Research Proposal

AMR ALABBASI
FACULTY OF BUILT ENVIRONMENT
UNIVERSITY TEKNOLOGI MALAYSIA
AALABBASIA@GMAIL.COM
SUPERVISOR: ISMAIL SAID (PHD)
FACULTY OF BUILT ENVIRONMENT
UNIVERSITY TEKNOLOGI MALAYSIA
1. Research Topic

1.1. Restorative Effects of Open Spaces at Well-Planned Cities on the Physiological Health of Obese Adults in Saudi Arabia

2. Research Aim

2.1. To examine the restorative effects of waterfront parks on obese adults in comparison to the effect of neighborhood parks on physiological health in well-designed cities.

3. Research Objectives

3.1. To identify where obese adults prefer to exercise; at waterfront or neighborhood parks;
3.2. To determine the properties and attributes of waterfront parks and neighborhood parks that enhance physical activeness of obese adults that can improve and control the glucose level in the blood, blood pressure, and heart beat rate; and
3.3. To examine the physiological change in obese adults after they experience open spaces at waterfront parks in comparison to neighborhood parks in order to show the restorative effect.

4. Assumptions

4.1. The design quality of the properties and attributes along waterfront parks encourage the users to be more physically active in comparison to neighborhoods parks. The activeness of the users plays an important role in enhancing the physiological health of the obese adults residing in well-planned cities.
4.2. Both spaces are well designed since the study is about well-designed cities.
5. Research Hypothesis

Exercising at open spaces in well-planned city has a restorative effect on the physiological health of obese adults.

6. Research Questions

6.1. What open spaces do obese adults use for exercising? And why?
6.2. What elements of open spaces do obese adults use the most for exercising?
6.3. What is the glucose level readings and blood pressure before and after exercising?
6.4. What is the average heart rate when exercising?
6.5. What is the relation between the intensity of exercise and physiological health?
6.6. What possible reasons would make obese adults choose one space over another?
6.7. What type of spaces can increase the intensity of the physical activities?
6.8. How do the properties and attributes of the open spaces enhance the physical activity?
6.9. What are the effects of the physical activity on the glucose level in the blood, blood pressure?
6.10. What physical activity do obese adults usually engage in at outdoor spaces?

7. Problem Statement

Many studies have led to the fact that encountering environment support has a restorative effect on visitors (Tsunetsugu et al, 2013; Cole and Hall, 2010; Staats and Hartig, 2004; Kaplan, 1992). Most of the studies that have been conducted aimed at
measuring the outcomes of experiencing natural environment, such as reducing stress and restoration from attention fatigue. Most of these studies were concerned with the psychological health of adults and children. Also, it has been determined that patients with a good window view recover more rapidly than patients with bad or solid wall view (Ulrich 1984). Many studies have discussed the restorative environment and its effect on health. (Abraham et al., 2010).

There has been an increase in the number of studies that discussed the restorative effect of outdoor environment (Tsunetsugu et al. 2013; Herzog et al. 2003; Payne 2009; Maruani & Amit-Cohen 2007; Völker & Kistemann 2011a; Völker & Kistemann 2011b). These first of these studies resulted in the development of Stress Recovery theory (Ulrich, 1984), which was then followed by Attention Fatigue theory (Kaplan & Kaplan 1989). The potential restorative influence of landscape open spaces affect mental health (psychological health) by separating the city residents from their daily life, and physical health (physiological health) by promoting physical activities (Abraham et al. 2010).

In Sweden, for sustainable development, good health has become the most important resource (Stigsdotter, 2005). As a result, health issues are a serious problem to be studied these days. One of the most serious problems in the 21st century is obesity and its related diseases. Obesity related diseases are conditions which arise as consequences of obesity such as diabetes, high blood pressure, and cardiovascular diseases (WHO 2016). According to The World Health Organization (WHO), adults over 17 years old who are
considered obese reached 600 million in 2014. Generally, 13% of the world’s population was obese in 2014 (WHO 2016). According to WHO, obesity is the accumulation of an abnormal amount of fat, and it is measured by body mass index (BMI), which is the weight in kilos divided by height in meter$^2$ (WHO 2016). Obesity leads to many diseases such as cardiovascular diseases and type two diabetes (T2D) (WHO 2016).

