

# The Importance of Healthy and Sustainable Built Environments for Vulnerable Groups of Population

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## ABSTRACT

*Researchers worldwide have demonstrated the adverse impact of unsustainable and unhealthy built environment on citizens. In the case of diabetes, studies have concentrated on the environmental impact and accessibility issues of a place i.e. the home and neighbourhood, whereas very few studies have addressed the spatial arrangement of places and linked it with the prevalence of diabetes. Also, little research has tackled the place's impact on diabetic patients and their views concerning their neighbourhoods. This paper illustrates the outcomes of survey that was carried out on diabetic individuals in the eastern province, Kingdom of Saudi Arabia (KSA). The present researchers found significant links between patients' diabetes symptoms with the unsustainable and unhealthy conditions of their homes and neighbourhoods. The paper makes recommendations on how to improve the built environment in the KSA to be sustainable and healthier for all citizens including the diabetic patients.*

**Keywords:** *Perception of place, unhealthy built environment, healthy principals, sustainable programs*

## INTRODUCTION

The provision of a healthy built environment became increasingly under focus nowadays as profound links are found between a healthy built environment and healthy lifestyles. Several programs such as LEED (i.e. Leadership in Energy & Environmental Design, is a green building certification program), BREEAM (i.e. Building Research Establishment Environmental Assessment Methodology), and HIA (i.e. Health Impact Assessment) (LEED, 2009, BREEAM 2009, and WHO, 2013) have attempted to measure the effect of physical environment on environment and health and minimize the adverse impact of the built environment on people health. Consequently, the World Health Organization (WHO) set a number of healthy principals for planning of cities and towns and these are: healthy lifestyle, social cohesion, housing quality, access to employment and education opportunities, accessibility, local low-input food production, safety, equity, air quality and aesthetics, water sanitation and quality, quality of land and mineral resources, and climate stability (Barton and Tsourou, 2000).

The design of a sustainable and healthy built environment became increasingly important as it would provide healthy environment for citizens, support their sustainable activities and healthy lifestyles, promote healthy lifestyles and facilitate the social cohesion and offer smooth access to educational, cultural, leisure and retail facilities capable of sustaining urban development (Barton, Grant, and Guise, 2010; Barton and Grant, 2011, Sidawi and Al-Harriri, 2012, Sidawi, Deakin and Al-Harriri, 2014, Sidawi, Al-Harriri and Albaker, 2014). However, vulnerable individuals such these with chronic diseases are more sensitive to the built environment's conditions than normal and healthy individuals thus they have more chance to be affected by bad environment conditions.

Diabetes, for instance, is caused by a complex interaction between patient's genetics and environment factors. Barton, Grant, and Guise (2010) pointed out to the direct and indirect impact of the built environment on health. Among the indirect effects are the place i.e. Home and neighbourhood characteristics and the people's perception of their neighbourhoods. In the case of Kingdom of Saudi

Arabia (KSA), certain cultural, environmental, and urban constraints would affect health. The consideration of such factors, would not only tackle the catastrophic spread of “unhealthy lifestyles”, and enable the built environment to contribute to the healthy lifestyles of diabetic patients in the KSA but also sustain the sustainable and healthy urban development of towns and cities in the KSA. The present researchers investigated the possible indirect built environment and spatial arrangement impacts on the health of diabetic individuals in the KSA. A survey has been carried out on a sample that consists of seventy six patients who usually visit the King Fahd teaching hospital of the University of Dammam, Al-Khober. The patients were surveyed and physically examined. The field study's results are discussed and linked with previous research studies.

