

# **The Vitality of Parks and Green Spaces on Environment and Health of the people: A study in Shillong city, Meghalaya, North East India**

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## **Abstract**

It is a universal truth that global efforts are made to preserve large, bio-diverse ecosystems or an individual animal or vegetal species, either endangered or threatened with extinction. However, very less attention is paid when it comes to the type of nature where we live and work. The study was conducted in the most popular and visited parks and green spaces in Shillong city- Lady Hydari Park, Wards Lake and Golf Link. Surveys conducted among visitors of the study sites are presented and discussed. The main concern of the study was to address the vitality of parks and green spaces for citizens' wellbeing and for the sustainability of the city they inhabit. The study has found that the presence of green spaces contributes not only to the environmental aspects- tree cover, air quality, reduced noise pollution, habitat for birds and animals and urban island cool-off; but also to the health benefits of people as well- Attention Deficit Disorder (ADD), reduced hyper tension, blood pressure, meditation, etc. The study also highlights the visitors' preference of the study sites with respect to age group and their activities, and the type of prospective facilities they would want to be associated with. In addition, it was also considered important to identify the strengths, weaknesses, opportunities and threats of the study sites for effective conservation and management, so as to aid Shillong into a more liveable, resilient, healthy and sustainable city.

Keywords- Parks, Green Spaces, Environmental benefits, Health benefits, Shillong

Introduction

Globally, a dramatic demographic shift towards urbanization is occurring (Galea and Vlahov, 2005). Between 2000 and 2050, the proportion of people living in urban areas is projected to rise from 46.6 to 69.6% (UN Report, 2009). Urbanization poses problems through effects such as environmental pollution, accidents, heat island effects and climate change (Frumkin, 2002). With no exception to Shillong, urbanization has its strong grip on the city with increased numbers of automobiles, buildings, shopping complexes, etc and a discouraging value of green spaces. For the past few decades the city is witnessing a rampant increase in environmental pollution which is seen accompanied by drastic climate change, health vulnerability and ecological disturbances.

This has flagged up the need for multi- sectoral action to promote health in urban populations and led to the rise of the 'Healthy Cities' movement (Kickbusch, 1989 ; Flynn, 1996).

Physical and psychological benefits have been linked to green spaces through their purported effects on physical activity (Morris, 2003). Numerous health benefits of physical activities have been documented, such as the effects on cardio- and cerebro-vascular disease, diabetes, colorectal cancer, osteo- porosis, depression and fall-related injuries (Williams 2001; Kahn et al., 2002; Shaw et al., 2006; Thomas et al., 2006 ; Meisinger et al., 2007; Gast et al., 2007) It also improves mental functioning, mental health and well- being (Glenister, 1996; Craft and Landers ,1998; Taylor et al., 2001; Lawlor and Hopker, 2001; Daley, 2002; Karp et al., 2006; ) and may have long-lasting psychological benefits (Sacker and Cable, 2006). Benefits on longevity of life have also been reported (Takano et al., 2002).

Over the last decade there has been increased political and public recognition of the contribution of good quality parks and green spaces to individual wellbeing, and their positive social, economic and environmental value to towns and cities (CABE, 2004; Maas et al 2006; Maas et al 2008; Bell et al., 2008). This study has found that the presence of green spaces contributes not only to the environmental aspects- tree cover, air quality, reduced noise pollution, habitat for birds and animals and urban island cool-off; but also to the health benefits of people as well- Attention Deficit Disorder (ADD), reduced hyper tension, blood pressure, meditation, etc.

Studies have shown that there is a great need for environment diversity, where the potential of green spaces is highlighted as a potential improvement of the quality of life for all citizens (Burgess et al., 1998).

The aim of this paper is to study the association between urban green space and environment and human health by identifying the benefits achieved through parks and green spaces. The study also highlights the visitors' preference of the study sites with respect to age group and their activities, and the type of prospective facilities they would want to be associated with. In addition, it was also considered important to identify the strengths, weaknesses, opportunities and threats of the study sites for effective conservation and management, so as to aid Shillong into a more liveable, resilient, healthy and sustainable city.

Through an interdisciplinary literature review the concepts of Green Infrastructure, environmental health, and human health and well-being are discussed.

### **Literature review**

Every person, regardless of race, ethnicity, income or age is entitled to live in a home, neighbourhood and city that support wellness and good health. More recently, aligning with the growing evidence about the benefits of having access to nearby nature, there is commitment to equal access to the environment that promote health, wellness and well being (Wolf and Housley, 2014). Today the importance of green spaces is widely recognised in the field of urban planning. The green structure that combines green open spaces provides several environmental, social, cultural and economic functions to the citizens (Bucht and Persson, 1994).

From an ecological/environmental perspective, green spaces support sustainable urban development by recycling carbon, absorbing pollutants, providing clean air, soil and water and stabilising urban temperatures and humidity. They also provide habitats for wildlife and can maintain or even improve biodiversity (Gilbert, 1991; Plummer and Shewan, 1992; Hough, 1995; Niemela, 1999; Woolley, 2003; Baycan-Levent and Nijkamp, 2004; Kaye et al., 2005; ; Pataki et al., 2006; Hussain et al., 2010; Krisdianto et al., 2012)

Air pollution, being a significant human health concern, can cause headache, respiratory problems, throat and eye irritation, heart disease and cancer (Nowak et al, 2002). He also found that urban green spaces are the most effective means of removing atmospheric pollution in big cities. In a study undertaken in fifty five cities of USA, it was found that environmental pollution worth more than seven lakh metric tonnes per year (valuing US \$ 3.8 billion) was removed by the vegetation. Vegetation of Guangzhou city, China consisting of

7,360 ha of urban forests removed 312 metric tonnes of atmospheric pollution annually (worth US \$ 11,000), out of which particulate matter accounted for 234 metric tons (Jim and Chen, 2008). 2.4 million Urban trees (over 300 sq km) of Beijing, China with 4.5 million population were responsible for removal of 1261 metric tonnes of environmental pollution annually, out of which 776 million were particulate matter (Yang et al., 2005). Another study in the United States, according to Aldous (2006) estimated that dust levels in an urban park in Georgia were 60% lower than outside the park.

Apart from the air quality, Whitford et al., 2001, shows a clear inverse relation between green space provision and rainwater runoff. The roles of vegetation in open green spaces reduce the surface runoff as well as enable infiltration of rain water and thus, recharge the groundwater. They also play an important role in preserving and protecting water resources by trapping and removing pollutants in rainwater runoff. Trapped pollutants are broken down by the root system and soil microbes (Heinz, 2011). The State of Michigan Department of Agriculture (2005) reported that, “well maintained turf and landscaping purifies and traps more than 12 million tons of dust, soil and other particulate matter annually”.

In addition, the amount of oxygen released by green space alone is truly phenomenal. Urban and peri-urban habitats increase the overall vegetation cover (natural, semi-natural and artificial), thus, contributing to conservation of biological diversity (Flores et al., 1998). Green areas in one's living environment may ameliorate air pollution and the urban heat island (Whitford et al., 2001), and may also lead to people spending a greater amount of time outdoors and being more physically active.

In urban areas, there is a significant increase in hard surfacing and the reduction in green spaces lead to higher temperatures than in the surrounding countryside which is known as ‘the heat island effect’ (Lowry, 1967). Ahrens (2006) states that parks and open space can help reduce the effect of urban heat islands. A research in Tel Aviv also found that the cooling effect of green spaces can be felt up to 100m from the site (Shashua et al., 2000). A study in the University of Minnesota found that trees, shrubs and lawns around homes can reduce air temperature from 7° to 14° F through the effects of shading and the cooling effect of the transpiration and evaporation of water through plant leaves. Apart from the cooling of buildings and areas located in or near the green settings, open green spaces also functions in noise abatement.

