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Licenciado em Ciências da Engenharia Civil

The 15-Minute City Concept:

Essential Guidelines to a 15-Minute city – A Proposal

MESTRADO EM ENGENHARIA CIVIL

Universidade NOVA de Lisboa
Setembro, 2023

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RESUMO

Esta dissertação investiga a cidade dos 15 Minutos e quais são as diretrizes essenciais para que uma cidade seja considerada como tal. Tem como objetivo propor um conjunto de orientações essenciais para uma cidade de 15 Minutos e elaborar um estudo de caso sobre a Freguesia de Benfica de forma a avaliar se esta pode ser considerada parte de uma cidade de 15 Minutos, através de uma análise aprofundada de bibliografia publicada, sites referenciados e pesquisa In Loco.

Os resultados desta investigação revelam que nenhuma cidade pode ser considerada uma cidade de 15 minutos, uma vez que dificilmente funcionará em pleno. No entanto, se as principais recomendações apresentadas puderem ser seguidas, é possível afirmar que uma cidade cumpre os requisitos mínimos para ser considerada uma "cidade de 15 minutos" no mundo moderno. De acordo com as diretrizes sugeridas, a área do estudo de caso de Benfica ainda não pode ser considerada um bairro de 15 minutos, apesar de estar claramente a caminhar na direção certa e de ter um desenvolvimento notável.

Palavras chave: Cidade de 15 minutos, Cidade inteligente, Benfica, Diretriz, Inclusividade.

ABSTRACT

This dissertation investigates the 15-Minute city and what are the essential guidelines for a city to be considered one. It aims to propose a set of essential guidelines for a 15-Minute city and elaborate a case study about the Benfica Parish in order to assess it can be considered part of a 15-Minute city, through an in-depth analysis of published bibliography, referenced websites and *In Loco* research.

The findings of this research reveal that no city can be regarded as a 15-minute city since it will hardly function to its full capacity. However, if the key recommendations put out can be adhered to, it is possible to claim that a city meets the minimum requirements to be regarded as a "15-Minute city" in the modern world. According to the suggested guidelines, the area in the case study of Benfica cannot yet be deemed a 15-minute neighborhood, despite the fact that it is obviously moving in the right direction and making remarkable development.

Keywords: 15-Minute city, Smart City, Benfica, Guideline, inclusivity.

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INTRODUCTION

1.1 Context

The contemporary city model, which is frequently defined by expansive suburban growth and urban planning that prioritizes cars, has several difficulties and issues. The environment, public health, social equity, and general urban sustainability are all significantly impacted by these problems.

Due to the necessities of today's generations, the basic city model is becoming more and more obsolete, as it requires extensive commutes, does not prevent inequality with marginalized communities facing greater barriers, has expensive housing, higher levels of pollution and contributes to the decrease of the overall well-being of the residents.

The points mentioned above are all linked. With expensive housing nearer the urban center, there is a barrier created for those residents who want to live nearer that area, forming an inequality in housing opportunities. Therefore, people with less possibilities are forced to settle further away from the center and, the further the cheaper is the housing. Consequently, there is an increase in the distance and commute time, consequently increasing anxiety and stress levels and pollution. With panel data, we directly examine this strong idea of equilibrium and discover that those who commute for longer periods of time consistently report lower subjective well-being (Stutzer & Frey, 2008).

When adding unwellness to the mix, there is the closing of the circle mentioned at the beginning because if people are unwell, they will be less productive in their jobs, thus earning less money and the chain starts all over again.

Urban development and design policies need to be fundamentally changed to address these issues. Innovative methods to urban design, like the 15-minute city, which prioritize accessibility, sustainability, and community well-being, attempt to lessen many of these difficulties and build more livable, equitable, and resilient urban settings.

1.2 Methodology and Goals

As mentioned before, the current city model has core flaws that have worked in the past but are becoming obsolete with society's development and new requirements. With this dissertation, the goal is to make a proposal for a set of essential guidelines to evaluate if a neighborhood can be categorized as a 15-Minute neighborhood and, therefore, forming a 15-Minute city composed of all its neighborhoods.

As the goal is to propose a set of guidelines, the methodology used in this dissertation was based on case studies. The first one sets an example of what a city should aim for to be considered a 15-Minute city and the second one to evaluate if a determined neighborhood can be considered as a 15-Minute city neighborhood, following the proposed guidelines.

