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Assessing Elements of Walkability in Women's Mobility

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Abstract – *Inclusivity and equality in the context of women's mobility has recently gained attention. This is due to the increased demands of women travelling with either private vehicles or public transportation. Inclusivity and equality planning is more than just providing women's coaches, special pregnant women seats, and women-only lines in public transportation. Walkability, as one of the most important keywords for mobility, must be enhanced by excellent walking conditions and facilities that are inclusive and equal. In this context, walking for women often relates to the issue of safety and security in addition to accessibility and connectivity. This paper describes different groups of women with divergent perceptions of safety reasons and security. Through the questionnaire survey we have establish a significant relationship between distance and the nature of activity regarding reasons for women walking to the LRT stations.*

Keywords: Walkability, inclusive, equality, women's mobility

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1.0 INTRODUCTION

The urban lifestyle has changed the way we travel and especially the way we think about walking. Technology has simplified our daily lives, including the way we walk. Now, we have Segway, a two-wheeled battery powered electric vehicle, Travelator, a moving walkway, and many other evolving technologies. Walking is not just a part of human nature, but also a means of mobility that provides many benefits to physical and mental health. Walking serves as a means to consolidate relationships in a community through communication, and allows get-togethers on the street, helping create a liveable city. This is all possible with walking. Despite that, walking is now more difficult as there are is an increased use of private vehicles to move around due to comfort, practicality, weather, and perhaps status. Hence, our lives have become even more complicated, not just affecting the way we move and the way we think about walking, but also the way we plan for walking. Providing excellent walking conditions with superior pedestrian facilities are key elements in providing a walkable city. Land uses should be connected by transit, while pedestrian spaces should be wide and connected. Although more attention is needed in terms of connectivity, over the years Malaysia has leaped forward and developed.

This paper discusses policies related to walkability, inclusivity and equality in relation to women's mobility in Malaysia. According to Perrotta et al. (2012), walkability is the healthier activities rather than non-walkable city because they allow people to use the mass transit, cycle, walk and less drive for the purpose of trips and it also contribute to the sustainable environment. Frank et al. (2006) defined walkability as derived from the human walking ability. While Landis et al. (2001) mentioned, walkability can be defined as the "quality and usability of a walking environment" supported with elements which include quality of walking, sidewalk and individual perception. Assessing walkability is also affected by several factors which were safety matters related to lighting, traffic, recreational facilities such as parks, trails and green space sidewalks and bike lanes. In the context of inclusive and equality, walkability means more than just walking in the city, but also the provision of adequate facilities people of all sorts of ability, gender, and age. However, we ought to ensure that inclusivity and equality in walkability also considers walking ability, safety and having a feeling of security to walk at any time to any place. This always concerns and relates to the female gender especially, as women feeling safety and security while walking is vital part of inclusive and equal transportation planning. In addition, inclusivity and being equal in a walkable city is not just about fairness in providing facilities for walking, but also giving the feeling of security and contentment, connection and feeling safe even when walking alone at night. It also means the ability of an elderly women or women with children being able to walk and use pathways in freedom and comfort any time of the day.

Walkability is also related to the accessibility of public transportation, as it is part of first and last mile to reach transit stations such as train station or bus station. Singh (2016) made clear that there are measuring factors contribute in assessing walkability as an option for the public transportation system. First, physical features include weather, building height, street width, sidewalk width and traffic volume. Second are urban design qualities such as imageability, legibility, linkage, complexity and human scale. The third factor includes individual reactions include the sense of safety, sense of interest, and sense of comfort. These key factors influence a person to walk, and in this context for a woman be able to walk without feeling insecure or worried. The feeling of insecurity can also come in the form of perception due to the condition of the surrounding area or just stigma. According to (Daamen & Hoogendoorn, 2003), stated that there are criteria of the transport needs, which are physical access in creating inclusivity and equality in women's mobility, safety and security and reliability play a major role in the context of walkability. Furthermore, human and environment influence the walking activities and it also closely related to the women mobility.