Importantly, trees in urban systems provide a variety of ecosystems services including biodiversity conservation, removal of atmospheric pollutants, oxygen generation, noise reduction, mitigation of urban heat islands, stabilization of soil, ground water recharge, prevention of soil erosion and carbon sequestration (Bolund and Hunhammar, 1999).

Some environmental philosophers have suggested that developing a relationship with nature through aesthetic experiences, that is, first-hand, multi-sensory, emotional and imaginative engagement can encourage or contribute to a moral attitude toward nature (Elliot, 1997). According to Maas et al., 2006, a large epidemiological study in the Netherlands found a positive correlation between the quantity of urban green space and the perception of general health.

The physical and social features of the environment may also affect behaviour (Pretty et al., 2003; Ohta et al., 2009). Studies in various groups such as students, inner city girls and workers reported associations between green space with a variety of psychological, emotional and mental health benefits. (Maas et al., 2009). The provision and access to green space also positively affects reported stress and quality of life (CABE, 2005; Stigsdotter et al., 2010; Vanden Berg et al., 2010;). Pretty et al (2006) suggests that every green environment improves both self esteem and mood. It has also been found that favourite places afford emotional release and also restorative experiences such as forgetting worries, clearing away random thoughts, recovering attention focus, facing matters on one's mind and relaxation, where a decrease in negative feelings and a commensurate increase in positive feelings have characterized visits to natural favourite places in particular (Korpela et al., 2001).

Recently, strong studies using experimental designs have produced additional convincing evidence that viewing nature (including green spaces) reduces patient pain as well as stress. These investigations support the interpretation that nature serves as a positive distraction (Ulrich et al., 2005). Physical activity participation provides mental and physical health benefits and can also reduce the risk of many chronic diseases (Kohl, 2001; Bauman, 2004; Warburton et al., 2006;). A brisk walk every day in the park can reduce the risk of heart attacks by 50%, strokes by 50%, diabetes by 50%, fracture of the femur by 30%, colon cancer by 30%, breast cancer by 30% and Alzheimer by 25% (Bird, 2002). Natural views of elements such as trees and lakes promote a drop in blood pressure and are shown to reduce feelings of stress (Hartig et al, 2003). It has also been found that park users reported better

general perceived health, higher levels of activity and the ability to relax faster (Payne et al., 1998).

A US study also found that a higher density of green space in urban areas, which is equivalent to better access to parks, is conducive to walking by older adults (Li et al., 2005). Recent evidence also indicates that neighbourhood outdoor spaces can contribute positively to people's health and quality of life status. This may occur by supporting physical activity such as walking (Giles et al., 2005; Cohen et al., 2007; Wen et al., 2007), offering mental health through restorative experiences (Kaplan and Kaplan 1989; Orsega et al., 2004), and through providing opportunities for positive social interaction (Kweon et al., 1998; Kearney, 2006). For older people, access to green spaces in the neighbourhood environment is associated with more walking (Li et al, 2005), which is known to enhance health and functioning (Manson, 2001), and with longevity (Takano et al., 2002)

Even passive viewing of natural environments after negative antecedent conditions, such as attention fatigue (Kaplan and Kaplan, 1989) or psycho-physiological stress (Ulrich, 1984), produces stress-ameliorating effects which may ultimately confer health benefits (Ulrich 1984). Nearby trees and grass visible from apartment buildings have been shown to enhance residents' effectiveness in facing their major life issues and to lessen intra-family aggression by reducing mental fatigue (Kuo, 2001). In addition, passiveness in green spaces may lead to lowered blood pressure, increased ability to concentrate and less production of stress hormones (Grahm & Stigsdotter, 2003). In a research carried out by CABI (2004), 85% of people felt that the quality of public space and the built environment has a direct impact on their lives and on the way they feel.

A remarkable 5 year study of senior citizens in Japan found that having readily available space for talking walks and the presence of parks and tree-lined streets near the residence were significant predictors of higher survival rates. Living in areas with walkable green spaces positively influenced the longevity of urban senior citizens independent of their age, sex, marital status, baseline functional status, and socio economic status (Takano et al., 2002). Moreover, Taylor et al., (2001) found that, according to parents' assessments, 7-12-year-old children with attention deficit disorder functioned better than usual following participating in activities in green settings. Also, it is reported that the greener a child's play area was, the less severe his or her attention deficit symptoms were (Taylor et al. 2001).

Careful planning and management are essential for the sustainable use of protected areas by visitors (Newsome et al., 2002). As all management is dependent on information, the better the quality of information that can be used, the better the opportunity for efficient management (Hornback and Eagles, 1999). Collecting visitor data also increases the likelihood of the 'best' facilities and services for meeting visitor needs rather than management decisions being the result of ad hoc decisions by managers (Wardell and Moore, 2005). The type of information required for effective management can include where visitors are going and what are they doing; who are they; and how satisfied were they with their visit. The information obtained can help assess the values of the park, its resources and its commercial activities, as well as contributing to a greater awareness of how visitors behave and their expectations of national parks. There is a danger that under-reporting visitor data, or even no reporting at all, can present a misleading impression to the public, business and government as to the values of parks and protected areas (Hornback and Eagles, 1999).

## Methodology

### i. Area of the study

Shillong is located at 25.57° N longitude and 91.88° E latitude. It is on the Shillong Plateau, the only major uplifted structure in the Northern Indian shield. It is one of the seven sisters of North-East India. The capital city Shillong is the headquarter of the East Khasi Hills District and is situated at an average of 4,908 feet (1496 m) above sea level, with the highest point being Shillong Peak at 6449 feet (1966 m). It covers an area of about 64.36 km<sup>2</sup>.

Shillong is one of the frequently visited hill stations in the country. It is the only hill station in the country that is accessible from all sides. It is said that the rolling hills around the town reminded the European settlers of Scotland. Hence, Shillong is known as the “Scotland of the East”.

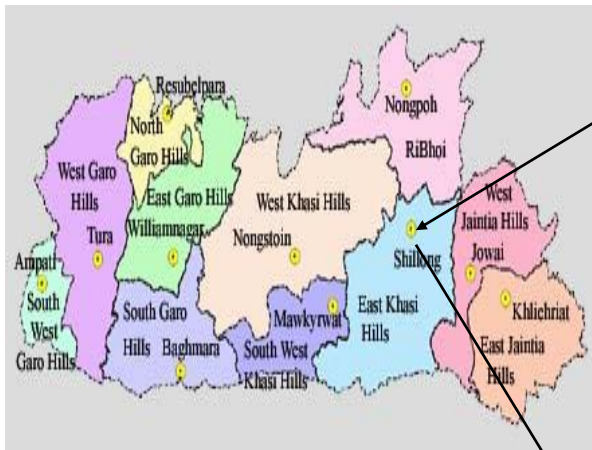




**INDIA**



**NORTH EAST INDIA**



**MEGHALAYA**



**SHILLONG**

**Figure (i) Location Map of the Study Area**

ii. Research design

The study was primarily designed to find out the importance of parks and green spaces on environment and people's health. It was largely exploratory in nature. It determined people's thoughts and perceptions in a qualitative manner, however, attention was paid to both qualitative and quantitative analysis of the data obtained.

iii. Sampling design

The study was conducted using mixed method of data collection.

a. Sampling units-

**Site A: Lady Hydari Park-** It is one of the well-known attractions and is among the most frequented tourist spots in Shillong. The park is managed by the Department of Environment and Forest and has a well manicured garden with a mini-zoo that has about 73 species of birds, 140 species of reptiles and other mammals. The Park is best known for beautiful bed of roses that blossom in various colours and landscaped in Japanese style. The Park can be visited throughout the year.

