



Walking Behaviour of Urban and Rural Residents

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Abstract

Walking behavior can be considered as one of the important factors in measuring the walkability level in neighborhood. Walking behavior has close interrelationships with walkability. This paper is based on a comparative study of walking behaviour of residents between urban and rural neighborhood. The method used in this study is known as walking distance test and the data were analyzed using the comparative approach. The findings show that there are slight differences of walking speed, walking time and walking speed between residents in the urban and rural neighborhood area.

Keywords: Walking behaviour; rural residents; urban residents; walking distance

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1.0 Introduction

Nowadays, the world is built towards the supremacy of the automobile as motorized vehicles are seen as the main mode of transportation to their desire destination. Although there are distinct advantages to that way of building and traveling, it does make walking much more difficult and often more unpleasant. Other than that walking activities also have a close relationship to a human being healthy. Studies by Ministry of Health in 2010 presented statistics showing that 60 per cent of Malaysia population is overweight. This can be argued that there are certain factors that contribute to low interest of Malaysia people towards walking activities. Studies by Alcaay & Bell (2000), found out that people who were provided with appropriate physical environmental setting will increase their walking behaviour.

2.0 Literature Review

Walking Behaviour

Different types of people will have different types of walking behaviour. There are many possible factors in measuring walking behaviour. According to Daamen and Hoogendoorn (2003), walking behaviour can be measured by walking speed, walking direction, walking experiences, group formation and density.

Studies conducted by Shahrol Mohamaddan (2010), suggested that walking behaviour can be measured by walking distance from one place to another, walking direction, walking time, walking experience and other behaviour factors that can be arise during the walking period. According to Karim (2008), different age groups have its own capability of walking for any distance depends of the fitness of the person. The fit pre-schoolers and the elderly have a limit to their strength and stamina compared to the teenagers and healthy adults. Walking distance, walking time and walking speed is related to one another. This is because according to Clarence Perry 1929, one of neighbourhood design principles is to locate the local facilities within 400 meter of walking distance which equal to 5 minutes of walking. Moreover, how walking speed related to walking time and walking distance is by its formula meter per second which is the distance over time taken to walk. In this research paper, only three factors are going to be used to testify the comparative study of walking behaviour between urban neighbourhood and rural neighbourhood which are walking distance, walking time and walking speed.

Walking distance

Walking distance is the fixed distance that can be travelled by foot. The unit of measurement for commonplace in the planning profession concept was often represented by a radius measuring 400 meter (Olson, 2010). The Neighbourhood Design introduced by Clarence Perry in 1929 illustrated the relationship between residential to non-residential components by walking distance. The walking distance proposed by Clarence Perry a maximum walking distance to local facilities with a radius of 400 meter within five minutes of walking time for families in the neighbourhood (Meenakshi, 2011). Neighbourhood Concept proposed by Clarence Stein in 1942 also suggested that the local facilities should be placed at the centre

of the neighbourhood unit within 400 meter of walking distance of all residents. According to Barton, Grant & Guise (2003), the accepted threshold for walking to local facilities is 400 meter while 800 meter is a suggested threshold for walking to a town centre.

In the Malaysian context, based on a planning report on a special development area in BerjuntaiBestari, Selangor the comfortable walking distance of the various age-groups within the duration of five minutes is different (APUDG, 2000). The walking distance for the elderly and pre-schoolers the maximum distance is 190 meter, for primary school children the distance is between 191 meter to 380 meter, for teenagers and adults the maximum distance is from 381 meter to 600 meter. More than 600 meter is considered as the uncomfortable distance for anyone to walk. Moreover, earlier studies done by Azmi and Karim(2011), in Shah Alam shows that resident tends to walk with the maximum distance of 200 meter or less only to reach their community facilities from their houses before they choose to drive. This argues that Clarence Perry 400 meter maximum walking distance is not always a suitable walking distance that can be used to design a neighbourhood area. This paper shall use the walking distance in the current guideline as the measurement to prove the average walking distance of residents in urban neighbourhood and rural neighbourhood in Malaysia.