In the 21st century, many discoveries have been made about obesity. One of the most significant was the link between obesity related disease and weight loss (Sicree and Shaw, 2007). Losing weight helps in preventing the occurrence of obesity which in turn prevents its related diseases. According to the authors, losing weight could control the glucose level in the blood and could help to cure T2D. In urban environment, people are have less mobility in their daily life than ever before. It has been suggested that the changes in peoples’ live style has affected their health and well-being. The new urban life style depends on vehicles for transportation, and the consumption of junk food, in addition to being physically inactive. It is concluded that many factors were responsible for the increased occurrence of diabetes worldwide. These factors are the reduction of physical activity, and the increased in rates of obesity. More importantly, change in life style has been allied with the growth of urbanization (Sicree and Shaw, 2007). Most of the health problems and chronic diseases found in people living in Arab towns, such as diabetes, high blood pressure, and high cholesterol, can be attributed to bad urban planning, which has led to a change in the lifestyle of the population, such as dependence on vehicles for transportation and the consumption of junk food (Alsayed 2010). The lifestyle of the people these days has become more dependent on machines,
and people are more physically inactive. Thus, what physical activities can help people to lose weight? Exercising, walking, jogging and swimming are activities that can help in losing weight.

According to WHO, by 2025 the number of people diagnosed with type 2 diabetes will reach 200-300 million (Hussain et al. 2007). Hypertension (raised blood pressure) and type 2 diabetes occur more frequently in obese adults than in lean people at almost every age. Weight loss is effective in reducing obesity and its related diseases (Thakur et al. 2001). Since obesity is an increase in body weight, which means an increase in body mass index BMI (WHO 2016), losing weight is the first step to stop obesity and prevent its related diseases. Type 2 diabetes risk (which is considered one of the obesity diseases) is linked roughly to two factors; environmental exposure and genetics (Hussain et al. 2007). How is environmental exposure related to T2D? It is suggested that sedentary lifestyle plays an important role in obesity prevalence. Environmental exposure means visiting urban parks and outdoor open spaces, thereby could encouraging people to be physically active. For example, exercising, jogging, walking, and swimming. All of these activities could occur in Yanbu open spaces. Overweight happens more often because of an inactive life style. In addition, physical inactivity has been identified as a risk factor of obesity and its related disease, which are Type 2 diabetes, high blood pressure, and cardiovascular diseases (Hussain et al. 2007). As a result, physical inactivity lead to obesity, which has affected people around the world. Therefore, to be physically active means being more healthy.
According to WHO, all body movement performed by muscles requires the expenditure of energy; for example, walking, cycling, or participating in sports is usually defined as physical activity (WHO 2016). This can occur at open spaces in urban areas. In Yanbu, the open spaces that provide space for physical activity are waterfront and neighborhood parks. Physical activity for adult on a regular daily basis could reduce the risk of type 2 diabetes by 20-60 percent (Hussain et al. 2007). Moreover, most of the prevention programs for type 2 diabetes require that people change their lifestyle. Thus, inserting physical activity in daily schedule of the people who live in urban context, especially obese adults, could prevent the obesity and its consequences. This indicates how beneficial physical activity like exercising helps in losing weight and preventing T2D. In 2010, adults (aged 20-79) diagnosed with type 2 diabetes numbered 285 millions and will increase to 439 million by 2030, globally (Shaw et al. 2010). This study will find the relation between physical activity performed by obese adults and reduction of obesity in certain types of open spaces.

The study will be held in Saudi Arabia at one of the well-planned cities along the coast of the Red Sea. This city, which is known in Arabic as Mdinat Yanbu Asenayah (MYAS), is the industrial city of Yanbu. It is located 350 kilometers north-west of Jeddah in Al Madinah province of western Saudi Arabia (see maps below). Industrial Yanbu is a major Red Sea port and was established in 1977 and it is still under development. It was designed and planned by Parsons Cooperation and is currently managed by the Royal Commission of Jubail and Yanbu (Al-But’hie & Eben Saleh 2002).
MYAS community area occupies 5,587 ha, 1450 ha of the community is subdivided into twenty three districts which can accommodate 96,000 people (Al-sinayiah 2014). Moreover, the length of the waterfront of the city is eleven kilometers - the smallest width is 20 m and the longest width is 250 m, and its area is 420 ha. The community has twenty five different parks spread within the city.
There is potential relationship between transport behaviors and obesity (Brown et al. 2017). Since people are using vehicles and public transportation, they are likely less physically active, which it is happening in Yanbu. Positive effects on health occurred because of physical activities users experience at waterfront parks. These physical activities like jogging, swimming, and exercising are known to prevent cardiovascular illnesses and obesity (Völker & Kistemann 2011b). From the authors experience living in Yanbu from 2007 to 2016, these activities are happening in the waterfront and neighborhood parks in MYAS. Exercising outdoors in a natural environment improves mood and self-esteem. It is proven that outdoor physical activity causes more positive
mood and attitude than indoors (Sandifer et al. 2015). Thus, what makes exercising outdoors more attractive than indoors? And what make outdoor space more attractive than others? It has been shown that spaces along water are preferred by the users to spend leisure time and engage in recreational activities, and to receive restoration from the daily stresses (Völker & Kistemann 2013). Urban waterfront has the potential to enhance health of people living in cities. However, do waterfront parks have any advantages over the neighborhood parks in enhancing peoples’ health? This study will show which space is affecting the prevalence of obesity among obese adults in Saudi Arabia. One of the identified ways that link landscape and physical health wellbeing is promoting physical activity in everyday life and leisure time by providing a walkable environment (Abraham et al. 2010). In MYAS, the waterfront parks and neighborhood parks are equipped with walkways (Al-sinayiah 2014). Does waterfront have a greater restorative effect on obese adults than neighborhood parks? If yes, what are the properties and attributes of both parks that give this effect?

