The Impact of urban design on health (A case Study of the Residential Community Madinaty in Egypt)

Dr. Mohamed Nabil Abdl Sadek El Sebai
Lecturer at Higher Technological institute
geepso_919@hotmail.com

Abstract:

Urban planning and design has a large and critical role to play in creating healthy cities by providing creative and equitable urban built form. Urban design is only one aspect of what is necessary to make cities healthy places to live and grow up in (7). Participants noted an urgent need for strong policies in the same direction in various sectors, each of which offers its own skills, experience and values, this can be achieved through various aspects of urban living, from work settings, housing conditions, availability of and access to basic services and transport and accessibility to all advantages of urbanization, so building healthy and wealthy cities should become a major goal of the built environment (41). In the late 19th and early 20th centuries, for instance, poor urban environments were a great threat to city residents from all walks of life, rapidly growing cities experienced severe epidemics of infectious diseases, including tuberculosis, cholera, typhoid, yellow fever, these epidemics were effectively mitigated through investment in public infrastructure and better urban planning, sewers were built to manage human waste, public parks were created give access to fresh air, building standards and development regulations were improved to ensure safe housing, to alleviate traffic congestion and relieve urban overcrowding, thus the built environment is a critical factor in human health outcomes(5). Planning and designing urban environments that effectively encourage and promote healthy eating and physical activity must be based on understanding people, their needs and how healthy habits can best be integrated into their everyday lives. As time is often a rare resource in people's lives, convenience is an important principle. Policies and strategies are often developed and implemented over a long time, and other tools and approaches are necessary to ensure that planning of healthy urban environments is more action-oriented(41). The World Health Organization (WHO) recommends that governments place health and health equity at the center of urban governance and planning (28). In recent years , urban regeneration has widened its approach not only to give cities a new and more competitive look but also to boost cultural, economic and social aspects, so increased attention is being paid to the role of environmental factors in health outcomes (33). Based on this, the United Nations(UN′s) initiated a global trend to face this challenge through sustainable buildings(35). The case study investigates Madinaty city, which is a gated community situated to the east of Cairo city center where sustainable buildings are analyzed according to global and local criteria, and its impact on the environment and user is evaluated. The study explored how to advance concrete actions in support of healthier environments and behavior in Madinaty city through better urban planning and people-friendly city design(41). However, some parameters need to be improved such as housing affordability, availability of services, preserving the cultural heritage and imbalance between supply and demand(32) .When evaluating all results, it is concluded that Madinaty has succeeded in having a positive impact on the environment and the users, eventually providing a better quality of life, whereas the community design of Madinaty has a mixture of residential, commercial and institutional uses within a relatively compact area.

Urban life in Madinaty City of Cairo was investigated according to the quality of built environment to form a more in-depth and comprehensive approach to deal with the challenges that meet architects, urban planners, and developers when solving the healthy problems in new urban communities(10). The study of Madinaty City has shown the following characters of the healthy community which coincides with The UN's Sustainability Development Goals" (SDGs)(35):

•Compact neighborhoods and higher residential density
•Good public transport facilities within easy residential reach
• Networks of parks and public open spaces
• Local access to shops and services
• Access to sport and recreational facilities
• Active travel facilities: Pedestrian areas and cyclist lanes
• Feelings of safety: Well-lit streets, natural surveillance for buildings(14,35).

Thus the way we design for greater social interaction fortuitously parallels the way we should design for good life style and behavior through creating attractive mixed use environments with destinations and amenity-filled gathering places serviced by supportive infrastructure that encourage people to get out of their cars and walk, or ride bike, bus, and mingle and linger instead(13) .Moreover, the study shows that the houses we inhabit, the neighborhoods in which those houses sit, the communities that live in those neighborhoods, and the facilities, essential services, transportation and open spaces that plug into those neighborhoods – all contribute to physical and mental wellbeing(17). The current research recommends that decision makers in the public health, environment, transport and park sectors must work together to promote healthy life as a way of cutting down air pollution and greenhouse gas emissions and energy usage, whilst achieving health benefits (3).

Keywords:

urbanization; potentially; transformative; physical activity

الملخص:

يلعب التخطيط والتصميم الحضري دورًا كبيرًا وحاسمًا في إنشاء مدن صحية من خلال توفير شكل عمراني إبداعي وعادل. إن التصميم الحضري ليس سوى جانب واحد مما هو ضروري لجعل المدن أماكن صحية للعيش والنمو فيها(٦). وأشار المشاركون إلى الحاجة الملحة لسياسات قوية في نفس الاتجاه في مختلف القطاعات، حيث يقدم كل منها مهاراته وخبراته وقيمه الخاصة، ويمكن تحقيق ذلك من خلال مختلف جوانب الحياة الحضرية، من أماكن العمل، وظروف السكن، وتوافر الخدمات والوصول إليها. إلى الخدمات الأساسية والنقل وإمكانية الوصول إلى جميع مزايا التحضر، لذا فإن بناء مدن صحية وغنية يجب أن يصبح هدفا رئيسيا للبيئة المبنية (٨). في أواخر القرن التاسع عشر وأوائل القرن العشرين، على سبيل المثال، كانت البيئات الحضرية الفقيرة تشكل تهديدًا كبيرًا لسكان المدن من جميع مناحي الحياة، وشهدت المدن سريعة النمو أوبئة شديدة من الأمراض المعدية، بما في ذلك السل والكوليرا والتيفوئيد والحمى الصفراء، وهذه الأوبئة تم تخفيفها بشكل فعال من خلال الاستثمار في البنية التحتية العامة وتحسين التخطيط الحضري، وتم بناء شبكات الصرف الصحي لإدارة النفايات البشرية، وتم إنشاء حدائق عامة تتيح الوصول إلى الهواء النقي، وتم تحسين معايير البناء وأنظمة التطوير لضمان السكن الآمن، وتخفيف الازدحام المروري وتخفيف حدة الازدحام في المناطق الحضرية. الاكتظاظ، وبالتالي فإن البيئة المبنية هي عامل حاسم في نتائج صحة الإنسان (٥). يجب أن يعتمد تخطيط وتصميم البيئات الحضرية التي تشجع وتعزز بشكل فعال الأكل الصحي والنشاط البدني على فهم الناس واحتياجاتهم وكيف يمكن دمج العادات الصحية على أفضل وجه

