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A Study of The Factors Influencing Street Planning on Residential Neighborhoods in Jeddah, Saudi Arabia

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***Abstract*— In some cities, the past decades have seen a surge of interest in building healthy community neighborhoods motivated by health, economic, humanitarian, and environmental goals. This thesis intends to promote health through better community neighborhood design and Sustainable. Also defined the determine of factors to a create walkable communities by setting out the policies and standards to using these information tools to achieve a healthy society, encourages healthy behavior such as (improve air quality, the network for footpaths, greenways). It was then developing the residential neighborhood streets for increased awareness and investment in walkable communities. The study tried to find the pedestrian's humanitarian needs and reach the quality of pedestrian paths as the viewpoint is not just a practical way also is not limited to the city's high street and places only and must be attended to within residential neighborhoods by drawing a set of standards and principles affecting pedestrian movement paths' planning and design based on the urban environment's requirements. Finally, this search identifies and assesses published evidence about the association of specific street design choices with health outcomes. It promotes healthier street design in the study area (Jeddah city, Saudi Arabia) and approaches to find practical model tools applicable to cities for a better life for the community.**

Keywords*— *(Street, Healthy, Jeddah, Walkability, Neighborhoods).

I. INTRODUCTION

This paper deals with the extent of the relationship and specific links between the built environments of an urban community and highlights the importance of a healthy urban environment. The quality of an urban built environment, including streets, has become an integral part and parcel of planning and designing modern cities' transportation infrastructure. At present, urban planners and public health professionals examine the street and the magnitude of its impact on the community and the environment to make them a complete street. It is a kind of street designed for all ages, abilities, and travel patterns. In this approach, the design of the street is modified to accommodate pedestrians, transport users, cyclists, and other vulnerable users, instead of providing the car's needs at the expense of the needs and requirements of people living in neighborhoods. Street design is not limited to functional movement. It also expands the functionality of a street from simply facilitating the movement of people to making them amalgamating multiple functions, including cultural, environmental, economic, and social. Healthy City is a city that is continually creating and improving those physical and social environments and expanding those community resources that enable people to mutually support each other in performing all the functions of life and in developing to their maximum potential"(Hancock and Duhl 1986).The built environment affects public health in many ways (Frumkin et al. 2004), is depending on the interplay between factors such as travel patterns, community design, physical activity, transportation safety, and air and sound pollution. Healthy cities provide urban environments that support health, social interaction, mobility, security, recreation, and a sense of cultural identity accessible to all their residents.

The study uses neighborhood design standards as a tool to create cleaner, healthier urban environments. Analyzes identify which neighborhoods perform well or poorly for both issues. The extent of pollution in the area and walkability are linked to a wide range of health impacts of residential neighborhoods. Through previous studies in this field, walkable communities that support transit have been shown to play an essential role in creating healthier and more sustainable cities than non-walkable communities.

A. Problem Statement

This paper sheds light on a lack of interest and design for planning healthy streets in some neighborhoods of the Jeddah region. According to quality standards based on pedestrian movement and placing them in their paths to accommodate them improve the neighborhood residents' environment and provide their necessary needs, whether by example but not limited to social, health, and psychological. And so on, and not consider when constructing new buildings or developing neighborhoods related to the subject. As a result of not addressing the treatment of healthy streets between neighborhoods, the latest studies and statistics have shown an increase in rates in the past years, the rate of obesity and chronic diseases in the Saudi society and the Western region in particular. One of the reasons and factors that led to the spread of these health diseases is the community's lack of awareness of the importance of walking or cycling and making it a daily routine in their daily lives, such as going to work, schools, and universities by personal vehicles in return. This action led to increased air and environmental pollution rates and accidents that cause serious injuries or pedestrian deaths due to insecurity road safety and not separating the line of the path pedestrians from vehicles. That affects many residents suffering from respiratory diseases, especially in crowded places, visitors, and other aspects that affect the long-term impact on the neighborhood and urban planning of

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the city in light of the community's desire to achieve sustainable development of the city.

