

# ASSESSING FACTORS AFFECTING UNIVERSITY STUDENTS' PREFERENCE OF WALKING; COMPARING UNIVERSITY OF MORATUWA & UNIVERSITY OF SRI JAYWARDENEPURA

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## Abstract

This research has been investigated factors affecting students' preference of walking comparing two universities which have distinct characteristics regarding the students' preference of walking. First developed framework including factors affecting for walking which have been found through reviewing past research studies. The framework has included three main features: Functionality, Safety and Aesthetic. Under the each feature, a set of elements have studied. Distance and duration elements and safety feature are significant for the decision of walking of university students over the other transportation modes available. Contribution of road conditions such as pavement availability, aesthetic aspects, shading trees, pollution and cleanliness and traffic volume and speed are not highly significant to decide student walking although it highly matters for decide leisure walking. Therefore this research has been revealed the importance of assessing the factors which contribute the decision of walking of university students. This will be helpful to decide future strategies for improve walking.

**Keywords:** *Walking Preference; University; Functional; Safety; Aesthetic*

## 1. Introduction

Countries have been begun as small walk-able cities and grown through the help of the different mode of transportation over years. The typical modes of passenger transportation found in most cities today can be generally categorized into walking, cycling, public transportation, and the private automobile. Usage of the private vehicle has been rapidly growing especially in urban areas of developing countries that have led to many environmental and socio-economic issues such as congestion, high fuel consumption and air pollution. Traffic congestion and delays continue to be the problem in mega, large and even in small cities, due to the excessive volume of private car; an important strategy to reduce the use of the private car is by offering high quality public transport services and by encouraging pedestrian mobility. Supporting pedestrian mobility is a key factor in sustainable urban development however peoples' preference; willingness to choose the walking is different in countries, regions, personnel behaviors and due to many other reasons.

Pedestrian mobility is generally important at the urban scale, but also inside a large part of an urban area that is a university campus. Eboli et al (2013). Factors influence peoples' walking were studied by many researchers however there are very few in the Asian region and no studies found on the walking preferences of university students in Sri Lanka. We believe that the results of the study could be helpful for define strategies on planning for sustainable transportation which can be adopted pedestrian planning in other urban areas. The main objective of this research is to identify key factors affecting university students' preference of walking and assessing these factors to identify the significance of each factor for the contribution of walking.

## 2. Why Do We Need to Walk?

Increasing the Green House Gas concentration in the atmosphere has led to climate change and due to that world is experiencing a tremendous number of natural disasters that cost the number of human and property losses. In the global context, the transportation sector accounts for 24% of global greenhouse gas emissions in the year 2019. Greenhouse gas emissions from this sector primarily involve fossil fuels burned for road, rail, air, and marine transportation. CO<sub>2</sub> emissions from transport (% of total fuel combustion), in Sri Lanka, were 47.73% as of 2014. IEA Statistics (2014). Nevertheless Sri Lanka incurs a huge economic loss of around 40 billion Rupees annually due to road traffic congestion and air pollution with too many vehicles on a limited road network. Unless the authorities take measures to modernize and improve public transport, the country cannot curb this massive, unproductive cost. Amal S. Kumarage (2010).

According to research findings physical activities such as walking is associated with numerous health benefits such as such as obesity prevention, reducing risk for cardiovascular disease, diabetes and certain cancers, and improvements in mental health and sleep. Duncan et al (2016). Further, it helps to create equitable, livable, cost-effective, environmentally sound, and safe cities. Many countries have been identified walking is an environmentally friendly alternative transport to motorized transport. Supporting pedestrian mobility is a key factor in a sustainable urban development. However there is few literature on how far people actually walk or about how street design affects peoples' willingness or capacity to access desired destination on foot.

## 2.1 WHY DO PEOPLE WALK?

People practice walking for different purposes and it mainly combined with leisure, personal care, transport, study, and work activities Armstrong and Bull (2006) and the World Health Organization., (2002). In the US, Canada, and Europe, walking is the most common form of leisure-time physical activity. Gilmour (2007), Kenyon et al (2002) Pucher and Dijkstra (2003). In the U.S and likely in Australia, a major reason for walking in urban areas, is walking to and from transit Besser and Dannenberg (2005); Agrawal and Schimek (2007)., Besser and Dannenberg (2005) find that "Americans who use transit spend a median of 19 minutes daily walking to and from transit".

