



Towards a Healthy City: An Indicator-Based Assessment of Port Said, Egypt

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Abstract

Background: The purpose of this study is to drive the process of transforming Port Said city (in the Arab Republic of Egypt) towards the Healthy Cities approach as being defined by the World Health Organization. It aims to seek to what extent the city possesses the characteristics of a Healthy City, identify the most significant challenges and obstacles that may prevent its transition to this approach and propose a set of policies and procedures to support this transformation. The methodology relies on a precise quantitative analysis based on recent statistical and field data, through which the current situation in Port Said is compared with a list of 48 indicators of healthy cities, which carefully has been selected to suit the Egyptian context. The results showed significant variation in the numerical values achieved across the indicators, which means there are clear differences in its levels of achievement inside the city. Approximately 17 indicators fell within the weak achievement level, two within the average achievement level and only one within the good achievement level, while around 28 indicators achieved an excellent level. The results also showed that the overall achievement level of all indicators in Port Said falls within the average level. This reflects the urgent need for a comprehensive review of the current city policies and the adoption of fundamental procedures that enhance its ability to progress more effectively towards the healthy cities approach

Keywords: Healthy Cities, Indicator-Based Assessment, Port Said City, Egypt.

Introduction

Healthy Cities is considered a framework for a participatory process which was initiated by World Health Organization (WHO) in order to respond to health issues which have emerged due to urbanization. Any city can become a Healthy City. Therefore, the process starts with the commitment to set people and health at the center of the urban development agenda. "World Health Organization, 2015". Port Said (in the Arab Republic of Egypt) faces a variety of urban and environmental challenges. Urbanely, the city suffers from significant pressures on its infrastructure networks, particularly its road and transportation networks, which experience increasing traffic congestion. Additionally, there are deficiencies in water and sanitation networks in some areas. Environmentally, the industrial activities which are related to the port and maritime transport contribute to high levels of air and water pollution. The city also suffers from inadequate solid waste management and a shortage of green spaces and public parks compared to its population density. Furthermore, the city's coastal location increases its vulnerability to the climate change, including the risks of high sea levels and their impact on the infrastructure. These conditions reflect the urgent need to adopt integrated urban and environmental policies that improve the urban environment, develop infrastructure, enhance public transportation, improve resource and waste management and increase the green spaces, ultimately enhancing the public health levels and urban sustainability in the city, in a way that ensures its transformation into a healthy and sustainable city capable of improve the quality of life for its residents and facing the future challenges efficiently.

In this context, The significance of this study is derived from its objectives which aim at promoting the transformation of



Port Said city into a healthy one that provides a healthy and safe urban environment for its citizens according to the World Health Organization (WHO) standards. This is achieved by studying and analyzing the range of correspondence to which the city, in its current state and characteristics, to the standards and indicators of the healthy cities and by identifying the nature of the challenges and obstacles which prevent its transition to this approach.

This study depends on an analytical methodology consists of five main integrated stages. The first stage focuses on building the theoretical knowledge base and defining the various concepts and aspects related to the healthy cities approach as defined by the WHO. The second stage focuses on formulating and designing a precise analytical model from which a specific list of accurate standards and indicators is derived. These standards and indicators accurately and objectively reflect the characteristics and objectives of the healthy cities and are suitable to be applied on the Egyptian case. The third stage, the analytical model is being used for the precise numerical measurement of Port Said's conformity to the healthy cities indicators. The fourth stage includes collecting, studying and analyzing the results of the indicator measurements and produced the conclusions. The fifth and final stage involves formulating a package of essential policies and procedures that enhance the city's ability to transform more effectively towards a healthy cities approach.

1. BACKGROUND OF THE STUDY

The concept of healthy cities, since its inception, has undergone significant developments. The Ottawa Charter issued by the World Health Organization in 1986 indicated that a healthy city or healthy urban environment is a dynamic process that necessarily requires the availability of enabling factors, including integrated services, community participation and good governance, which in turn enhance the ability of the individual and the community to control their health pathways.⁽¹⁾ The World Health Organization also indicated that a healthy city is not necessarily a city that has achieved a certain health status, but rather one that is aware of health and strives to improve it regardless of its current health status.⁽²⁾ Thus, any city can begin the process of becoming a healthy city if it is committed to develop and maintain the physical and social environments that support and promote health and quality of better life for its population.⁽³⁾

On the other hand, the World Health Organization – Regional Office of Eastern Mediterranean (WHO-EMRO) guide issued in 2000 indicated that healthy cities are “cities that continue to create physical, social and institutional environments that enable residents to support each other to perform all the life functions and achieve the best use of their abilities”.^{(4) (5)} It is clear that this concept did not place health as a direct objective within the city's policies, but rather as a natural and logical outcome achieved through the coordination between the city's sectors.

The Urban Health Facts News which was issued by the World Health Organization on March 19, 2025, indicated that the concept of a healthy city has evolved to include integrating the health principles into all the policies to ensure that the health's impact are considered in the planning of transport, housing, energy and other sectors. Also, promoting environmental and climate resilience through climate-friendly infrastructure that reduces heat risks and addresses flooding and ensure the equitable to reach the health services and social support networks regardless of the income level or the geographic location within the city. Moreover, using the tools of health impact evaluation which are depending on data such as Urban HEART to guide the urban planning and investment in the health-supporting projects.⁽⁶⁾

1.1 Goals of Healthy Cities

Several studies have addressed the various aspects of the goals of healthy cities from different perspectives. The World Health Organization (WHO) has indicated that the main objective of healthy cities is to improve the health and quality of life of urban residents, particularly those with low incomes, by improving their living conditions and providing the environmental and health services. In addition, there are a number of secondary objectives, including raising awareness of the health and environmental issues, promoting political engagement and community participation in the optimal planning and implementation of health and environmental projects and activities in cities, and enhancing the capacity of the municipal management of address the urban problems using participatory approaches.⁽⁷⁾

In 1988, Hancock & Dohle proposed a list of eleven goals or features of healthy cities, which the World Health Organization has "sometimes" adopted as a checklist for a healthy city and for many healthy city projects worldwide. These goals include the following:^{(8) (9) (4)}

1. A clean, safe and high-quality physical environment, including quality housing.
2. A current stable ecosystem and sustainable in the long term.
3. A strong, mutually supportive and non-exploitative community.
4. Meeting the basic needs (food, water, shelter, income, security and employment) for all city residents.
5. A high degree of participation and control over decisions that affect the individual's life, health and well-being.
6. Access to a wide range of experiences and resources with opportunities for multicultural communication and interaction.
7. A varied, vibrant and innovative city economy.
8. A city form that aligns with and promotes the standards and behaviors mentioned above.
9. Encouraging a connection to the past, cultural and biological heritage.
10. An ideal level of public health services and appropriate healthcare for all people.
11. High health status (i.e., high positive health status and low disease status).

In 2022, the WHO Regional Office for Europe has developed these goals to just ten, focusing on addressing the urban issues and challenges that significantly affect the health, safety and living conditions of the city residents.⁽¹⁰⁾ However, the researchers adopted the goals set by Hancock and Dohle (1988) as the basis for this paper.