1. Risk Factor in Saudi Arabia,2017 (World Obesity Rates,2017):

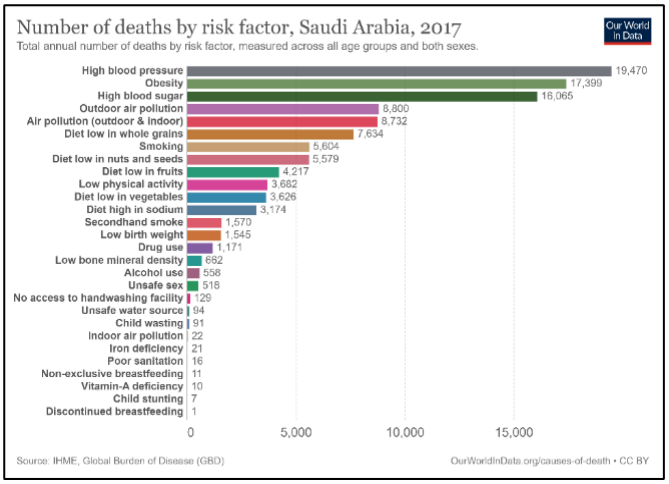

Figure 1: Statistics for Risk Factor in Saudi Arabia

In Saudi Arabia, a variety of different risk factors contribute to the estimated number of deaths annually. It shows the most critical risk factors that affect a person's life in Saudi Arabia.

2. Air quality: refer to (Global Air Report,2019):

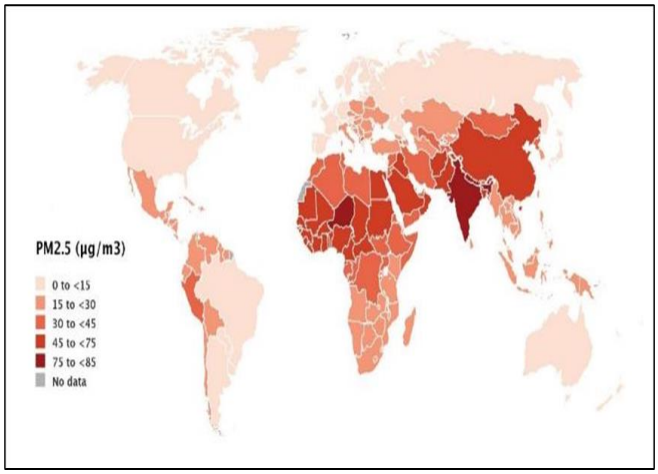

Figure 2: Population-weighted annual average PM2.5 concentrations in 2019

Several countries in the Middle East are highly exposed to PM2.5, with Qatar ranking as the top in exposure, followed by Saudi Arabia, Egypt, Bahrain, Iraq, and Kuwait. These countries have significantly higher pollution exposure levels than China does. The sources of ambient PM2.5 include vehicle emissions, power plant emissions from coal-burning plants, industrial emissions, and other natural sources.

B. Aims of the Research

This study aims to provide quality standards for residential neighborhoods in line with the needs of the population and the region through factors that help improve and develop pathways and streets for them for a better environment and life.

C. The objective of the Research

- For planners, landscape, architects, and local decision-makers: provides street design principles that effectively make streets more inclusive, safe, and healthy and promote street integration, particularly in areas of high deprivation.
- Knowing street characteristics and their effects: can positively contribute to social cohesion, mental and physical health, and reduce health disparities between and within communities and neighborhoods.
- Encourage the community: practice walking and cycling, using public transportation, and reducing their vehicles' use.
- It improves individual indicators and a healthy lifestyle: Reducing the chronic disease and obesity rates associated with increased physical activity. Also, improving safety roads contributes to lower rates of injury and death resulting from road accidents.
- Reducing pollution factors: Improving air quality and lifestyle through methods that contribute to living in a healthy environment leads to lower diseases resulting from pollution.