في حياتهم اليومية. نظرًا لأن الوقت غالبًا ما يكون موردًا نادرًا في حياة الناس، فإن الراحة مبدأ مهم. غالبًا ما يتم تطوير السياسات والاستراتيجيات وتنفيذها على مدى فترة طويلة، كما أن هناك أدوات وأساليب أخرى ضرورية لضمان أن يكون تخطيط البيئات الحضرية الصحية أكثر توجهاً نحو العمل. توصي منظمة الصحة العالمية (WHO) بأن تضع الحكومات الصحة والمساواة الصحية في مركز الإدارة والتخطيط الحضريين (١٩). في السنوات الأخيرة، وسع التجديد الحضري نهجه ليس فقط لإعطاء المدن مظهرًا جديدًا وأكثر تنافسية ولكن أيضًا لتعزيز الجوانب الثقافية والاقتصادية والاجتماعية، لذلك يتم إيلاء اهتمام متزايد لدور العوامل البيئية في النتائج الصحية (٣٣). . وبناءً على ذلك، بدأت الأمم المتحدة اتجاهًا عالميًا لمواجهة هذا التحدي من خلال المباني المستدامة(٣٥). تتناول دراسة الحالة مدينة مدينتي، وهي مجتمع مسور يقع شرق مركز مدينة القاهرة حيث يتم تحليل المباني المستدامة وفقًا للمعايير العالمية والمحلية، ويتم تقييم تأثيرها على البيئة والمستخدم. استكشفت الدراسة كيفية تعزيز الإجراءات الملموسة لدعم البيئات والسلوكيات الصحية في مدينة مدينتي من خلال التخطيط الحضري الأفضل وتصميم المدن الصديقة للناس (١). ومع ذلك، هناك حاجة إلى تحسين بعض المعايير مثل القدرة على تحمل تكاليف السكن، وتوافر الخدمات، والحفاظ على التراث الثقافي، وعدم التوازن بين العرض والطلب. وعند تقييم جميع النتائج، نستنتج أن مدينتي نجحت في إحداث تأثير إيجابي على البيئة والمجتمع. للمستخدمين، مما يوفر في النهاية نوعية حياة أفضل، في حين أن التصميم المجتمعي لمدينتي يحتوي على مزيج من الاستخدامات السكنية والتجارية والمؤسسية داخل منطقة مدمجة نسبيًا. تمت دراسة الحياة الحضرية في مدينة مدينتي بالقاهرة وفقًا لجودة البيئة المبنية لتشكيل نهج أكثر تعمقًا وشمولاً للتعامل مع التحديات التي تواجه المهندسين المعماريين ومخططي المدن والمطورين عند حل المشكلات الصحية في المجتمعات العمرانية الجديدة. أظهرت دراسة مدينة مدينتي السمات التالية للمجتمع الصحي(٥) والتي تتوافق مع أهداف الأمم المتحدة للتنمية المستدامة (SDGs):

احياء مدمجة وكثافة سكنية أعلى • مرافق نقل عام جيدة يسهل الوصول إليها من قبل السكان • شبكات من المتنزهات والمساحات العامة المفتوحة • الوصول المحلي إلى المتاجر والخدمات • الوصول إلى المرافق الرياضية والترفيهية • مرافق السفر النشطة: مناطق المشاة وممرات راكبي الدراجات • المشاعر السلامة: شوارع مضاءة جيدًا، مراقبة طبيعية للمباني (١٤,٣٥). وبالتالي فإن الطريقة التي يصمم بها المرء لمزيد من التفاعل الاجتماعي توازي بالصدفة الطريقة التي يجب أن نصمم بها أسلوب حياة وسلوكًا جيدًا (٨) من خلال إنشاء بيئات جذابة متعددة الاستخدامات مع وجهات وأماكن تجمع مليئة بوسائل الراحة المخدومة ببنية تحتية داعمة تشجع الناس على الخروج من سياراتهم ومشيهم، ودراجاتهم، وحافلاتهم، ويختلطون ويقيمون بدلاً من ذلك. علاوة على ذلك، تظهر الدراسة أن المنازل التي نسكنها، والأحياء التي تقع فيها تلك المنازل، والمجتمعات التي تعيش في تلك الأحياء، والمرافق والخدمات الأساسية والنقل والمواصلات المساحات المفتوحة المتصلة بتلك الأحياء – تساهم جميعها في تحقيق الصحة البدنية والعقلية(١٧). يوصي البحث الحالي بأن يعمل صانعو القرار في قطاعات الصحة العامة والبيئة والنقل والمتنزهات معًا لتعزيز الحياة الصحية (٦) كوسيلة لخفض تلوث الهواء وانبعاثات الغازات الدفيئة واستخدام الطاقة، مع تحقيق الفوائد الصحية (١٣).

الكلمات المفتاحية:

التحضر؛ من المحتمل؛ تحويلي؛ النشاط البدني

Aim of the study:

The Healthy New Towns programed has reinforced the need to make good health and wellbeing a key objective for the future planning and design. The research study aims to clarify the relationship between the built and natural environments and human physical and mental health, so the city planners, public health officials, medical practitioners, and landscape architects can work together to reform environment planning and design to create sustainable and resilient communities(7).

Research problem:

The urban environment shapes people’s life style and behavior throughout the life-cycle. Urban design and planning influence public health and human behavior by limiting or providing access

to healthy foods and active lifestyles, which have profound effects on people's general health(40,42).

Research Objectives:

(1) The study focused on frameworks and tools for inspiring innovative means to encourage physical activity, healthy eating and sustainable environment through urban design because the built environment can facilitate or constrain active lifestyles (41).

(2) The study focused on analytical tools to assess the current situation and to translate behavioral trends into design decisions, policy and planning of interventions to improve the people's health and behavior (43,45).

Research Hypothesis:

Built environments that facilitate more active lifestyles and reduce barriers to physical activity are desirable. There is a relationship between sustainability, sound environment, and the people. Sustainable buildings affect the environment in different ways such as preserving the natural resources through water and energy efficiency, improving air quality, and minimizing waste, which has a negative impact on the environment (3,7). All these in turn positively influence the users of the environment by improving the people's health, standard of living and mental state.

Research Importance:

• The study shows with great clarity the relationship between the urban planning and human health and behavior (9). Cities are places where it all comes together, such as economic development, urbanization, demographic change, non-communicable diseases (NCDs), and migration and climate environmental changes (43,44).

• The built environment in place today has been shaped by long standing policies and the practices of many decision makers (e.g., policy makers, public health officials, medical practitioners, architects planners, developers, and traffic engineers) (25,37).

