

# Impact of Outdoor Environments on the Quality of Life

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## Abstract

The characteristics of outdoor environment in urban spaces and morphology distress the quality of life (QoL) of urban dwellers and visitors. The main purpose of this study is to develop an extensive hypothesis on the parametric evaluation related to the adaptation of the urban environment and dweller's QoL by methodical literature review, field observation and proposal on an alternative design strategy. The parameters include microclimate, urban space and traffic, waste management and other influencing factors are desired to envisage for effective investigation. Factors play a key role on the variation of QoL and instinctively affect the dwellers approach and comportment.

**Keywords:** : Outdoor thermal environment; microclimate; urban space and urban community; human attitude and behaviour.

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## 1.0 Introduction

Throughout the ages, Quality of life (QoL) has been influenced by the multifaceted and complicated characteristics of multi-dimensional issues and features includes environmental pressure; total water management; total waste management; noise and level of air pollution (Feneri *et. al.* 2013). The dimensional characteristics of Environmental pressure interact on an individual life condition with diverse perception and it is also incorporated with the outdoor environmental statuses that may perceive through the accretion of urban dwellers and visitor's behaviour. Despite all of the above, from the perspective of real estate and finance the researchers (Ca *et. al.*, 1998) an empirical research had been developed, where it was found that QoL at crossroads. To minimize the complication, it is essential to elaborate and sort out the determinants of QoL on the basis of contemporary detrimental effects during the measurement. This paper employed the investigation outcomes on the impact of urban thermal environmental features, thus influencing the urban dwellers by providing them with a better QoL. This paper also revisits, with the aim and objectives of this study, explicitly among the features of the urban environment and quality of life.

## 2.0 Literature Review

Some of the researchers (Rantakokko, 2011; Jamaludin *et. al.* 2014) revealed that an outdoor environment hampers the outdoor instant mobility; accelerating the degree of distress sensitivities of changing outdoors due to the lack of facilities and abnormal physical activities. The aim of this study is to analyse the outdoor thermal environment and level of comfort in urban housing communities in a tropical climate of Malaysia. The identifiable objectives of this research are to clarify the determinants of QoL; analysis of outdoor thermal environment and comfort level for urban dwellers and visitor's; GHG emission and health of urban dwellers and measurements of air quality index.

### 2.1 The Determinants of QoL

Most of the scholars have extended an agreement, where both the objective and subjective indicators are required to be studied, (Judith and Linda, 2006; The World 2005) in order to identify the determinants of QoL. Accordingly, the 'Economic intelligences unit's index' illustrated the predicted values of the life-satisfaction scores, which are presented by nine quality factors with brief descriptions for displaying the index of the quality of life. The factors and indicators are known as the determinants of QoL. Figure 1 describes the determinants of QoL with factors and their brief description.

The abbreviations of above figure 1 are as GDP (gross domestic products); UR (urban and regional); CES (clean environmental strategy); EC (environmental constraints); EPA (environmental protection agency); WFB (world Fact Book); ILO (international labour organization).

Figure 1 represents the detrimental factors analysed by the researchers (Judith and Linda, 2006) identifying the indicators of QoL in urban and regional context as analytical outcome. Table 1 provides brief description of QoL indicators, in order to investigate the sustainable

### QoL parameters

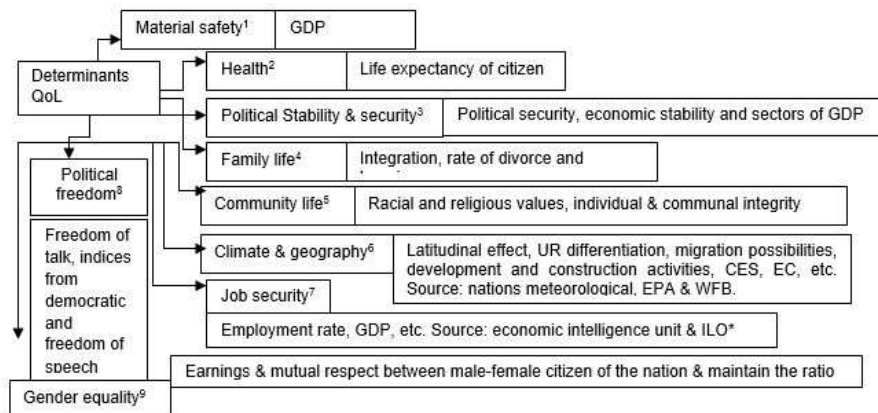


Figure 1: Determinants of QoL with brief descriptions  
(Source: the World, 2005)