Figure 1: Goals of Healthy Cities

Source : Authors based on Hancock and Duhl (1988)

1.2 Healthy Cities Indicators:

Indicators are generally defined as "a set of measurable quantitative and numerical variables that form the foundation of any objective evaluation"⁽¹¹⁾; which means they are a measurement tool whose primary benefit lies in showing how close or far we are from achieving our goals, identifying the size of the gap and the field of obstacles and problems.⁽¹²⁾ In this regard, when evaluating anything such as development, sustainable cities, healthy cities, or others, the evaluation indicators should be derived from the goals and objectives of each.⁽¹³⁾

Since the World Health Organization launched the Healthy Cities Initiative, the need to develop specific indicators for measuring it has been vital. Many attempts have been made to develop these indicators, the most attempt one was of the WHO's effort in 1992, which developed 53 indicators distributed across four groups or categories: health, health services, environment and social and economic conditions. In 2003, Nakamura developed a framework consists of 341 comprehensive indicators which are distributed across 12 groups or categories: Population health; Urban infrastructure; Environmental quality; Housing, living environment and sanitation; Community work and activities; Lifestyles and preventive activities; Health care, well-being and environmental health services; Education and empowerment; Employment and industry; Income and household living expenses; Local economy; and Demographics.⁽¹⁴⁾

In 2013, Webster & Sanderson proposed a framework of approximately 30 indicators across four main categories.⁽¹⁵⁾ Then, in 2018, Benio et al. , developed a framework of 58 indicators distributed across 10 categories: air quality, access to food, green infrastructure, housing and buildings, recreation, noise pollution, resilience, safety and security, transport, utilities and services.⁽¹⁶⁾ In 2022, Loh et al. developed their own framework which consists of 37 indicators distributed across six categories related to urban form and transport, health-friendly services, environmental quality and governance, community and facilities, green and open spaces and Eco-building and biodiversity.⁽¹⁷⁾

In 2023, (Diafati et al.) developed a distinctive proposal consisting of 99 indicators distributed across eleven categories or groups. The difference and distinction of this proposal from previous attempts and proposals lies in the fact that its basic groups or categories are the same as the goals of the healthy city that we have mentioned previously, which gives it importance and strength not only in measuring the indicators but also in judging to which extent the main goals and objectives of healthy cities have been achieved or not. Moreover, some of the 99 indicators provide data at the city level, some provide data about the city's neighborhoods and other indicators provide data about a single area, which gives these indicators great flexibility in dealing with the city as a whole or a part of it.⁽¹⁸⁾ This is what made this study adopt this proposal as a reference in measuring the indicators of healthy cities in Port Said city.

2. RESEARCH METHODOLOGY

The proposed methodology depends on assessing the extent to which the current indicators in Port Said city align with and its consistent with the healthy city indicators. Therefore, the researchers designed an analytical model based on several key stages. The first stage started by identifying the list of healthy city indicators (the list of 99 indicators proposed by Diafati et al.). The second stage involved reviewing the names, meanings and implications of these indicators in relation to their counterparts in Egypt according to the Egyptian national health statistics and data collection systems. This review resulted remeasuring and specializing the list, creating a new customized list consists of approximately 48 indicators which are suitable to be applied in the Egyptian context (which will be mentioned later).

The third stage in building the analytical model focused on determining the ideal standard value for the indicators. This refers to the best values a city can achieve for these indicators, and it typically ranges from 0% to 100% depending on the indicator's subject matter. For instance, the optimal standard value for some indicators is zero, such as the indicator for the percentage of buildings in flood-risk areas. Other indicators have an optimal standard value of 100%, such as the indicator for the percentage of buildings which have access of safety drinking water. The process of determining the optimal standard values



of the indicators is based on the ideal rates and standards issued by the relevant international organizations, such as the World Health Organization, or the ones by the country under study.

The fourth stage in building the analytical model focused on determining the relative weight of each indicator, which reflects the indicator's impact on achieving the healthy cities and its interrelationships with other indicators and the strength of its influence on them. It was intended to design an algorithm which is able to accurately determine the appropriate relative weight for each indicator. However, the researchers faced significant technical difficulties in completing this methodological step. Accordingly, they settled for assigning a symmetric relative weight of 1 point for each indicator.

The fifth stage in building the analytical model focused on determining the method for calculating the achieved numerical value of the indicators in Port Said city. This method relied on calculating the achieved numerical value of each indicator according to the following mathematical equation, then adding this value to give the total numerical value for all the indicators in the city.

The achieved numerical value for the indicator in the city =

(actual achievement of the indicator in the city / optimal standard value of the indicator) * relative weight of the indicator

Due to the considerable diversity among the selected indicators, it was found that they can be classified into four different groups, each representing a distinct method of measurement and calculation of the achieved numerical value. These four categories are as follows:

- *Indicators with ratio values (percentage %) for which the optimal standard values are 100%*

The indicator (percentage of buildings receiving sewage services) is among the indicators that represent this type; where the optimal standard value is "100%", meaning that the ideal situation in the city is that all the buildings receive sewage services. The actual achieved in the city, i.e. the percentage of buildings that actually receive sewage services in the city, is about 75% of the buildings (as a hypothetical figure). The relative weight of the indicator is "one point", and therefore the achieved numerical value for this indicator is determined as follows:

The achieved numerical value for the indicator in the city =

(Percentage of the achieved from the indicator in the city / optimal standard value of the indicator)

The achieved numerical value for this indicator = $75 / 100 * 1 = 0.75 \times 1 = 0.75$ points.

- *Indicators with ratio values (percentage %) for which the optimal standard values are zero %*

The indicator (percentage of the population suffering from diabetes) is among the indicators that represent this type, where the optimal standard value is "zero percent", meaning that the ideal situation in the city is that there are no diabetic patients, and the actual achieved percentage, i.e. the percentage of the population actually suffering from diabetes in the city, is about 8% of the population (as a hypothetical figure), and the relative weight of the indicator is "one point", and therefore the numerical value achieved for this indicator is determined as follows:

Actual achieved in the city = Total percentage of the city's population – Percentage of those with diabetes

Actual achieved in the city = $100\% - 8\% = 92\% = 0.92$

The achieved numerical value of the indicator = the actual achieved in the city * the ratio weight of the indicator = $0.92 * 1 = 0.92$ point

- *Indicators with absolute values (absolute number) that do not have optimal standard values.*

The indicator (per person share (m2) of public entertainment spaces) is among the indicators that represent this type, as the optimal standard value for it is 12 m2/person, and the actual achieved value in the city is about 2 m2/person, and the ratio weight of the indicator is "one point", therefore the achieved numerical value for this indicator is determined as follows:

The achieved numerical value of the indicator in the city = (Percentage of the achieved indicator in the city / optimal standard value of the indicator) * Ratio weight of the indicator

The achieved numerical value for this indicator = $(2/12) * 1 = 0.17 * 1 = 0.17$ points.

- *Indicators with absolute values (absolute numbers) that do not have optimal standard values*

The indicator (number of voluntary sector organizations) is one of the indicators that represents this type, as there is no specific "ideal" number for the number of these organizations, as it depends on the specific needs and requirements of each community or region. Therefore, the cities seek to increase the number of volunteers and institutions that work to support the voluntary work in order to encourage the members of society to participate. The more the voluntary sector organizations existed in the city, the better it is. Thus, if the actual number of these organizations in the city is about 5, this means that the community has a certain degree of participation and community solidarity, which has direct positive repercussions on the health aspects of the city. However, at the same time, it is not possible to calculate the achieved numerical value for the indicator in the city. Therefore, this type of indicator is excluded when calculating the total numerical value which is achieved for all the indicators in the city.

The sixth and final stage in building the analytical model focused on developing a classification for the actual numerical value of the indicators in the city, consists of four different levels: the first level (weak verification level) with an achieved value of (0.00 – 0.49) points, the second level (medium verification level) with an achieved value of (0.50 – 0.65) points, the third level (good verification level) with an achieved value of (0.66 – 0.79) points and the fourth level (excellent verification level) with an achieved value of (0.80 – 1.00) points.