Walking was the only available land transportation mode available in ancient Sri Lanka, only kings and high ranked officials rode horses. Public transportation was introduced in 1907 as an owner regulating service and there was no regulation and un-availability of a good road system it was not much popular Manukulasooriya (1979), Pabasara et al (2016). However, with the introduction of open economy, dramatic changes were occurring in the country. Demand for the private vehicles was increased dramatically and road systems were developed. There are more than 6 million vehicles registered Department of Motor Traffic, Sri Lanka, (2016), and the active vehicle fleet are about 5 million, which is a three-fold increase with respect to the year 2000 INDCs, (2016). Walking is practicing by Sri Lankans for many days to day purposes still it is not the most popular mode of transportation in the country.

## 2.2 FACTORS INFLUENCE THE WALKING

Mahalwat et al (2007) state that economic factors such as travel cost, income, expense etc. and demographic factors such as gender and ethnicity are important for the decision of walking. Kim et al (2011) divided factors influence on walking in to two categories; a physical environment which consist of traffic, sidewalk, network and safety elements and human subjective elements are ones that could be differently represented depending on individual performances., However, there is very little literature on how far people actually walk or about how street design affects peoples' willingness or capacity to access the desired destination on foot. Until the mid-1990s', pedestrian behavior was virtually ignored in the transportation and planning literature. Yet micro-scale urban design and environmental factors were often ignored Agrawal et al (2008).

Distance: According to the study of Olszewski and Wibowo (2005) average walking distances is more than 600 meters to transit in Singapore and over 40% of transit riders in Toronto residing over 300 meters distance from transit. Alshalalfah and Shalaby (2007). Distance matter work, study, commercial transit-oriented walking. The average distance people would like to travel only 500m or less than 1 km for this type of trip purpose. Office people, students like go to offices, schools, and universities with a fresh mind without tired in the morning time because they need to spent the whole day at offices, schools and universities. Some office places, large transit stations provide facilities to have a bath to encourage walking.

Duration: Same as the distance, duration matter to increase work, study, transit-oriented walking. These types of trip purposes need to be faster than leisure, shopping walking. According to the

research study by Hewawasam et al (2013) the survey results conclude that shorter distances and lower travel time are significant for the pedestrian movements. The average time duration people would like to spend work, study trip purpose 6 minutes or less than 10 minutes.

**Availability of Infrastructure:** Availability of infrastructure facilities such as sidewalk or footpath boost people's perception of walking. Some researchers have been found sidewalks to be significantly associated with travel walking. Forsyth et al (2008). The landscape associated with sidewalk especially large trees with shades, benches to sit, and rest attract more people to walk. Leisure walks tend to increase with this type of infrastructure availability. Whereas walking to school has been found to increase where there are sidewalks along main roads. Ewing et al (2004); crossings, an absence of busy roads. Giles-Corti et al (2009).

**Safety:** Hence sidewalk footpath availability increases children and their parents' perception of walking considering safety. Safety from crime at day time. Hawthorne (1989) lighting at night time is important factor to decide people's perception of walking. Whereas unappealing environmental qualities included air pollution, litter and garbage, dangerous street crossings, traffic noise, poorly maintained footpaths, and the presence of skateboarders and cyclists on footpaths discouraged people's view of walking.

**Environment factors:** Many researchers has identified environment factors, such as visual attraction, pollution, and cleanliness are less important factors for work, study purposes walking, as distance and duration. Hewawasam et al (2013), although they are important for the leisure walking that increases the quality of the experience. As state by Ranasinghe et al (2013), pedestrianization has become an integral part of the sustainable modern urban design, where pollution-free, convenient, safe, and comfortable pedestrian facilities are ensured. The National Consumer Council in the The United Kingdom reported that a pedestrian environment should be: clean and visually attractive, free from conflict with and the threat from vehicles and the side effects of traffic, such as noise and pollution, comfortable and convenient, and personal safe. National Consumer Council (1987).

**Policies and Practice:** Urban planning and transport policies and day to day practice provide additional insights into factors that could affect patterns of people walking. Among urban design and planning agencies, the policy focus is on the creation and development of "healthy" or "live-able" communities. Transport agencies, on the other hand, are primarily concerned with the transportation of goods, the management of traffic, and only more recently has their attention turned toward the provision of routes for people to walk and cycle. Pikora et al (2012). Policies and practice are vital factors to encourage people's perception of walking. At presently most of the countries have been taking actions to promote walking.