Table 1: The analytical outcome of QoL indicators for the identification of sustainable QoL-parameters

Indicators	Description
Human comfort	Having a comfortable and diurnal relaxation.
Material	Aesthetic appearance of infrastructural continuity.
Status and appreciation	Being appreciated and respected by others.
Aesthetic characteristics	Being able to enjoy the beauty of nature and culture.
Security	Attended to and cared for by others.
Income & buying capacity	Having buying capacity to fulfil the necessity
Family & relationships	Having a stable family life and good family relationships
Health	Having access to adequate health care.
Social Justice	Equal opportunities and the same possibilities for everyone.
Leisure time	Having enough time after work for household work and being able to spend this time satisfactorily.
Change, variation	Having a varied life. Experiencing as many things as possible.
Freedom	Freedom and control over the course of one's life, to be able to decide for yourself, what you do, when and how
Privacy	Having the opportunity to be yourself, to do your own things and to have a place for your own
Environmental quality	Having access to clean air, water and soil. Having and maintaining a good environmental quality
Identity, self-respect	Having sufficient self-respect and being able to develop an own identity
Social relations	Having good relationships with friends, colleagues and neighbours. Being able to maintain contacts and to make new ones
Spirituality, religion	Being able to live a life with the emphasis on spirituality and/or with your own religious persuasion
Education	Having the opportunity to get a good education and develop one's general knowledge
Safety	Being safe at home and in the streets. Being able to avoid accidents and

	being protected against criminality
Nature and biodiversity	Being able to enjoy natural landscapes, parks and forests. Assurance of the continued existence of plants and animals and maintaining biodiversity.
Challenge and excitement	Having challenges and experiencing pleasant and exciting things
Work	Able to find a job and fulfil it as pleasantly as possible

Source: Judith and Linda, 2006

## 2.2 Parameters of QoL

The parameters of QoL include microclimate conditions, urban space, urban community, construction process, urbanization and migration growth, urban life style with modern electronics and communication facilities, urban transportation networks, waste minimization and recycle, climatic factors and their influences are essentially required for considering further intensive investigation.

Researchers (Lai *et al.* 2013; Latif *et al.* 2013; Eusuf *et al.* 2012) mentioned that most of the urban inhabitants desired a quality outdoor space associated with thermal comfort, functionality, safety, convenience and aesthetic level to maintain community closeness, liveability and vitality. Among the many factors that influence outdoor space quality, the outdoor thermal comfort is significant (Lai *et al.* 2013). Besides, there are some more parameters involved in order to enhance the scale of QoL, such as construction, infrastructure and structures, building materials, urban traffic and transportation, workmanship, continuous supervision, inspection and associated with professional total services.

## 2.3 Modification of Urban thermal environment

It is widely recognized that the present transportation system will not sustain in the long run due to the environmental related problems caused by the interacted parameters, such as traffic, transport, emission, and pavement (Judith and Linda, 2006; Amiril *et al.* 2014).

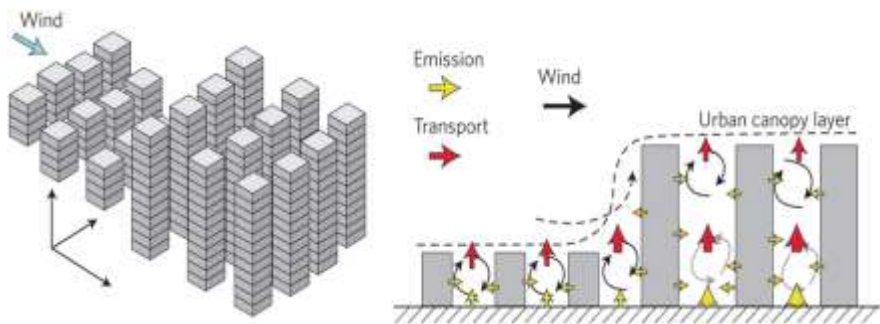


Figure 2: Schematic illustration of air flow, pollutant concentration & dispersion with different building heights