D. Importance of the research

Discovering the features of the built environment concerned with improving the streets and residents' neighborhoods in Jeddah will make these improvements more flexible societies. An improvement in public health indicators, the quality of life of communities, and the extent of interaction with the social, economic, and security environment are influenced by optimizing the city and neighborhoods' pathways and streets. Street effectiveness can be measured by examining the resulting impact on health determinants, defined as a set of social, personal, and environmental factors that determine individuals' health status or society.

E. Study Area

It will analyze and set the current healthy street in many districts of Jeddah city, Saudi Arabia, by suggesting the best alternative to an approach that can create a sense of place in neighborhoods and regulate and improve community visions.

II. Literature Review

Walkability is a way of defining and quantifying factors that determine whether or not people can and will walk from place to place within a town or city. (Park, S.2008, P. 21). The movement of the pedestrian is one of the most important pillars and thinking in the construction and planning of the transport network and among the elements to build a road or pathways for them. Walking is the most primary form of transporting (Grignaffini et al., 2008). New

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Urbanism is a movement to bring back more traditional neighborhood design focusing on higher densities, mixed uses, public transit being easily accessible, pedestrians and cyclists being accommodated, and interconnected streets (Southworth1997; Talen 2002; Krizek 2003). When designing a pedestrian corridor and measurement must be taken from all aspects and needs that are desired and encourage people to walk. Walkability is a measure of how friendly an area is to walking. It takes into account the quality of pedestrian facilities, roadway conditions, land use patterns, community support, security and comfort for walking (Raja Noriza,2013).

Researchers in planning and transportation have identified the land-use mix (diversity of uses and access to facilities), residential density and street connectivity as the fundamental aspects for creating walkability indices (Frank and Pivo as cited in Leslie, 2005). On the same notes, higher population density, greater connectedness of streets (higher number of intersections) and mixed land use has also been linked with higher rates of walking and bicycling trips for transportation (Saelens et al. as cited in Leslie, 2005). The results of a study by Clark et al. (2013) also demonstrate that population density and to a lesser extent, pedestrian infrastructure can affect the rate of walking.

III. Hypothesis

To develop a plan for the city's street network and pedestrian pathways according to the appropriate planning criteria and their direct relation to health and its impact and simulations on the health indicators of the community in the long term, such as chronic diseases and aging. They are using standards and specifications of the environment and roads and comparing them to other cities to improve the area and the city and reduce pollution of all kinds.

IV. RESEARCH METHODOLOGY

The methodology of this research is a fundamental and strategic element in this type of studies for the integration and comprehensiveness of all hypotheses, solutions, alternatives and data used in studies and influences on society and the city through knowledge of previous experiences of nearby developed cities or examples in the city and knowledge of the requirements in functional aspects and standard variables and climate suitable for walking in The issues related to the pedestrian paths and their direct relationship to health to develop a comprehensive vision of the ways and successful methods and improve the health and environmental status of the city and society.

•The theoretical part: The presentation of the background and importance of pedestrian paths and their relation to health with the knowledge of the differences and results in the health indicators of society and the environment in the case of the pathways allocated to them in the region or not through previous studies and experiences and knowledge of the programs used in some sources of books and references, and access to expertise from reports, statistics and data available and updated.

- The practical part: the selection of three residential districts in Jeddah with an explanation of the reason for their choice of these sites and the application of quality standards for the paths and roads for the public and the healthy environment with the processing and updating of information from the analytical aspects. The collection of studies and data through the questionnaire as one of the main tools for research and interviews with the competent government agencies and residents of the region, Conducting an on-site survey and knowing the extent of their requirements and needs with the use of drawings, photographs, and documents for consideration and review in the functional design when building or developing any pedestrian passage or street will be useful and positive for community and city in the future.

V. Result and Discussion

To measure the extent to which the needs of the population of the area are met in the urban environment and to build a healthy city, it is necessary to establish quality standards for streets and paths in the urban environment. These criteria include multiple aspects, be it environmental, functional, social, visual, or economic. This chapter will talk about the factors and influences that overlap in constructing those standards so that a set of standards share the same need or are almost complementary. Each criterion helps meet part of the need to create an urban environment for the city.