Considering the walking preference of students Mahalvat et al (2007) state apart from the economic and demographic factors, travel time is also a significant factor for students in selecting travel mode. Parisi and Hondorp (2005) have shown that distance, traffic, and crime are three key factors preventing students from walking/ biking to school. Also Zhou et al (2009) found that factors such as distance, safety, climate pathways, time, violence or crime affect children's' walking or biking. Rates of walking to school vary widely across the globe. Less than 15% of US schoolchildren walked or biked to school in 2001. Martin and Carlson (2005). This compares with a walking rate of approximately 50% for British children in 1999–2001 and 27% of children in Melbourne, Australia in 1993–1996. Ampt (1996); Pooley et al., (2005). However, there is no literatures are available regarding preferences or statistics on the walking of Sri Lankan students. The notion of what we can be developed reviewing the literature is walking has linked with every kind of activity.

### **3. Study Area**

Both universities selected for the study are located in the Colombo district which is the capital economic center in Sri Lanka. The land use pattern is urban. Climate is tropical; average annual temperature 26.9 °C and the average annual rainfall is 2516 mm (Department of Meteorology, Sri Lanka) and the terrain is flat around both universities. Although other environmental factors such as

shading trees, visual cleanliness, socio-economic and physical features such as the built environment is different. There are approximately 10,000 students in the University of Moratuwa (University of Moratuwa official web site) and about 13,000 students in the University of Sri Jayewardenepura (University of Sri Jayewardenepura official web site) both undergraduates and postgraduates. There are many travel mode options available for both universities' students including, walking, biking, driving alone, and taking a bus.

*University of Moratuwa*

University of Moratuwa (UOM) is located in Katubedda, Moratuwa, facing the 255 bus route. It has more than 1km distance from Galle Road and a continuous 255 bus supply, presented in figure 1. In addition to that Molpe bus also has been running between University and Kutubedda Junction frequently. Therefore the majority of students have been using 255 buses to come to the university from Katubedda Junction. Whereas students are starting to walk onward Mola Road. It has approximately 500m distance between Mola Road and University.

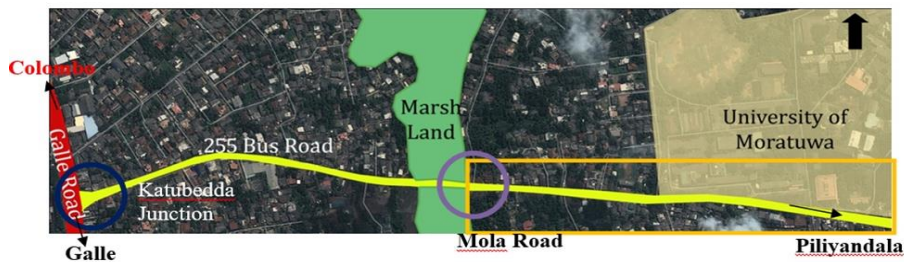


Figure 1, Location Map of UOM (Source: Author)

*University of Sri Jayewardenepura*

University of Sri Jayewardhanepura (USJP) is located in Gangodawila, Nugegoda close to Sri Jayewardenepura Kotte the capital city of Colombo. It has approximately 500m distance from Wijerama Junction to University figure 2). It has only 2 buses run via university in between Wijerama Junction and Piriwena Junction.



Figure 2, Location Map of USJP (Source: Author)

**4. Methodology - Assessing Student Walking Practices**

Based on the literature review, a framework has developed for assessing students' preference for walking, presented in figure 3. The framework has three key features: Functional, Safety, and Aesthetic and under each feature, there are a set of elements. The below chart included elements that were considered under each feature to assess the student walking practices. Field verifications were conducted on walking practices of students in the University of Moratuwa and the University of Sri Jayewardenepura.

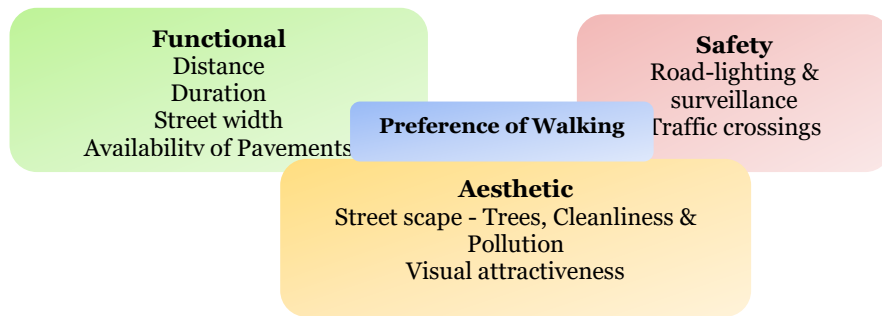


Figure 3, Framework for Assessing Student Walking (Source: Author)

Data were collected through a short questionnaire survey. 150 university students were selected randomly from each university and examined their transportation mode and reasons to select or not to select walking according to the framework.