(Source: Eusuf and Omar, 2014)

Researchers also proposed that heat balance method is suitable for this study, where effective parameters represent the urban dwellers, effective air temperature, standard effective air temperature, surface temperature and the recently developed Universal Thermal Climate Index (UTCI). The following figure 2 describes the process-element of the modification of urban thermal environment. By applying the concept of irrigation system, it may reduce the intensity of thermal condition of urban premises (Abdelkerim *et. al.* 2013).

#### 2.4 Urban Sustainability Concept

QoL can be ensured by the consideration of sustainable construction. Researcher (Raynsford, 2000) stated that these aspects provide more efficient humanity, minimum total pollution and total waste, and finally, efficient use of natural resources. However, several environmental constraints affect the growth of urban cities, which are basically related to traffic congestion, overcrowded, environmental quality, waste management, health facilities, criminality and other factors. (Royuela, 2007, Eusuf *et. al.* 2011)

The main focus of this study is to examine the impact of outdoor thermal environment and comfort in urban communities towards the QoL in Malaysian tropical climate. At least 300 respondents were selected as a sample for the justification and investigation of QoL determiners and parameters. A case study area was selected on the aspects of: dwellers size, opportunities, economic viability and environmental conditions. This study employed self-administered questionnaire for data collection. Respondents were able to attend at their convenient time. The structured questionnaire was designed to measure all hypotheses involved in the theoretical framework. GHG generation and emission to urban atmosphere is one of the critical parameters in urban areas and it effects directly to deteriorate the health of urban dwellers and their quality of life. Table 2 shows the monitoring methods of GHG. In this study, emphasize had been given to improve the QoL index for Malaysia and then compared with the other surrounding countries, such as Thailand, Singapore, Japan, South Korea, Hong Kong and other developed countries.

For experimental study, all equipment was calibrated before because the whole process is completed on the basis of adaption. Significant factors were included, such as dwellers physical, physiological and psychological adaption in change climate, in order to perform the experimental study. The complete set of data was analysed by the software related with outdoor space and thermal environment. The sensitivity of the data can be presented by the regression analysis.

Table 2: Describes the Monitoring methodology of GHG emissions

Stages	Assessment/ estimation entry/ points	Monitoring element	Monitoring method
1	Sum of waste collection vehicles	waste collection vehicles	Investigate the sum of vehicles
	Distance travelled by waste collection vehicles	Distance travelled	Investigate the distance travelled
	Average amount of fuel consumption by waste collection vehicles	Amount of fuel used	Investigate data on the amount of fuel consumed
2	Sum of waste collection vehicles	waste collection vehicles	Investigate the sum of vehicles

	Distance travelled by waste collection vehicles	Distance travelled	Investigate the distance travelled
	Average amount of fuel consumption by waste collection vehicles	Amount of fuel used	Investigate data on the amount of fuel consumed
	Amount of waste incinerated	waste incinerated	Quantify and review data on the amount of waste incinerated
	Fossil fuel consumption	Data on amount of fossil fuel used by facilities	Record and review data on amount of fossil fuels used
	Amount of methane generated from landfill sites	Amount of methane generated	Install equipment to measure and monitor amount of methane
3	Amount of methane generated	Amount of methane generated from landfill sites	Install equipment to measure and monitor amount of methane
	Amount of waste incinerated	waste incinerated	Quantify and review data on the amount of waste incinerated

Source: Amount of methane generated from landfill sites, 2006

Vegetation is an important design element in improving the urban microclimate and outdoor thermal environment in urban spaces, but due to urbanization, vegetation is infrequent and irregular in many tropical urban areas (Spangenberg *et. al.* 2008). In built environment design and construction, there has often been a predisposition and propensity to replace natural vegetation, permeable soils covered with impervious surfaces such as asphalt, concrete and brick or ceramic, which modify the urban environment and provide more sensible than latent heat flux (Eusuf *et. al.* 1998; Sarat and Eusuf, 2012; Spangenberg *et. al.* 2008). This study also found a suitable strategy by an experimental set-up for the investigation of the mitigation thermal environment conditions in urban area and increase the index rank of QoL for Malaysia.