The research was based mainly on the collection of information from published sources, such as scientific articles, newspapers articles, books and referenced websites. However, as the topic of this dissertation is an applied concept and it is observable to some degree, the author considered that *in loco* experience was highly relevant. Therefore, the author went to Paris to evaluate some of the 15-Minute city features. For the second case study, as it is an evaluation of whether a neighborhood follows the proposed guidelines or not, it is important to have the knowledge and experience in the determined neighborhood. The choice of Benfica is due to the author's knowledge and experience, as he lived there for 24 years.

With regards to limitations to this research, the major ones were the lack of verified articles, the budget constraints, and the overall complexity of the topic. As it is a relatively new topic, there is not much verified literature. In academic and scientific research, peer-reviewed articles are often regarded as the gold standard since they have undergone meticulous scrutiny by subject-matter specialists. Budgetary restrictions are a frequent problem in research, especially in academic and scientific endeavors. The breadth, quality, and viability of research projects can all be greatly impacted by these limitations. This limitation comes when most of the reviewed literature needs to be paid for. Finally, the overall complexity of this topic refers

to the fact that setting a finite number or essential guidelines can be challenging, and it gets easily overwhelming.

1.3 Structure

This dissertation is divided into six different chapters.

This first chapter contextualizes the current city model panorama with all the inaccuracies and barriers it brings. It also explains the adopted research methodology and philosophy and the limitations encountered during the process. Finally, the present sub-chapter demonstrates how this dissertation is structured and organized.

In the second chapter, it was done a bibliographical revision. It starts with the definition of a 15-Minute city, what it represents, what it proposes and the four pillars of the concept. It then subdivides into three different sub-chapters, each one referring to important notions and nuances related to the 15-Minute city concept.

The third chapter is a case study about Paris, as it is considered the first and most developed 15-Minute city. It showcases all the major features of a 15-Minute city, with a brief description of how the concept was implemented and analysis of the application and effects of it in a real case scenario.

The principal focus of this dissertation is the fourth chapter. In this chapter it is presented the author's proposal of essential guidelines for a 15-Minute city. It is divided into seven major areas and then sub-divided into the specific guidelines. Each guideline has a description of what should be implemented.

The fifth chapter is the application of the set of guidelines proposed. It is essentially a case study of a Lisbon neighborhood, Benfica, and analyzing if it can be considered as a 15-Minute neighborhood following said guidelines.

THE 15-MINUTE CITY CONCEPT

The 15-minute city is a concept that aims to create neighborhoods where people can access all their needs within a 15-minute walk or bike ride from their homes. The concept first arose in the 2015 United Nations Climate Change Conference (COP21), in an attempt to solve part of the urban and social problems of today's cities layouts. It was presented by Carlos Moreno, a Franco-Columbian Urbanist teaching at Sorbonne University ("The 15-Minute City Is Already Here. It's Called Paris," 2023) The idea is to reduce the dependence on cars and promote sustainable modes of transportation, as well as improve the quality of life for residents by creating more walkable and livable communities.

In this concept, essential amenities such as grocery stores, schools, healthcare facilities, parks and public transportation are located within close proximity to homes, making it possible for people to complete their daily tasks and activities without having to travel long distances. The concept is gaining popularity as a way to promote sustainability, reduce traffic congestion and air pollution, and create more livable urban environments.

Besides the essential amenities, there is a hierarchy in terms of means of transport. The first and most important priority is the pedestrians. Next are the bicycles, then the public and shared transport and, last, the cars and private vehicles.

The 15-Minute City proposal is considered to be timely in the contemporary era, which is marked by the fourth industrial revolution and the widespread adoption of Information Communication Technology (ICT). This is accurate given that ICT is currently thought to provide a variety of answers to many urban difficulties, particularly through the Smart City idea. (Moreno et al., 2021).

The concept lays on four important dimensions: Density, Proximity, Diversity and Digitalization. In conventional planning, density is viewed in terms of ultra-high-density buildings, but in the 15-Min City concept, density is viewed in terms of people per kilometer square (Moreno et al., 2021).