Start to determine the study of three places out of every three residential neighborhoods, and address the standards of the quality of pedestrian corridors and streets and the extent of residents' satisfaction with the services available through our tour in these places, and the evaluations were carried out as follows:

- Determine the selected study areas with densely populated areas for conducting the survey: (Aziziayah neighborhood, and Al Muhammadiyah neighborhood) . Also interview/questionnaire with residents and visitors to take their evaluation and opinions about the quality of pedestrian paths and streets in residential areas.

- Taking pictures and carrying out an assessment based on analyses made in the areas and see if existing or not the elements of quality standards for the streets and roads in general for each of the neighborhoods.

A. Healthy Street components

It is a goal of the quality standards for healthy street to meet the needs of the region's residents in providing the appropriate climate or environment for walking (Hasan, 2018).
Based on knowledge of the concept of the population's needs, these criteria have been developed to control the quality of the streets, beginning with the following:

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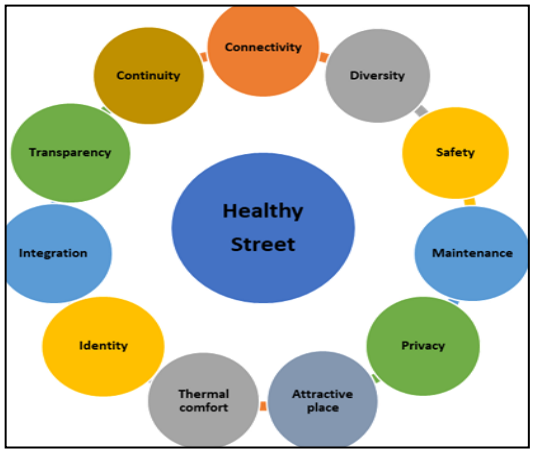

Figure 3: Healthy Street components

1.Connectivity: - Through the entrances leading to the track, connectivity means full access and use of the path, its services, and its capabilities. It is preferable to have access to the way every 90 meters so that the path is well connected to the surroundings, and multiple pathways increase its association with neighboring areas (Jacobs,1993). factors that achieve connectivity are path continuity, accessibility, Integrated network of paths.

Figure 4: Connectivity- Aziziayah / Al Muhammadiyah

2.Diversity: - What is meant by diversity is not just a mixing of the different sensations within the space but also the formation of a homogeneous structure that harmonizes with the various activities and functions to increase the space's visual beauty (Lynch,1994).

Figure 5: Diversity-
Aziziayah / Al Muhammadiyah

3.Safety: Restaurants and similar establishments that support residential populations can help sidewalks stay active during the day and into the evening, keeping “eyes on the street,” as Jane Jacobs famously recommended. Factors that achieve safety roads are visible police presence, people walking, cycling, and waiting at bus stops etc.

Figure 6: Safety - Aziziayah / Al Muhammadiyah

4.Continuity: - Continuity is one of the most critical factors affecting the path's efficiency, and it means that there are no obstacles that interrupt the continuity of pedestrian movement in the path (Jacobs,1993). Factors that achieve continuity roads are sidewalk need to be smooth, level, and clear of obstructions to prevent trips and falls, and be accessible to all.

Figure 7: Continuity - Aziziayah / Al Muhammadiyah

5.Transparency: - refers to the degree to which people can see or perceive what lies beyond the edge of a street or other public space and, more specifically, the degree to which people can see or perceive human activity beyond the edge of a street or other public space (Gail Marie,2008). Factors that achieve transparency are the proportion of windows, street walls, active uses, and the number of businesses.

Figure 8: Transparency - Aziziayah / Al Muhammadiyah

6.Integration: - The integration of the built environment on both sides of a street is based on height and character (Ahmed, 1998). Integration factors are consistency and harmony in materials, colors, buildings, size, window openings, and their details, entrances, and facade details.