Urban parks are defined as open space areas reserved for public, and mostly dominated by vegetation and water (Konijnendijk et al., 2013). In MYAS, waterfront parks and neighborhood parks are the open space provided by The Royal Commission for Jubail and Yanbu (RCJY). Possibly, engagement in physical activities in both parks can reduce stress (Tyrväinen et al., 2014) and obesity. This can lead to reducing the risk of diabetes, high blood pressure, and cardiovascular disease. However, which one of these waterfront parks or neighborhood parks are more beneficial to reach this effect?

8. Literature review
8.1. Preliminary Literature Review

Studies discussing obesity and its related disease interaction with physical activity were conducted by four different disciplines including medical (AR Al-Nuaimt, K Al-Rubeaanl, Y Al-Mazrou2, O Al-Attasl, 1996), environmental psychology (Parsons, 1991), urban design, landscape architecture (Frank et al., 2004), and community design (Frank et al., 2004). In 2014, 600 million adults 18 years and older were obese around the world (WHO 2016). This show how serious this health issue has become. What are the reasons behind this phenomenon? It has been suggested that the new life style such as sedentary lifestyle and eating junk food are behind the obesity prevalence (AR Al-Nuaimt, K Al-Rubeaanl, Y Al-Mazrou2, O Al-Attasl 1996; WHO 2016; Dubbert et al., 2002). Obesity has other effects that consequentially occur with its appearance. These effects, which are called obesity related disease (Hu 2013), include diseases such as type 2 diabetes (T2D), hypertension or high blood pressure, cardiovascular diseases (WHO 2016). However, many medical studies analyzed the obesity problem to stop its rapid spread. These studies suggested preventive strategies that can stop obesity and its related diseases. Two main strategies are improving physical activity as daily routine and fixing the daily diet (Hussain et al. 2007; Pais 2006). This study focus on improving physical activity.

On the other hand, urban design and landscape architecture studies suggested that open space promotes more physical activeness (Giles-Corti & Donovan 2002). Since this study is examining the restorative effect of two different open spaces, which are neighborhood parks and waterfront parks, it is necessary to show how previous study presented the relation between physical activity and obesity and its related diseases.
In medical terms, obesity is the increasing of body mass index because of gaining weight (WHO 2016). Consequently, losing weight is the logical reaction. But what about the obesity related diseases? How does physical activity affect diabetes, high blood pressure, and cardiovascular disease? Medical studies discussed the benefit of routine physical activity on the obesity related diseases. These physical activities such as walking, jogging and exercising can be done in open space in MYAS.

Type 2 diabetes is one of the obesity related diseases, and globally it has become one of the most prevalent diseases (Hu 2013). Diabetes has two types, and the focus of this study is type 2. Type 2 diabetes is defined as the condition when the body cannot use the insulin hormone efficiently, which causes the increasing of the glucose concentration level in the blood (WHO 2016). The glucose level in the blood should be less than 100 mg/dl for normal person, 100-125 mg/dl is considered prediabetes, and 126 mg/dl or higher is considered diabetes (American Diabetes Association 2016). Thus, to measure the effect of physical activity on diabetic person, the glucose level should be monitored. Saudi Arabia was ranked sixth in diabetes prevalence in 2011(Whiting et al., 2011). This can show the seriousness of this problem of diabetes as well as obesity in Saudi Arabia. It has been suggested that to prevent T2D, lifestyle must be changed by becoming more physically active, and changing the daily diet (Hussain et al. 2007), which could happen at open spaces such as neighborhood parks and waterfront parks. Thus, being physically active affects diabetes and this is the restorative effect the study is going to measure. As a
result, physical activity affects obesity in two different ways, losing weight and controlling one of the related diseases, which is T2D. Losing seven percent of the body weight and moderate exercising for 30 minutes five days a week could reduce the risk of T2D by 58 percent (American Diabetes Association 2016). Therefore, the commitment of keeping physically active on a daily basis gives an image of how crucial physical activity is for urban people. Another study also suggested that 150 min/week of leisure-time physical activity, which is considered moderate, reduced the risk of diabetes by 36 percent (Smith et al. 2016). This could help to show how beneficial physical activity is in the reduction of diabetes and obesity. However, another study suggests that high intensity physical activity helps to control the glucose level in the blood in T2D diagnosed people (Peter Adams, 2013). This raises the question, “how is moderate, high or low intensity exercise determined? There are two different methods to measure physical activity intensity, subjective and objective. First, the subjective methods to draw an assessment about the intensity using questionnaires and diaries (Strath et al. 2013). It is possible that these two ways may not be accurate for this study, because the time frame is short and the data will be self-reported. The objective method, in contrast, has many categories, namely:

1. Measuring the expenditure of energy: it is measuring the calorimetry or how many calories has been used during this activity
2. Motion sensors: this method counts how many steps have been taken, which then determines the distance covered.
3. Physiological measures: such as heart rate monitoring (Strath et al. 2013). According to the American Heart Association, exercise is considered moderate if the heart rate
reached 50-69 percent of the person’s maximum heart rate, and high if it reached 70-89 percent (American Heart Association 2016) as shown in Table 1.

<table>
<thead>
<tr>
<th>Age</th>
<th>Target HR zone 50-85 %</th>
<th>Max heart rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>100-170</td>
<td>200</td>
</tr>
<tr>
<td>30</td>
<td>95-162</td>
<td>190</td>
</tr>
<tr>
<td>40</td>
<td>90-153</td>
<td>180</td>
</tr>
<tr>
<td>50</td>
<td>85-145</td>
<td>170</td>
</tr>
<tr>
<td>60</td>
<td>80-136</td>
<td>160</td>
</tr>
<tr>
<td>70</td>
<td>75-128</td>
<td>150</td>
</tr>
</tbody>
</table>

Table 1: Targeted HR Zone according to the age (American Heart Association 2016)

4. Combined assessment method: a combination of more than one of the previous categories (Strath et al. 2013).

This method is more suitable for this study because the collected data will be more accurate since it is more automated. It depends on different type of gadgets that count the heart rate and energy amount that determine the intensity of the physical activity. There are gadgets which combine two or three assessment methods that could be used in the study. In previous studies, gadgets such as accelerometer and pedometer were used to measure motion (Strath et al. 2013). Smart watches such as Apple watch could measure average heart rate, calories, and distance and this could be used in data collection.
It is obvious from the previous studies how much physical activity is beneficial to the obese adults who were diagnosed with T2D. Furthermore, it shows how the intensity of the physical activity plays a role in how it is effective in controlling diabetes.

The second obesity related disease is hypertension or high blood pressure. Hypertension is the condition that occurs when the blood pressure continuously rises, causing increased stress on the vessels (WHO 2015b). Blood level readings are important to understand, to figure out what is considered high and what is not (see the table) (American Heart Association 2017).

<table>
<thead>
<tr>
<th>Top number (systolic) in mm Hg</th>
<th>Bottom number (diastolic) in mm Hg</th>
<th>The category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 120</td>
<td>Below 80</td>
<td>Normal blood pressure</td>
</tr>
<tr>
<td>Between 120-139</td>
<td>Between 80-89</td>
<td>Prehypertension</td>
</tr>
<tr>
<td>Between 140-159</td>
<td>Between 90-99</td>
<td>Stage 1</td>
</tr>
<tr>
<td>160 or higher</td>
<td>100 or higher</td>
<td>Stage 2</td>
</tr>
</tbody>
</table>

*Table 2: The blood pressure readings (American Heart Association 2017)*

It is shown that high blood pressure is more prevalent among obese and overweight people than normal people (Papathanasiou et al. 2014). Many studies have examined the relation between physical activity and blood pressure. In older women, habitual physical activity is associated with decrease of blood pressure (Reaven et al. 1991). Does this effect apply to men as well? Another study which has been conducted in Cameroon concluded that obesity, diabetes, and hypertension are more prevalent in urban areas than rural areas, and it is affected by physical activity, however it is not significant for women (Sobngwi et al. 2002). Another study suggested that the intensity of the physical activity plays a role in controlling hypertension (Paffenbarger et al. 1983). Possibly, the intensity
of the physical activity is what made this opposing argument and this could be solved by this study if the intensity has been measured. Another study raised disagreement, suggesting that blood pressure is only associated with BMI, not with smoking or with physical activity status (Papathanasiou et al. 2014). Thus, there are different sides to this issue, but what all sides agreed on is the relation between blood pressure and obesity. As a result, reducing obesity helps in preventing hypertension, which is considered a restorative because of being physically active in outdoor spaces. In Yanbu, 20 percent of the residential area are green spaces (Al-sinayiah 2014) and because Yanbu is a well-designed city, this study will be conducted there.