## **THE DIABETES SYMPTOMS AND ITS' PREVALENCE IN THE KSA**

Diabetes mellitus is the most common non-communicable disease worldwide and the fourth to fifth leading cause of death in developed countries. There are – in general- two types of diabetes. In Diabetes type I (T1DM), the person's own body has destroyed the insulin-producing beta cells in the pancreas. Although type II diabetes mellitus (T2DM) can be caused by genetic factors, an unhealthy lifestyle happens to be the main cause (Sidawi and Al-Hariri, 2012). A person with T2DM has one of two problems, and occasionally both: a) not enough insulin is being produced; and b) the insulin is not working properly. The direct symptoms of diabetes, such as thirst, frequent tingling sensation, frequent urination and fatigue, can be mild and may cause little interruption to activities of daily living, it is the complications of the disease, including blindness in adults (Jeppesen & Bek, 2004) non-traumatic lower-limb amputation (Chaturvedi, Stevens, Fuller, Lee, & Lu, 2001) and kidney failure that result in transplantation and dialysis (Atkins, 2005). Furthermore, the risk of coronary heart disease is two to four times higher in diabetic patients. The risk of stroke or peripheral vascular disease also increases strongly.

The Kingdom of Saudi Arabia has one of the highest percentages of diabetes in the world, with an estimated number of 3,414,510 people diagnosed with the disease in 2012, which is 23.38% of the population (International Diabetes Federation, 2012). Little research though was conducted in the KSA with regard to the effect of the unhealthy built environment on diabetic patients whereas it is evident that urbanism and poor built environment conditions in the KSA (Khodeir et al. 2012) have promoted unhealthy lifestyles and aggravated diabetes (Sidawi and Al-Hariri, 2012, Sidawi, Al-Hariri and Albaker, 2014, Sidawi, Deakin and Al-Hariri, 2014).

## **THE IMPACT OF BUILT ENVIRONMENT ON HEALTH**

Barton, Grant, and Guise (2010) have classified the impact of the built environment on health into two categories: direct and indirect. Direct impacts include those traditionally associated with: a) planning and b) environmental health, e.g. air quality (indoor and outdoor), climate, water quantity and quality, noise and traffic-related injuries (Sustainable Development Commission, 2008). Indirect impacts include how the characteristics and design of the built environment influence the determinants of health, in particular perceptions of the local area, social connections and physical activity, which in turn are associated with physical and mental health and well-being (Barton, Grant, & Guise 2010).

## **THE INDIRECT IMPACTS OF BUILT ENVIRONMENT**

### **Home and neighbourhood characteristics**

This section discusses the characteristics of a home and neighbourhood, and how it promotes social connections, accessibility, physical activity, and whether it creates positive perception for the residents in their neighbourhood. It is well known that the influences of interactions between the level of activity and psychosocial wellbeing and stress in the pathogenesis of T2DM.1 (Sridhar, Venkata, and Lakshmi, 2010). Additionally, genome-wide association studies have identified the complex interplay between genes and the environmental factors that may change in genes expression making the genes

potentially important pathogenic mechanisms in Diabetes and its consequences (Jirtle and Skinner, 2007).

At home level, a US study has looked at many risk factors for diabetes including physical characteristics and personal habits (e.g. weight, smoking, exercise, and alcohol use), marital status, education and housing conditions. The study rated the houses on the following basis: cleanliness inside of the building, the physical condition of the building's interior and exterior, and the condition of the furnishings in the building. The researchers tested the impact of housing conditions and used physical attributes and habits as mediators and they found that housing conditions still influence diabetes risk and contribute to the development of diabetes (Schootman, Andresen, Wolinsky, 2006). For instance, dampness in buildings would critically affect health and a study found that damp housing is often associated with poor maintenance of the dwelling and socio-economic disadvantage of the occupants (Environmental Epidemiology Unit, 1999). There is a growing body of literature suggest that the progression of the Diabetes and its complications resulting in part from poor lifestyle habits such as lack of physical activity, which are in turn affected by built environment factors (Sudhir, Appa and Sridhar, 2010). Poorer health status in socioeconomically deprived and rural environments may reflect, in part, the inaccessibility of built environmental features such as public pools, recreation centres, physical fitness utilities, parks, sidewalks, and streetlights (Goldberg et al., 2000).