**Site B: Wards Lake-** It is locally known as Nan-Polok. This Central landscaping element of Colonial-era Shillong has a pretty ornamental bridge, flower beds, coy courting couples and gaggle of geese. The artificial lake is set amidst lush green garden and is located in the middle of the scenic hill station. This horse-shoe shaped lake is visited frequently by both tourists and local people.

**Site C: Golf Course-** Shillong has one of the largest golf courses in Asia. It enjoys the rare distinction of being one of the oldest and the best natural golf course in the world. The course is set in an undulating valley covered with

thick groves of pine and rhododendron trees. Shillong golf course is considered to be the “Glen Eagle of the East” at the United States Gold Association Museum.

b. Sampling method

To select a sample, convenient random sampling method was induced as the researched were chosen on the spot based on their observed participation in various activities in the settings, including recreation, exercise, picnicking and sightseeing (Krisdianto et al., 2012).

c. Sample size

Survey was conducted on 150 visitors followed by direct observations of the sampling sites.

iv. Methods of data collection

Data were obtained based on a combination of open and closed ended questions. The questionnaire included personal information, their reason for visiting green space, the frequency of their visits, their likes and dislikes within the settings, their perceptions of environmental and health benefits covered by the green spaces and their personal recommendations for better management of the spaces.

Data was collected during the months of March to May, 2015. Surveys were conducted between 7:00 to 9:00am; 12:00 to 2:00 pm and 4:00 to 5:00pm. The time intervals for the survey were divided assuming that the sampling sites will be visited by users of different ages at different timings and so as to avoid monotonous answers/feedbacks/information/recommendations.

There was a pretesting of the questionnaires where the visitors were questioned as to how they would feel about answering the lists of questions. After pretesting, some questions were modified in order to enhance the workability of the method

(Krisdianto et al., 2012). To avoid any language barrier, the interview was conducted with the help of a translator whenever required.

Information was also gathered through observation. As a type of social behaviour, recreational activities are best analysed via observational survey (Bryman, 2008; Yen, 2009).

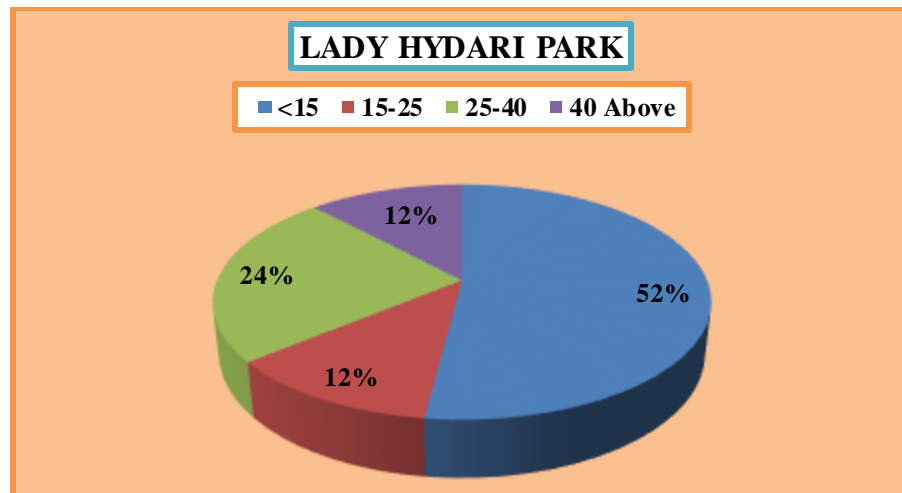
### **Data analysis**

The raw data was entered into Microsoft Excel spreadsheets and later developed into pie-charts and bar diagrams. The age distribution of the green space users was represented by pie charts, which showed the different age group visitors to different green spaces to fulfil their purposes. The different purposes served by the green spaces and the benefits achieved by the users were explained with the help of bar diagrams. Bar diagrams were also used to represent and explain the SWOT (Strengths, weaknesses, opportunities and threats) analysis making it easier and suitable to understand the different parameters undertaken for the analysis.

The information related to environmental and health benefits were recorded and presented in verbatim.

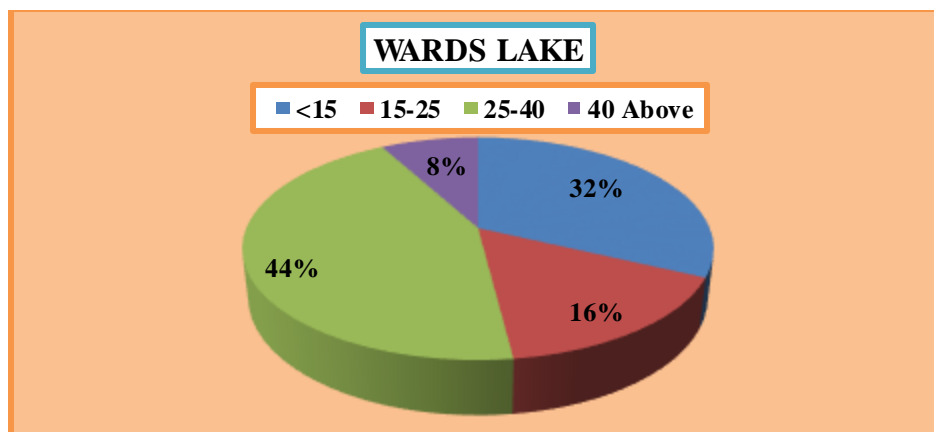
## DISCUSSIONS-

The basic information gathered from the study is given below:



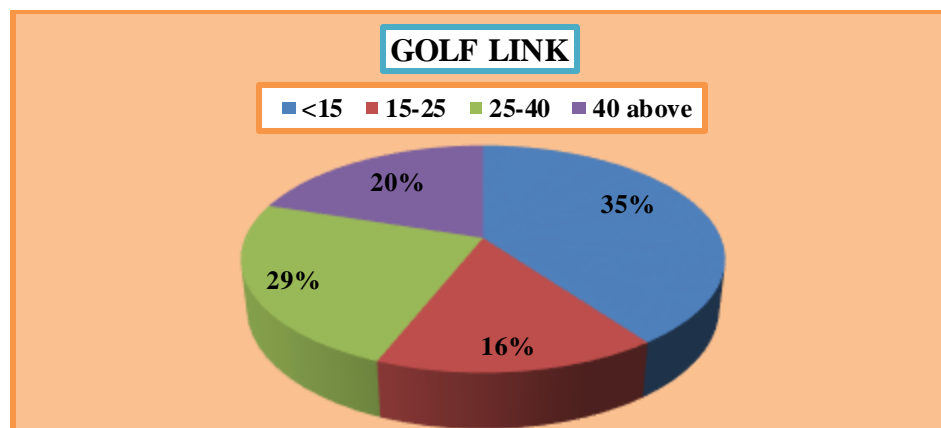
**Figure 1.1 Age distribution of the green spaces' users**

In this study area, the most frequent users were children below 15 years of age. They comprised 52% of the universe and the second most frequent visitors were between 25-40 years of age (24%). The least visitors were of age group between 15-25 years (12%) and visitors above 40 years of age (12%). It was further researched that the site provided recreational opportunities for children in comparison to the available facilities or opportunities for the other age group visitors.