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Figure 9: Integration - Aziziayah / Al Muhammadiyah

7.Identity: - One way to create a kind of participation between the users and their surrounding environment is by providing a set of characteristics and vocabulary that gives it an independent personality. People feel its distinction and uniqueness, strengthening the feeling of belonging.

Figure 10 : Identity - Aziziayah / Al Muhammadiyah

8.Thermal comfort: - Thermal comfort is defined as the condition of mind that expresses satisfaction with the thermal environment and is assessed by subjective (ASHRAE Standard 55,2004).and determined by Air velocity, Relative humidity, air temperature. There are many physiological, physical, and social aspects, such as climate comfort, visual comfort, acoustic comfort, and a comfortable feeling of safety in the path by using water elements and trees.

Figure 11:Thermal comfort -Aziziayah /Al Muhammadiyah

9.Privacy: -This privacy is taken into personal account spaces affected by many factors such as distances between buildings, noise, and trees' use to provide insulation for this type of space.

Figure 12: Privacy -Aziziayah /Al Muhammadiyah

10.Maintenance: Affecting the path, including street maintenance and attention to all street elements, including afforestation, materials, buildings, etc., to continue preserving the healthy urban environment.

Figure 13: Maintenance -Aziziayah /Al Muhammadiyah

11.Attractive places: Study places that help attract people and gatherings such as parks, events, shopping, museum, and theaters. One of the factors behind the place's success is the availability of supportive uses for pedestrians and that they are available to all segments of society (Ahmed, 1998).

Figure 14: Attractive places -Aziziayah /Al Muhammadiyah

B. The questionnaire with residents and visitors

We conducted a questionnaire to determine their impression about services, quality of the streets, and path. Their total number reached 300 people, and they were as follows Figure 16:

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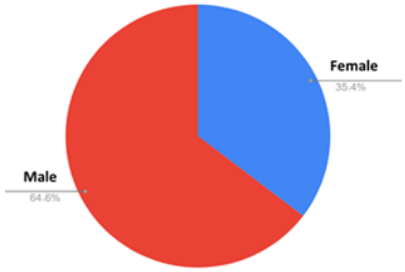
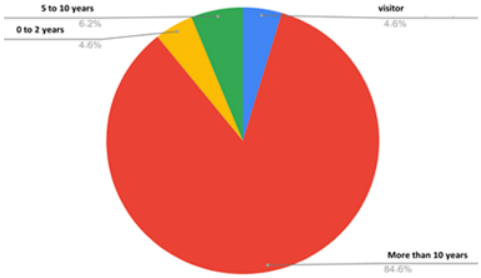
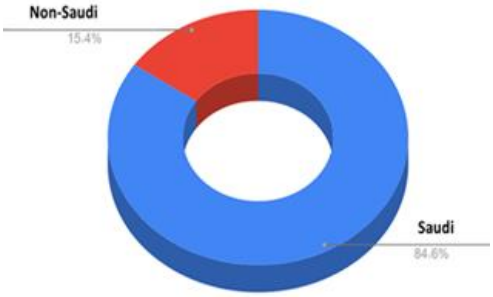
A.Gender



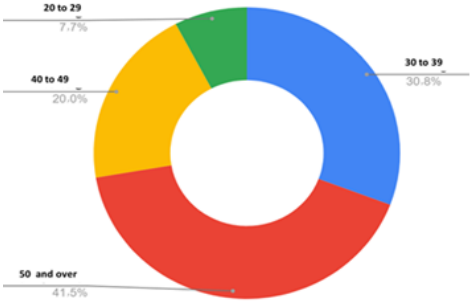
B.How Long have you been in the nighborhoods in Jeddah ?