Allanah, Ashley and Farley (2010) stated that an ill designed urban setting would enforce people to adopt an unhealthy lifestyle thus contribute to the development of T2DM. Eckel et al. (2004) have linked passive entertainment and a lack of physical activity with the increasing incidence of the diabetes. Physical activity has been found to reduce the symptoms of coronary heart disease and strokes associated with T2DM (Frumkin, Frank and Jackson, 2004). The decline in local facilities, the reduction in pedestrian movement and neighbourly street life all reduce opportunities for the supportive social contact so vital for mental well-being (Barton, Grant, & Guise, 2006). The absence of facilities, barriers to facilities (such as steep hills, busy roads to cross) or the perception that facilities are inadequate have negative associations with physical activity (Humpel, Owen, Leslie, 2002). So, neighbourhood design that promote social networks are those which have mixed use and pedestrian oriented, with public spaces, such as parks, that can act as places for socializing (Greenspace Scotland, 2008). Those living in more "walkable" neighbourhoods, characterized by high population density, mixed land use and high levels of connectivity (e.g. good pedestrian and cycling facilities) have been found to be more physically active (Pikora, Giles-Corti, Knuiiman et al. 2005, Duncan, Spence, and Mummery, 2005).

## **The neighbourhood characteristics in Saudi Arabia**

There are a number of housing arrangements in KSA such as: gated compounds; terraced housing, villas, blocks of flats, or mixed development. The gated compounds are usually well fenced and guarded and have facilities that are different in number and quality according to the compound class i.e. middle, upper, rich and very rich. Facilities in gated compounds can be only used by the compound's residents and their guests. Some of the compounds have a lack in facilities such as: café shops, restaurants, laundries, bank branches, gardens etc., so the residents have to travel by car to get their daily/ weekly needs from the district's centres or shopping malls. Each of the above mentioned spatial arrangements would have a unique effect on the occupant's health and well-being. Residential districts in KSA can be also classified in accordance to the social class. The facilities, finishing quality, level of furnishing and cleanliness varies from one district to another. These suffer from irregular location of the amenities such as; gardens, parks, leisure and recreation within the neighbourhoods, quarters, and districts (Choguill, 2008).

In Jeddah, problems of poor quality public spaces within modern residential areas seem to beset the public realm (Manadeli, 2010). Alshuwaikhat and Aina (2006) conducted a study in AL Dhahran, KSA and found that there is low level of access to open spaces by people (i.e. percentage of population) comparing with the standards. Also, there is lower percentage of total land dedicated to open space than standard (ibid). Aleid and Alseef (2010) revealed a lack of recreational

places/facilities and public parks, particularly kids' playgrounds. Citizens in Alkhuber are also not satisfied about the public facilities. They highlighted the absence of green areas, lack of safety, lack of entertainment facilities for children, the absence of shaded public spaces and recreational facilities, and lack of hygiene and cleanness (Alshuaibi, 2012). With respect to the built environment and individuals' habits in KSA, the following issues are noticed:

- *rapid growth of Saudi cities and the absences of healthy and sustainable planning code*
- *the extreme hot, dry inland and humid weather in coastal cities create environmental conditions that affect the type and timing of people's activities. Thus, Saudis tend to engage in unhealthy activities: such as irregular sleeping patterns (e.g. afternoon nap, sleeping late), evening or late night trips to local malls and shopping arcades or sitting in coffee shops, late night's heavy meals. These activities replace outdoor activities, such as children's playgrounds and walking children to school (Choguill, 2008);*
- *in major cities across the KSA, it was found that the majority of Saudi adolescents spent more than 2 hours watching TV, and around half of them do not meet the daily physical activity requirements (Al-Hazzaa et al., 2011)*
- *poor living conditions add to these problems and adversely affect the health of all citizens, particularly those with diabetes (Allanah, 2012, Sidawi and Al-Hariri, 2012, Sidawi, Deakin and Al-Hariri, 2014). Such living conditions make it difficult for diabetics to enjoy walking around their neighbourhoods due to the extreme hot, dry and humid weather conditions and high level of air pollution within cities (Sidawi et al. 2011 and Sidawi, 2012);*
- *certain cultural issues should also be taken into consideration when exploring the relationship between diabetics and living conditions such as the segregation between men and women and restricted rules regarding women clothing and their mobility, social relationships within the Saudi families and tribes and socio-economic disadvantage for poor (Sidawi, 2013 & 2014).*