1) Contrary to conventional planning, **Density** refers to the number of people, activities, and services within a given area, more precisely, per square kilometer. Nevertheless, it is necessary to cap the amount of people at an optimal level in order to preserve the sustainability of the concept. When looking through the scope of (Sisson, 2023), density is a critical factor in favor of social sustainability, as it is able to provide an equitable distribution of public services.

2) The whole concept of a 15-minute city is heavily dependent on **Proximity**.

Moreno contends that this aspect is crucial since it speeds up the transition for residents between their homes, places of employment, commercial districts, educational institutions, healthcare facilities, and other fundamental institutions. Ultimately, because of the planning model's support for multimodal usage of fundamental infrastructure, citizens can benefit from enhanced service delivery in both commercial and public organizations (Moreno et al., 2021).

This dimension is fundamental in reducing the amount of time spent on commuting and, therefore, in reducing its environmental impact. A 15-minute city should prioritize public transportation, including buses, trains, trams, and subways, to connect people to different parts of the city. A well-planned public transportation system can make it easy for people to travel quickly and conveniently from one part of the city to another, without relying on private cars. It should also rely on a well-designed pedestrian and bike infrastructure that makes it easy and safe for people to walk or bike to the amenities and services they need. (Bous-sauw et al., 2012)

3) **Diversity** is an important aspect of a 15-minute city, as it helps to create vibrant, inclusive communities where people of all backgrounds can live, work, and thrive.

In the context of the aforementioned framework and the evolution of the 15-Minute City concept, diversity takes two forms: (i) the requirement for mixed-use neighborhoods, which are essential in supplying a wholesome mixture of residential, commercial, and entertainment components; and (ii) diversity in people's cultures and backgrounds (Moreno et al., 2021).

Diversity can be fostered in a 15-minute city by creating neighborhoods with a mix of residential, commercial, and office spaces. A 15-minute city can attract people of different

ages, incomes, and backgrounds. Mixed-use development can also help to create a sense of community, as residents and workers interact with each other daily. It can also help by creating more affordable housing options. This can include social housing, co-housing, and other forms of affordable housing that are integrated into mixed-use developments. Lastly, diversity would mean cultural diversity and accessibility. A 15-minute city should celebrate and embrace cultural diversity, by promoting cultural events, festivals, and other activities that highlight the city's diversity and should be designed to be accessible to all people. (Fainstein, 2005)

4) The Digitalization dimension is crucial to the 15-Minute City concept, particularly in ensuring that the three other dimensions are actually realized. It might be argued that the 15-Minute City concept was somewhat inspired by the Smart City concept because this dimension, in particular, strongly correlates with it (Moreno et al., 2021).

Digitalization enables residents to access information, services, and amenities more efficiently and conveniently. Taking advantage of the digital era allows the creation of digital platforms such as mobile apps and websites, can help residents to access services and amenities more easily. For example, a city could create a mobile app that allows residents to book public transportation, pay for parking, or access real-time information about bike-sharing programs. (Köker & Gözta, 2010)

It is also possible to create virtual services which can enable residents to access services and amenities virtually, reducing the need to travel long distances. For example, a city could create an online platform for telemedicine services, enabling residents to connect with healthcare professionals remotely. (Köker & Gözta, 2010)

The COVID-19 pandemic has had a profound impact on societies around the world, and people have been rethinking their priorities and preferences. The lockdowns and social distancing measures have highlighted the importance of having access to local amenities and services and the need to reduce dependence on long-distance travel and crowded public transportation. (Guzman et al., 2021)

In a post pandemic scenario, the 15-minute city concept is likely to become even more relevant as people seek more resilient and sustainable urban environments. Cities around the world are exploring ways to create more walkable, bikeable neighborhoods with a mix of residential, commercial, and public spaces that are easily accessible to all. This includes strategies such as expanding pedestrian and bike infrastructure, prioritizing public transit and promoting local businesses and services. (Pinto & Akhavan, 2022)

The 15-minute city concept is also seen as a way to address issues of social and economic inequality, as it can make essential services and amenities more accessible to all residents, regardless of their income or social status.