Walking time

The walking distance depends on the free time a person has. Walking behaviour also can be classified into three walking time group namely regular walkers; are peoples who walk more than 150 minutes per week; irregular walkers who walk between 10 to 150 minutes per week; and non-walkers walk less than 10 minutes per week (Addy et al., 2004). The average walking time proposed by Barton, Grant & Guise (2003) to local community are as below:

Walking Distance	Walking Time
400 meter	Approximately 5 minutes
800 meter	Approximately 10 minutes
1 km	Approximately 12 minutes
1 mile	Approximately 17 minutes

According to expert interview done byAzmi and Karim (2012), the findings shows that in the context of walking time, the comfortable walking time for residents is 5 to 10 minute in reaching the community facilities provided in their neighbourhood area. According to Clarence Perry guidelines 5 to 10 minutes of walk equal to 400 meter of walking distance. In this study context, the walking time suggested by Barton, Grant &Guise (2003), Clarence Perry (1929) and Clarence Stein (1942) will be used as the current guideline to calculate the walking time for the study area.

Walking speed

Everyone walk at a different pace and people can choose to walk at a speed that they find most comfortable, there are several factors that influence a person's normal walking speed. These factors include a person's age, gender, levels of physical fitness, height and weight. According to Patricia (2010), the average male walking speed is higher as compared to the

average walking speed in women. Other than that, the average walking pace in senior citizens will be a bit lower, as compared to the average speed of walking in younger people. The average walking distance will increase as development becomes denser. According to Barton, Grant & Guise (2003), the average walking speed is 1.40meters per second. Individual speeds vary widely in the 2- 4 miles per hours range. People who walk more slowly tend to cause others to slow down.

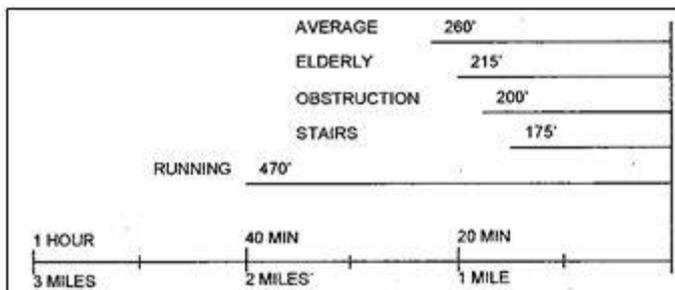


Fig. 1. Average travel speed, Accommodating the Pedestrian. Adapting Towns and Neighbourhoods for Walking and Bicycling.

(Source: Richard K. Untermaun, 2002)

3.0 Methodology

This paper is aims to compare the walking behaviour of residents in rural and urban neighbourhood in a tropical climate county such as Malaysia with the current guidelines from the literature review. This paper is a pilot study of an on-going master research to identify a suitable variable that can be used in the study. The study is conducted in an urban neighbourhood area such as Shah Alam and Putrajaya while Sabak Bernam is taken as the location for rural neighbourhood area. The survey conducted is known as the walking distance test whereby; the tools utilized were the professional measuring wheel and the stop watch to calculate the walking distance and the time taken for residents to walk. The respondents consist of three different resident groups which are primary school children, teenagers/adults and elderly. The primary school children group consist of residents from ages 7 years old to 12 years old. Meanwhile, the teenagers/adults group consist of residents' age between 13 years old to 60 years old. Elderly group consists of residents' age 61 years and above. The data were analysed using the comparative approach whereby, the raw data from the survey field are compared with the data from current guidelines and index found in the literature reviews and the background study. According to Carpi and Egger (2008), comparative approach includes both retrospective studies that look at events that have already occurred, and prospective studies, that examine variables from the present forward.

4.0 Analysis

The results compare the walking behaviour of rural neighbourhood and urban neighbourhood with the current guideline to measuring walking distance, time and speed. The findings were

based on descriptive analysis comparing current guideline based on the previous literature review with survey data collected.

Walking distance

For walking distance, the current guideline used which proposed the same average walking distance of 400 meter in five minutes. Based on table 1 it shows that male teenagers and adults achieved highest average walking distance with the distance of 407 meter while the lowest average walking distance is female elderly with the distance of 355 meter. These situations happen because the distances residents can walk within 5 minutes are depending on their physical ability and stamina. Older people tend to have lower physical ability compare to teenagers/ adults or primary school children.

Other than that, the walking distance can be analysed in two different contexts, either in the health context or in neighbourhood planning design context. Table 2 shows the comparison of 400 meter waking between current guidelines with the average five minutes walking for different group of residents in the study area. The result indicated that primary school children achieved 400 meter of average of walking distance similar to the proposed walking distance in guidelines.

Unfortunately, both age groups which are the elderly/pre-schooler and teenagers/adults group achieved less distance than 400 meter within 5 minute of walking time. In term of health context, the longest walking distance residents can walk within 5 minute of walking, indicated the healthier their body condition. It is different from the context of neighbourhood planning design, as walking distance for every age group must be taken it to consideration because older citizen tends to achieve shorter distance of walking compared to younger people within 5 minutes of walking. In this case, the elderly group achieved the shortest distance with only 368 meter within 5 minutes of walking.