## 5. Results and Discussion

According to the field observations number of students practicing walking at the University of Sri Jayewardenepura from Wijerama junction to university is higher compared to the University of Moratuwa. It is a unique feature at the Soratha road always full of University students walking here and there while most of the students from the University of Moratuwa are using 255 buses to reach the university. Why do the University of Sri Jayewardenepura students choose to walk and why the University of Moratuwa students do not choose walking option to reach to the university was evaluated using the proposed framework and results are discussed below.

As per the analysis University of Moratuwa, from 150 students surveyed, 55 students were selected walking as a transportation mode. As a percentage it is 37%, among that 20% used Mola road to reach the university. University of Sri Jayewardhanepura students 97 students selected walking rather other transportation modes. As a percentage it is 65%. .

### 5.1 FUNCTIONAL FEATURES

**Distance:** Under the functional feature first element is distance. Katubedda Junction to University of Moratuwa has approximately 1km distance whereas Wijerama Junction to Jayewardenepura University has 500m distance. So it is very apparent students of Jayewardenepura have more walking preference than Moratuwa because average distance people tend to walk is around 500m. Students of Moratuwa also have been starting to walk on ward Mola Road. Students who are settled close to Mola Road have been practicing walking at presently.

**Duration:** Duration also same like the distance to walk 1km distance takes more time whereas to walk 500m distance takes less time. Hence it has proved that lesser distances and durations encourage people participation of walking through comparative analysis of these two universities.

**Street width:** Both of roads have two lanes. In terms of width both of the roads does not have any vast different. But the 255 bus road condition is good than Soratha road.

**Availability of pavement:** The 255 bus road has separated bicycle lane while Soratha Road new pavement construction works are going on by the time of study. Condition of the roads are shown on image 1 and 2.

**Traffic volume and Speed:** Both of the roads do not have high traffic. Although during the peak hours there is a traffic congestion near Wijerama junction on the high level road, not towards the



university. On street parking is common to both roads. Vehicles are parked in both sides of the roads obstructing pedestrian lanes.



Image 01: The 255 Bus Road.



Image 02: Soratha road

## 5.2 SAFETY

**Road lightning and surveillance:** Road lightning is available in both roads but surveillance systems are not. However on the both sides of the Soratha road there are dense built areas; including bookshops, food restaurants and communications and they have personnel surveillances. Therefore students tend to walk in the Soratha road without fear because they feel safe whereas the 255 road condition is other way.

**Traffic Crossings:** Both roads have standard road crossings in good condition. In terms of traffic crossings both of the roads are secured (image 3 & 4).



Image 03: Road crossings - 255 road



Image 04: Road crossings - Soratha road

## 5.3 AESTHETIC

**Availability of shading trees:** Both roads do not have continues stretches of shading trees only few trees are existing.

**Cleanliness and Pollution:** Based on the visual observations both roads are polluted with litter along the road side however 255 road is better than the Soratha road.

**Visual Attractiveness:** The 255 road is going through a marsh land therefore 255 road has nice views than the Soratha road.

## 6. Conclusion

This study investigated the factors affecting people preference of walking as a leisure, work, transit, study and shopping activity through past research works. Built environment, distance, duration, availability of infrastructure, safety and policies and practices are the main factors that enhances the

people preference of walking. The research assessed key selected factors that affect the walking preferences of university students comparing two universities having two distinct characteristic in terms of student preference of walking.

According to the findings it is obvious lesser distance and less time attract more students to walk. Therefore distance and duration has significant contribution to determine walking. Distance and duration highly matters of selection of walking for purpose like studying. If we compare walking as leisure activity no arguments the 255 road attract more walking people than the Soratha road. The 255 road also attracted more walking students onwards Mola road that is the desirable distance of student to walk for the purpose of study. In terms of road conditions and aesthetic difference of two roads are not much significant as distance and duration. But we can't avoid these features although contribution is less. To some extent these factors also contribute to student perception of walking.