The concept of a smart city refers to one that uses technology and data-driven solutions to improve the quality of life for its residents and enhance the efficiency of urban services. Smart cities integrate digital technologies and infrastructures to create a more sustainable, livable, and equitable urban environment. (Winkowska et al., 2019)

Technology can be used to streamline traffic, lessen congestion, and enhance public transportation systems. This can include real-time traffic monitoring and routing, smart traffic signals, and smart parking systems that use sensors to guide drivers to available parking spaces. (Kostakos et al., 2013)

Smart cities also prioritize energy efficiency in buildings and infrastructure, using technologies such as smart meters, energy management systems, and renewable energy sources. This can reduce energy consumption and greenhouse gas emissions, while also saving costs for residents and businesses. (Nižetić et al., 2019)

Another initiative is leveraging digital platforms and services to improve access to information and services for residents. This can include mobile apps that provide real-time public transportation information, online portals for paying bills and accessing government services. (Radek Kuchta, 2014)

Finally, smart cities use IoT (Internet of Things) sensors to collect data on a wide range of urban systems, from traffic to air quality to waste management. The analysis of this data is then used to spot trends, forecast future events, and improve service delivery. (Kim et al., 2017)

However, putting too much emphasis on technology alone causes numerous issues with the execution of the smart city concept. A city can barely become smart by relying just on technology. There is a return to the needs and desires of the residents in the present understanding of the "smart city" idea. The emphasis is on them, and technology solutions are employed to further their objectives (Winkowska et al., 2019).

Overall, the smart city concept represents an innovative and integrated approach to urban development that prioritizes sustainability, efficiency, and citizen well-being. By leveraging technology and data, smart cities can address many of the challenges facing urban areas today, from climate change to traffic congestion to social inequality.

The 15-minute city concept has the potential to significantly impact neighborhood dynamics by creating more livable, walkable, and sustainable communities.

It encourages residents to become more engaged in their communities by promoting local businesses, services, and amenities. This could lead to increased social interaction, community events, and a sense of collective ownership and responsibility for the neighborhood.

By providing easy access to essential services within a 15-minute walk or bike ride, the 15-minute city could significantly reduce car dependency in neighborhoods. This could lead to a pedestrian-friendlier environment, less traffic congestion, and improved air quality (Gehl, 2013).

The 15-minute city could also lead to more diverse neighborhoods, as residents from different socio-economic backgrounds would have access to the same services and amenities. This could lead to a more vibrant and inclusive community (Scott, 2001).

Neighborhoods that are designed around the 15-minute city concept could become more attractive to potential residents, leading to increased property values. This could benefit homeowners, but it could also lead to gentrification and displacement if affordable housing is not prioritized.

The 15-minute city could also have a positive impact on resident's health by encouraging more physical activity and reducing air pollution. This could lead to lower rates of chronic disease and improved overall well-being.

PARIS AS A 15-MINUTE CITY

In recent years, Paris has been pioneering the concept of the 15-minute city. As mentioned earlier, this concept was first presented in the 2015 COP21 by Carlos Moreno.

The most effort was done by Anne Hidalgo, who promised to turn Paris into a 15-minute city in her mayor re-election campaign ("The 15-Minute City Is Already Here. It's Called Paris," 2023). Her steps towards the goal were phasing out cars from the city center and motivating the communities spread around the different neighborhoods to be more self-sufficient.

Since Mayor Hidalgo's first election in 2014, Paris has implemented several regulations that have reduced traffic in the city's streets, removed cars off the Seine's quayside, and allowed for more trees and pedestrian space. During Hidalgo's *Paris en Commun 2020* campaign for reelection, the city's pedestrianization process was encouraged. This campaign's platform has been revived as part of a post-COVID approach, and it introduces the idea of a "15-minute city," where residents' essential requirements, like employment, shopping, healthcare, and cultural amenities, should be met within 15 minutes of their homes (Pisano, 2020). (Figure 3.1)



Figure 3.1 - Le Paris du 1/4 Heure

Source: <https://www.groupepec.paris/2021/06/01/communication-le-paris-du-quart-dheure-big-bang-de-la-proximite-a-paris/>

3.1 Neighborhood-centric Design

A neighborhood-centric design, often referred to as neighborhood-focused or community-based design, places a high priority on the growth of local communities or neighborhoods as self-sufficient and complete entities within a city or urban area. In order to reduce the need for long commutes and reliance on cars, this design concept seeks to create walkable, livable, and sustainable neighborhoods that provide inhabitants with convenient access to necessary resources, services, and opportunities. (Talen & Koschinsky, 2013)