Researchers found that assessing walkability has a strong significant or connection related to the surrounding characteristics that contributed people to walk around the area. Gebel et al. (2009) stated, walkability refers to how 'friendly' an area especially for the people living in the community that connected with the pedestrians streetscape. In the context of urban environments with a mixture of densities and types of land uses create shorter distances between desired destinations for the purposes of trips, thus encourage people to walk for public transportation services. People tend to walk if it is easier, faster, or cheaper than driving. In the context of Malaysia scenario, Malaysia's "Government Transformation Programme" or GTP 2.0 is an initial move of the government initiatives in promoting inclusivity and equality mobility in Malaysia, such as by reducing the number of parking bays and converting these spaces for public use as effective pedestrian walkways (PEMANDU, 2016). Meanwhile, enforcement cameras have also been installed at identified hotspots and public transportation to monitor any violations of policies enacted for safety. The Malaysian Urban-Rural National Indicator Network on Sustainable Development (2017) strengthens this move with the

"Happiness Index" as another approach of local authorities to promote inclusivity and equality in the planning process. Every person has a different degree of perception and assessment of his or her local environment and factors such as insecurity, life satisfaction, and adequacy of facilities provided by the government.

In short, it can be determined that human behaviour and activity, influence the decision making whether if it encourages people to walk and use the public transportation or vice versa. Any type of activity will effect in their decision on what kind of transport mode that they will choose. Walking is not just our nature but it is most accessible, seam less and environmental way to travel. One of the best way to encouraged by improving the routes of the pedestrian walkway. Walking distance also plays a major role in assessing walkability city. Distance criteria can varies from shorter distances of less than 400 meters to longer distances of 1,500 meters which vary much depends on a person ability and willingness to walk. This paper surveys safety and perception about walking felt by women as a method to assess women mobility through their walkability.

2.0 METHODOLOGY

2.1 Instrument and Design Sample

A survey was conducted in November and December 2016 at nine Light Railway Transit (LRT) stations: Asia Jaya, University, Abdulah Hukum, Bangsar, Pasar Seni, Kampung Baru, Dato Keramat, Wangsa Maju, and Taman Melati. Stratified random sampling was used to select the samples according to the age, income, distance of walking, location and land use activities that affect respondents' choice to travel by walking. The objective of this survey is to understand and assess walking in the context of inclusivity and equality in women's mobility in particular areas.

The LRT stations were choosen based on rapid and dynamic growth of surrounding area, walking distance from surrounding land uses, LRT station location, LRT station facilities, and accessibility to public transportation service providers within the area. However, this study also had limitation to collect the data from the survey. 562 respondents were surveyed throughout the study. The survey only selected and evaluated women respondents walking to and from LRT stations. Meanwhile, this study emphasises women using the LRT in a few main groups: women from working groups, women travelling for social activities, women travelling to perform services, women travelling for shopping and women travelling for household errands. The major reason of selecting these variable groups is their significant and vigorous relationship with walking, especially in the context of inclusivity and equality in different women needs.

2.2 Data Collection and Analysis

The data gathered were statistically analysed using the SPSS. For descriptive analysis, frequency distributions were used. The type of correlation that we used is the bivariate correlation. From the sample, we have found that assessing walking in terms of the inclusivity and equality of women's mobility can be defined by specific characteristics such as income, distance, walking time, a location of the origin and destination. According to studies on assessing walking, it can be seen in other contexts and different perspectives such as design of the road, street connectivity, surrounding land use, and public facilities especially infrastructure and other factors reflecting general and equal women's mobility in Malaysia.

3.0 RESULTS AND DISCUSSION

Descriptive analysis and correlation were used to study the direction of the relationship between two variables and also to describe the strength of the results. The statistic obtained is Pearson's product-moment correlation (r). The details of explanation and discussion are provided in the following subsections.

3.1 Travel Time Average

According to the questionnaire results in Table 1, the researchers found that majority of the respondents travel less than 1 hour for work, shopping, social activities, services, house errands and other reasons. Using the descriptive data analysis, 81.3% had equal or less than 1 hour of average travel, whereas 15.3% had one to two hours and the rest had more than 3 hours per day. In the context of assessing walkability, travel of an average of less than 1 hour encourages women riders to walk from home to the LRT station for the purpose of the trip.

Table 1: Results on travel time average

Travel Time Average (hours)	Frequency	Percent	Valid Percent	Cumulative Percent
<1	457	81.3	81.3	81.3
1-2	86	15.3	15.3	96.6
>3	18	3.2	3.2	99.8
12	1	0.2	0.2	100.0
Total	562	100	100	

It was revealed that travel time average was influenced by factors such as travel time, distance between stations, and also alternative mode choice. Commonly, the single basic standard for the duration of walking is around 400 meters, depending on the factors as mentioned earlier.