Another significantly contributed feature to determine walking is safety. Safety in terms of crimes is big threat to reduce walking behavior of people. Not only the crimes, availability of lights, traffic and crossings also need to be considered under the safety. The findings have been revealed that the Soratha road is better than the 255 road.

In addition to these factors availability of bus service also matter for student decision of walking. 255 buses are frequently available at the Katubedda Junction. As a result of that students tend to use bus service to come university than walking.

Assessing those factors is vital in many ways. The study can be further developed by assessing walking preferences with another university in different physical, demographic and socio-economic features. Policy makers can be used these findings to develop policies to encourage people perception of walking. Urban Planners can be developed strategies to encourage people perception of walking identifying situation properly.

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## 8. References

- Agrawal, A. W., Schlossberg, M. & Irvin, K. 2008 *How far, by which route and Why? A Spatial Analysis of Pedestrian Preference*, Journal of Urban Design, Vol 13, No1, 81-98, February 2008.
- Agrawal, A. W., Schimek, P 2007 *Extent and correlated of walking in the USA*, Transportation Research Part D Transport and Environment 12(8): 548-563., December 2007
- Ampt, E., 1996. *The travel of children in perspective: their exposure to the risk of accident*. In: Hensher, D., King, J., Oun, T.H. (Eds.), Proceedings of the Seventh World Conference on Transport Research, vol. I. Pergamon Press, Oxford, pp. 343–356
- Alshalafah, B., Shalaby, A. S 2007 *Case Study: Relationship of Walk Access Distance to Transit with Service, Travel, and Personal Characteristics*, Journal of Urban Planning and Development 133(2), June 2007.
- Armstrong, T., Bull, F 2006 *Development of the World Health Organization global physical activity questionnaire (GPAQ)*. Journal of Public Health, 14(2), 66–70
- Besser, L. M., Dannenberg A. L 2005 *Walking to Public Transit Steps to Help Meet Physical Activity Recommendations*, American Journal of Preventive Medicine 29(4): 273-80, November 2005.
- Clark, A, F, Scott, D, M 2013 *Does the social environment influence active travel? An investigation of walking in Hamilton, Canada,* Journal of Transport Geography  
Department of Meteorology, Sri Lanka (accessed 4January 2020)  
Department of Motor Traffic, Sri Lanka (accessed 4January 2020)
- Duncan, D. T., Meline, J., Kestens, Y., Day, K., Elbel, B., Transande, L., Chain, B 2016 *Walk score, Transportation Mode Choices, and walking Among French Adults, A GPA, Accelerometer, and Mobility Survey Study*, Int. J. Environ. Res. Public Health 2016, 13(6), 611
- Eboli, L., Mazzulla, G., Salandria, A 2013 *Sustainable mobility at a University campus; Walking Preference and the Use of Electric Minibus.*, International Journal of Transportation., Vol 1., No 1, pp 21-34.,