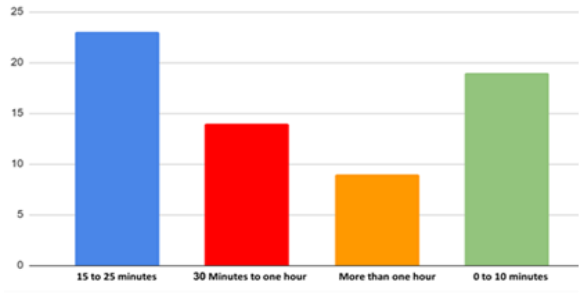
C.National



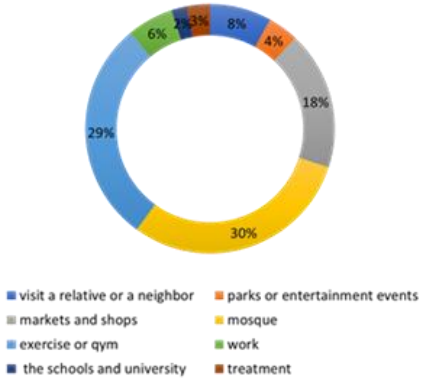
D.Age



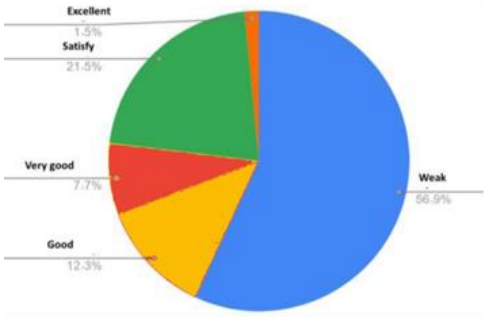
E.How Much Daily you Walk ?



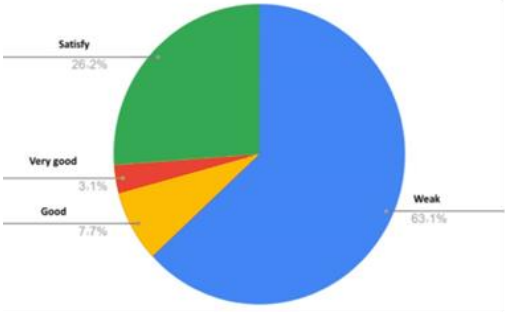
F.What Drives you to walk fairly daily in your area ?



G.Designs and paths of intersections of roads are safe for pedestrian for all users?



H.Availability of adequate station locations for bus passengers and taxi parking?



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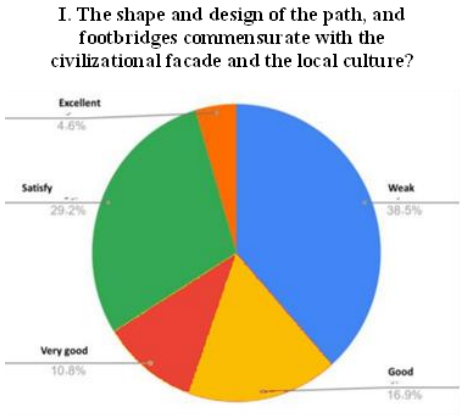

Figure 15: evaluation from residents and visitors

C. *Schedule of evaluating & final result for the quality of healthy streets in the two residential.*

Type of quality	Aziziyah neighborhood	Muhammadiyah neighborhood
Connectivity	4	6
Diversity	5	8
Safety	5	7
Continuity	1	3
Transparency	1	3
Integration	1	2
Identity	0	0
Thermal comfort	2	4
Privacy	1	3
Maintenance	2	2
attractive places	3	5
Total score from 88	25	43

Table (1): The final result of the evaluation.