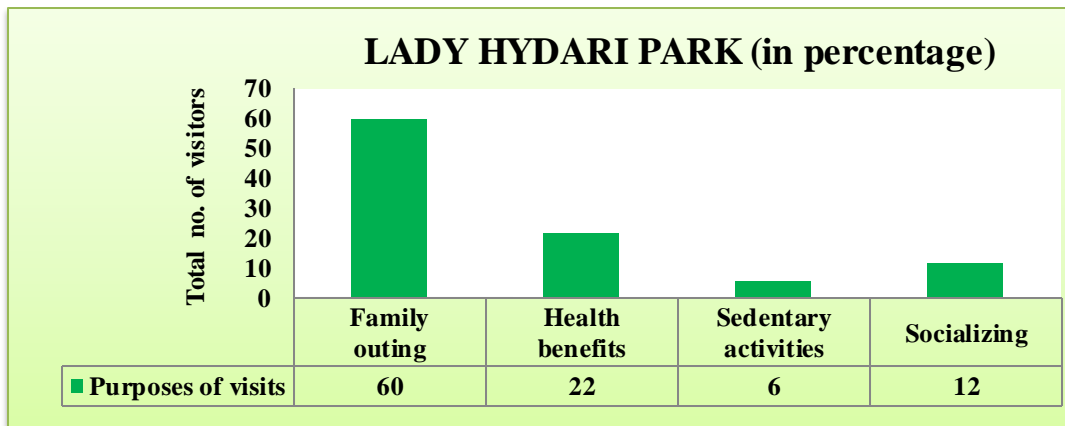
**Figure 1.2 Age distribution of the green spaces' users**

From the above figure, it was found that the most frequent users belonged to the age group of 25-40 (44%) , followed by children below 15 years of age (32%). The least visitors were of age group between 15-25 years (16%) and 40 years and above (8%). The study further showed the provision of easy access to physical health opportunities (morning and evening walk, jogging, fitness regime) within the green space to be an ideal purpose for the most frequent visitors.



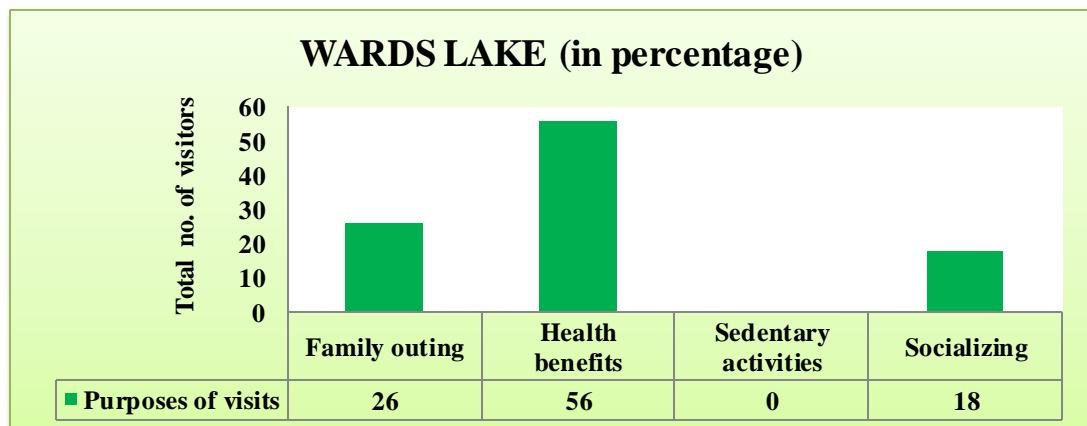
**Figure 1.3 Age distribution of the green spaces' users**

In this study area, children below 15 years of age (35%) were the most frequent visitors, followed by visitors of age group between 25-40 years (29%). Visitors between the age group of 15-25 (16%) and 40 years and above (20%) also used the green space for different purposes.



**Figure 2.1 Purposes served by Lady Hydari Park**

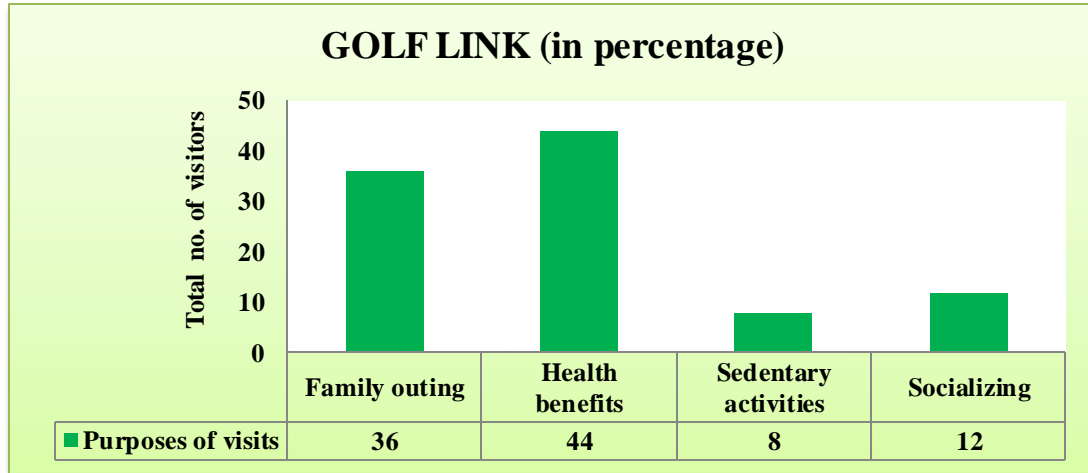
From the above figure, it can be seen that in Lady Hydari Park, 60% of the population visited the park for family outing, while 22% of the users visited the green space for health benefits. Socializing amounted to 12% while 6% of the visitors were engaged in sedentary activities such as relaxation, quiet time, etc, that did not include any active participation.



**Figure 2.2 Purposes served by Wards Lake**

From the above figure, it is understood that 56% of the population were engaged in physical health exercises (morning and evening walk, jogging, fitness regime), showing that the green space offered opportunities to various health benefits. Family outing was

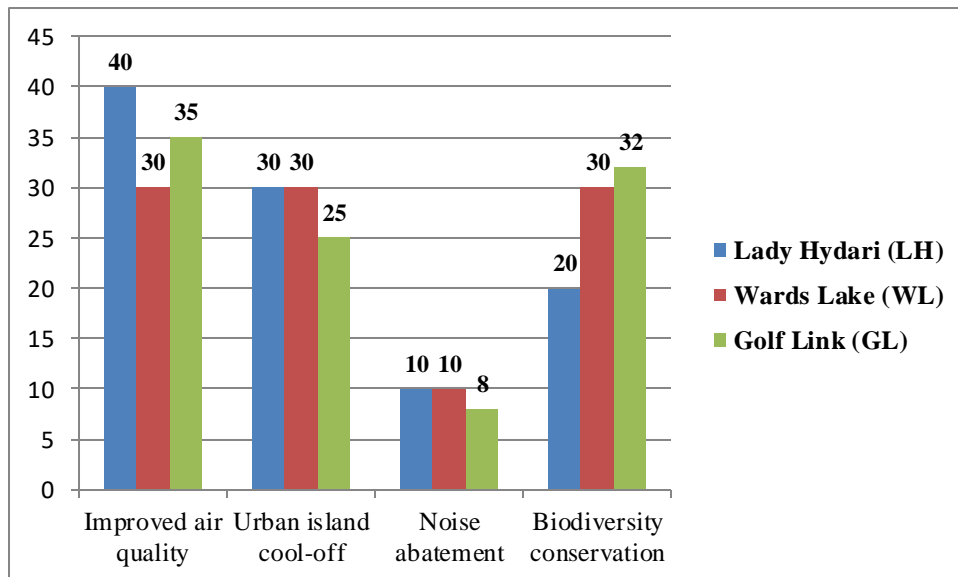
26% and the least visitation purpose was socializing (18%). No sedentary benefits were reported in this study area.