Introduction:

It is widely acknowledged that the life style, prosperity, health and wellbeing of an individual are heavily influenced by the 'place' in which they live or work (33). Health-promoting urban design will emerge as a central planning issue over the next decades, underpinned by arguments for containing the car, increasing pedestrian friendly environments, controlling out-of-town shopping, creating local facilities within walking distance, making cities more compact and investing in public transport (7,19). WHO stated that environment and living spaces are considered as global, social and political entities that determine the health status of populations (40). It is becoming increasingly important to acknowledge the fundamental role of designing and developing sustainability for 24-hour cities, given that over 47% of the world's population currently lives in urban areas, and about 60% of us will be considered urban by 2030 (41). Although we're in the last quarter of 2023, and we still don't know when the pandemic will be "over." But one thing is for sure that sequels of pandemic will reshape urban design around the world (8). Many of the developments in urban planning through the history of cities are the direct results of pandemics and health crises. Various researches back this up, like that

surrounding London's response to the 1850 cholera outbreak ,the same phenomenon spanned the Spanish flu pandemic in 1918 up to the most recent SARS and H1N1(8) . Moreover our success over the acute diseases found within the city gives us valuable lessons for the present given that communities around the globe face a different health threat—more specifically the spread of chronic diseases, such as asthma, Type-2 diabetes, cancer, heart disease and obesity(5,8). The primary method used to evaluate the evidence base associated with the urban planning and health must be conducted by well-trained, objective researchers working in key disciplines (e.g., urban planning, public health, environmental psychology, and medicine) (6) (fgure1). The United Kingdom's National Health Service developed a Healthy Urban Development Unit to improve co-operation between city planning and the health sectors to respond to population change, development pressures, environmental constraints and the delivery of health care services(12,20)(figure 2). There are four key areas of opportunity for urban planners and designers to facilitate innovative thinking and promote better mental health and wellbeing, by using a framework called Mind the GAPS (green place, active place, pro-social place and safe place), these four design principles enhance productivity, age longevity, good healthy behavior and lower health care expenditures (21).

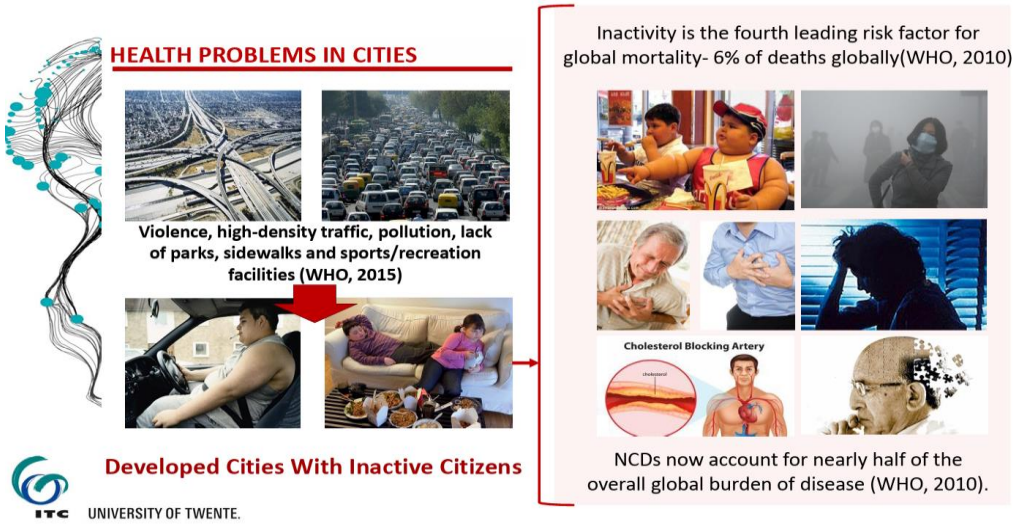

Figure (1) Health Problems in Cities (Source: WHO, 2015)

Figure (2): Relationship between Urban Planning and Health, Source: WHO,2018

Researchers had shown that city design can play a big role in a community's physical, mental and social well-being. Various approaches and tools were presented towards supporting healthy diets and physical activity on different scales, ranging from policy level to the actual implementation of different designed environments (19,). United Nations experts focused on frameworks and tools for urban design to inspire innovative means that encourage physical activity and healthy eating (42). UN's framework is divided into seventeen "Sustainability Development Goals" (SDGs) in order to achieve sustainable development worldwide (35).

Egypt could apply such strategies called "Sustainability Development Strategy" (SDS) to ensure sustainable development for future projects. The strategy is classified into three main aspects of sustainability; environmental, social, and economic, figure (3), (9,35). Urban design and planning of Madinaty City (case study) influence public health and human behavior by limiting or providing access to healthy foods and active lifestyles, which have profound effects on people's physical and mental health(2). Although Madinaty City succeeded in preserving the human settlements inclusive, safe, resilient, and sustainable and Egypt's SDS Environmental pillars (35) ,but it attracts higher income group just like some other similar gated communities in Egypt and not for average income group and this against UN's SDG requirements (15,36).

This concludes that Egypt needs more inclusive gated communities that are helpful for everyone, especially for low-income people, not just the rich ones. The Healthy People and Healthy Places programmed aim to promote and deliver local and national policies and resources in support of the vision of healthy places for everyone through four main work streams: •

Universities should develop interdisciplinary education programs to train professionals in conducting the recommended research and prepare practitioners with appropriate skills at the intersection of physical activity, public health, transportation, and urban planning. • Build networks and partnerships with more stakeholders. •

Build capacity at local and national levels through learning. Analysis study done in UK had shown that better designed built environments could improve people's lifestyle and reduce reliance on Government services, potentially leading to a £15 billion saving to the economy by 2050, (12,34).

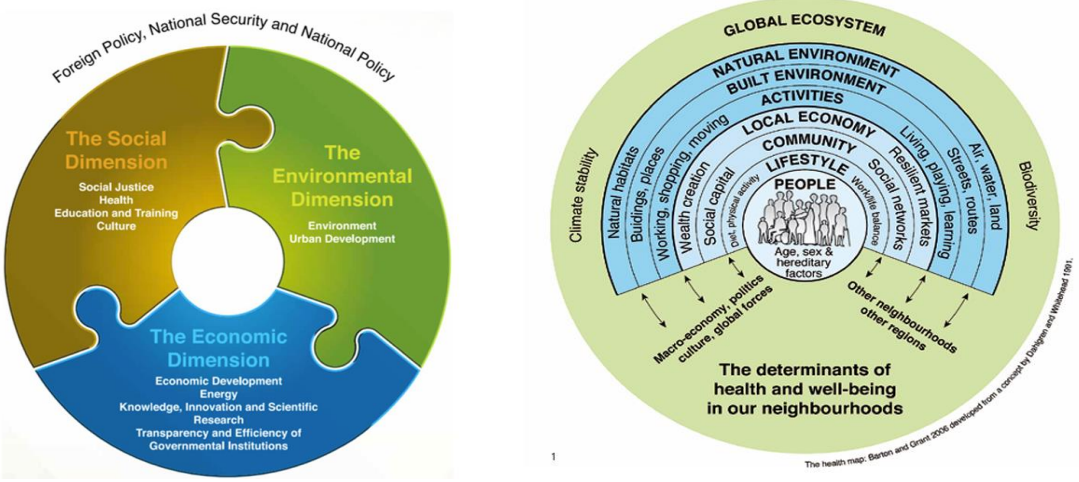

Figure (3): 1-The three main divisions of the sustainable development strategy. Source: SDS document 2-Diagram illustrating how health and wellbeing are determined by age, sex, genetic heredity, lifestyle, behavior, and location on the Planet, Barton and Grant's ,Urban Design Group Journal — spring 2017.