3.2 Level of Safety While Walking

Table 2 highlighted the findings and descriptive data which include mean, standard deviation and 95% confidence intervals for the dependent variable for each variable. The results indicated the output of the one-way ANOVA analysis and significances between the groups. The results revealed that there is a statistically significant F (2,559) = 0.004. The results also showed that the highest mean reported was 1.54 (SD = 0.490) for ‘fairly safe’, while ‘very unsafe’ was 1.42 (SD = 0.564), and the remaining reported ‘very safe’ with mean equalled to 1.35 (SD = 0.501).

For further analysis, the data underwent multiple comparisons via Tukey’s HSD to compare the groups. Variables on ‘very safe’ and ‘fairly safe’ recorded showed statistically significant difference in terms of level of safety ($p<.003$). However, there are no statistically significant differences for ‘very unsafe’. In short, the researcher realised that majority of respondents chose ‘fairly safe’ due to the lack of proper lighting that connecting the buildings and areas and less of presence other people around the areas. However, on-going construction close to public facilities, especially during the night, and temporary construction barriers isolated certain areas.

Table 2: Results on level of safety

Level of Safety	*n*	Mean	Std. Deviation	Std. Error	95% CI for Mean	
					Lower Bound	Upper Bound
Very safe	98	1.35	0.501	0.051	1.44	1.64
Fairly safe	**379**	**1.54**	**0.490**	**0.025**	**1.30**	**1.40**
Very unsafe	85	1.42	0.564	0.061	1.30	1.55
Total	562					

(I) Level of Safety Walking Around LRT Station	(J) Level of Safety Walking Around LRT Station	Mean Difference (I-J)	Std. Error	Sig.	95% CI	
					Lower Bound	Upper Bound
Very safe	Fairly safe	0.187*	0.057	0.003	0.05	0.32
	Very unsafe	0.117	0.075	0.259	-0.06	0.29
Fairly safe	Very safe	-0.187*	0.057	0.003	-0.32	-0.05
	Very unsafe	-0.070	0.060	0.479	-0.21	0.07
Very unsafe	Very safe	-0.117	0.075	0.259	-0.29	0.06
	Fairly safe	0.070	0.060	0.479	-0.07	0.21

*The mean difference is significant at the 0.05 level

3.3 Crime Cases Related to Safety While Walking

This subsection looks more closely at the correlation between the purpose of trip and crime cases around the LRT stations. As defined by Pallant (2010), non-experimental research design closely related to the correlational techniques especially to seen the relationship between the variables. Together with this, correlation is used to describe the strength and direction of the relationship between two variables. In this subsection, interpreting a Pearson Correlation Coefficient (r) is presented. This study used the Pearson Correlation Coefficient (r) to measure the results. The results of the table below using the Pearson correlation may be represented as follows.

Based on Table 3, there is a strong positive correlation between purpose of the trip and a theft, robbery, physical assault and sexual attack. Based on the first variable, it was found that correlation between work and sexual attack or harassment had a higher value for positive correlation at r = 0.120. The second variable reported is a positive correlation between social activities and robbery at r = 0.258. This result shows that third variable between services and robbery has the highest value of positive correlation equal to r = 0.182. However, the fourth variable reported the highest correlation between shopping and robbery r = 0.255. Nonetheless, the last variable shows that household and robbery also had high values at r = 0.205.

According to the similar table, the higher value represents a positive relationship between the variables. As mentioned earlier, a positive correlation means that as one variable increase in value, the second variable also increases in value. Regarding the result above, it can be summarised that social activities and robbery reported of the highest value r = 0.258 while women walking around the area. This is because the distance of walking for the purpose of the trip such as social activities is too far from the residential area. However, location and the design of the road structure influence the type of crime that might happen in an area. It was clearly indicated that crime cases affected women for the purpose of the trip. Women feel unsafe walking to destinations especially when walking alone.