The third obesity related disease is cardiovascular disease (CVD). It is a condition that affects heart and blood vessels including the failure of delivering blood to the body parts such as brain and heart muscle (WHO 2015a). This disease is the result of being obese, which leads to increased glucose level in the blood and unstable blood pressure (American Diabetes Association 2016; Whiting et al. 2011). Thus, cardiovascular diseases occur as the result of obesity, and the other two related diseases increase the risk of it occurring. As a result, preventing obesity causes a reduction of T2D and BP, consequentially reducing the risk of CVD.

In sum, habitual moderate physical activity causes a reduction in the prevalence of obesity. Thus, it will cause to prevent the occurrence of type 2 diabetes, high blood pressure, and cardiovascular diseases. However, the question is, “do open spaces in Yanbu promote more physical activity?” If yes, which space promotes more physical activity, waterfront parks or neighborhood parks? And why?
As discussed in medical field, the ultimate goal is the enhancing of physical activity of obese people. What are the keywords within the environmental psychology to achieve this goal? It is suggested that people who live in cities along water have attachment to the spaces along water (Völker & Kistemann 2013). As a result, spaces along water attract the people to spend their leisure time at water fronts. Thus, waterfront parks have the potential to be a restorative environment for obese adults. In addition, there are many possible physical activities a user could do while they are experiencing the spaces at the waterfronts such as jogging, swimming and working-out (Völker & Kistemann 2011b; Doherty et al. 2014). It has been found by another study that people who live close to the coast are usually physically more active (Giles-Corti & Donovan 2002). In sum, it can be assumed that availability of waterfronts in cities has a restorative effect on the residents. Thus, the preference for outdoor space can encourage people to use it in their leisure time. Yanbu is a well-planned coastal city and from the author’s experience, the people use the waterfront parks for recreation. The author was working as landscape operation and maintenance section manager in MYAS, responsible for the landscaping O&M at the residential area. Another study suggested that the quality of the open space increases the time people spend there for walking (Ekkel & de Vries 2017). Furthermore, outdoor spaces could help people to be more physically active, which sometimes depends on design, mentality, and/or the distance (Herzog et al. 2003; Giles-Corti & Donovan 2002). Thus, how attractive the park is plays a role in encouraging people to engage. Since Yanbu is following standards in designing open space, the possibly of quality parks in Yanbu is good because it is well-designed city. However, the obese adults opinion, which will be collected in this study, will clarify which space is more preferred, waterfronts
parks or neighborhood parks and why. As result, the preference and attractiveness are the factors that control the eagerness of obese adults to be more physically active at outdoor parks. These two factors will help to show which space is helping the obese adults to be more active, which means more restorative effect from the outdoor spaces. In this study, the restorative effect is controlling glucose level in the blood, lowering blood pressure and losing weight.

In landscape architecture, urban design and community design, obesity has been discussed in relation with the built environment. The scale which has been discussed varied in every study. For example, in community design, every hour of using vehicle per day increases the risk of the obesity by 6 percent (Frank et al. 2004). Thus, new life style that depends on vehicle for transportation is increasing the possibility of obesity, which is happening in MYAS (Zawawi 2013). The design has the influence to promote physical activity in daily life and leisure time by enhancing the walkability of the environment (Abraham et al., 2010). Walkability is the most often mentioned word because it has effect on peoples’ health. For each kilometer of walking, the obesity risk reduced by 4.8 percent (Frank et al., 2004). This raises the question, “why don’t people walk?” Another study suggested that the land use design plays a role, the accessibility to open spaces improving peoples’ health (Sandifer et al. 2015). In MYAS, there are 14 square kilometer of green open spaces (Al-sinayiah 2014). Thus, the amount of green open spaces provide good accessibility for the residents for physical activity. Therefore, in landscape architecture scale, the availability of open spaces system in Yanbu could encourage people to walk more. Other aspects also discussed included well-designed landscape
spaces attracting people (Abraham et al. 2010), and that helps people to be more active by providing walkways, pedestrian zone and cycling tracks. MYAS was designed and planned by an American cooperation with expertise in this area, which is Parsons Cooperation (Zawawi 2013). This cooperation is still working as consultant with RCJY until present time. MYAS has received the third place prize in the Arab Cities Organization landscaping competition in 2013 (Al-sinayiah, 2014). As a result, Yanbu is a well-designed city and has high quality green open spaces.