THE PROPOSED DESIGN PRINCIPLES (Features of The Healthy Built Environment):

1-Smart Locations:

Locate new development adjacent to existing development or close to existing infrastructure, especially transit. “Smart Locations” help preserve habitats and biodiversity, lower the use of the automobile by facilitating the link between physical activity and transit utilization; simultaneously it supports “aging in place, accessibility to transit and design inviting, well-lit, sheltered transit stops (14).

2-Integrated Nature: The integration of nature into urban development is increasingly being seen as a method for promoting human lifestyle at the community scale (2). Both physical and psychological benefits have been attributed to green spaces. the linkage of open spaces to each other through walking paths and recreational trails are expected to enhance physical activity and mental health (14,16).

3. **Mixed Land Uses:** Provide a mixture of land uses including residential, commercial, educational, and institutional within a relatively compact area. Mixed land uses are hypothesized as being positively associated with human health because it is thought that having different activities and destinations located in close proximity to one another will facilitate physical activity and opens up the option of different forms of transportation, including walking and biking as well as encourage social interaction (14,17)(figure4).

Figure (4): Mixed- Use Policies, (HART HOWERTON, The University of Virginia,2014)

4. MIXED HOUSING TYPES / MIXED INCOMES / MULTI GENERATIONAL: Create residential developments that include a variety of housing types and tenures; encourage attainable housing for all community members of all backgrounds and ages. The more flexible housing designs and zoning standards that will enable older adults, for instance, to live together with their children and grandchildren or have them in close proximity, facilitate mobility, increase social contact and reduce isolation and psychological upset (14).

5- CIRCULATION ALTERNATIVES: “Active Transportation,” that is walking and biking for utilitarian purposes, has been demonstrated to have a positive impact on population health including a reduced risk of obesity, cardiovascular disease, and mental illness. It can facilitate positive environmental outcomes (such as less pollution) and economic effects (such as lowered expenditure on automobiles) that have health benefits. Sidewalks should also be designed for a variety of users from an older adult depending upon a walker to a young family strolling with toddlers, (14,16) (figure5).

Figure (5) Healthy Street source: Lucy Saunders,2016

6- SOCIAL CONNECTIONS TO INSTILL PRIDE OF PLACE: Provide a variety of open spaces from natural areas, regional parks, community parks, neighborhood parks, recreation centers, pocket parks, and public plazas/squares that enable residents to exercise, meet and mix to foster human livability and behavior (14, 16).

7-PROVIDE ACCESS TO HEALTHY FOODS: Encourage healthy eating habits by establishing farms nearby, integrating demonstration gardens within parks and open spaces, community gardens, rooftop gardens and window boxes and other forms of urban agriculture to supports the integration of sources of fresh foods into the built environment as a strategy for improving human health (14,17) (figure ,6).

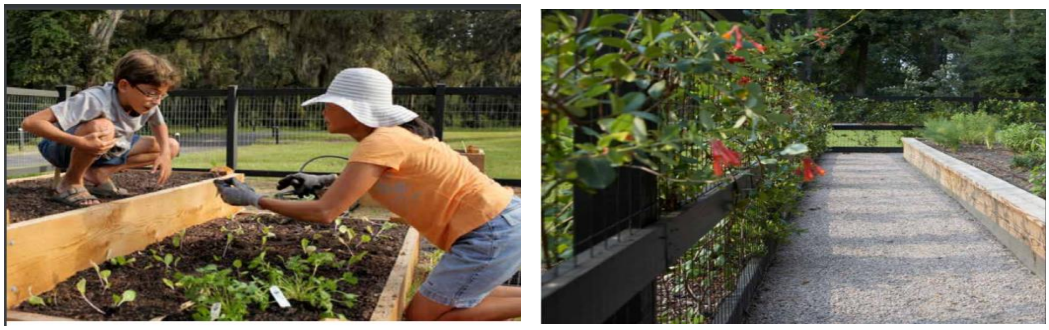

Figure (6): City as farm and nature reserve, (HART HOWERTON, The University of Virginia,2014)

8-LIFELONG LEARNING: Foster opportunities for intellectual growth and exchange along life span (6), including the provision of educational facilities within walking distance of residences. The existing communities need to think about how they can design their street networks, so that walking and biking to school can become a viable option (14, 17).

9- **SUSTAINABLE DEVELOPMENT**: Integrate sustainable development at all scales, including urban form, mix and location of uses, walking networks, sustainable infrastructure, social programs and green building technologies can yield positive benefits for the ecosystem as well as human health (14,16) (figure7).

Figure (7): (Healthy City), Bradford's City Park (Urban Design Journal, Spring 2017)

10- **IDENTIFYING CORE VALUES (Decentralization of core services)**

Some residents lack access to essential services like water, health care and good housing, and can have trouble amending the problem (figure,8)(14,34).

Figure (8): (Core Services) (Bradford's City Park Centenary Square) (Urban Design Journal, Spring 2017)

11-Digitized, granular data: Easy access to data was important in dealing with the pandemic. Granular, local data should be available digitally to aid in faster decision-making, local mapping and community information (14, 34).

study approach and key issues:

A healthy new town is a combination of a huge range of sustainable components, including service redesign and integration, active travel, delivering infrastructure, behavior change and healthy food options which have profound effects on people's health and behavior (7). The effects of environmental planning on physical activity levels which in turn affect health to operate through a complex set of relationships (28,33). Figure (9) shows the committee's conceptualization of the key connections. The starting point is the person (2), with all the demographics, household and lifestyle characteristics, genetic factors, culture, biological dimensions, and time allocation that influence the capacity to be active. Some individuals choose to live in neighborhoods with bicycle lanes and walking trails and others are constrained by time, income, or physical disabilities (33). Secondly the characteristics of the built environment may provide opportunities for the individual to engage in a variety of physical activities, which can be categorized into four types : (a) exercise (e.g., bicycle riding, a sports

club or a home treadmill), (b) transport (e.g., commuting, grocery shopping), (c) household production and home maintenance (e.g., housework, gardening), and (d) occupation-related physical activity (e.g., physically active jobs,)(28,33). Thirdly, the link between environments and health manifests differently in different cities and is found in various aspects of urban living, from work settings, housing conditions, availability of and access to basic services and transport(28). For instance, less affluent neighborhoods and inner cities experience more traffic, a greater risk of road traffic injuries and exposure to high crime rates and more polluted air and noise, which in turn increase the risks for poor health and a higher incidence of NCDs (17,43). On other hand connectivity and mix land uses often present in inner cities are important correlates of good activity and safe driving to school for children and teenagers(26). Finally, time occupies an important role in allowing physical activity for many individuals according to family demands, work and travel limit (33).