**Figure 2.3 Purposes served by Golf Link**

From the above figure, it is understandable that physical health benefits (44%) amounted to the highest visitation purpose to the green spaces, reason being, the natural golf course attracted visitors to fulfil their targeted health benefits. Family outing amounted to 36% while 12% of the visitors used the green space for socializing. Similar to Lady Hydari Park, sedentary activity was the least purpose for visitation (8%).





**Figure 2.4 Responses on environmental benefits of green spaces by visitors (in percentages)**

From the figure, it is seen that the visitors clearly understood the multiple environmental benefits of green spaces ; 40% of the visitors in LH, 30% in WL and 35% in GL were aware that it helps in improving air quality; 30% in LH, 30% in WL and 25% in GL affirmed that green spaces contributes to urban island cool-off; 10 % each in LH, WL and 8% in GL opined for noise abatement and 20% in LH , 30 % in WL and 32% in GL affirmed for biodiversity conservation.

**Table 1 Responses on environmental benefits of green spaces by visitors**

*"It's cooler than my locality."*

*~ Female, 33, Wards lake*

*"I know that trees act as noise barriers."*

*~Male, 40, Wards lake*

*"I can notice the difference in temperature around the parks as compared to my locality."*

*~Male, 38, Wards lake*

*"It's so cool here, but as soon as I go about 8 kms from here, I feel the change in temperature."*

*~Female, 39, Golf Link*

*"I enjoy the calmness of this place, however, just as I exit, the nuisance of the honks of vehicles irks me right away."*

*~Female, 45, Lady Hydari*

*"It's very overwhelming to see the birds and squirrels around me."*

*~Male, 53, Golf Link*

*"With these trees around, I just feel like the air that I breathe here is cleaner."*

*~Female, 52, Lady Hydari*

*"According to me, the air that I breathe in here feels a lot cleaner than the locality where I live and work."*

*~Male, 41, Lady Hydari*

*"I see lots of birds around here. It is a good sight to see."*

*~Female, 61, Golf Link*

*"I enjoy being in this locality. Its cooler and quieter here as compared to my old locality."*

*~Male, 54, Golf Link*

**Table 2 Responses on health benefits (Arthritis) of green spaces by visitors**

<i>“My visit to the doctor has decreased ever since I started walking every morning”.</i>	-Female, 48, Wards Lake
<i>“My joint pain especially my knees seem to decrease”.</i>	- Male, 51, Golf Link
<i>“My knee doesn’t hurt like it used to do before”.</i>	- Male, 58, Wards Lake

**Table 3 Responses on health benefits (Stress and mental fatigue) of green spaces by visitors**

<i>“I feel less tired now.”</i>	-Male, 28, Lady Hydari
<i>“My headache seemed to subside with frequent exercise here every morning.”</i>	- Male, 35, Wards Lake
<i>“I visit the park with a colleague to relieve us from our work stress.”</i>	-Female, 30, Lady Hydari
<i>“I went into depression following my best friend’s death. I come here every morning to walk and feel peace within. I feel better. It’s been almost 5 months now.”</i>	-Female,24, Wards Lake
<i>“I feel like I don’t need an analgesic tablet every time i have a headache.”</i>	- Female, 38, Wards Lake

**Table 4 Responses on health benefits (Blood pressure) of green spaces by visitors**

*“My blood pressure has been normal for the past 7 months.”*

- Male, 62, Golf Link

*“No more frequent headaches due to fluctuating blood pressure.”*

- Female, 59, Wards Lake

*“Now that I have been taking brisk walks every evening, my blood pressure is normal.”*

- Male, 48, Wards Lake

*“I had very high pressure, but since my friend advised me to join her for morning walks, It has been about 4 months, my blood pressure is normal.”*

- Female, 50, Golf Link

**Table 5 Responses on health benefits (Heart related illness) of green spaces by visitors**

*“I have never felt so alive since the past 6 months after a cardiac arrest.”*

- Male, 63, Wards Lake

*“I feel very healthy and I know it because it’s been a while since I last visited a doctor.”*

- Female, 58, Golf Link

*“After my early morning walks for about 3 months, I went for a routine check up, and the doctor told me that i was completely healthy.”*

- Male, 60, Golf Link

**Table 5 Responses on health benefits (Attention Deficit Disorder) of green spaces by visitors**

*“My son’s school teachers told me that my son listens and pays more attention now.”*

-Female, 47, Lady Hydari

*“My son had the habit of getting frustrated doing his home works and his teachers told me that he has difficulty paying attention. But, now his classmates and teachers tells me that he is improving.”*

- Female, 53, Lady Hydari

**Table 6 Responses on health benefits (Fitness regime) of green spaces by visitors**

*“I come here for jogging every day.”*

-Male, 35, Wards Lake

*“I feel very energetic the entire day after brisk walk here every morning.”*

-Female 27, Golf Link

*“I am an athlete and so, I run for two hours. Nice place for daily exercise.”*

-Male, 24, Golf Link

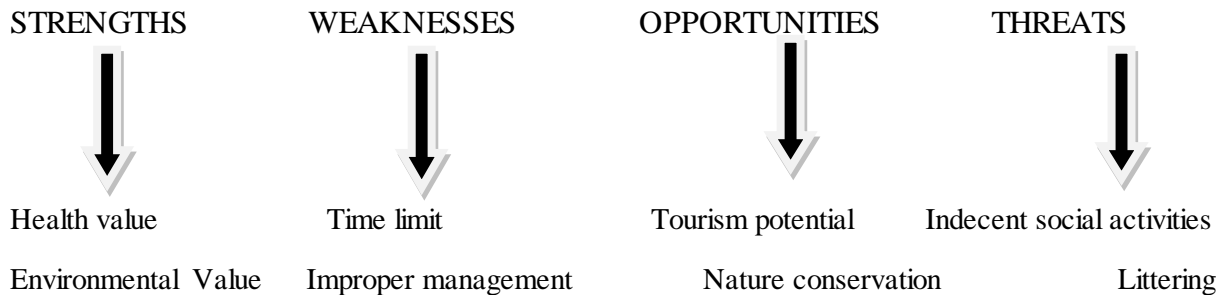
*“I maintain my health by jogging here every morning.”*