The most important keywords in the community design, landscape architecture and urban design are walkability and reducing the use of vehicles. Another study contradicts this idea by suggesting that there is no relation between park use and physical activity (Zenk et al., 2011). Therefore, this contradiction could be solved through this study in the context of Yanbu. Accessing landscape open spaces is important for health, but more evidence is needed (Ward Thompson, 2011). This states that there are a gap in the evidence which can be provided by this study. Studies about urban parks showed that people who spend time in parks are usually more physically active. For example, being in urban park encouraged people to walk, play social games and do other physical activities (Völker & Kistemann, 2011b; Ahern, 1991; Völker & Kistemann, 2011a; Doherty et al., 2014; Abraham et al., 2010). Moreover, to do some passive activities such as bird watching, fishing, and sitting have good physiological, psychological, and social benefits. In MYAS, people do some of these activities such as walking, jogging, fishing, and sitting at the waterfront, which called in Arabic Cornich.
In sum, because of the availability of open spaces system in Yanbu, people especially the obese adults, can engage in physical and passive activities at outdoor spaces.

9. Research gap

9.1. The number of studies about the relation between health and landscape have increased rapidly. Many studies discussed the possible relation and the restorative effect from engaging in outdoor spaces (Tsunetsugu et al., 2013; Herzog et al., 2003; Payne, 2009; Maruani & Amit-Cohen, 2007; Völker & Kistemann, 2011a; Völker & Kistemann, 2011b). However, most of this studies were focusing on the psychological benefit of experiencing outdoor environment (Tsunetsugu et al., 2013; Kaplan & Kaplan, 1989; Kaplan, 2001; Nutsford et al., 2016).

For example, Attention Restoration Theory (Kaplan & Kaplan, 1989) has been discussed by other researchers as well (Wilkie & Stavridou, 2013; Abraham et al., 2010). In addition, some studies examined the mental effect of being outdoors such as being at parks or promenade along rivers (White et al., 2010; Völker & Kistemann, 2013). All these previous studies were looking at the psychological effects of the outdoors spaces on people.

Furthermore, the lack of quantitative data about the effect of outdoor environment on physiological health was also the focus of present studies (Tsunetsugu et al. 2013). As a result, this study will be depending on collecting quantitative data on how outdoor spaces affect the physiological health.
Statistically, Saudi Arabia is recorded as one of the top ten countries for the prevalence of diabetes. Moreover, obesity prevalence in Saudi Arabia is recorded among the highest when compared to other countries (AR Al-Nuaimt, K Al-Rubeaanl, Y Al-Mazrou2, O Al-Attasl n.d.). In addition, no previous studies have examined the relation between experiencing urban parks such as waterfront and neighborhood parks and the physiological health and wellbeing of people in Saudi Arabia.

Many medical studies suggest that physical activity plays an essential role in obesity prevalence reduction (Brown et al., 2017; Thakur et al., 2001; Dubbert et al., 2002). Therefore, this study will systematically look at how waterfront park and neighborhood parks encourage obese adults to be more active, and how that affects the obesity related diseases.
10. Scope Of Study And Variables

The study determines whether waterfront parks or neighborhood parks have a greater restorative effect on obese adults who live in well-planned cities in Saudi Arabia such as MYAS. The study will compare the physiological changes after experiencing two different open spaces. These two open spaces are waterfront park and a neighborhood park in MYAS. Thus, the study will measure the glucose level in the blood and the blood pressure of the obese adults (dependent variables) before and after being physically active at the two parks (independent variables). The intensity of the physical activity will be measured by taking the average heart rate beat of the participants while they are experiencing the waterfront park and neighborhood park. The unit of the analysis is the male obese adults who live in MYAS. The reasons for selecting the residents of MYAS is because it is a new well-planned city that has designed open spaces.

11. Significances Of Study

This study will add to the body of knowledge evidence about the restorative effect of open space on the physiological health of obese adults. The restorative effect in this study means the reduction of the glucose level in the blood and blood pressure, and weight loss. The evidence will be provided by using quantitative data to measure the changes, which are the glucose level in the blood and the blood pressure. Furthermore, it will show the properties and attributes of the two parks that cause the restorative effects on the physical health of obese adults. In addition, what encourages obese adults to be more active at waterfront park in comparison to the neighborhood park or the opposite. These benefits
might help in similar projects in the future and help in reducing the prevalence of obesity and its related diseases.

12. Research Paradigm

This research is to assess the outcomes of being physically active at two well-designed urban open spaces. Identifying and assessing the causes that influence the outcomes, like what usually happen in experiments, can happen if the problem is studied by post-positivism paradigm (Creswell 2003). As a result, this study will adopt post-positivism paradigm. This research will be based on the measurements that will be taken to evaluate the obesity condition. This measurements are glucose level, blood pressure and heart beat rate. By observing this measurement before and after being engaging in two different urban open spaces which are waterfront park and neighborhood park, the restorative effect of these spaces will be determined. Then, the taken measurements of the two spaces will be compared to define which one is the most restorative. This comparison will prove or reject the hypotheses of the study. In sum, positivism is to evaluate the causes that affect the outcomes by reducing the idea into small units and measuring these units (Creswell 2003). In this study, the obesity problem will be reduced into small variables which are blood glucose level, blood pressure and heart beat rate. This variables will be observed into two different outdoor spaces to define which one of them is more restorative.
13. Research Method