3. DATA ANALYSIS & FINDINGS

The study and analysis of Healthy City indicators in Port Said rely on the measurement and evaluation of each goal's indicators individually, based on precise and up-to-date quantitative data across the city's various sectors. These data are



obtained from official information bodies and agencies, such as the Central Agency for Public Mobilization and Statistics, the Ministry of Health, the Port Said Governorate, among others. In addition, supplementary data are drawn from reports and studies issued by the General Organization for Physical Planning and other relevant institutions, as outlined below: ^{(19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32)}

- **Measuring and evaluating the indicators of the first goal (a clean, safe and high-quality physical environment (includes housing quality))**

The list of indicators for the first objective includes approximately 9 different indicators, as shown in the following table:

Table 1: List of indicators of the healthy cities' first goal

Indicator	Explanation of Indicator
1. Percentage % of buildings that receive waste collection services	Percentage of buildings connected to waste collection services out of the total number of buildings in the city
2. Percentage % of buildings with a supply of potable water.	Percentage of buildings connected to drinking water out of the total number of buildings in the city
3. Percentage of buildings receive sewage services	Percentage of buildings connected to sewage services out of the total number of the city buildings
4. Percentage of buildings in flood areas	Percentage of buildings located within the flood zone out of the total number of the city buildings
5. Percentage of neighborhoods with public transport stations in their geographic center	Percentage of neighborhoods includes stations (designated for public transportation such as buses, metro, trains, etc.) out of the total number of the city neighborhoods
6. Number of streets without sidewalks	Number of streets without sidewalks (the area designated for pedestrians alongside the road)
7. Per person (m ²) of public entertainment space	Per person (m ²) of public entertainment spaces (government-owned entertainment spaces designated for the use of all residents) in the city
8. Percentage % of neighborhoods with a park	Percentage of neighborhoods contain a public park out of the total number of neighborhoods in the city
9. Percentage % of neighborhoods with paths & roads for bicycle	Percentage of neighborhoods contain bicycle roads (either separate or integrated alongside roads) out of the total number of neighborhoods in the city

The process of measuring the indicators of the first goal for healthy cities in Port Said revealed great disparity in the achieved numerical value for each indicator in the city. The first four indicators, in addition to the eighth indicator, achieved excellent



levels of achievement and the actual numerical values achieved for them ranged between 0.83 points to 1.00 points, while the fifth indicator achieved a good level of achievement (at the value of 0.66 points), while the sixth, seventh and ninth indicators achieved weak levels of achievement and the achieved numerical values for them ranged between zero and 0.22 points.

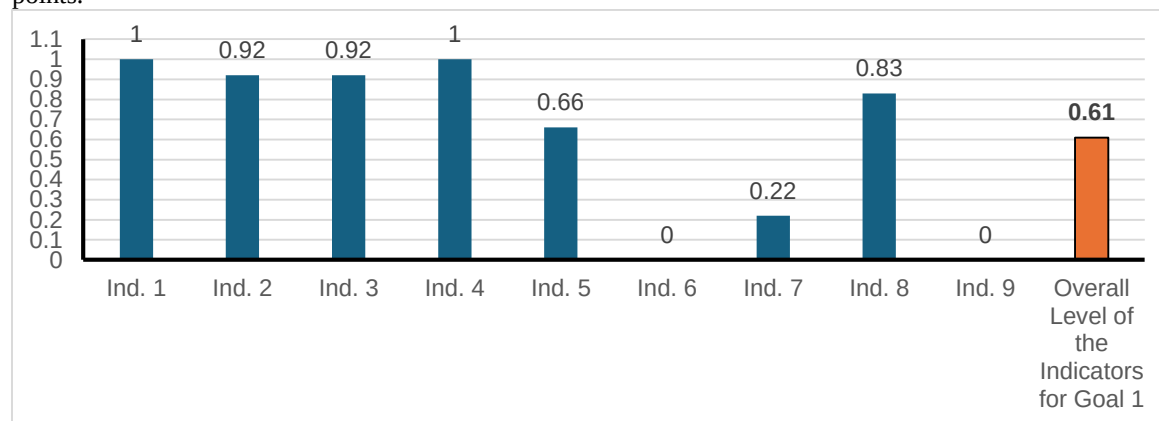


Figure 2: Measure and evaluate the indicators of the first goal of healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achieve the first goal indicators for healthy cities “combined” in Port Said city falls within the average level of achievement with almost a value of 0.61 points.

- **Measuring and evaluating the indicators of Goal 2 (a current stable ecosystem and sustainable in the long term)**

The list of indicators for the second objective includes approximately 6 different indicators, as shown in the following table:

Table 2: List of indicators of the healthy cities' second goal

Indicator	Explanation of Indicator
10. Percentage % of energy derived from renewable sources	Percentage of reliance on renewable energy (solar, wind, etc.) out of the city's total energy consumption
11. Percentage %of buildings certified according to sustainability standards	Percentage of certified buildings as sustainable buildings out of the city's total building
12. Number of green urban areas ≥ 20 hectares	Number of green spaces in the city approximately 47.6 acres or more
13. Water consumption Per person	Per capita of the city's total water consumption
14. Percentage% of wastewater recycling	Percentage of recycled wastewater out of the city's total wastewater
15. Percentage % of waste recycling	Percentage of recycled waste out of the city's total waste

The process of measuring the indicators of the second goal for healthy cities in Port Said revealed a severe disparity in the achieved numerical value for each indicator in the city. Indicators ten, eleven and twelfth achieved weak levels of achievement and the achieved numerical values for them ranged between 0.00 points and 0.14 points, while indicators thirteen, fourteen and fifteenth achieved excellent levels of achievement and the achieved numerical values for them ranged between 0.80 points and 1 point. The measurement and evaluation process showed that the overall level of achievement of the indicators of the second goal for healthy cities “combined” in Port Said city falls within the weak achievement level with a value of 0.48 point

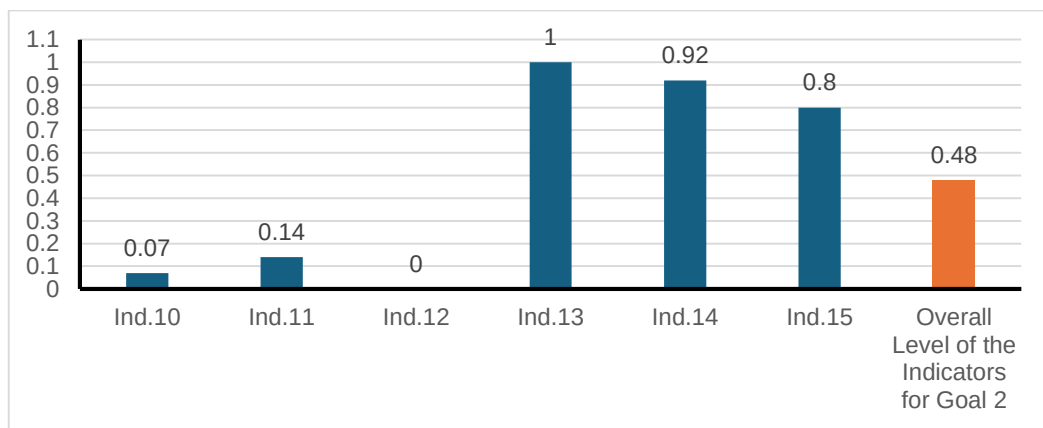


Figure (3): Measure & evaluate second goal indicators for healthy cities

Source: Authors

- **Measuring and evaluating the indicators of Goal 3 (strong, mutually supportive and non-exploitative society)**

The list of indicators of the third objective includes two indicators, as shown in the following table:

Table 3: List of indicators of the healthy cities' third goal

Indicator	Explanation of Indicator
16. Percentage % of neighborhoods that contain community center	Percentage of neighborhoods contain a community center (public space that serves as a meeting place of community members to provide social support, entertainment and educational activities and offer services and information) out of the total number of neighborhoods in the city
17. Percentage % of neighborhoods that contain public school	Percentage of neighborhoods contain public or government school out of the total number of neighborhoods in the city

The process of measuring the indicators of the third goal for healthy cities in Port Said revealed an increase in the achieved numerical value for each indicator in the city. The sixteenth and seventeenth indicators achieved excellent levels of achievement with a value of 1.00 points for each of them.