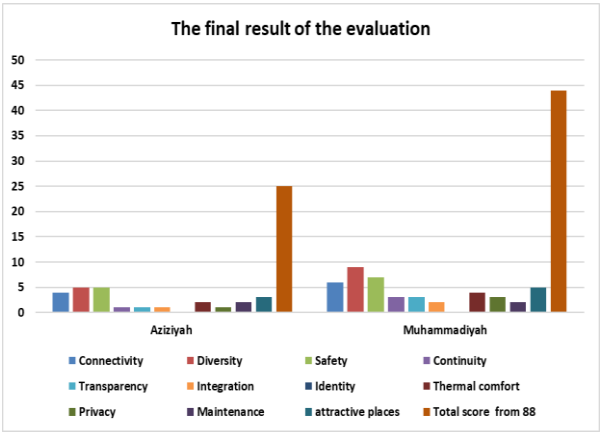

Figure 16: The final result of the evaluation

-The study results show that the Muhammadiyah neighborhood has superior standards for healthy streets than the other neighborhood (Aziziyah).
- The results and surveys show a lack of application of healthy street standards within residential neighborhoods. There are common factors in the visited neighborhoods that need to develop an improved road for Jeddah neighborhoods.

As the score corresponds to each grade: Excellent (4) –Very good (3) – Good (2) – Satisfy (1) -Weak (0).

Aziziyah neighborhood										
Type of quality	Element evaluation	Status			Evaluation					score
		available	not available	Somewhat	Excellent 4	Very good 3	Good 2	Satisfy 1	Weak 0	
Connectivity	path continuity			✓				1		4
	accessibility			✓			2			
	Integrated network of paths			✓				1		
Diversity	activities	✓					2			5
	facades /building heights			✓			2			
	Users			✓				1		
Safety	signs and guiding board			✓					0	5
	visible police presence and monitoring	✓				3				
	lighting	✓					2			
	Separation of pedestrian and cycle paths			✓					0	
Continuity	clear of obstructions			✓					0	1
	Smooth/ level			✓				1		
Transparency	proportion of window, street wall, and active uses			✓				1		1
Integration	consistency and harmony in materials, colors, buildings, size, entrances, furniture street, and facade details.			✓				1		1
Identity	Local characteristics and vocabulary		✓						0	0
Thermal comfort	trees			✓				1		2
	Water element		✓						0	
	Architectural shading elements			✓				1		
Privacy	by using furniture street and space			✓				1		1
Maintenance	Monitoring /cleanliness			✓			2			2
Attractive places	Various activities and uses.			✓			2			3
	Facilities and support for residents and visitors			✓				1		
Total score from 88										25

Table (2): the result evaluation of the Aziziyah neighborhood.

Muhammadiyah neighborhood										
Type of quality	Element evaluation	Status			Evaluation					score
		available	not available	Somewhat	Excellent 4	Very good 3	Good 2	Satisfy 1	Weak 0	
Connectivity	path continuity			✓			2			6
	accessibility			✓			2			
	Integrated network of paths			✓			2			
Diversity	activities	✓				3				8
	facades /building heights	✓				3				
	Users			✓			2			
Safety	signs and guiding board			✓					0	7
	visible police presence and monitoring	✓				3				
	lighting	✓				3				
	Separation of pedestrian and cycle paths			✓				1		
Continuity	clear of obstructions			✓				1		3
	Smooth/ level	✓					2			
Transparency	proportion of window, street wall, and active uses	✓				3				3
Integration	consistency and harmony in materials, colors, buildings, size, entrances, furniture street, and facade details.	✓					2			2
Identity	Local characteristics and vocabulary			✓					0	0
Thermal comfort	trees			✓			2			4
	Water element		✓						0	
	Architectural shading elements			✓			2			
Privacy	by using furniture street and space			✓		3				3
Maintenance	Monitoring /cleanliness	✓					2			2
Attractive places	Various activities and uses.			✓		3				5
	Facilities and support for residents and visitors			✓			2			
Total score from 88										43

Table (3): the result evaluation of the Muhammadiyah neighborhood.

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VI. CONCLUSION AND RECOMMENDATIONS

Various theoretical studies are included concerning the quality of paths and streets in multiple fields and the roles they play in the built environment, as well as an analysis of pedestrian needs and their impact on the planning and design of walking paths in neighborhoods by following specific standards and principles that are applicable to their needs.
A questionnaire and a field visit are used to analyze the factors for determining if there are quality standards for healthy streets in the chosen areas.
The Jeddah city needs improvement and development in most of its neighborhoods to implement street quality standards. The evaluation results and the opinions of the area's residents and visitors showed their absence and dissatisfaction with the streets and corridors in their area.