Paris is an excellent example of a neighborhood-centric design, as it is divided into 20 different "*arrondissements*". (Figure 3.2)

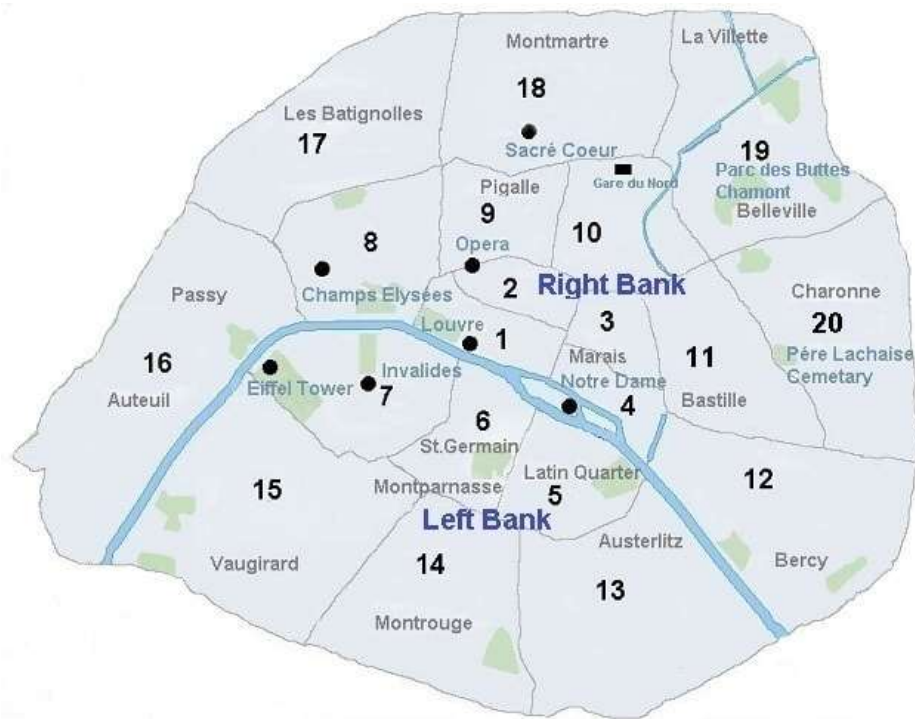


Figure 3.2 - Neighborhoods in Paris

Source: <https://www.about-paris.com/paris-districts.htm>

Inside each neighborhood or "arrondissement", it is possible to get anywhere within a 15-Minute commute, either by walking, cycling, or using a public transport.

With this neighborhood centric design approach, Paris is encouraging the development of cultural venues, public libraries, community centers, and overall hubs for social interactions.

3.2 Leisure

Paris provides a wide choice of public recreational facilities that are suitable for locals and guests of all ages and interests. These facilities are an essential component of the city's rich culture and support its standing as a major center for art, culture, and recreation on a global scale. As a result of the abundance of public and free leisure facilities available in Paris, both locals and visitors can take use of a wide range of artistic, recreational, and outdoor activities without having to make a sizable financial commitment. (*Sporting and Leisure Activities - The Best Outdoor Activities*, 2023)

These amenities include:

- Parks and gardens.

- Museums, cultural spaces, theatres, and performance spaces.
- Sports and recreational facilities.
- Free events and festivals.
- Outdoor markets.

Many of the stunning parks and gardens in Paris are open to the public for free. The Luxembourg Gardens (Figure 3.3), Parc des Buttes du Chaumont (Figure 3.4), and Parc de la Villette (Figure 3.5) are a few noteworthy examples. These open spaces offer places to unwind, go on leisurely walks, and have picnics. (alesa, 2020)