-Male, 30, Wards Lake

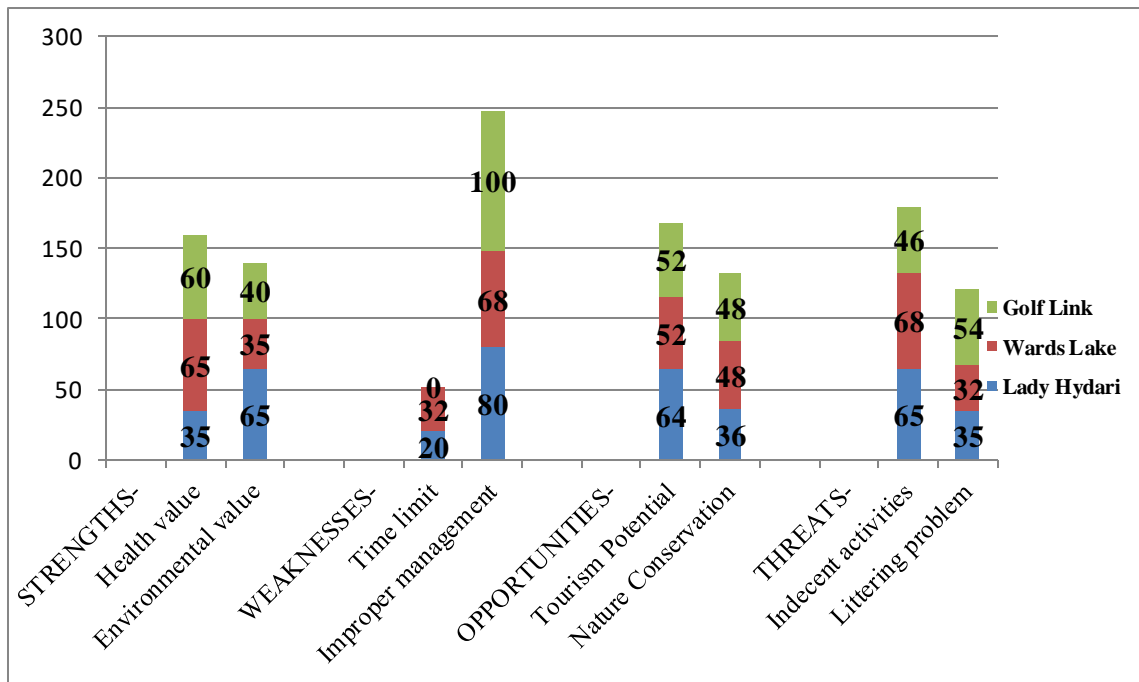
**Table 7 Responses on health benefits (Biophilia) of green spaces by visitors**

<p><i>“I just feel relaxed at the sight of flowers.”</i></p>	<p>-Female, 49, Lady Hydari</p>
<p><i>“By looking at the flowers, I feel happy.”</i></p>	<p>-Female, 27, Wards Lake</p>

**PARAMETERS FOR SWOT ANALYSIS ON THREE STUDY SITES-**



From the above flow chart, it can be clearly understood that the SWOT analysis of the study sites were supported by parameters which proved to be of utmost importance in conducting the analysis. The strengths, weaknesses, opportunities and threats were measured using two parameters each. The strength analysis was supported by health and environmental value while time limit and improper management of the green spaces were the weaknesses. Tourism potential and nature conservation were parameters of opportunities, while on the other hand, indecent activities and littering within the green spaces were regarded as threats.



**Figure 2.5 SWOT analyses of the study sites (in percentages)**

From the above figure, it is understood that for both Wards Lake and Golf Link, health value amounted to be highest with 65% and 60% respectively, while for environmental value, Lady Hydari was the highest with 65%. There was zero weakness in Golf Link in terms of time limit as compared to Lady Hydari (20%) and Wards Lake (32%) while improper facilities amounted to be the highest (100%) in Golf Link as compared to Lady Hydari (80%) and Wards Lake (68%).

Lady Hydari's tourism potential was the highest (64%) as compared to both Golf Link and Wards Lake at 52% each, whereas for nature conservation, both Golf Link and Wards Lake topped with 48% each as compared to Lady Hydari at 36%. Indecent activities amounted to be high in all study sites- 68% in Wards Lake, 65% in Lady Hydari and 46% in Golf Link, whereas Golf Link's littering problem proved to be highest than Lady Hydari (35%) and Wards Lake (32%).

## 5.1. CONCLUSION

With Shillong city witnessing increasing rate of urbanization, significant negatory changes in people's health and environment splurges into wider debate. The negative implications of urbanization cannot be ousted entirely yet it can be minimized with significant efforts. One such effort is to multiply the available green spaces in the city. Green spaces dispense motley of purposes for different people. Green spaces have an important legacy since time immemorial providing opportunities for individuals to ameliorate their health, for communities to develop, and to fortify the environment. It is paramount that this resource be augmented for a sustainable Shillong.

With additional support from literature review, the study also confirmed the vitality of green spaces' advancement towards physical health benefits of the users in all the study sites. Different age-groups have different motives to visit green spaces and also variant activities they engage in. The management, therefore, should take into consideration different recreational requirements of all target groups.

From an environmental panorama, the green space visitors were aware of multiple benefits of parks and urban green spaces- improved air quality, urban island cool-off, noise abatement and biodiversity conservation. All these conferment contributes to environmental protection, thus, making a city sustainable. In addition, the visitors knew the paramount importance of green spaces on their health which is supported by the evidences of their frequent visits to the green spaces. They have experienced the variant benefits in terms of improvement in their health- blood pressure, arthritis, Attention deficit disorder (ADD), Biophilia, mental fatigue, heart related illness as well as in maintaining their fitness regime.



The appraisal of these intangible services and benefits of green spaces is of paramount significance in order to identify and analyse its strengths, weaknesses, opportunities and threats for an effective maintenance and management of green spaces. The SWOT analysis postulates that Wards Lake stimulated more strength as compared to Lady Hydari and Golf Link in facilitating health value. Whereas in terms of weaknesses, Wards Lake had the highest percentage, thus concluding that the frequency of visits can decline with increasing indecent social activities within the green space. This was considered an identified barrier to green space use by most families in Wards Lake and Lady Hydari. On the contrary, there was a compatible association between Lady Hydari Park and increased family visits, reason being, the site provided recreational opportunities for children in comparison to the available facilities or opportunities for the other age group visitors.

With regards to opportunity of green spaces, tourism potentiality supported Lady Hydari as the green space with the highest opportunities. The conservation and development of such green spaces will, then, aid in transforming and enhancing Shillong into a more liveable, resilient and sustainable city.

My study supports a shared association of green spaces, health and environmental value succoured by visitors' strong approval of green spaces' contribution to the mentioned significant values.

## REFERENCES

- Aldous, D. E. (2006). "Benefits of trees and natural green space for urban communities", *International Federation of Park and Recreation Administration European Congress, Annecy, France*.
- Baycan-Levent, T., and Nijkamp, P. (2004). "Urban Green Space Policies: Performance and Success Conditions in European Cities", *paper presented in the 44<sup>th</sup> Congress of ERSA in Porto*, pp 25-29.
- Bauman, A.E., (2004). "Updating the evidence that physical activity is good for health: An epidemiological review", *Science and Medicine in Sport, Vol. 7*, pp. 6-19.
- Bird, W. (2002). "Green Space and our Health", *paper to London Greenspace conference*.
- Bratton, S.P. (1997). *Alternative models of ecosystem health*, Island Press, Washington DC
- Bryman, A. (2008). "Social Research Methods", Oxford University Press, Oxford.
- Burgess, J., Harrison, C.M., and Limb, M. (1988). "People Parks and the Urban Green: A Study of Popular Meanings and Values for Open Spaces in the City", *Urban Studies, Vol. 25*, No.6, pp 455-473
- Commission for Architecture and the Built Environment (2004). *The value of Public space: How high quality parks and public spaces create economic, social and environmental value*. London.
- Commission for Architecture and the Built Environment (2005). *Decent Parks? Decent Behaviour? The Link between the Quality of Parks and User Behaviour*. London.
- Craft, L.L., and Landers, D.M. (1998). "The effect of exercise on clinical depression and depression resulting from mental illness: A meta-analysis", *Sport Exercise Psychology*, Vol. 20, pp. 339–57.
- Cohen, D. A., McKenzie, T. L., Sehgal, A., Williamson, S., Golinelli, D., and Lurie, N. (2007). "Contribution of public parks to physical activity", *Public Health, Vol. 97*, pp 509-514.
- Daley, A.J. (2002). "Exercise therapy and mental health in clinical populations: Is exercise therapy a worthwhile intervention", *Advanced Psychiatry Treatment, Vol.8*, pp 262–70.