Table1. The walking distance for five minutes walking for the different group of residents

Age groups	Urban Neighbourhood		Rural Neighbourhood		Average Walking Distance (meter)
	Putrajaya	Shah Alam	Average	SabakBernam	
The elderly and pre-schooler					
Male	386m	380 m	385m	377m	381m
Female	335m	383 m	333m	376m	355m
Primary school children					
Male	428m	424m	374m	426m	400m
Female	367m	358m	363m	438m	401m
Teenagers and adults					
Male	378m	377m	378m	436 m	407m
Female	377m	378m	378m	380 m	379m

Table 2. Comparison 400 meter walking between the current guidelines with average five minute walking for different group of residents

Age-groups	Average walking distance					This study (meter)
	Current Guidelines (meter)					
	*Clarence Perry (1929)	*Clarence Stein (1942)	APUDG (2000)	*Barton, Grant & Guise (2003)	*Green Neighbourhood by JPBD (2011)	
The elderly and pre-schooler			190m			368m
Primary school children	400 meter	400 meter	191m - 380 m	400 meter	400 meter	400m
Teenagers and adults			381m - 600 m			393m

*Note: similar walking distance for all age groups

Walking Time

For walking time, the current guideline use is based on average walking time to local community. For this analysis, the 400 meter walking distance is used as a baseline to identify whether each age group of residents can achieve five minutes of walking within that distance. Table 3 shows that only the female resident for elderly/ pre-schoolers group in both neighbourhoods did not achieve the duration of 5 minute of walking within 400 meter.

The walking time for walkers is related to their walking speed; the speed that the pedestrian likes to keep in undisturbed circumstances since pedestrians cannot walk at the exact speed. Moreover, it also depends on the presence or non-presence of obstacles such as space, pedestrian space, and visual appropriateness. The time taken for walking will be shorter if the space to walk is free from barrier. Moreover, there are slight differences of average walking time between current guidelines with the walking time for different group of residents in the study area. The primary school children and teenager/ adults group of residents have the walking time of 5.20 minute and 4.50 minute. In neighbourhood planning design context, the less time a resident take in achieving shorter distance of walking in a neighbourhood area, the higher is the success in designing towards walkability neighbourhood.

Table 3. Comparison between current guidelines with the current walking time for different group of residents

Age-groups	Average Walking Time			*This study (meter)**
	Current Guidelines (meter)			
	*Clarence Perry (1929)	*Clarence Stein (1942)	Barton, Grant & Guise (2003)	
The elderly and pre-schooler			400 m - 5 minute	6.30
Primary school children	5 minute	5 minute	800m - 10 minute	5.20
Teenagers and adults			1km - 12 minute 1 mile - 17 minute	4.50

* Note: time taken for 400m distance of walking

** Note: Total average walking time has been calculated earlier

Table 4. Walking time between urban and rural residents for different group of residents

	Time taken to walk (per min)					
	The elderly/ pre-schoolers		Teenagers / Adults		Primary School children	
	Male	Female	Male	Female	Male	Female
Urban Neighbourhoods						
100m	1.32	2.32	1.16	1.22	1.27	1.30
200m	3.10	3.43	2.35	2.41	3.10	2.57
300m	4.16	5.21	3.52	3.55	4.20	4.31
400m	5.45	7.05	4.72	5.07	5.35	5.48
500 m	7.30	9.01	6.35	6.28	7.21	7.02
600m	8.27	10.58	7.20	7.06	9.26	8.05
Rural Neighbourhoods						
100m	1.34	2.25	1.18	1.15	1.11	1.26
200m	3.09	3.33	2.34	2.31	2.21	3.10
300m	4.10	5.15	3.47	3.49	3.51	4.08
400m	5.51	7.10	4.67	5.12	4.68	5.25
500 m	7.22	9.00	6.28	6.27	6.24	7.27
600m	8.13	11.00	7.07	7.08	7.02	8.23

Walking speed

For walking speed, the current guideline use is based on average walking speed from Barton, Grant & Guise (2003) which is 1.40 meters per second. The walking speed usually is calculated by dividing walking distance with the time taken for walking. According to earlier literature review, female walker tends to walk slower than male walkers but the findings of shows the different picture. Table 5 shows the comparison of average waking speed in guidelines and from the data collected in a survey. From the table it shows that the fastest age groups walk is male teenagers and adults for rural neighbourhood with the speed of 1.45 meter per second. Female primary school children achieved fastest walking speed in urban neighbourhood area with 1.46 meter per second.