13.1. Research design

The aim of the study is to examine the restorative effects of the waterfronts parks on obese adults in comparison to the effect of neighborhood parks in well-designed cities. This may show the link between the quality of the open spaces and the health quality of the residents of Saudi Arabia. Therefore, it will investigate the physical activeness of the users while they are at the waterfront parks and neighborhood parks (independent variable) towards the physiological health (dependent variable). The responses of the obese adults will be obtained through three data collection instruments:

1. Questionnaires survey: the benefit of using this instrument is to build a data base about the participants to know their health history, how often they visit this parks, why they come to this outdoor space, how far this space is located from their houses, and how long do they usually stay at this space.

2. Observation by video shooting: the benefit of this instrument is to determine the habits of the users during their time in these spaces, and what are the properties of the waterfront parks and neighborhood parks they use more often. In addition, how intense their physical activeness is while they are at the waterfront park and neighborhood park.

3. Physical check-up: this instrument will be used to build the quantitative data that can help in distinguishing the relationship of experiencing this waterfront park and neighborhood park with the physiological health and well-being. The targeted measurements are blood sugar, blood pressure, and heart beat rate. This measurements will help the author to link the physical activities to the health and well-being of the obese adults. Professional help
will be needed in this stage. The author will recruit medical assistant from King Abdulaziz university medical school to collect the data of blood pressure and blood glucose level.

The study will compare the collected data from two urban spaces in a well-planned city in Saudi Arabia. This city is Madinat Yanbu Alsenayah (MYAS). The first space is the waterfront of MYAS, and the second space is a neighborhood park in the city. These two spaces have same design theme, which is curvilinear walkway that could be used for exercising (see the table).
Research Methods

This research will involve the preparation of an experimental study. Experimental study is to look over the possible factors that could cause or influence a specific condition or phenomenon (Leedy & Ormrod, 2013). It means that this study will examine the influence of being physically active at outdoor spaces on obese adults by measuring the change in the glucose level in the blood and the blood pressure. This research will focus on the obese adult resident’s experience of the current open spaces in MYAS. This research will use three data collection instruments on the obese adult residents as a significant data source. The parameters that will be measured are (1) health history of the obese adults, (2) blood pressure (BP), (3) blood glucose level (BG), (4) heart beat rate (HB), and (5) their activities performed at the waterfront park and neighborhood park physical and connective activity. This data set will show the relation between experiencing urban open spaces and the obesity prevalence. The collected data should also aid in the investigation of users’ preference on properties and attribute of waterfront park and neighborhood park. Finally, it will help to identify the properties and attributes of the parks that the obese adults used while they are experiencing these two spaces.

The sample population will be recruited from residents of MYAS, Saudi Arabia. The recruiting process will require the following phases. First, the researcher will contact administrators of Royal Commission of Yanbu to briefly explain the proposal. The sampling will follow two stages known as clustering (Creswell 2003). This design will be used because the number of obese adults could not be determined exactly. At the first stage, questionnaires will be sent to all male employees of the RCYJ through email. Only obese male adults will complete the survey and will be asked to participate in the physical check-
up stage. The number of RCYJ employees is 3448 individuals (Al-sinayiah 2014), since the obesity percentage in Saudi Arabia is 15 percent in the western area (AR Al-Nuaimt, K Al-Rubeaanl, Y Al-Mazrou2, O Al-Attasl 1996). Furthermore, the T2D prevalent in Saudi Arabia is 20 percent (Whiting et al. 2011). The anticipated number of male obese adults who may complete the questionnaire is 689 persons. The cover letter includes instructions for the subjects to contact the researcher privately if they are interested in participating. Then, the researcher contact information and a written description of the project (all documentation will be translated into Arabic), will be provided to all potential participants who will be participating in the check-up stage. Second stage will be the check-up stage. The minimum number of the sample for this stage will be 5 percent of the amount of obese adults, which equals 35 persons. The researcher has contacted some key positions at the MYAS management and they already starting to recruit the obese adults who will participate in the second stage. The selection of the subjects will be based on the following factors:

1) They are residents of Madinat Yanbu Alsenayah MYAS who have lived in the city for at least six months according to the employment procedure of Royal Commission for Jubail and Yanbu RCJY.