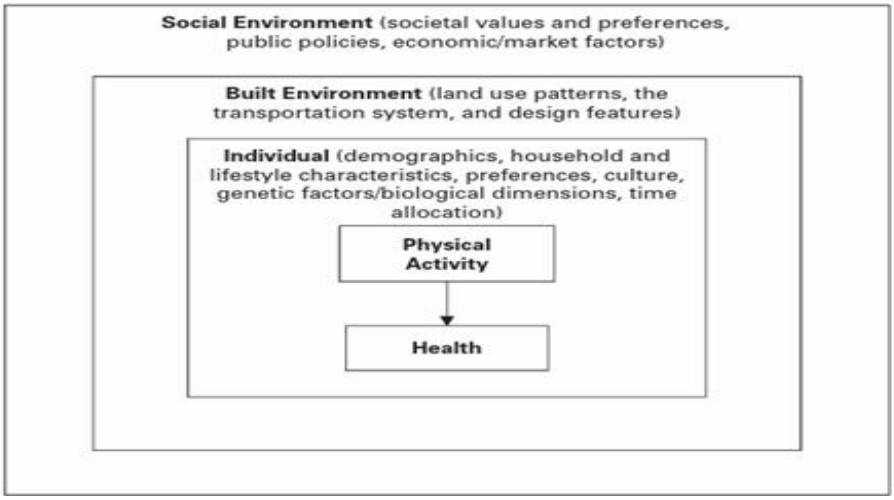

Figure (9): Overview of a model idea for the study

United Nations. New Urban Agenda. HABITAT III. http://habitat3. org/wp-content/uploads/NUA-English.pdf. Published Accessed July 2019.

From the overall findings the researcher concluded that communities should be built to accomplish the following goals:

1) Facilitate physical activity along the life span.

2) Foster social interaction between community residents.

3) Positive design interventions for built environment include:

• Different building types in close proximity.

• A variety of streets servicing equitably the needs of people, bikes and vehicles.

• Streets to terminate at other streets, clearly defined public spaces, squares and parks (22).

• Well-placed civic buildings becoming landmarks to express community identity, buildings at street corners, consolidating the corners,

• Buildings forming a hard edge to the street.

• Street edges to be unbroken by car parking, and on-street parking to be encouraged (22,34)(figure 10).

Figure (10) :(Healthy Environment components)
(Urban Design Journal,Spring,2017,Alfonzo,2005)

Case study:

The research shows that the urban environment shapes human health and well-being throughout the life-cycle. Urban design and planning influence public health and human behavior by limiting or providing access to healthy foods and active lifestyles, which have profound effects on people's physical and mental health (41). Madinaty is a fully occupied communities that provides high diversity of social, income and education, that can represent a diversity of familiarity level with (Information, Communication, Technology) (ICT)(1). Madinaty project is one of the important projects in new urban communities and recently it became one of the main and important projects for the Egyptian state, as it became a distinguished example of integrated cities, which won the admiration of many citizens, for several advantages that we will be listed in the following article (10, 23).

The most important features in Madinaty:

Madinaty currently occupies the best geographical areas, as it is an extension of New Cairo and is located in the square of the new administrative capital and Mostakbal City, the city is approximately a 10-min drive from Heliopolis and 20 min from downtown Cairo. It is also located near the second ring road, also its proximity to Suez, Ain Sukhna, Nasr City and Heliopolis regions (23,32). Figure (11).

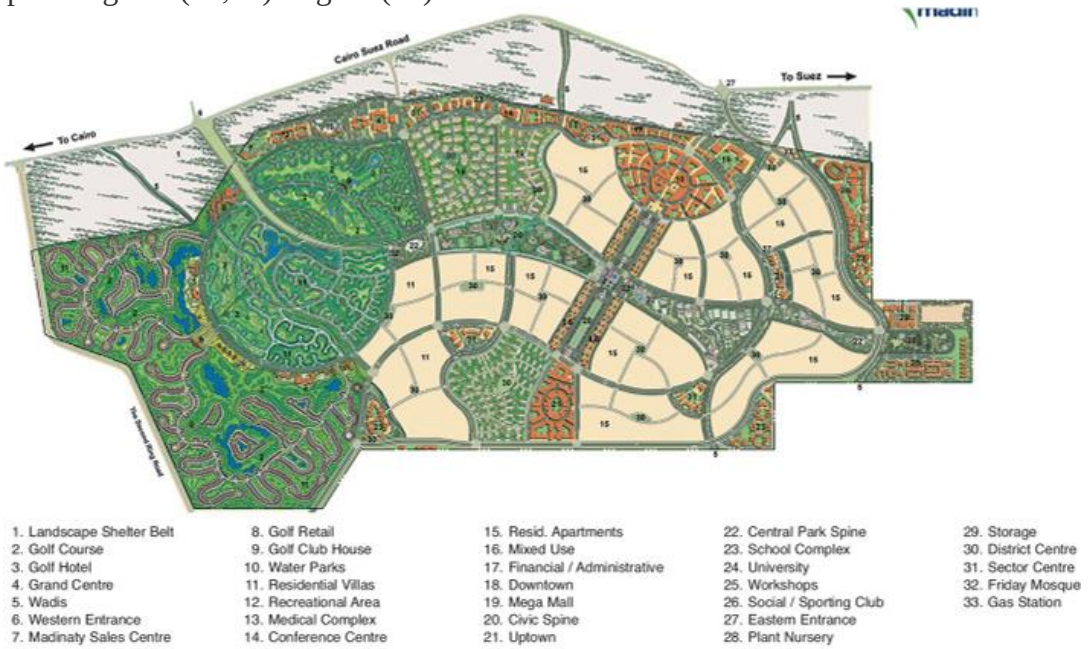

Figure (11): Masterplan of Madinaty city. Source: http://www.madinaty.com/en/project.aspx

Area: Madinaty is located on an area of 8000 acres, including a giant club on an area of 200 acres and contains within it 120 thousand different housing units, and it was estimated to be inhabited by approximately 600 thousand people, and the total budget of the project was 60 billion Egyptian pounds(23).