Elliot,R. (1997). *Faking nature: The Ethics of environmental restoration*, Routledge, London.

Floris, A., Pickett, S.T.A., Zipperer, W.C., Pouyat, R.V., and Pirani, R. (1998). “Adopting a modern ecological view of the metropolitan landscape: the case of a green space system for the New York City region”, *Landscape Urban Planning*, Vol. 29, pp 295-308.

Flynn, B.C. (1996). “Healthy cities: Toward worldwide health promotion”, *Annual Revised Public Health* ,Vol. 17, pp 299–309.

Frumkin, H. (2002). “Urban sprawl and public health”, *Public Health Report* ,Vol. 117, pp 201–17.

Galea, S., and Vlahov, D. (2005). “Urban health: evidence, challenges and directions”. *Annual Review Public Health*, Vol. 26, pp 341–65.

Gast, G.C., Frenken, F.J., and van Leest L,A. (2007). “ Intra-national variation in trends in overweight and leisure time physical activities in the Netherlands since 1980: Stratification according to sex, age and urbanisation degree”, *Obesity*, Vol. 31,No. 3, 515–20.

Giles, B., Broomhall, M. H., Knuiman, M., Collins, C., Douglas, K. (2005). “Increasing walking-how important is distance to, attractiveness, and size of public open space?”, *Public health*, Vol. 100, pp 9-13.

Gilbert, O. (1991). *The Ecology of Urban Habitats*, Chapman & Hall, London.

Glenister, D. (1996). “ Exercise and mental health: A review”, *Public health*, Vol. 116, No. 1,pp. 7–13 , viewed on February 2, 2015,

<http://jpubhealth.oxfordjournals.org/>

Grahn, P., and Stigdotter, U. (2003). “Landscape Planning and Stress in Urban Forestry Urban Greening”, *Landscape Urban Planning*, Vol. 2, pp 1-18.

Hartig, T., Evans, G.W., Jamner, L.D., Davis, D.S. and Garling, T. (2003). “Tracking restoration in natural and urban field settings”, *Environmental Psychology*, Vol. 23,pp 109-123.

Heinze,J. (2011). “Benefits of Green Space- Recent Research”, *Environmental Health Research Foundation (ERHF)*, Chantilly, Virginia.

Hornback, K.E. & Eagles, P.F.J. (1999). "Guidelines for Public Use Measurement and Reporting at Parks and Protected Areas", *IUCN Gland, Switzerland and Cambridge, UK*

Hussain, G., Nadeem, M., Younis, A., Riaz, Khan, M.A., and Naveed, S. (2010). "Impact of public park on human life: A case study", *Agricultural Science*, Vol. 47, pp 225-230.

Jim, C.Y., and Chen, W.Y. (2008). "Assessing the ecosystem service of air pollutant removal by urban trees in Guangzhou", *Environmental management*, Vol. 88, pp 665-676.

Kahn, E.B., Ramsey, L.T., and Brownson, R.C. (2002). "The effectiveness of interventions to increase physical activity—a systematic review", *Preventive Medicine*, Vol. 22, No. 4, pp 73–107.

Kaplan, R., and Kaplan, S. (1989). "The Experience of Nature: A Psychological Perspective", Cambridge University Press, New York

Karp, A., Paillard, B. S., and Wang, H. (2006). "Mental, physical and social components in leisure activities equally contribute to decrease dementia risk", *Dementia Geriatric Cognitive Disorder*, Vol. 21, No. 2, pp 65–73.

Kaye, J.P., McCulley, R.L., and Burke, I.C. (2005). "Carbon fluxes, nitrogen cycling, and soil microbial communities in adjacent urban, native and agricultural ecosystems", *Global Change Biology*, Vol 11, pp 575-587.

Kearney, A. (2006). "Residential development patterns and neighbourhood satisfaction: Impacts of density and nearby nature", *Environment and Behaviour*, pp 112-139.

Kickbusch, I. (1989). "Healthy cities: a working project and a growing movement", *Health Promotion*, Vol. 4, No. 2, pp 77–82.

Krisdianto, Soemarno, Udiansyah, and Januwadi, B. (2012). "Standing carbon in an urban green space and its contribution to the reduction of the thermal discomfort index: a case study in the City of Banjarbaru, Indonesia", *Scientific and Research Publications*, Vol. 2, No. 4, pp 184-189.

Kohl, W.W. (2001). "Physical activity and cardiovascular disease: Evidence for a dose response", *Medicine and Science in Sports and Exercise*, Vol. 33, pp 472-483.

Korpela, K.M., Hartig, T., Kaiser, F., and Fuhrer, U. (2001). "Restorative experience and self regulation in favourite places", *Environment and behaviour*, Vol. 33, pp 572-589.

Kuo, F.E. and Sullivan, W.C. (2001). "Coping with poverty: Impacts of environment and attention in the inner city". *Environment & behaviour*, Vol. 33, pp 5-34.

Kweon, B. S., Sullivan, W. C., and Wiley, A. R. (1998). "Green common spaces and the social integration of inner- city older adults", *Environment and Behaviour*, Vol. 30, pp 355-375.

Lawlor, D.A., and Hopker, S.W. (2001). "The effectiveness of exercise as an intervention in the management of depression: systematic review and meta-regression analysis of randomized controlled trials", *Sport Exercise Psychology*, Vol. 322, pp. 1-8.

Li, F. Z., Fisher, K. J., Bauman, A., Ory, M. G., Chodzko-Zajko, W., and Harmer, P. (2005) "Neighbourhood influences on physical activity in middle aged and older adults: A multilevel perspective", *Aging and Physical Activity*, Vol. 13, pp 87-114

Lowry, W.P. (1967). *The climate of cities: their origin, growth and human impact*. Readings from *Scientific American*, San Francisco, W.H. Freeman and Company.

Maas, J., Verheij, R.A., Groenewegen, P.P. (2006). "Green space, urbanity, and health: How strong is the relation?", *Epidemiological Community Health*, Vol 60, pp 587-92.

Maas, J., Verheij, R.A., and de Vries, S. (2009). "Morbidity is related to a green living environment", *Epidemiological Community Health*, Vol 63, pp 967-97.

Maas, J., Verheij, R.A., Groenewegen, P.P., de Vries, S., and Spreeuwenberg, P. (2006). "Green Space, urbanity and health: How strong is the relation?", *Epidemiological Community Health*, Vol. 60, pp 587-592.

Maas, J., Verheij, R.A., Spreeuwenberg, P., and Groenewegen, P.P. (2008). "Physical activity as a possible mechanism behind the relationship between green space and health: A multilevel analysis", *Public Health*, Vol. 8, pp 206-10.

Manson, J.E., Greenland, P., Lacroix, A.Z., Stefanick, M.L., and Houton, C.P. (2001). "Walking compared with vigorous exercise for the prevention of cardiovascular events in women", *New England journal of medicine*, vol. 347, pp. 716-725.