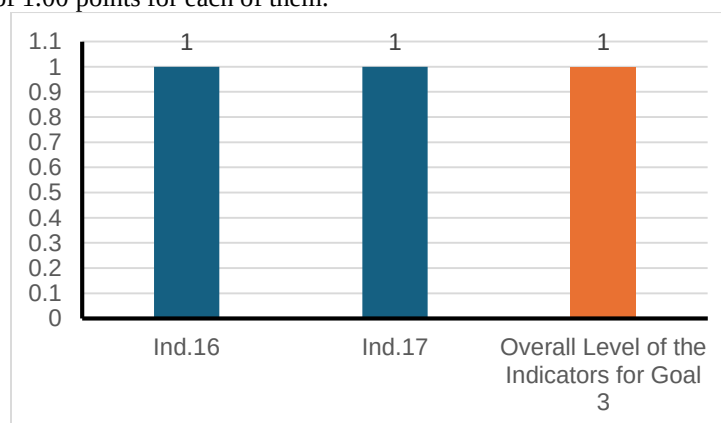


Figure (4): Measure & evaluate third goal indicators for healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the third goal indicators for healthy cities “combined” in Port Said city falls within the excellent achievement level with a value of 1.00 points.

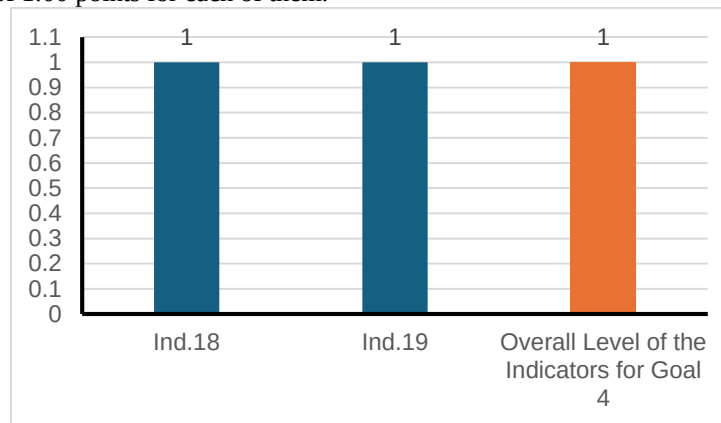
- **Measuring and evaluating the indicators of Goal 4 (a high degree of public participation and control over decisions that affect an individual's life, health and well-being).**

The list of indicators of the fourth objective includes two indicators, as shown in the following table:

**Table 4: List of indicators of the healthy cities' fourth goal**

Indicator	Explanation of Indicator
18. Number of voluntary sector organizations.	Number of associations & civil organizations (non-governmental) in the city.
19. The ratio of public consultations that seek to identify urban problems.	Percentage of urban problem identification sessions out of the total number of public sessions in the city

The process of measuring the indicators of the fourth goal for healthy cities in Port Said revealed an increase in achieved the numerical value for each indicator in the city. The eighteenth and nineteenth indicators achieved excellent levels of achievement with a value of 1.00 points for each of them.

**Figure (5): Measure & evaluate fourth goal indicators for healthy cities**

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the fourth goal indicators for healthy cities “combined” in Port Said city falls within the excellent achievement level with a value of 1.00 points.

- **Measuring and evaluating the indicators of Goal 5 (meeting the basic needs "food, water, shelter, income, safety, work" for all city residents)**

The list of indicators of the fifth goal includes about 5 different indicators, as shown in the following table:

Table 5: List of indicators of the healthy cities' fifth goal

Indicator	Explanation of Indicator
20. Percentage % of the population living in slums.	Percentage of the population (living in deteriorated neighborhoods) out of the total city population
21. Percentage % of families living below the national poverty line.	Percentage of households living below the Egyptian poverty line (1400 Egyptian pounds per person per month) out of the total number of families in the city
22. Percentage % of neighborhoods with cheap food outlets.	Percentages of neighborhoods include cheap food outlets (such as ful, ta'amiya, koshari, etc.) out of the total number of neighborhoods in the city.
23. Number of organized street vendors.	Number of locations authorized and regulated by the city council for street vendors in the city
24. Percentage % of neighborhoods with accessible streets for people with disabilities.	Percentage of neighborhoods with streets accessible to people with disabilities (including level and smooth pedestrian crossings, clear signage, suitable ramps, traffic signals, etc.) out of the total number of neighborhoods in the city



The process of measuring the indicators of the fifth goal for healthy cities in Port Said revealed in a severe disparity in the achieved numerical value for each indicator in the city. Indicators twenty, twenty-one, twenty-two and twenty-three achieved excellent levels of achievement and the numerical values achieved for them ranged between 0.84 points and 1.00 points, while indicator twenty-four achieved a weak level of achievement with a numerical value of 0.00 points.

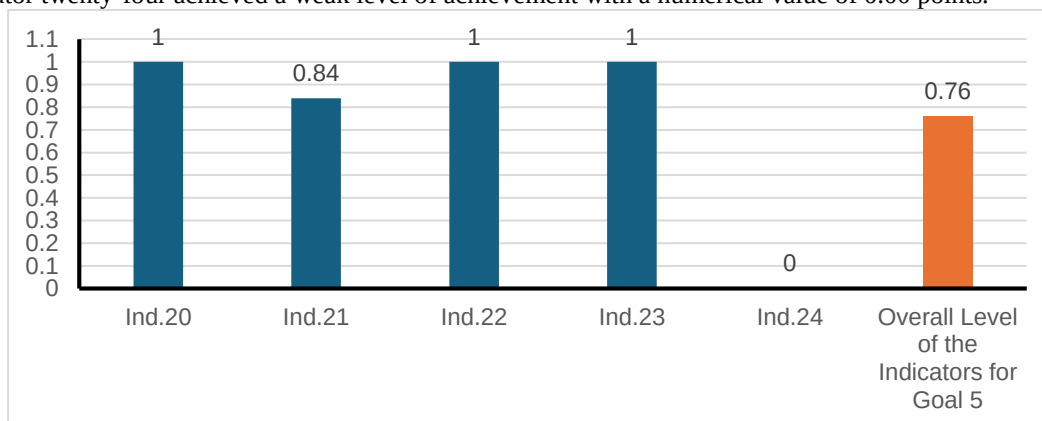


Figure (6): Measure & evaluate fifth goal indicators for healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the fifth goal indicators for healthy cities “combined” in Port Said city falls within the good achievement level with a value of 0.76 points.