Table 3: Results on crime cases related to safety while walking (n = 562)

Purpose of Walking		Thief/ Pick Pocket	Robbery	Physical Assault	Sexual Attack/ Harassment	Sexually-Toned/ Nuisance Behaviour
Work	Pearson Correlation	0.117**	0.170**	0.089*	0.120**	0.022
	Sig. (2-tailed)	0.005	0.000	0.035	0.005	0.600
Social Activities	Pearson Correlation	0.108*	0.258**	0.142**	0.138**	0.056
	Sig. (2-tailed)	0.010	0.000	0.001	0.001	0.188
Services	Pearson Correlation	0.123**	0.182**	0.134**	0.165**	0.061
	Sig. (2-tailed)	0.003	0.000	0.001	0.000	0.151
Shopping	Pearson Correlation	0.149**	0.255**	0.121**	0.186**	0.049
	Sig. (2-tailed)	0.000	0.000	0.004	0.000	0.246
Household Errands	Pearson Correlation	0.143**	0.205**	0.113**	0.174**	0.022
	Sig. (2-tailed)	0.001	0.000	0.007	0.000	0.607

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Table 4 shows the results according to the purpose of the trip with the situation around the area. In this context, positive correlation which are other value variables indicates with the one variable to prove the good result. Results in the table also reveal that all the variables had positive correlations between people hanging around, poor lighting, dirty environment, vandalism graffiti and drunk or noisy people. For the variable work, it shows that poor lighting reported the highest value which is r = 0.178. Entertainment and poor lighting also recorded higher positive correlation with r = 0.265. Access to service reported r = 0.221 for the positive correlation with poor lighting. Furthermore, shopping also had positive correlation with the highest value of r = 0.239 and household errands reported r = 0.154 for the poor lighting. It can be concluded that all the variables had good positive correlations with other variables. However, it can be postulated that strong relationship between the variables reflects on the increased value with others.

Based on the results of analysis, it can be summarised that a positive correlation has a tendency to produce a positive linear correlation. Regarding the positive correlation, it can be postulated that social activities as the purpose of a trip and poor lighting reported the highest value r = 0.265 as compared to other variables. However, the impact of inclusive mobility is also supported with the same aspects of being well-connected and accessible by public transportation (Romero, 2015).

Table 4: Results on purpose of walking with issues and problem around the LRT station

Purpose of Walking		People Hanging Around	Poor Lighting	Dirty Environment	Vandalism Graffiti	Drunk/ Noisy People Around
Work	Pearson Correlation	0.118**	0.178**	0.144**	0.149**	0.167**
	Sig. (2-tailed)	0.005	0.000	0.001	0.000	0.000
Entertainment /Social Activities	Pearson Correlation	0.253**	0.265**	0.263**	0.235**	0.246**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
Services	Pearson Correlation	0.203**	0.221**	0.195**	0.127**	0.210**
	Sig. (2-tailed)	0.000	0.000	0.000	0.003	0.000
Shopping	Pearson Correlation	0.236**	0.239**	0.235**	0.192**	0.242**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
Household Errands	Pearson Correlation	0.145**	0.154**	0.123**	0.091*	0.113**
	Sig. (2-tailed)	0.001	0.000	0.003	0.030	0.007

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

4.0 CONCLUSIONS

The study has revealed perspectives of assessing walkability in the context of inclusivity and equality in women's mobility in Malaysia. Assessing women's responses about safety shows that safety is correlated with willingness to walk. In terms of inclusivity and equality of walking among respondents, facilities are well-established but remain fragile in terms of safety issues. So, are inclusivity and equality supported? According to the results and analyses, walkability can be measured in many aspects include safety, time of travel, travel time average, and purpose of walking. The analyses show that the level of safety for working women respondents is fairly safe.

As for crime cases while walking, social activities and crimes such as street robbery have a strong positive correlation with the highest of the values as compared to other variables. However, sexually-toned or nuisance behaviour had a negative correlation and did not influence the purpose of walking. Examples include noise nuisances such as playing loud music. The purpose of walking related to issues and problems around the LRT station also clearly shows that social activities and people hanging around have stronger positive correlation than other elements. Based on these results, all components or variables have a significant positive correlation.

The situation around the LRT station area influences the purpose of walking. It is recommended to encourage women to walk in the city by introducing women signals for pedestrian crossing as well as encouraging inclusivity and equality in women's mobility. Providing a 'Green Lady' pedestrian signal is a good approach to promote gender equality and this initiative was a "unique and rare" way to display gender equality (Davis, 2016). Note that walkability allows for a good relationship with the community and public in an area. It is important to note that this study considers the context of inclusivity and equality in women's

mobility with an emphasis on the elements of safety, the purpose of walking, and factors that influence crime in order to develop a physical, social, environmental, and economical solution to women's mobility issues in Malaysia.

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