### 3.0 Results

#### 3.1 Is the influence of quality of life on urban growth non-stationary in space?

Royuela, (2007), with regards on the test of methods for measuring the quality of life in order to spatial variation, degenerate the subjective perceptions of QoL of individuals against a series of variables related to different objective dimensions of QoL. From researchers' (Royuela, 2007) findings, it is recognized that the factors influencing the growth of urban cities are urban size, network economic opportunities, spatial distribution, parameters of QoL such as index of opportunities for progress and index of social equilibrium.

#### 3.2 Environmental factors, Outdoor Air Quality, and Activity Level

Table 3 depicts the air quality index level and their effects. Air Quality Index (AQI) is regulated by the clean air act of the nation. AQI has to modify the pollutants: Ozone at ground level, particulate matter, carbon monoxide, sulphur dioxide and nitrogen dioxide.

Table 3: Air Quality Index (AQI) with description and effects to modification of QoL

AQI		Brief Description
Numerical values	Levels	
0-50	Good	The lower the levels, the better the quality of the air &QoL
51-100	Moderate	The higher the levels, the worse the quality of air and then quality of life. But this level is still acceptable, but impact moderately to the AQI and QoL.
101- 150	Sensitive	This level may effect to the sensitive groups and hampered the QoL for average people.
151-200	Unhealthy	Dwellers may begin to experience health effects; sensitive groups may experience more serious health effects. Finally, affect the QoL of that region.
200-300	Very unhealthy	Alert to dwellers and inhabitants: all may experience more serious health problems and seriously affect to QoL
>300	Hazardous	Emergency condition for all dwellers. All are affected and impact upon the collective QoL level.

Source: Potter and Perveen (2006)

### 3.3 GHG emission and health of urban dwellers and measurements of air quality index

Table 3 describes the air quality index on the theoretical aspects; it is found that AQI in two levels (numerically up to 100) can be used to identify the impact to the QoL. Figure-3 depicts the GHG emission level from the various sectors.

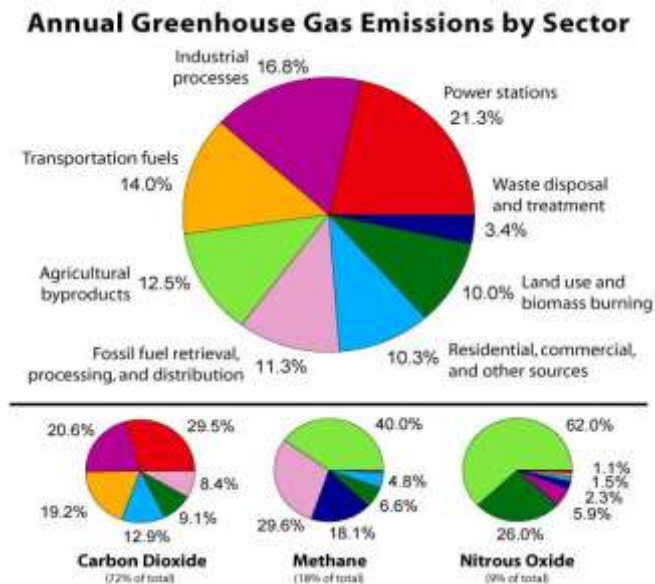


Figure 3: Annual GHG emissions from various sectors

## 4.0 Discussion

After continuous analysis, it has been found that further investigation must be done on the behavioural characteristics, for further enhancement of urban climatic condition through the modification of urban thermal environment. Other significant factors that had been verified include air quality, acoustic environment, functionality, and convenience. Moreover, the variation of urban thermal environment and air ventilation condition in urban scale within the urban canopy layer (refer to figure 2) are important in the analytical process of climatic-environmental and quality evaluation.