## Perceptions of Place and Health

Perception of place problems refers to aspects people say they dislike about their local area when interviewed in general health surveys (NICE, 2007). Such problems have been considered in relationship to health (Parkes & Kearns, 2005, Stafford & Marmot, 2003). Some problems can be labelled as physical or environmental when they relate to the presence of noise, dense traffic, dirt, odours, fumes or various signs of deterioration in the built environment such as abandoned buildings, trash, litter, graffiti and vacant housing (NICE, 2007). Other problems refer to the absence of basic infrastructure, facilities and amenities in the neighbourhood (ibid). Studies have consistently found evidence of a relationship between neighbourhood environment (both perceptions and more objective measures) and self-reported health (Curtice, Ellaway and Robertson et al. 2005, Wilson, Elliot and Law et al. 2006). For example, people who perceive their neighbourhoods to be hostile, dirty, poorly maintained, and lacking in safe places to play, are more likely to experience anxiety, depression, and poor health (Curtice, Ellaway and Robertson et al., 2005). On the other hand, high self-efficacy, perceptions of good quality facilities in the area and high levels of neighbourliness were independently associated with good self-rated health and physical functioning. Perceptions of problems in the area were also predictive of poorer health (NICE, 2007). The perception of problems in the neighbourhood is negatively associated with several health outcomes such and health behaviours (NICE, 2007). Such perceptions might influence people's health through various pathways (Kawachi & Berkman, 2003). Perceived environmental problems, such as air or water pollution would affect physiological pathways, whereas perceived problems and social cohesion may influence health through psychosocial and physiological pathways (Latkin & Curry, 2003). So, perceived problems in the neighbourhood, such as noise and dense traffic are considered as chronic stressors heightening the level of anxiety, insecurity and fear among residents. Perceived local environments might influence health through behavioural pathways such as smoking, diet and physical activities.

## HEALTHY BUILT ENVIRONMENT AND HEALTHY LIFESTYLE

WHO has emphasized on the importance of planning healthy built environments (Barton and Tsourou, 2000). The built environment should be designed to be sustainable and promote healthy lifestyles, facilitate social cohesion and offer access to educational, cultural, leisure and retail facilities capable of sustaining urban development (Curwell and Deakin 2002, Barton, Grant, and Guise, 2010, Barton and Grant, 2011). Jackson and Kochtitzky (2001) advocated providing neighbourhood opportunities for walking to accomplish routine activities such as shopping, going to work and exercise. Green areas should be carefully located, designed and integrated with the neighbourhood in order to be pleasant in appearance, encourage walking and improve health. Landscape architecture appears to be the primary key at the finest scale to sound mind and body, and simply viewing nature reduces the stress of daily urban life (Jackson, 2011). In addition, urban green space does more than offer opportunities for physical activity; it offers opportunities for engagement with, and observation of, nature, as well as opportunities for social interaction, thus enhancing individuals' sense of well-being (Greenspace Scotland, 2008). Accessibility for all types of users to all facilities and services is a must. Visual landmarks and logical transit pathways assist people, particularly the elderly, in reaching their destinations. Psychologically, the above-mentioned elements provide a sense of ease and comfort. On a neighbourhood, urban or city level, urban planning should promote walking, the use of public transport, minimizing the number of vehicles on roads, providing well (cross) ventilated and shaded urban areas in hot climate countries. It also reduces the pollution and noise levels and would provide thermally comfortable urban areas.

## THE RESEARCH OBJECTIVES AND METHODOLOGY

The research aim is to examine the effect of the built environment on diabetic individuals within the context of The Eastern province, Kingdom of Saudi Arabia. Therefore, the researchers have set a number of objectives and these are:

- *To find out the relation between the disease's symptoms and resulted medical investigations of patients with the characteristics of their residence;*
- *To find out possible links between the disease's symptoms and medical investigations of patients with their perception of the neighbourhoods*

Consent to carry out the study was first obtained from the University of Dammam's ethics committee. The fieldwork began in January 2013. The study's sample constituted of diabetic patients who usually visit the diabetic clinic at the King Fahd teaching hospital of the University of Dammam, Al-Khobar. This list of patients includes T1 and 2DM male and female adults, age 15-70 years and resident in the Eastern province, KSA. Seventy six patients have participated in the study. These patients were handed a questionnaire form to fill in, and physical exams of patients' health statuses were carried out. The questionnaire includes questions on the characteristics of their home and neighbourhood, the patients' lifestyles and activities since the onset of the disease, their perception of the environmental conditions of the home, work and neighbourhood, and self-reported health conditions since the onset of the disease. All patients have filled in the questionnaire and returned it. The patients were physically examined. The exams include; a blood pressure test and Body Mass Index (BMI). The medical test results such as the fasting blood glucose, HBA1C, urine albumin, and lipid profile, were extracted from the patients' medical files.

