the LI respondents have higher mean rating than HI respondents on the actual and desired level of social interaction when using the primary transport mode given that the former are using public transportation.
- While in the case of the use of information (i.e. cellphones), actual and desired levels, for use in choosing alternative transport modes, both groups have equal mean ratings.
- In terms of the built environment, the HI respondents have higher mean ratings to car-related infrastructures while the LI respondents have higher mean ratings to public transport and bikeway-related infrastructures. However, there are other pedestrian and public transport-related infrastructures with no mean rating difference between the two. However, with respect to the level of importance of all these mobility infrastructure issues the HI respondents' mean ratings are significantly different than that of the LI respondents.
- The HI respondents have significantly higher mean ratings than the LI respondents with regards to the assessment of the current conditions of facilities near the home (e.g. *Park and squares, Cinemas, theatres, and museums*, *Health facilities*, *Grocery shops malls, and trade*, and *Educational facilities*). However, in terms of improving these facilities, facilities for basic necessities like *Health facilities*, *Grocery shops, malls and trade,* and *Educational facilities,* no significant difference was observed between the two respondents.

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