Split it: As for dividing the city from the inside, the company divided it into approximately 33 sections. Figure (9) which included**:**

1-City entrances area
2-The green belt areas that surround the whole city
3-Areas of apartments, buildings, and villa areas
4-Zones for schools
5-Green areas within the stages and many golf courses
6- A zone for universities
7 -Many lakes, areas for golf breaks and inquiries areas
8- Hubs for hiking, shopping and entertainment.
9- Areas for exhibitions, showrooms as well as sales.
10- The presence of luxury and high-end hotels, such as the Four Seasons.
11-Malls and commercial centers, whether in the golf areas or within the city, water sports areas, club area, cinemas areas
12 -The International Convention Center area.
13- Agricultural nurseries area
14- The corporate complex area, gas station areas
15- Service center area for the population sector

Services available within Madinaty:

Many services are available in my city, which include schools and transportation, as well as medical centers, markets, malls, police points, communication centers, the Internet, the civil registry, the real estate registry, a building for real estate taxes, the Energy Company for electricity and water services, natural gas companies, and soon universities and hospitals, and all the services needed by the residents of Madinaty, and all the neighboring cities it has, which may include a city of games, entertainment places and cinemas, in addition to clubs and wonderful and large green spaces (figure 12)(11,23).

Large green spaces, cyclist lanes and sitting places

Housing units, open green spaces, school areas, service area and bus station

Large open green spaces, Bank area, Police point, Medical services and library area

Figure (12): The most important features in Madinaty

RESULTS:

Healthy lifestyle includes broad human needs ranging from food and basic security to beauty, cultural expression, and an intimate relation to a community or a place (41). Cities can be understood as places where everything comes together and where local officials are expected to react and interact with drivers and complex feedback mechanism operating at the same time, such as economic development, urbanization, demographic change, NCDs, migration, climate,

environmental changes and residents' social and psychological wellbeing (**Pineo,2020**). Madinaty city offers adequate and safe housing for its residents; but these housing units are suitable for high-income families, and only 7% of housing units are allowed for average-income families so this is still a very low percentage compared to the total amount of available housing units (Hafez T ,2019). Based on the UN's SDG number 11 goals for a city to be livable, it must allow safe, adequate and affordable housing (36). Moreover, in Madinaty City, some zones architectural styles are inspired by European design style and an Andalusian architecture in an effort to show the uniqueness of the city, but this does not preserve the country's heritage according to the UN's SDG number 11 goal

(1,32). Furthermore, Madinaty city offers different services for its users; but they are not equally distributed on the different residential zones such as green areas and open spaces. The improved air quality through the provision of vast areas of green and open spaces results in improved health, comfort, and satisfaction of users. Efficient water and energy techniques preserve the natural resources of the environment, while waste management and public transportation result in reduced environmental pollution and improve social interaction, cooperation and quality of life for inhabitants. The presences of the gates surrounding the city, increased safety, and elimination of infringement; thus, the residential environment has become one of the most important factors that affect consumer choice and property selection (2,32). Eventually, users of Madinaty city will have a better quality of life (**Kinder, K**., 2022). Because of the wide geographical area in an urban setting, a residential environment that is able to satisfy the daily demand of inhabitants is desired, therefore, it is crucial for urban planners and cities administrators to be involved in the projects that are important to people to allow them to live satisfying lives (31). Moreover, planning of Madinaty City focuses on open spaces, parks for recreations and playgrounds to encourage physical activities and gives priority to walking and bicycling pathways and created affordable and easily accessible mass transport, all the above mentioned planning strategies contribute towards making a healthy city (10,43). The overall findings from the current research substantiate the proposition that built environment strategies can improve health in its many dimensions and broadly support the principles we have laid out and all communities should be built to accomplish the following goals:

1) Facilitate healthy life and good mental health (29).
2) Foster social interaction between community residents.
3) UN Sustainable Development Goals application.

Since 2015, 195 nations cooperated with the United Nations (UN) to improve the lives of their people all over the world (33). Figure (13) summarizes the seventeen goals which need to be well established by the year 2030 (35,36).

Figure (13): The UN Sustainability Development Goals (UN, SDG)
Source: https://www.un.org/sustainable development/sustainable-development-goals/

This research focuses on one goal (number 11), which concentrates on making cities and human settlements inclusive, safe, resilient, and sustainable [36)

SDG number 11 goal targets:

11.1 Safe and affordable housing and basic services and upgrade.
11.2 Affordable, safe, accessible and sustainable transport systems.
11.3 Enhance inclusive and sustainable urbanization.
11.4 Protect the world's cultural and natural heritage.
11.5 Reduce the adverse effects of natural disasters.
11.6 Reduce the environmental impact of cities(waste management, air quality).
11.7 Provide access to safe, inclusive and accessible, green and public spaces.
11.A Strengthening national and regional development planning.
11.B Implementing integrated policies and plans towards inclusion, resource efficiency and disasters risk reduction.
11.C Support least developed countries in sustainable and resilient buildings utilizing local materials (35,36).

Egypt's 2030 Vision about (The Sustainable Development Strategy) (SDS):
Egypt 2030 Vision was developed following the Sustainable Development Goals (SDGs) of the United Nations (1,9). It is composed of political, economic, and social visions that deal with a general framework concerning with the quality of life and keep the rights of future generations to have a prosperous life, (9). Research paper about Madinaty City has succeeded in creating built environment that promote physical and mental wellbeing according to SDG number 11 goals(35,36), Table (1). Madinaty sustainable gated community is selected as the case study because it follows SDG number 11 goal targets except in providing affordable housing for the wealthy persons only not as the UN SDG goal states that (32).