## DISCUSSION OF THE RESULTS

Many previous researchers have pointed out to the pathways through which the unsustainable and unhealthy built environment would impact health. This is true for diabetic patients who suffer from indoor and outdoor conditions (see for instance Schootman, Andresen and Wolinsky, 2006). Such conditions would force people to adopt unhealthy lifestyles, and contribute not only to the development of diabetes T2DM but to the deterioration of the health status of T1DM patients (see also

Allanah, Ashley and Farley, 2010, Eckel et al., 2004, Jirtle and Skinner, 2007, Sidawi, Deakin and Al-Harriri, 2014).

In this paper the present researchers examined the adverse impact of the built environment on health of specific population that is the diabetic individuals in the KSA. The study showed that the progress of the disease is caused by unhealthy built environment in the KSA (see also Khodeir et al. 2012, Sidawi and Hariri, 2012, and Sidawi, Deakin and Al-Harriri, 2014). This is represented by high pollution levels, and irregularity of spatial configuration/ arrangement of public facilities and the lack of the public facilities as well. The irregular settings of urban services would promote unhealthy lifestyles as around half of the respondents never or rarely do any recreational activities, morning sport exercises or participate in social activities (see also Barton, Grant, and Guise, 2006, and Humpel, Owen, Leslie, 2002). In regards to the dietary habits, around half of the respondents admitted bad habits related to drinking fizzy drinks or eating junk food meals, watching TV or working in the office for long hours.

In regards to the environmental conditions, the patients suffered from various home or neighbourhood's environmental conditions such as unpleasant outside views, noise from neighbours, traffic noise etc. Also, patients said they suffer mostly from extreme fatigue/ tiredness, tension/ stress, blurred vision, and an inability to control their nerves. The study found significant links between the environmental conditions at home and in the neighbourhoods with the frequency of disease symptoms whereas bad environmental conditions are associated with higher frequency of self-reported symptoms (see also Schootman, Andresen and Wolinsky 2006). The home conditions have links with the medical investigations results whereas uncomfortable home conditions from environmental, social and psychological perspectives have a bad effect on diabetic individuals and causes higher levels of LDL, TG and poorer HDL. Respondents who live in poor areas suffer more from the poor environmental conditions at home and in their neighbourhoods and subsequently they suffer more from a number of diabetes manifestations such as: Paraesthesia, Blurred vision, and stress (also see Barton, Grant, and Guise, 2010 for health& poor environment correlations).

## **CONCLUSION AND RECOMMENDATIONS**

With regards to this research findings and previous research, the present researchers would suggest that fundamental changes should be carried out in the Saudi built environment to promote physical activity, improve psychological and physiological conditions not only of normal citizens but also for vulnerable groups of population such as diabetic individuals. However, a number of issues should be considered in any future planning of cities. Amongst of these, is the Islamic lifestyle and practices; and the Saudi culture. Also, one should consider the have unique social, cultural, environmental and economic characteristics of Saudi cities. The fabric of these cities is rapidly changing due to the urban sprawl on macro level, neighbourhoods' level, and micro level (i.e. homes level). There are also on-going and rapid negative environmental changes due to the increased levels of pollution and desertification in the KSA and the global warming at national, regional and global level. Therefore, the present sustainability programs and Health Assessment tools should be developed further into a robust assessment framework that addresses and measures the relationship between people's activities and the built environment (i.e. indoor, outdoor, and interlink relationship between them). Such framework should be incorporated into the planning and decision making process so it would help improving the existing neighbourhoods and designing new healthy neighbourhoods and cities.

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