The healthy street Strategy envisions Jeddah, where citizens, visitors, and stakeholders enjoy and contribute to walking, cycling, and public transit culture. It proposes to create a city where streets, parks, spaces, and neighborhoods are secure and vibrant to live in a healthy city. The following list of recommendations are presented for authorities and future studies, as follows:
-Good street design has positive effects on mentality and social health. Streets and paths with seating areas and various activities of interest, with minimal disturbance
From vehicles, traffic helps the area encourage social activity.
-Placing trees and plants in the right place and coordinating them leads to strengthening
better mental health. Exposure to vehicle exhaust It can be reduced by controlling neighboring traffic Building design and providing plants.

- To increase people's comfort and promote walking and cycling, sidewalk width and public benches are essential for communities. Shade-giving trees that reduce temperatures and provide shade should also be chosen for sidewalks.
-People's perception of an attractive walk is strongly influenced by the buffer zone between the sidewalk and the street. Physical activity, mental health, and social health are positively impacted by the presence of trees, benches, and street furniture.
-A continuous building facade forms a street wall, with windows overlooking the street and an attractive building facade design that increases pedestrian activity and increases good health.
- The street connection design is important to allow smooth and easy access to the desired place while enjoying walking or cycling.
- A benefit of designing intersections and crossings is to guarantee pedestrians and cyclists are protected from collisions with vehicles and prepare drivers to wait, so the speed is reduced and pedestrians are given priority.

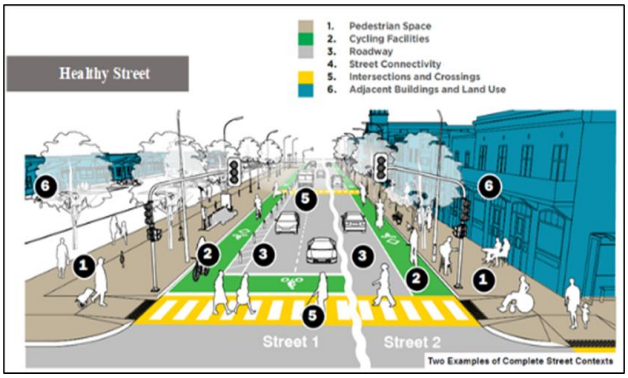

Figure 17: Healthy Street – (Toronto Public Health,2014)

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REFERENCES

[1] Annex (2007), Sustainable Urban Transport Plans.
[2] Ana V. Diez Roux (2010), Neighborhoods and health, New York Academy of Sciences.
[3] Advait Jani (2013), Footpath design: a guide to creating footpaths that are safe,comfortable, and easy to use.
[4] Amel Badri (2016), The Influence of Weather and Climate Change on Pedestrian Safety.
[5] BadiaMasoud (2016), Sky Access versus Shading for Pedestrian Comfort in the Hot
[6] Tropical Climate of Jeddah, An International Conference Ecuador, PP 26– 30.
[7] Dibyendu Bikash Bhattacharyya (2013), Making Siliguri a walkable city, Procedia - Social and Behavioral Sciences 96.
[8] Dogan Dursun (2015), Air Quality in the City of Erzurum: Strategies for Climate Sensitive Urban Design, 9th International Conference on Urban Climate.
[9] Duncan, Skye (2013), Active Design: Shaping the Sidewalk Experience, Department of City Planning, City of New York.
[10] Lucy Saunders (2018), Healthy Streets For London.
[11] Toronto Public Health (2014), Healthy Streets: Design Features and Benefits.
[12] Toronto Public Health (2012), The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health.
[13] Tsuyoshi Honjo (2009), Thermal Comfort in Outdoor Environment.
[14] U. S. Department of Transportation (1995), Highway Traffic Noise, Analysis andAbatement Policy and Guidance, Washington D. C.
[15] [44] Venetin Aghostin (2007), Human Behaviour in Public Spaces.

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