Table 4 describes the results of the survey. The research also discussed the relationship of QoL index and GDP per person with individual ranking. Finally, the difference between the rank of QoL and GDP per person had been computed. It had been observed that QoL index was not fully related with GDP, but it is related to the following mentioned factors-

- Purchasing power or buying capacity index
- Safety Index
- Health care Index
- Consumer price Index
- Property price to income ratio
- Traffic commute time index: Time Index; Time exponential Index; Inefficiency index and CO<sub>2</sub> emission index
- Pollution Index: Pollution and exponential

Table 4: Analysis the worldwide QoL index, 2005 (151)

Countries	QoL	GDP per person	Difference in Rank
	Score* (Rank)	Per capita (Rank)	
Australia	7.925(6)	31, 010(14)	08
Singapore	7.796(9)	32, 530(7)	-2
USA	7.615(13)	41,529(2)	-11
Canada	7.599(14)	34, 150(5)	-9
NZ	7.436(15)	25, 110(25)	10
Japan	7.392(17)	30, 750(16)	-1
HK	7.347(18)	31, 660(11)	-7
Germany	7.048(26)	28, 250(21)	-5
UK	6.917(29)	31, 150(13)	-16
South Korea	6.877(30)	23, 360(26)	-4
Malaysia	6.608(36)	10, 450(51)	15
Thailand	6.436(42)	8, 140(62)	20
Sri Lanka	6.417(43)	3, 810(91)	48
Kuwait	6.171(55)	14, 550(40)	-15
China	6.083(60)	6, 270(74)	14
Vietnam	6.080(61)	2, 890(97)	36
Indonesia	5.814(71)	3, 840(90)	19
Saudi Arabia	5.767(72)	11, 110(49)	-23
India	5.759(73)	3, 290(96)	23
Bangladesh	5.646(77)	1, 660(105)	28



Egypt	5.605(80)	3, 930(88)	08
Algeria	5.571(81)	5, 770(76)	-5
Iran	5.343(88)	7, 630(65)	-23
Pakistan	5.229(93)	2, 340(101)	08

\* Out of 10. Source: The World, 2005

GHG emission has been extracted from figure 3 and describe in the following Table-5. It is found that the GHG emission line for CO<sub>2</sub> is 72%, 18% methane and 9% of NO<sub>2</sub> of the total emission.

Table 5: GHG emissions by sector

No	Sectors	Emission (%)	Ranking	GHG (in %)			Influence to modify the QoL parameters
				CO <sub>2</sub>	CH <sub>4</sub>	NO <sub>2</sub>	
1	Power stations	21.3	1	29.5	-	-	Passively
2	Industrial processes	16.8	2	20.6	-	5.9	Passively
3	Transportation fuels	14.0	3	19.2	-	1.1	Actively
4	Agricultural by-products	12.5	4	-	40.0	62.0	Passively
5	Fossil fuel retrieval, processing & distribution	11.3	5	8.4	29.6	-	Passively
6	Residential, commercial, and other sources	10.7	6	12.9	4.8	1.5	Actively
7	Land use and biomass burning	10.0	7	9.1	6.6	26.0	Passively
8	Waste disposal and treatment	3.4	8	-	18.1	2.3	Actively

## 5.0 Conclusion

This theoretical study had been based on the contemporary literature and it updates the position of this study through analytical aspect of “The impact of outdoor environment and the Quality of life”. The study on the Quality of life has broad perspectives, therefore this study needs to be relooked at the outdoor space, outdoor environmental conditions and quality, urban waste reductions, reduction process of GHG gas emissions, demographic perspective of urban dwellers, inhabitant’s and visitor’s health, and comfort analysis. This study has provided valuable inputs to the design of urban spaces in the urban community. Limitations had been found in the experimental parameters; microclimatic elements, surface temperature and albedo. The time constraint, which is required to analyze the data from the real phenomena, also played as an obstacle.