- **Evaluating the indicators related to Goal 6 (Access to a wide range of experiences and resources with the possibility of multi-connection, interaction and communication)**

The list of indicators of the sixth goal includes about 6 different indicators, as shown in the following table:

Table 6: List of indicators of the healthy cities' sixth goal

Indicator	Explanation of Indicator
25. Average number of land use types per district	Average number of land use types (residential, commercial, entertainment, etc.) in each neighborhood of the city
26. Percentage % of neighborhoods with both daytime and nighttime activities.	The percentage of neighborhoods that include both daytime and nighttime activities (daytime activities such as work, study, sports, etc., and nighttime activities such as social, entertainment, shopping, etc.) out of the total number of city neighborhoods
27. Number of pedestrian-only streets.	. The number of streets in the city that are designated for pedestrian traffic only (i.e., streets where cars and motorized bicycles are not allowed to pass(
28. Number of large public spaces within the city.	The number of large public spaces or areas in the city, such as public parks, gardens, squares and major plazas.
29 Number of streets with access to all modes of transportation.	The number of streets in the city through which all means of transportation pass (public transport vehicles - private cars - metro or trains - motorcycles - in addition to lanes designated for bicycles(
30. Percentage % of the population with access to high-speed internet.	Percentage of the population who have access to high-speed internet service out of the total population of the city.

The process of measuring the indicators of the sixth goal for healthy cities in Port Said revealed in a severe disparity in the achieved numerical value for each indicator in the city. Indicators twenty-five, twenty-six , twenty-seven, twenty-eighth and twenty-ninth achieved excellent levels of achievement and the numerical values achieved for them ranged between 0.83

points and 1.00 points, while the thirtieth indicator achieved an average level of achievement with a numerical value of 0.53 points.

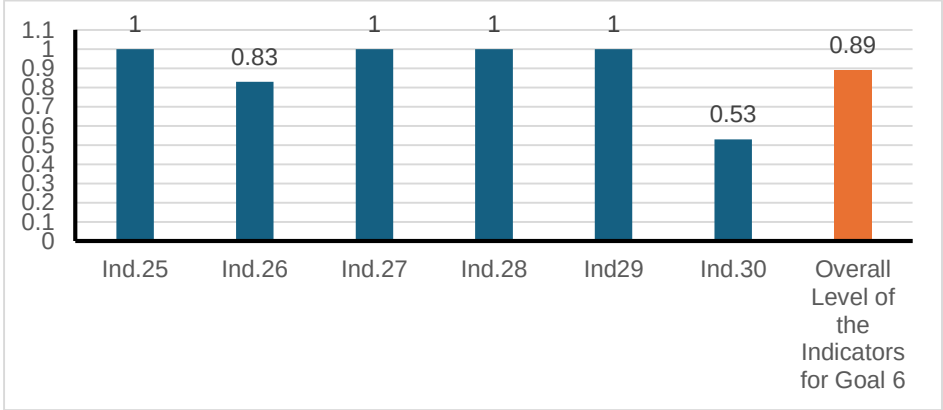


Figure (7): Measure & evaluate sixth goal indicators for healthy cities

Source: Authors
The measurement and evaluation process showed that the overall level of achievement of the sixth goal indicators for healthy cities “combined” in Port Said city falls within the excellent achievement level with a value of 0.89 points.

▪ **Measure and evaluate the indicators of Goal 7 (a diversified, vibrant and innovative city economy)**

The list of indicators of the seventh goal includes about 3 different indicators, as shown in the following table:

Table 7: List of indicators of the healthy cities' seventh goal

Indicator	Explanation of Indicator
31. Unemployment rate (%)	The percentage of people who are able to work, willing to work and seriously seeking employment but have not yet found it, compared to the total workforce in the city.
32. Percentage of population with higher education	Percentage of the city's population with university degrees
33. Number of housing units built annually	The number of housing units built annually in the city, including units built by the government, the private sector and civil society.

The process of measuring the indicators of the seventh goal for healthy cities in Port Said revealed the achievement of the thirty-first indicator at a weak level with a numerical value of 0.25 points. It also revealed the percentage of those with higher education reaching 4.13% of the city’s population, When compared to the general average for medium-sized cities in Egypt, which is about 12%, it can be said that the thirty-second indicator achieved a weak level with a numerical value of 0.34 points. It also revealed the number of housing units built during the past year in the city reached about 29,400 housing units. When compared to the general annual average for medium-sized cities in Egypt, which is about 6,000 units, it can be said that the thirty-third indicator achieved an excellent level with a numerical value of 1.00 points.

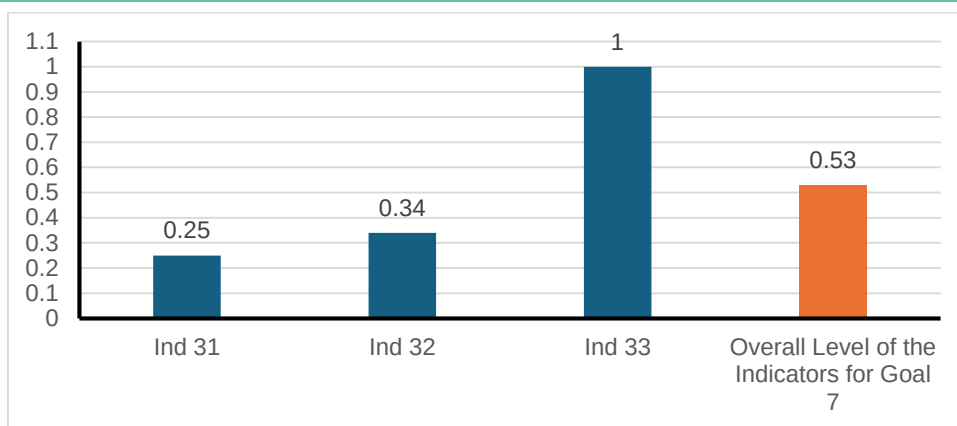


Figure (8): Measure & evaluate seventh goal indicators for healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the seventh goal indicators for healthy cities “combined” in Port Said city falls within the average level of achievement with a value around 0.53 points.

- **Measure and evaluate the indicators of Goal 8 (promoting connection with the past, with cultural and biological heritage and with other groups and individuals)**

The list of indicators of the eighth goal includes about 2 indicators, as shown in the following table:

Table 8: List of indicators of the healthy cities' eighth goal

Indicator	Explanation of Indicator
34. Percentage % of neighborhoods connected to the city center by a single public transport line.	The percentage of neighborhoods connected to the city center by mass transit, such as buses or trains, out of the total number of neighborhoods in the city..
35. percentage % of neighborhoods that contain natural areas	The percentage of neighborhoods that include areas with distinctive natural characteristics (geologically, botanically, zoologically, or climatically) out of the total number of neighborhoods in the city

The process of measuring the indicators of the eighth goal for healthy cities in Port Said revealed an excellent level of achievement of the thirty-fourth indicator with a value around 1.00 points, while the thirty-fifth indicator achieved a weak level of achievement with a value around 0.00 points.

The measurement and evaluation process showed that the overall level of achievement of the indicators of the eighth goal for healthy cities “combined” in the city of Port Said falls within the average level of achievement with a value around 0.50 points.