2) To be diagnosed with type two diabetes

3) To be overweight the BMI should be ≤ 30, which will be measured at the site

4) To be willing to participate in the study for the 7 days duration. Most of the studies suggested that physical activity should be an amount of minutes per week. For example, 150 min/ week (Smith et al. 2016) or 30 min/day five days weekly (Zethelius et al., 2014). As a result, the testing stage will be 7 days.
The spaces which will be used for collecting the data at MYAS have been chosen for the following reasons:

1) Both of the spaces are linear parks
2) Both have walkway systems which could be used for exercising
3) Designed and approved by RCYJ and has services.
4) Both of the sites are accessible by car if they live one kilometer away from the park and by walking if they live less than one kilometer. In addition, the two sites are located in two different sides of the city (see the map). As a result, if an obese adult lives in the middle of the city, they have the same chance to use any of the two sites.

The exact location will be determined after obtaining the required permissions from the industrial city management.

Upon hearing back from individual participants, a package of documents will be emailed to the participants. This package contains a manual of the planned test, an approval letter
asking for their written approval (please see the proposed approval letter, general information application, and test manual– appendix A), and general information application. The subjects will fill the general information application and the approval letter. This information will be used to group the subjects into two groups. Each group will experience one site. The first group will experience the waterfront park for seven days and the second group will experience neighborhood park for 7 days. At this point, a date and time for the test will be set.

The test procedure is to advise each group to gather at chosen space, either the Waterfront Park or Neighborhood Park, and they should eat two hours prior to the test time. Then, all the measurements will be taken at the site on the first day. These measurements are the height, weight, and body mass index BMI. After that, the dependent variables will be measured, which are BP, BG, and HB. This stage will be called pre-test stage.

Next, the subjects will start experiencing the chosen space for one hour. According to the previous studies, moderate physical activity for 30 minutes per day is minimum (Smith et al., 2016; Zethelius et al., 2014). However, due to the author’s experience as a type 2 diabetic patient, 40-60 minutes is beneficial to control the glucose level. This single hour will be called the test stage. During the test stage, the participant will be observed by video camera to identify the intensity of the physical activity, and what are the properties they use at the space. Furthermore, they will be wearing smart watch which will record the participants’ average heart rate, energy expenditure, and step count. They will receive a short massage via SMS to inform them that the time is up. Then, the subjects will gather at one spot, where they will be provided with water and rest for 15 minutes. The three variables will then be measured again, and the participants will fill a short questionnaire
(please see the proposed post-test questionnaire – appendix B). This stage will be called post-test stage. This procedure will be repeated for seven days in each park to monitor the gradual results, and to investigate if there any differences between the spaces in terms of commitment. If any participant skipped a day, they will be advised to fill a skipped day questionnaire (please see the proposed skipped day questionnaire – appendix C). This will help the researcher to identify if there are any other factors that may affect the commitment of the participant. The researcher plans to recruit a minimum of 36 participants. The participants will be divided into two groups.

The experimental study data analysis will conform to the following procedure. First, all data will need to be organized in a logical order to aid in the analysis. The proposed organization will categorize the data into groups represented by the waterfront park space or neighborhood park space. Second, the proposed process will attempt to compare the data between the two groups. Finally, the process will synthesize into results and draw conclusions from the change of the variables and the collected data from the questionnaires.

After analyzing the collected data, the final chapter of the proposed thesis will discuss the findings and begin to draw preliminary conclusions in comparison to the scholarly literature. More importantly, it is my hope that recommendations regarding future development of the open spaces can be drawn. Ideally, those findings can potentially guide the next phase of urban parks development in Saudi Arabia in an effort to improve the influence of these parks on the obese adults in other coastal cities in Saudi Arabia. Saudi Arabia has many other cities that could use the same result of Yanbu. For example, King Abduallah Economical City, Jeddah, Dammam and industrial Jubail city.
14. Expected Findings

Changes in the level of glucose in the blood and blood pressure of an individual will prove that restorative environment conditions in the waterfront park may result in reduction in the prevalence of obesity in the well-planned cities in Saudi Arabia.

15. Proposed Research Timeline

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEM1</td>
<td>SEM1</td>
<td>SEM1</td>
</tr>
<tr>
<td>PROPOSAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.REVIEW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATA COLLECTION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATA INPUT AND ANALYSIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FINDING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRITE-UP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRAFT AND SUBMISSION</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
16. References


Al-sinayiah, Y., 2014. *Yanbu Al-Sinayiah*,


American Heart Association, 2016. Target Heart Rates - AHA. Available at: http://www.heart.org/HEARTORG/GettingHealthy/PhysicalActivity/FitnessBasics/Target-Heart-Rates_UCM_434341_Article.jsp [Accessed May 12, 2017].


AR Al-Nuaimt, K Al-Rubeaanl, Y Al-Mazrou2, O Al-Attasl, N.A.-D. and T.K., 1996. high


http://dx.doi.org/10.1016/j.healthplace.2011.05.001.