Furthermore, this investigation helps to explain the relationship between QoL determinants, QoL indicators and QoL index with others parameters in relation to thermal environment, thermal comfort, and outdoor spaces. The further extension of this study can be done with more extensive include field questionnaire survey, recording activities in various spaces: shaded and sunlit, in playground with equipment and experiment with appropriate experimental set-up. Lastly, this study provides valuable input to the design of urban spaces in the urban community and targets tropical urban areas in Malaysia.

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## References

- Abdelkerim, Eusuf S. MMR, Salami MJE, Aibinu A. and Eusuf MA (2013), Development of Solar Powered Irrigation System, IOP Conf. Series: Materials Science and Engineering 53, 1-13.
- Amiril A., Nawai A. H., Takim R and Latif SNFA (2014), Transportation infrastructure project sustainability factors and performance, *Procedia - Social and Behavioral Sciences*, Elsevier, 153, 90-98
- Ca VT, Asaeda T and Eusuf MA (1998) Reductions in air conditioning energy caused by a nearby park, *Energy and building*, 29 (1), 83-92.
- Eusuf M. A and Omar C. M. C (2002), A Study of Energy Storage in Urban Materials and its Effect on Thermal Environment: A Sustainable Development Approach, International Symposium 14- 15 October 2002, Jakarta-Indonesia, " *Building Research and the Sustainability of the Built Environment in the Tropics*", University Tarumanagara- Indonesia and Oxford brookes University- United Kingdom.
- Eusuf MA, Mohit MA, Eusuf S. MMR and Ibrahim M. (2014), Impact of outdoor environment to the Quality of life, *Procedia - Social and Behavioral Sciences*, Elsevier, 153, 639 – 654
- Eusuf MA, Ibrahim M, Affendy S.and Islam R. (2011), Solid Waste Generation Characteristics: The Malaysian Local Authorities' Outlook., *Journal of the Malaysian Institute of Planners*, Vol. IX, 51-76
- Feneri A-M, Vagiona D. And Karanikolas N. (2013), Measuring Quality Of Life (QoL) In Urban Environment: An Integrated Approach, *Cest2013, Athens, Greece*.
- Jamaludin S. N., Mohamad N.H.N, and Thani S.K.S.O (2014), Designing conducive residential outdoor environmentfor community: Klang Valley, *Procedia - Social and Behavioral Sciences*, Elsevier, 153, 370-383
- Judith de Groot and Linda Steg (2006), Impact of transport pricing on quality of life, acceptability and intentions to reduce car use: An exploratory study in European countries, *Journal of Transport Geography*, 14 463–470.
- Lai D., Zhoua C., Huang J.,Jiangd Y., Longa Z. and Chena Q., (2013), Outdoor Space Quality: A Field Study in an Urban Residential Community in Central China, *Energy and Building*.

Potter C. and Perveen G. (2006), Environmental Factors, Outdoor Air Quality and Activity Level 2005, Kansas Department of Health and Environment, Office of Health Promotion.

Rantakokko M. (2011) Outdoor Environment, Mobility Decline And Quality Of Life Among Older People, Studies In Sport, Physical Education And Health, Academic Dissertation, University Jyvaskyla, ISBN 978-951-39-4283-0.

Raynsford N. (2000), Building a Better Quality of Life: A Strategy for more Sustainable Construction, Department of the Environment, Transport and the Regions: London.

Royuela V., Moreno R. and Vayá E. (2007), Is the influence of quality of life on urban growth non-stationary in space? A case study of Barcelona. Institut de Recerca en Economia Aplicada 2007.

Sarat AA and Eusuf MA (2012), An Experimental Study On Observed Heating Characteristics Of Urban Pavement, Journal of Surveying, Construction and Property Vol.3 Issue 1.

Spangenberg J, Shinzato P., Johansson E. and Duarte D. (2008), Simulation of the Influence of Vegetation On Microclimate And Thermal Comfort In The City Of São Paulo, Rev. SBAU, Piracicaba, Vol.3, No.2, 1-19.

The World (2005), The Economist Intelligence Unit's quality-of-life index.