- Ewing, R., Schroerer W., Greene W 2004 *School Location and Student Travel Analysis of Factors Affecting Mode Choice*, Transportation Research Record: Journal of the Transportation Research Board, January 2004.
- Forsyth, A., Oakes, M. J. H. O. M., Schmitz K 2008 *Design and Destinations: Factors Influencing Walking and Total Physical Activity* Urban Studies 45(9), August 2008
- Gerike, R. 2011 'Infrastructure for walking and cycling' *The SCP Knowledge*
- Giles-Corti, B., Ketty, S.F., Zubrik, S.R and Villanueva, K.P 2009 *Encouraging walking for transport and physical activity in childer and adolescents: how important is the built environment?*, Sports Med.; 39(12): 995-1009.
- Glimour, H 2007 *Physically active Canadians* Health reports/ Statistics Canada, Canadian Centre for Health Information 18(3): 45-65.
- Hawthorne, W. 1989 *Why Ontarians walk, why Ontarians don't walk more: A study of the walking habits of Ontarians*. Ontario: Energy Probe Research Foundation
- Hewawasam, H. U. C. P., Bandara, S.,Wirasinghe, S.C 2013 *Analysis of Factors Affecting Pedestrian Route Choice.*, Transport Research Forum, August 2013.
- Sideris, A L. 2006 *Is it Safe to Walk? Neighborhood Safety and Security Considerations and Their Effects on Walking*, Journal of Planning Literature., February 2006.
- Kenyon, S., Lyons, G., Rafferty, J 2002 *Transport and social exclusion: investigating the possibility of promoting inclusion through virtual mobility*. Journal of Transport Geoghrapy, Volume 10, Issue 3, Pp 207-219
- Khalil, N, S 2013 *Factors Affecting Students Walking to School: Case Study of Two Middle Schools in Lincoln*, Community and Regional Planning Program
- Kumarage, A. S 2010 *Review of Sri Lanka Transport Sector*
- Kumarage, A. S 2012 *Sri Lanka Transport Sector Policy Notes*, World Bank Sri Lanka
- Kim, S. Joo, Y. J. and Park, S. H 2011 "Pedestrian Path Findings using Multi-Factors Affected Walking", Proceedings of the Geospatial World Forum, January 18-21; Hyderabad, India.
- Legare, E 2009 'Walking and Cycling International Literature Review,' Department of Transport Walking and Cycling Branch
- Mahalawat, M. and Rayan, S 2007 "Examination of Student Travel Mode Choice", Proceedings of the 86th Annual Meeting of the Transportation Research Board, (2007) January, Washington DC, USA.
- Manukulasooriya, R. C. D.D 1979. *Transport in Sri Lanka in ancient & medieval times. The earliest kingdom in Sinhala kingdom*. Vol.24,p.50
- Martin, S., & Carlson, S. 2005 *Barriers to children walking to or from school—United States*, MMWR Morbidity & Mortality Weekly Report, 54 (38), 949–952.
- McDonald, N, C 2008 'Household interactions and children's school travel: the effect of parental work patterns on walking and biking to school', Journal of Transport Geography, pp 324-331
- Millward, H, Spinney, J, Scott, D 2013, 'Active-transport walking behavior: destinations, durations, distances', Journal of Transport Geography, pp 101-110
- Ministry of Mahaweli Development and Environment Sri Lanka, August 2016, *Readiness Plan for Implementation of Intended Nationally Determined Contributions (INDCs)*, pp 15-28.
- National consumer council, United Kingdom, 1987
- Olszewski, P. S., Wibowo, S., 2005 *Using Equivalent Walking Distance to Assess Pedestrian Accessibility to Transit Stations in Singapore*, Transportation Research Record Journal of the Transportation Research Board 1927(1): 38-45., January 2005
- Pabasara, G. A. & Budović, A 2016, *Development of Transport Systems in Sri Lanka.*, University of Belgrade., Belgrade
- Pikora, T, Corti, B,G, Bull, F. Jamrozika, K, Donovan, R 2003 'Developing a framework for assessment of the environmental determinants of walking and cycling', Social Science & Medicine, pp 1693-1703
- Parisi, D. and Hondorp, B 2005 "Transportation Professionals Get Involved with Safe Routes to School", ITE journal, pp. 41-46.
- Pooley, C.G., Turnbull, J., Adams, M 2005. *The journey to school in Britain since the 1940s: continuity and change*. Area 37 (1), 43–53.
- Pucher, J., Dijkstra, L 2003 *Promotinf Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany*, American Journal of Public Health 93(9), October 2003
- Ranasinghe, G. Amarawickrama, S, Rathnayake, R, Randeniya, T, Rathnasiri, S 2013 *A Model for Assessing the Level of Walkability in Urban Neighborhoods in Sri Lanka*. Available from: [https://www.researchgate.net/publication/280830213\\_A\\_Model\\_for\\_Assessing\\_the\\_Level\\_of\\_Walkability\\_in\\_Urban\\_Neighborhoods\\_in\\_Sri\\_Lanka](https://www.researchgate.net/publication/280830213_A_Model_for_Assessing_the_Level_of_Walkability_in_Urban_Neighborhoods_in_Sri_Lanka) accessed May 06 2020.
- Tight, M, Timms, P, Banister, D, Bowmaker, J 2011 'Visions for a walking and cycling focussed urban transport system', Journal of Transport Geography, pp 1580-1589
- World Health Organization 2002 *The World Health Report 2002: reducing Risks, Promoting Healthy Life*. Geneva: WHO
- Zhou, H. Zhao, J. Hsu, P. and Rouse, J 2009 October, "Identifying Factors Affecting the Number of Students Walking or Biking to School", ITE Journal, pp. 40-44.
- University of Moratuwa official web site, <https://uom.lk/facts-and-stats-about-uom>, accessed date-3December 2019
- University of Sri Jayewardenepura official web site, <https://www.sjp.ac.lk/about/>, accessed date 3December 2019
- <http://www.iea.org/stats/index.asp>