Figure 3.3 - Luxembourg Gardens in Paris

Source: <https://parisjetaime.com/eng/culture/jardin-du-luxembourg-p1063>

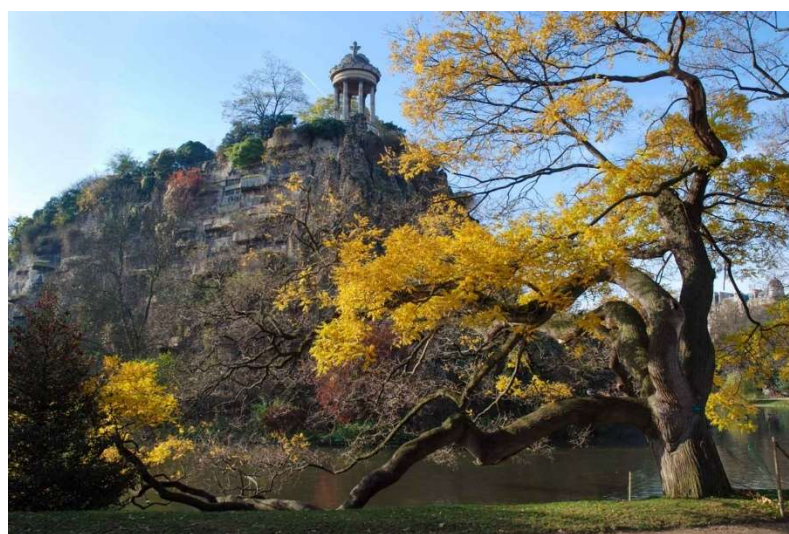


Figure 3.4 - Parc des Buttes du Chaumont.

Source: <https://www.paris.fr/lieux/parc-des-buttes-chaumont-1757>

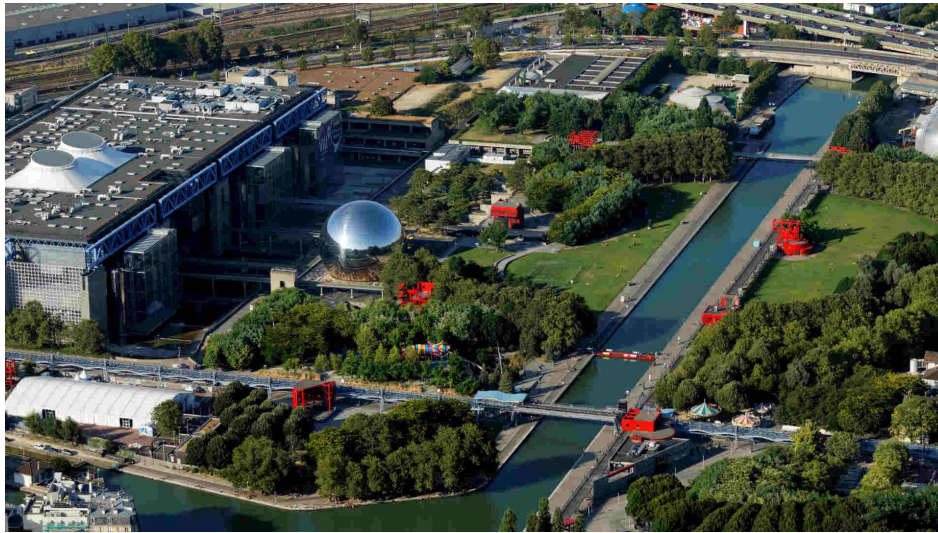


Figure 3.5 - Parc de la Villette.

Source: <https://demirelsimay.wordpress.com/2020/06/12/parc-de-la-villette/>

On certain days or hours, some of Paris's museums and galleries are free to enter. For instance, every month's first Sunday is free to enter the Louvre Museum (Figure 3.6). Year-round free permanent collections are available at the fourteen museums of the city. (*Foire aux questions / Paris Musées*, 2023)



Figure 3.6 - Musée du Louvre.

Source: Author

For locals and tourists, Paris has a variety of free or inexpensive sports and recreation facilities. Many of the parks and gardens are provided with sports and recreational facilities like basketball or tennis courts, outdoor fitness equipment, jogging paths, and bike lanes. There are also other recreational spaces with paid activities such as pools, gyms, arenas, and stadiums.

Paris is a dynamic city that hosts numerous free events and festivals all year round. Tourists and locals can immerse themselves in the city's rich legacy and diverse culture by attending these cultural, artistic, and communal festivities. Some examples of these events are the Chinese new year's parade, jazz festival, fashion week or open-air cinema. The excellent opportunities to take in Paris's rich cultural scene, artistic expressions, and sense of community without exceeding the budget are made possible by these free events and festivals. (MasterOldContent, 2017)

Lastly, the open-air markets in Paris offer an amazing opportunity to experience the local culture, sample the local cuisine, and find one-of-a-kind treasures (Figure 3.7).