McMichael, A.J. (2000). "The urban environment and health in a world of increasing globalisation: Issues for developing countries", World Health Organisation, Vol. 78, No.9, pp 1117–26.

Meisinger, C., Lowel, H., and Heier, M. (2007). "Association of sports activities in leisure time and incident myocardial infarction in middle-age men and women from the general population", Cardiovascular Preventive Rehabilitation, Vol.14, No. 6, pp788–92.

Morris, N. (2003) Health, well-being and open space: literature review, OPENspace, Edinburgh.

National Audit Office. Enhancing Urban Green Space. London: TSO, 2006.

Newsome,D., Moore, S.A., and Dowling, R.K. (2002). "Natural Area Tourism: Ecology, Impacts and Management", Channel View, Clevedon, England.

Niemela, J. (1999). "Ecology and Urban Planning", *Biodiversity and Conservation*, Vol. 8, pp. 1-15.

Nowak,D.J., Crane,D.E., nad Stevens, J.C. (2005). "Air pollution removal by urban trees and shrubs in the United States", Urban forestry and urban greening, Vol. 3, pp 65-78.

Ohta, M., Mizoue, T., and Mishima, N. (2007). "Effect of the physical activities in leisure time and commuting to work on mental health", Occupational Health, Vol. 49, No. 1, pp 46–52.

Orsega ,S.E., Mowen, A., Payne, L., and Godbey, G. (2004). "The interaction of stress and park use on psycho-physiological health in older adults", *Leisure Research*, Vol. 36, pp 232-256.

Pataki, D.E., Alig, R.J., Fung, A.S., Golubiewski, N.E., Kennedy, C.A., McPherson, E.G., Nowak, D.J., Pouyat, R.V., and Lankaos, P.R. (2006). "Urban ecosystems and the North American carbon cycle", *Global Change Biology*,Vol 12, pp 1-11.

Payne, L., Orsega-Smith, B., Godbey, G., and Roy. (1998). "Local parks and the health of older adults: Results from an exploratory study", *Parks and Recreation*, Vol. 33, No. 10, pp 64-71.

Plummer, B., and Shewan, D. (1992). "City Open Spaces and Pollution in City Gardens: *An Open Space Survey in the City of London*". *Belhaven*, London.

Pretty, J., Griffin, M., and Sellens, M. (2003). "Green exercise: complementary roles of nature, exercise and diet in physical and emotional well-being and implications for public health policy", University of Essex, CES Occasional Paper -1.

Sacker, A., and Cable, N. (2006). "Do adolescent leisure-time physical activities foster health and well-being in adulthood? Evidence from two British birth cohorts", *Public Health*, Vol 16, No. 3, pp 331-5.

Shaw, K.A., Gennat, H.C., and O'Rourke, P. (2006). "Exercise for overweight or obesity", *Preventive Medicine*, Vol. 4, pp 150-155.

Shashua, B. L., and Hoffman, M.E. (2000). "Vegetation as a climatic component in the design of an urban street: an empirical model for predicting the cooling effect of urban green areas with trees", *Energy and Buildings*, Vol.31, pp 221-235

Simons, R., and Andel, R. (2006). "The effects of resistance training and walking on functional fitness in advanced old age", *Journal of aging and health*, vol.18, no. 1, pp. 91-105.

Stigsdotter, U.K., Ekholm, O., and Schipperijn, J. (2010). "Health promoting outdoor environments—associations between green space, and health, health-related quality of life and stress based on a Danish national representative survey", *Public Health*, Vol. 38, No. 4, pp 411-7.

Sugiyama, T., Leslie, E., Giles-Corti, B., and Owen, N. (2008). "Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships", *Epidemiology and Community Health*, vol. 62, no. 5, pp. 220-235.

Takano, T., Nakamura, K., and Watanabe, M. (2002). "Urban residential environments and senior citizens' longevity in megacity areas: The importance of walkable green spaces", *Epidemiology and Community Health*, Vol. 12, pp 300-320.

Taylor, A.F., Kuo, F.E. and Sullivan, W.C. (2001). "Coping with ADD- the surprising connection to green play settings", *Environment and Behaviour*, Vol. 33, No. 1, pp 54-77.

The State of Michigan, (2005), Green Facts, Department of Agriculture, viewed on 16<sup>th</sup> January 2016,

[http://www.michigan.gov/mda/0.1607-125-1570-2476-934-00.html](http://www.michigan.gov/mda/0,1607-125-1570-2476-934-00.html)

Thomas, D., Elliott, E.J., and Naughton, G.A. (2006). "Exercise for type 2 diabetes mellitus", Vol.3, pp 500-30.

United Nations. World Urbanization Prospects: The 2007 Revision Population Database [online]. Population Division of the Department of Economic and Social Affairs, 2007. <http://www.esa.un.org/unup/> (20 November 2009, date last accessed).

Ulrich., Quan, X., and Zinring, C. (2010). "The role of the physical environment in the hospital of the 21<sup>st</sup> century: A once-in-a-lifetime opportunity", Report prepared for TriPoint Hospital Center, viewed on 22<sup>nd</sup> December 2015,

[http://www.cleveland.com/healthfit/index.ssf/2010/09/blueprintfor\\_healing\\_hospital.html](http://www.cleveland.com/healthfit/index.ssf/2010/09/blueprintfor_healing_hospital.html)

Van den Berg, A.E., Maas, J., and Verheij, R.A. (2010). "Green space as a buffer between stressful life events and health", *Social Science Medicine*, Vol. 70, No. 8, pp 1203–10.

Warburton, D. E. R., Nicol, C. W., and Bredin, S.S.D. (2006). "Health benefits of physical activity: The evidence". *Canadian Medical Association*, Vol. 174, pp 801-809.

Wen, M., Kandula, N. R., and Lauderdale, D. S. (2007). "Walking for transportation or leisure: What difference does the neighbourhood make?", *General Internal Medicine*, Vol. 22, pp 1674-1680.

Whitford, V., Ennos, A.R., and Handley, J.F. (2001). "City Form and Natural Processes: Indicators for the Ecological Performance of Urban Areas and Their Application to Merseyside, UK", *Landscape and Urban Planning*, Vol. 20, pp 91-103.

Williams, P.T. (201). "Physical fitness and activity as separate heart disease risk factors: a meta-analysis", *Medical Science Sports Exercise*, Vol. 33, No. 5, pp 754–62.

Wardell, M.J., and Moore, S.A. (2005). "Collection, Storage and Application of Visitor Use Data in Protected Areas: Guiding Principles and Case Studies", *Sustainable Tourism Cooperative Research Centre, The Gold Coast, Queensland, Australia*.



Weuve, J., Kang, J.H., Manson, J.E., Bretler, M.M., Ware, J.H., and Grodstein, F. (2004). "Physical activity, including walking, and cognitive function in older women", *American Medical Association*, vol. 292, no. 12, pp. 1454-1461.

Wolf, K.L., and Housley, E. (2014). "Environmental equality: Providing nearby nature for everyone", Annapolis MD, TKF Foundation, pp. 16.

Wooley, H. (2003), *Urban Open Space*, SAGE, London.

Yin, Robert K. (2009). "Case Study Research. Design and Methods", SAGE, London.

Yang, J., McBride, J., Zhou, J., and Sun, Z. (2005). "The urban forest in Beijing and its role in air pollution reduction", *Urban forestry and urban greening*, vol. 3, no.2. pp. 65-78.