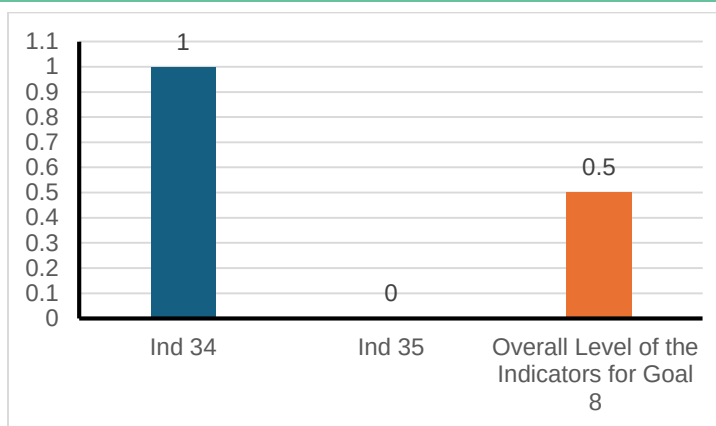


Figure (9): Measure & evaluate eighth goal indicators for healthy cities

Source: Authors

- **Measure and evaluate the ninth goal indicators (A city that comply with & promotes the standards & behaviors mentioned before)**

The list of indicators for the ninth goal includes about two indicators, as shown in the following table:

Table 9: List of indicators of the healthy cities' ninth goal

Indicator	Explanation of Indicator
36. Population (population density per km ²)	A measure of population in a city, i.e., determines number of people living on one square kilometer of the city's area...
37. Percentage % of mid-rise houses	Percentage of medium-rise residential buildings (3-6 floors) of the total number of buildings in the city

The process of measuring the indicators of the ninth goal of healthy cities in Port Said revealed a weak level of achievement for the thirty-sixth indicator with a value around 0.06 points. It also revealed that the percentage of the medium-height buildings reached 30.0% of the city's buildings, When compared it to the general average for medium-sized cities in Egypt, which is about 35%, it can be said that the thirty-seventh indicator achieved an excellent level with a numerical value of 0.86 points.

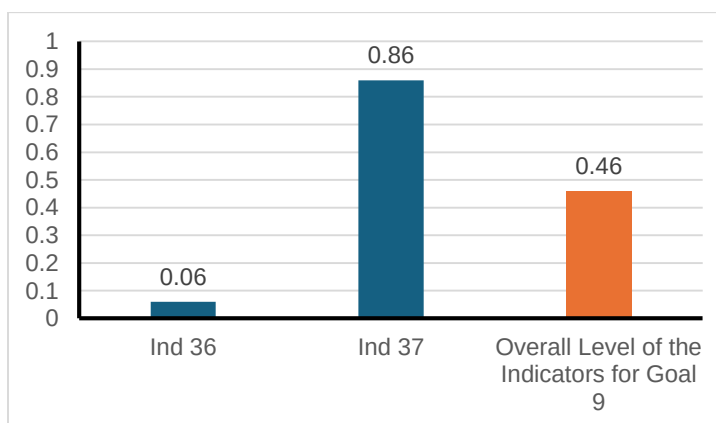


Figure (10): Measure & evaluate ninth goal indicators for healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the ninth goal indicators for healthy cities "combined" in Port Said city falls within the weak level of achievement with a value around 0.46 points.

- **Measure and evaluate the indicators of Goal 10 (an ideal level of public health services and appropriate satisfactory healthcare available to all)**

The list of indicators for the tenth goal includes about nine different indicators, as shown in the following table:



Table 10: List of indicators of the healthy cities' tenth goal

Indicator	Explanation of Indicator
38. Percentage % of neighborhoods that contain a primary health care center.	... Percentages % of neighborhoods include primary healthcare centers, out of the total number of neighborhoods in the city.
39. Percentages % of primary healthcare centers that offer services in foreign languages.	Percentage of primary healthcare centers that offer services in foreign languages, out of the total number of healthcare centers in the city.
40. Number of doctors per 1000 persons.	Number of doctors allocated per 1000 city residents
41. Number of beds in hospitals per 1,000 persons	Number of beds in hospitals per 1000 of city residents.
42. Number of pharmacies per 1000 residents	Number of pharmacies allocated per 1000 of city's residents
43. Percentages % of neighborhoods where free digital health examination has been installed	.Percentage of neighborhoods that use information and communication technology in prevention, diagnosis, treatment, monitoring and management of health conditions, out of the total number of neighborhoods in the city.
44. Percentage % of public hospitals in low-income and high-risk areas	Percentage of public hospitals located in poor (low-income) and at-risk areas, out of the total number of public hospitals in the city.
45. Percentage % of neighborhoods with rehabilitation services for people with disabilities.	The percentage of neighborhoods in which there are services to assist individuals with various disabilities, out of the total number of neighborhoods in the city
46. Percentage % of healthcare centers that also offer virtual healthcare	Percentage of medical facilities that provide remote medical services using digital technology, out of the total number of medical facilities in the city

The process of measuring the indicators of the tenth goal for healthy cities in Port Said city revealed a severe disparity in the achieved numerical value for each indicator in the city. The thirty-eighth, forty-two and forty-fourth indicators achieved excellent levels of achievement, with numerical values of 1.00 points each, while the rest of the indicators achieved a weak level of achievement with numerical values ranged from 0.00 to 0.22 points.

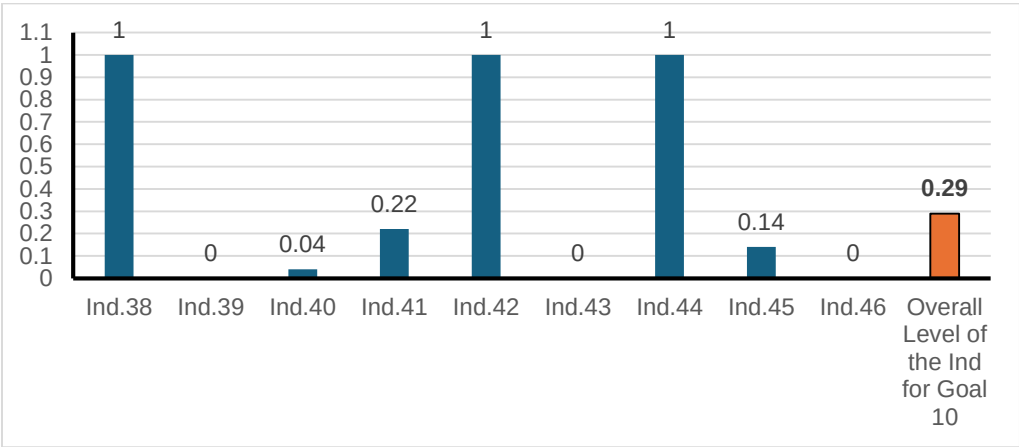


Figure (11): Measure & evaluate tenth goal indicators for healthy cities

Source: Authors

The measurement and evaluation process showed that the overall level of achievement of the tenth goal indicators for healthy cities "combined" in Port Said city falls within the weak level of achievement with a value of approximately 0.29 points.

- Measure and evaluate the eleventh goal indicators (A city that comply with & promotes the standards & behaviors mentioned before)

The list of indicators for the eleventh goal includes about two indicators, as shown in the following table:

Table 11: List of indicators of the healthy cities' eleventh goal

Indicator	Explanation of Indicator
47. Percentage % of the city's population suffers from heart disease?	Percentage of cardiovascular disease patients out of the total city population, such as coronary artery disease, arrhythmias, congenital heart defects, heart valvular heart disease, cardiomyopathy and others
48. Percentage % of the population suffering from diabetes in the city	Percentage of people with diabetes (high blood sugar/glucose levels) out of the total city population

The process of measuring the indicators of the eleventh goal of healthy cities in Port Said revealed the fact that the percentage of the population suffers from heart disease reached about 1.2% of the city's population. Compared to the global average which is 8%, it can be said that the forty-seventh indicator achieved an excellent level with a numerical value of 0.85 points. It also revealed the fact that the percentage of the population suffering from diabetes reached 5.54% of the city's population. Compared to the global average which is 11%, it can be said that the forty-eighth indicator achieved an average level with a numerical value of 0.50 points.