Table 5. Comparison between current guidelines with the current walking time for different group of residents

Age-groups	Average walking speed				
	Current Guideline (m/s) Barton, Grant & Guise (2003)	This study (m/s)			
		Urban Neighbourhood		Rural Neighbourhood	
		Male	Female	Male	Female
The elderly and pre-schooler	1.4 m/s	1.28	1.11	1.25	1.25
Primary school children		1.25	1.46	1.42	1.21
Teenagers and adults		1.26	1.26	1.45	1.27

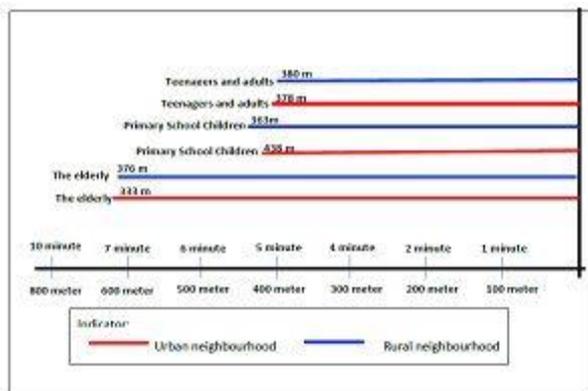


Fig. 2. Comparison of male average walking speed between urban and rural neighbourhood by a different group of residents

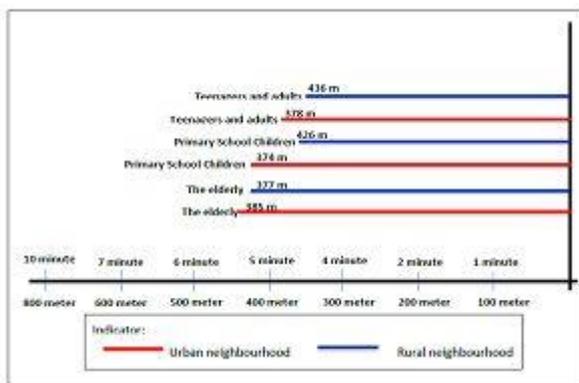


Fig. 3. Comparison of female average walking speed between urban and rural neighbourhood by a different group of resident

Moreover, urban neighbourhood walks faster than rural neighbourhood from the figure explained earlier. Walking speed by genders show that female walk faster than male for this study. Moreover, the slowest walking speed in urban neighbourhood is the female elderly/ pre-schooler groups and primary school children in rural neighbourhood. In urban neighbourhood the slowest walking speed is 1.11 meter per second while in rural neighbourhood the slowest walking speed is 1.21 meter per second. Figure 2 shows the comparison of male average speed of walking between rural and urban neighbourhood while figure 3 shows the comparison of female average speed of walking between rural and urban neighbourhood. The X-axis in the figure shows that the average time taken that residents

should walk for every 100 meter of walking distance. For walking speed factors, it can be concluded that walking speed is related to walking time and walking distance.

5.0 Discussion

Based on the analysis, the major finding shows that in term of walking distance only the primary school children group achieved five minutes of walking time within 400 meter of walking distance. For teenagers/adults groups there are slight differences of average walking distance from the guidelines average walking distance. There is a significant difference for the elderly groups of residents. This can be argued that in the context of designing the neighbourhood design towards a walkable environment the average walking distance for every different age group of residents must be taken into consideration. This is because different age groups have different physical ability. For the most convenient the accessibility standards to local facilities in neighbourhood design, the shortest distance the residents are able to walk should be taken in consideration to encourage high walkability level within the neighbourhood. In terms of walking time, it is proven that it took 5 minutes to walk a distance of 400 meter to local in a tropical climate like Malaysia. Eventually, it still depends on the walking speed residents can achieve while performing the walking speed. This is because walking speed is also affected by the obstacles walker faces during walking activities and density of people within the walking space itself.

6.0 Conclusion and Recommendation

This paper concluded the slight differences of walking behaviour factor which are walking distance, walking time and walking speed in urban neighbourhood at Putrajaya and Shah Alam and rural neighbourhood at Sabak Bernam compared to current guidelines. In the future, there are other walking behaviour aspects need to be taken into consideration such as walking experience to make the study more robust as this paper only analysed the comparison of three walking behaviour aspects which are walking distance, walking time and walking speed. Furthermore, this study is helpful in comparing the Malaysian experience with the western literature and also applicable to the concept of accessible distance to community facilities.

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