Table (1) Application of SDG no 11 by UN on Madinaty City Environment (Global sustainability criteria)

SDG number 11 targets	
Adequate safe and affordable housing for everyone	-
Basic services for everyone	+/-
Enhance inclusive and sustainable urbanization	+
The cultural and natural heritage	-
Improved air quality	+
Sustainable waste management system	+
Access to safe, inclusive, and accessible green and public spaces	+
Resources efficiency	+
Building using local materials	+

Key: strong (+), intermediate (+/-), weak (-), source: Alagamy, Journal of Engineering and Applied Science,2023

Figure (14a): Stone used in pedestrian paths in Madinaty, source: The researcher

Figure (14b): Madinaty open air mall. Source: https://twitter.com/OpenAirMall

Table (2): Madinaty Sustainability Assessment based on specific criteria of Egypt's SDS. Source: Alagamy Journal of Engineering and Applied Science,2023

Local Sustainability Criteria			
Environment		Urban Development	
Sustainable water system	+	Population settlement in new development areas	+

Sustainable water consumption	+	Relation between supply and demand in housing sector	-
Sustainable solid waste management system	+	Eliminate informal settlements	N/A
Hazardous wastes disposal system	N/A	Substitute& Renew infrastructure	N/A
Preserve natural resources	+	Supply of utilities in new areas	+
Sustainable infrastructure	+	Sustainable building methods	+
Environmental protection	+	Eliminate infringement	+
Condition of coastal and marine areas	N/A	Improve and increase the capacity of public transportation	+
Reduce air pollution	+	Increasing construction capacity	+

Key: strong (+), intermediate(+/-),weak (-) ,N/A: Not applicable. source: Alagamy Journal of Engineering and Applied Science,2023

Livable community has the ability to provide access to adequate, safe, and affordable housing to everyone (15,36).

Figure (15): Underground trash bin system. Source: https://fount.aucegypt.edu/etds/223

Results had shown that Madinaty City does not provide essential services for everyone because some residential zones lack some services than the other ones. In addition to this, the design could not preserve the cultural heritage of the city. Each residential zone is designed on a different architectural style that does not keep the Egyptian heritage characters (32,36). On the other hand, there was imbalance between supply and demand due to the very high prices of some building units which could not match average income of most people (28,32). Furthermore, the good urban design of Madinaty has positive impact upon the environment and users. The livability techniques applied such as resource efficiency, sustainable infrastructure, transportation system, waste management, green areas, open spaces and security measures, all enhance the environmental air quality, reduce pollution, and preserve natural resources (23,27). This in turn improves the lifestyle and behavior of users, reduces stress, encourages communication and social interaction between people, enhances safety and security, and eventually, provides a better quality of life (23). From the results of the previous studies, the

search study can suggest six dimensions of urban, economic, social, environmental, safety and transportation with 23 sub variables according to schema ball (table 3,4), we choose these dimensions because they were the most mentioned in literature and most relevant to the Egyptian context (31). It should be noted that these dimensions might not have precisely the same content and meaning as those used in other literature, even though the same term might be used (31). Results of the case study show that Madinaty is indeed a distinguishable livable urban city that can help in preserving the environment and providing a better quality of life for its users. This means that Egypt needs more inclusive gated communities that proportionate for everyone income, not just the privileged ones (19).

Table (3) The chosen Healthy dimensions& livability in Madinaty City

healthy dimension& Livability	Variable	Theme
Urban	V1	Housing affordability
	V2	Streets quality
	V3	Open spaces and sense of place.
	V4	Street scape
	V5	Density
	V6	Mixed land uses and services
Social Dimension	V7	Behavior of neighbors
	V8	community life and social contact
	V9	The sense of belonging
Economic Dimensions	V10	Income
Safety Dimension	V11	Employment opportunities
	V12	Employment varieties
	V13	Number of crimes
	V14	The feeling of safety
	V15	Lighting
	V16	Fire fighting
	V17	Security
Environmental Dimensions	V18	Air pollution
	V19	Water pollution
	V20	Sound pollution
	V21	Visual disturbance
Transportation	V22	Means of transportation
	V23	Signs and street labels are sensitive variables

Circo's Table Viewer v0.63-9 © 2008-2017 Martin Krzywinski http://mkweb.bcgsc.ca/tableviewer/- http://circos.ca/-(24)

Table 4: Schema ball analysis and results (correlation matrix) of Madinaty City (24):

Domain	Active Variable	Passive Variable	Discussion
Urban	**Housing Compatibility Vv1**	**Open spaces and sense of place V3**	The ability of the housing unit to fulfill the residents' requirements and needs, increases the perception of livability within the local residents. However, the variable of feeling toward a place is considered as passive variable because it is affected by the other variables as Streets quality and Street scape (33).
Social	**Neighbors' behavior Vv7**	**Community life and social contact V8**	Neighbors' behavior and attitudes affect greatly the feeling of livability within the studying area, while, any disturbance in the other variables has an effect on social connections and community contact.
Economic	**Income Vv10**	**Employment opportunity V11**	The income is an important variable that affects economic value of livability. Employment opportunities are very sensitive that affected by the economic dimension as Employment varieties. (1)
Safety Dimension	**Feeling safety Vv14**	**Security V17**	Feeling safety is an active variable that defines Livability value, any enhancement within safety feelings increases the achievement of livability domain. Security is a labile variable, that affected by all safety dimension variables. (4)
Environmental Dimension	**Visual disturbance Vv21**	**Sound pollution V20**	The active variable that affects both the environmental dimension and the livability is the visual disturbance, due to improper conservation, and misused spaces, while sound pollution is affected by other variables due to inappropriate land-use and activities.
Transportation	**Means of transportation Vv22**	**Signs V23**	The two variables of transportation domain affect livability, where means of transportation act as active variable, while the signs and street labels are sensitive variables that are affected by transportation and accordingly livability.

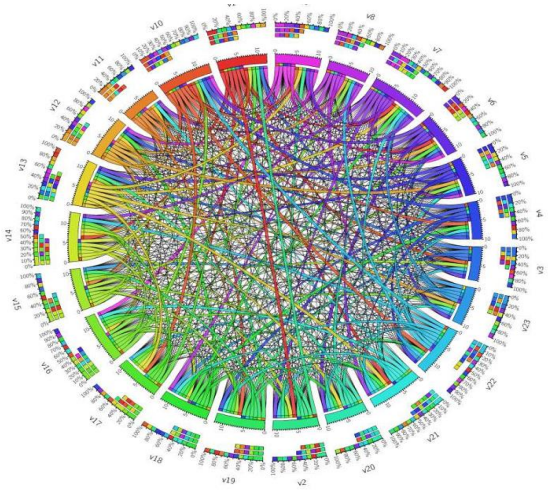

Figure (16): Schema ball between the 23 variables. Made by Circo's Table Viewer v0.63-9 © 2008-2017 Martin Krzywinski http://mkweb.bcgsc.ca/tableviewer/- http://circos.ca/-(24)