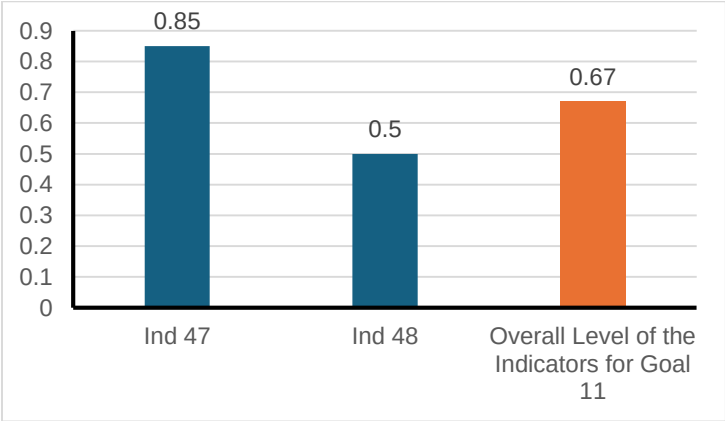


Figure (12): Measure & evaluate eleventh goal indicators for healthy cities



The measurement and evaluation process showed that the overall level of achievement of the eleventh goal indicators for healthy cities "combined" in Port Said city falls within the good level of achievement with a value of approximately 0.67 points.

4. DISCUSSION OF RESEARCH FINDINGS

In light of measuring and evaluating the indicators and objectives of the healthy cities in Port Said, the findings can be discussed and interpreted on two different levels; the level of indicators and the level of objectives, as detailed below:

Findings' Discussion at the Indicators level

The findings of measuring and evaluating the indicators of the healthy cities in Port Said showed that there is a large disparity in the level of achievement of these indicators, reflecting a clear difference between the aspects in which the city has achieved high levels of progress and those that still suffer from weakness or structural deficiencies.

The number of indicators with an excellent level of achievement reached about 28 indicators, including indicators from the first one to the fourth, from the thirteenth to the twenty-third, from the twenty-fifth to the twenty-ninth, also the indicators of thirty-three and thirty-four, as well as indicators of thirty-seven, thirty-eighth, forty-two, forty-four and forty-seventh, which means that the city has achieved a great successes in some basic aspects, including municipal services and the supplies of the infrastructure networks (drinking water, sanitation and waste collection), the concern of the urban life quality (indicators such as public parks, community centers, schools and green areas ≥ 20 hectares), the orientation towards the environmental sustainability (waste recycling and availability of public transport) and the concern of the social justice (percentage of families below the national poverty line and percentage of the population in the poor neighborhoods).

Table 12: Measure and Evaluate indicators of healthy cities in Port Said city

Level of achievement	Weak level (0.00-0.49) points	Intermediate level (0.50-0.65) points	Good level (0.66-0.79) points	Excellent level (0.80-1.00) points
Total of Indicators	17	2	1	28
Numbers of Indicators	Ind.6: Ind.7	Ind.30	Ind.5	Ind.1: Ind.4
	Ind.9: Ind.12	Ind.48		Ind.8
	Ind.24			Ind.13 : Ind.23
	Ind.31: Ind.32			Ind.25: Ind.29
	Ind.35: Ind.36			Ind.33: Ind.34
	Ind.39: Ind.40			Ind.37: Ind.38
	Ind.43			Ind.42
	Ind.45: Ind.46			Ind.44
				Ind.47

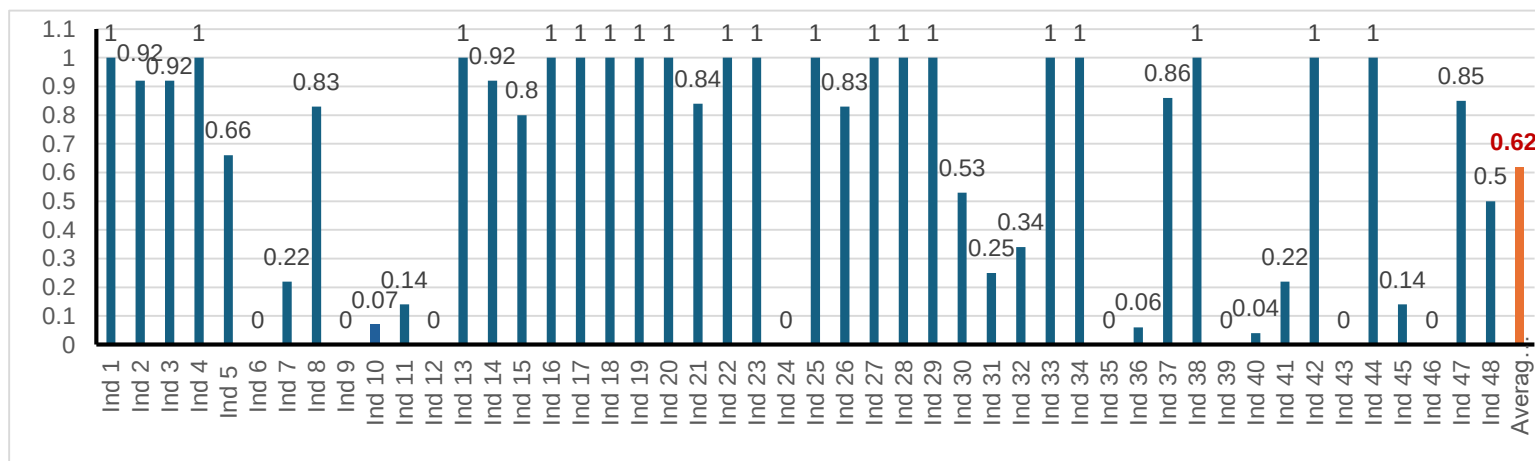


Figure (13): Measure & evaluate healthy cities' indicators in Port Said City

Source: Authors



The results also showed that the number of indicators with a good level of verification was only one indicator, which is the fifth indicator, which relates to public transport stations in the center of neighborhoods, which indicates that the city has begun to improve the internal connectivity but has not yet reached the full integration in the urban transport system. Therefore, this area represents a clear opportunity for improvement through the development and expansion of the public transport networks.

The results also showed that the number of indicators with an average level of achievement reached two indicators, which are the thirtieth and forty eighth indicators, which are related to the percentage of the population in the area of access to the high-speed internet service and the percentage of the population that suffers from diabetes, which indicates to the existence of a digital and health gap that needs a dual intervention by strengthening the digital infrastructure to expand the internet access and improve the health prevention programs in order to confront the chronic diseases.

The results showed that the number of indicators with a weak level reached about 17 indicators, which includes the sixth and seventh indicators, as well as the indicators from ninth to twelfth, in addition to the twenty-fourth indicator, the thirty-first and thirty-second indicators, as well as the indicators thirty-five and thirty-six, in addition to the indicators from thirty-nine to forty-one, as well as the forty-third indicator, in addition to the indicators forty-five and forty-six. This indicates that the city suffers from a severe deficiency in applying the principles of the sustainable cities (especially with regard to the public entertainment spaces, bicycle paths, renewable energy and sustainability standards) and it also faces major challenges in the human development (especially with regard to the low rates of higher education, advanced health services and virtual care), in addition to the fact that it suffers from large gaps in health and economic infrastructure (indicators such as the unemployment rate, number of doctors and beds per 1000 persons), as well as suffering from the limited social and technological inclusion (the weakness of the indicators for rehabilitation of people with disabilities and digital health).