Discussion of the results and recommendation

Healthy sustainable cities aim to encourage and increase levels of physical activities, particularly high levels of walking and cycling as an essential factor for resident's health, in addition to other social, entertainment and sport activities as a complementary factor for resident's health (43). Planners are required to change city design criteria to small distance communities that provide interest to make people depend on walkability for most of the travel needs, this could reduce traffic flow, traffic congestion, parking requirements, and accordingly could change most of the design criteria of city planning, street design could be narrower and limited in parking requirements per occupant. The pedestrian and cycle mode choices will be increased and their standards and requirements for walkways will be increased. Sustainable urban mobility in cities aims to encourage movement behavior that reduces automobile dependency induces non-automobile and public mobility, increase walkability reliance, travel distance and frequency and reduce motor travel distances (36,43). Socially sustainable city emphasizes the importance of social networks and social ties and enhance the way it works to assure social relation, integration and especially the face-to-face co-presence and interaction, safety and security, correlation, cooperation, social equity, and equal opportunities in the distribution of development benefits and costs (9). Measuring such norms with research study reveals that Madinaty City planning depends upon four dimensions for better environmental quality—namely, physical, functional, visual, and social relation—to improve resident's health and behavior .Physical activity and health are among the most significant issues in the area of building design and planning (31). Regarding the criteria of building design the factors such as functional diversity, accessibility, climatic comfort, and the distance from the working activity were among the most important environmental features affecting working activities (19),but for recreational activities, environmental factors such as functional diversity, safety and security ,climatic comfort, urban facilities and furniture, natural and artificial visions and landscapes, the social and cultural features of the environment, the human scale in open urban space, and the historical identity of the space played a significant role in physical and mental health(19,44). For healthy community the policymakers and planners are better informed of residents' satisfaction and what they really need (31). The perception of crime and feeling of safety are

greatly influenced by the way a neighborhood is managed, maintained, lighting efficiency, street network design and the presence of security ,all these elements increase the resident feeling of safety especially in gated community as Madinaty City(31,32).Therefore , security is a very sensitive variable, that affected by all safety dimension variables and can be seen clearly in Correlation matrix from schema ball which has shown the active and passive variable in each dimension (31), so street networks should be designed with continuous buildings to provide good management to improve security and increasing lighting efficiency in them (10,22). Madinaty planners pay more attention to availability and quality of parks and open green spaces, and they care to be out of any kind of pollution (3,11). The communities already built in Madinaty City succeeded to accomplish the following steps as Bristol City Council's Public Health Team Work and Layla McCay's GAPS framework. (12,21)

1-Living healthy, and happy is the shared hope of everyone.
2-Healthy children, equal healthy students and equal healthy city.
3-Safer street and healthy travel (creating safe routes to schools).
4- Allowing public transport and cycling.
5- Creating polycentric cities of mixed use, self-sustainable (sustain urban villages which foster happy and healthy lives).
6-Compact, mixed use, and walkable neighborhoods.
7-Neighbourhoods that are clean and safe.
8-Healthy food and positive social contact for everyone in society.
9-Accessible and appealing green spaces. (12)
10- Bring people health to the table, work with the people responsible for health promotion, and social care.
11- Use the frameworks that exist to derive the design and programming of the places that the people will use in their daily lives from the planning of playground to the strategy for an urban expansion (20,21). In brief, the livability of cities is a crucial element to the prosperity and development of cities because it reflects the real-life experiences of inhabitants. Thus, a livable environment creates an optimistic future for quality and living comfort, which ultimately become the determining factors in creating a sustainable built-up environment of the whole (31).

Conclusion:

The building design has a positive force in improving happiness, health and mental wellbeing. If these factors were put at the heart of urban design in every community across the world, the positive impact would be considerable, resulting in better life for millions of people, lower public spending and greater productivity as what has occurred in UK. "In Paris, France …many investments in cycling infrastructure in the past few years have caused the share of cyclists to rise by 54% (23). In Ghent, Belgium, a 25% increase in cycling was reported during implementing its new traffic plan (7,19). The benefits of physical activity extend beyond health and apply the United Nations Sustainable Development Goals (SDGs) (35,36). Architecture, city and transport planning can encourage people to be more active and cooperative.

The research study agrees with Laurence Carmichael results (2017).

The United Nations Sustainable Development Goals (SDGs) around the characters of the urban planning that promote physical activity (1,9) ,so we look forward to working with urban

designers to see how we can take further steps together towards achieving our vision of healthy places for everyone to grow up and grow old in.

Recommendation and Future Studies

According to WHO European Region, environmental risk factors such as heart diseases, NCD, and cancers are estimated to cause many deaths per year, due to inequalities in environment and health from different aspects of home and work life, including housing conditions , access to basic services , transport and air pollution (38,40).Our aim in the forthcoming years is to strengthen our work with designers, builders and developers to see how we can turn emerging evidence of the impacts of the urban design on health into action on the ground through advancing tools for healthy urban planning.

Advancing actions for urban health:

Various approaches and tools were presented for supporting healthy diets and physical activity on different scales, ranging from policy level to concrete design of the built environment (40). WHO's report presents several tools to facilitate healthy urban planning:

1-**Public Open Space**: A smartphone app to evaluate the efficiency of public open spaces for physical activity. An open-source app creates linkages with individual studies (cohort, case–control, cross-sectional, surveys) (40) .

2-**Place Standard**: A simple, free, easy-to-use, online tool developed in 2012–2015 to assess the site of a place. By addressing 14 factors that affect health and well-being, the place standard tool facilitates conversations among communities, organizations, businesses and decision-makers. It identifies priorities for action and initiates ideas on how to address problems (40,45).

3-**The healthy streets approach**: The approach is supported by a number of tools developed with and for each stakeholder group to enable them to assess, measure and make improvements in the 10 healthy streets index. The healthy streets index is used for large-scale, long-term strategic planning (22).

4-Food Policy Council: This tool brings together community members and local government agencies to promote local and regional food systems (41,44).

5-**Health Economic Assessment:** An online resource developed by WHO to estimate the economic benefits of preventing deaths by increasing physical activity, such as by regular cycling and walking. The tool used in planning new cycling and walking infrastructure, estimating the results and comparing the costs of different interventions for benefit–cost analysis for use in making a case for investment in active mobility infrastructure (43,44).

6-**Food Asset Mapping Tool**: includes the local food infrastructure that sustains food-secure communities and regions – farms, markets, community gardens, urban farms, community kitchens, and student nutrition (42).

7-**Gehl Public Life app:** The Gehl Public Life app is an online platform for systematic collection of data on people's activities in public spaces based on direct observations. The app includes surveys on both movement patterns and types of activity in public spaces, which can be collected according to gender and age (43).

8-**Hackathons:** An event-based tool to generate ideas and solutions with a group of people within a short time: Formulate the challenge, Announce and promote the challenge, Form teams,

Set the time for addressing the challenge, “Pitch” ideas, and Implement the best ideas (14 cities commit to sustainable food policies that will address the global climate emergency) (45).

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