The results also showed that the overall level of achievement of all the indicators in Port Said city falls within the average level of achievement with a value of about 0.62 points, which is an early warning that the large disparity between the indicators may prevent the city's transformation into an integrated healthy city. It also reflects that the city is not weak in terms of the urban health indicators, but it is also not developed enough to be classified as a model healthy city. This means that the city needs a comprehensive review of the urban and environmental policies in general, with the adoption of a clear strategic plan that focuses on raising the weak and average indicators to approach the excellent indicators.

▪ Findings' Discussion at the Objectives level

The results of measuring and evaluating the Healthy Cities Goals in Port Said city revealed a clear disparity in the level of goal achievement. This reflects the city's significant successes in achieving some goals, with a great insufficiency in other goals. Consequently, this explains the overall average level of achievement across all the goals in the city which fell at the moderate level (0.65 points).

The results showed that the number of goals with an excellent level of achievement reached about 3 goals, representing about 27% of the total goals, which included goals of third, fourth and sixth, which means that these goals represent the main core strengths of the city, which are considered major successes for it in the areas of social structure, and justice in providing the basic needs and openness to the resources and services, which reflect the city's ability to build a coherent and sustainable society.

Table 13: Measure and evaluate the goals of healthy cities in Port Said City

Table 13: Measure and evaluate the goals of healthy cities in Port Said City

Level of achievement	Weak level (0.00-0.49) points	Intermediate level (0.50-0.65) points	Good level (0.66-0.79) points	Excellent level (0.80-1.00) points
Total of Goals	3	3	2	3
Numbers of Goals	Goal 2	Goal 1	Goal 5	Goal 3
	Goal 9	Goal 7	Goal 11	Goal 4
	Goals10	Goal 8		Goal 6

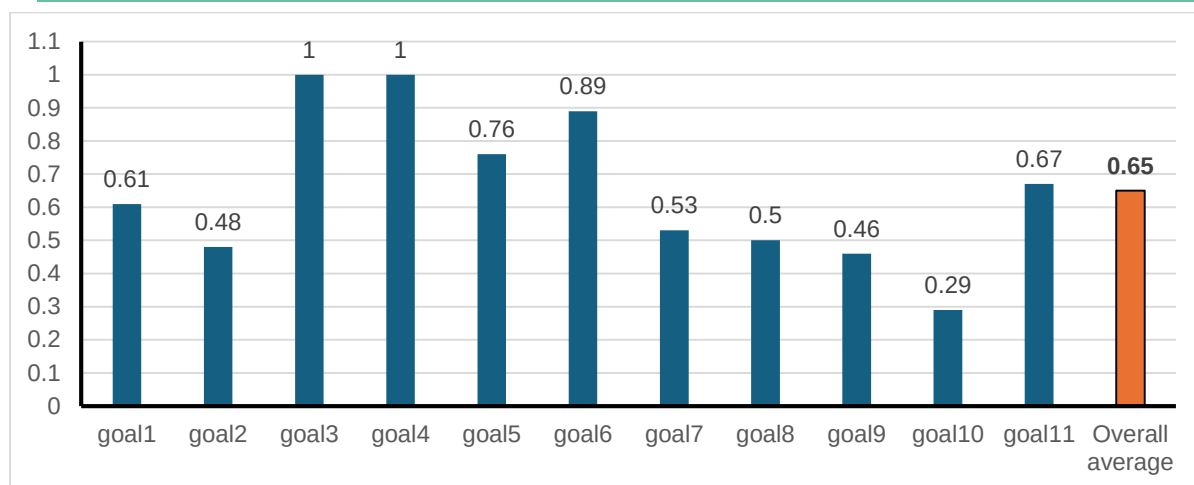


Figure (14): Measure and Evaluate the goals of healthy cities in Port Said City

Source: Authors

The results also showed that the total goals of a good level of achievement reached around two goals with a rate of (around 18%), including goals five and eleven. This indicates that the city has achieved a ratio success in the areas of community participation and public health, but further strengthening is still needed to ensure the sustainability of participation and to maximize the level of health services.

The results also showed that the total goals of a moderate level of achievement are three goals with a rate of (around 27%) out of the total objectives, including the first, seventh and eighth, indicating that efforts are being made in the areas of the urban environment, local economy and urban planning. However, these efforts still need to be developed to reach higher levels.

The results also showed that approximately three (around 27%) of the total targets had a low level of achievement, including targets two, nine, and ten. This indicates that significant weakness is existed in the areas of the environmental sustainability, cultural heritage and the adequacy of public health services which are the areas most in need of urgent strategic intervention.

5. RECOMMENDATION

In light of the previous analysis and its conclusions, this research proposes a set of policies and procedures which aimed at addressing the structural gaps and key weaknesses in Port Said's performance in terms of the healthy cities indicators. These policies and procedures also aim to raise the level of indicators that have reached weak or moderate levels to higher and better levels, in a way that ensures the a fast transformation of the city towards a healthy cities approach. These policies and procedures include the following:

▪ Review and develop urban development policies in the city

The authorities of the city must conduct a comprehensive and accurate review of the urban development policies of the city, integrating the health considerations into the urban planning and design to ensure the provision of the healthy living requirements with focusing on the following:

- Provide safe walking and cycling paths, which in turn enhance the physical activity to improve the public health on one side and protect the environment from pollution on another one.
- Provide appropriate and adequate rehabilitation services for people with disabilities and develop the streets of the city to be more appropriate for the elderly and people with various disabilities (hearing, visual, mobility, etc.).
- Expand the green and open spaces by creating more parks and public squares, which will help reduce pollution, decrease the chronic disease rates and promote the psychological health, while also enhancing the city's resilience and ability to adapt to the future health and environmental crises.

▪ Develop the city's health system

The city's healthcare system and medical infrastructure must be strengthened to address its fundamental weaknesses. This can be achieved by focusing on the following:

- Improving the healthcare services in the city by increasing the number of beds and doctors in the healthcare facilities and providing them with the necessary medical equipment and supplies.
- Working on making an easy access to the healthcare services for all the segments of the society.
- Strengthening the Preventive health programs, expanding awareness campaigns about chronic diseases (especially diabetes and others) and working on providing early medical examination and free treatment services.
- Expanding in providing the digital health services and virtual care.

▪ Adopt policies for the city's environmental sustainability

Environmental sustainability is one of the most important policies through which several key weaknesses that prevent Port Said's city transformation into a healthy city, can be solved, and by focusing on some of the following procedures:

- Expanding the city's reliance on new and renewable energy sources (particularly solar and wind power).



- Encouraging the use of new and renewable energy in public and private buildings through financial support and mandatory legislation.
- Requiring the new buildings to obtain the sustainability certifications and offering rewards to the real estate developers.
- **Other policies and procedures**

There are a number of other policies and procedures that the city must adopt (in addition to the aforementioned policies) to address and overcome several key weaknesses which prevent the transformation of Port Said city into a healthy city approach. The most prominent of them are:

- Expanding the city's digital transformation policy by investing in the digital infrastructure and expanding high-speed internet coverage to ensure rapid access to the health services through the digital health and virtual care services.
- Launching vocational training programs for young people and linking them to the local labor market to reduce the city's high unemployment rates.
- Supporting the open education programs to increase the percentage of those obtaining higher education.

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