Figure 3.7 - Marchée Bastille.

Source: <https://www.visitparisregion.com/en/marche-bastille>

3.3 Healthcare

As the nation's capital, Paris holds a complete healthcare system that gives citizens and tourists alike access to exemplary medical care. The French healthcare system is renowned for its universal coverage, which makes sure that everyone has access to basic medical treatments (Paris et al., 2010).

Public health insurance is now a right for all lawful inhabitants of France, and taxes are being used to supplement social payments made by workers. So, a fee-per-item scale serves as the foundation of the French healthcare system. Apart from individuals who have a recognized chronic condition, public health insurance typically pays 70% of the fixed charge for items of treatment. These patients are paid 100% of the fixed fee (Pegon-Machat et al., 2016).

The hospitals in Paris have fully prepared emergency rooms. The Pitié-Salpêtrière Hospital is arguably the most well-known, however there are other hospitals that offer emergency care, like the Hôtel-Dieu Hospital.

Paris is home to a vast network of pharmacies that can provide over-the-counter medication, prescription medication, essential healthcare services and health advice. They have a unique green cross sign, which is frequently illuminated at night, and makes them easy to spot. Most of the pharmacies are open between 9h00 and 19h00, from Monday to Saturday, but in case of emergencies, some provide a 24-hour service. These pharmacies are called "pharmacies de nuit" or night pharmacies. ("See All the On-Duty Pharmacies Open 24h a Day in Paris and the Île-de-France," 2023)

Like many large cities, Paris is home to a range of community health projects and programs that work to advance general health, wellbeing, and community involvement. Local government entities, associations of nonprofits, medical professionals, and community organizations frequently plan these events. Examples of these events range from public health campaigns to physical activity promotion or from support for aging population to substance abuse services. (*Health & Healthtech*, 2023)

Lastly, to increase patient comfort, improve access to healthcare, and address a variety of healthcare concerns, Paris has been adopting telemedicine.

3.4 Transportation

Soft mobility refers to environmentally friendly, low impact means of transportation that give priority to non-motorized modes of transportation like walking and cycling. In order to lessen road congestion, cut carbon emissions, and improve the quality of urban life, Paris has been actively supporting soft mobility programs.

Paris is perhaps the European city that is actively requalifying public spaces on a regular basis to increase their accessibility to all users. The majority of requalification projects attempt to enhance urban environment quality by promoting soft mobility (Rocca, 2009).

As seen in figure 3.8, Paris has a great coverage of the city with Bike Lanes (in orange) and shared lanes between bikes and buses (in blue).



Figure 3.8 - Existing and in development bike lanes

Fonte: <https://www.freewheelingfrance.com/where-to-go/cycling-lanes-in-paris.html>

In addition, to encourage the residents to pursue a more sustainable way of transportation, there are bicycle parking spots throughout the neighborhoods as well as shared bicycle

hubs. There are also shared streets between cars and bicycles, streets that are now closed to cars and open to bicycles (Figure 3.9 to 3.12).



Figure 3.9 - Bicycle Sharing Dock.
Fonte: Author Photograph



Figure 3.10 - Bicycle parking spot.
Fonte: Author Photograph



Figure 3.11 - Shared Lane between cars and bicycles.
Fonte: Author Photograph



Figure 3.12 - Closed transit to cars
Source: Author Photograph

However, Paris is voting strongly against shared scooters as Parisians consider that the users leave them parked in spaces that cause restraints.

As documented by numerous newspapers, 2020 saw the introduction of the strongest rules in the world, limiting the number of operators and automatically tracking and limiting speeds, in response to complaints about the anarchic use of e-scooters and Paris turning into a deadly "jungle". However, it did not suffice to end the argument (Chrisafis, 2023).

Furthermore, Paris takes into account that not everyone is able to cycle around and has accessible sidewalks with cut curbs, lighted and audio signals on road crossings and smooth pavement. (Figures 3.13 and 3.14)



Figure 3.13 - Smooth pavement on paris' sidewalk.

Source: <https://www.strongtowns.org/journal/2019/8/19/the-streets-of-paris>



Figure 3.14 - Smooth pavement and lowered sidewalk.

Source: <https://wheelchairtravel.org/paris/sidewalks/>

Paris's has a public transport system with great effectiveness, broad reach, and accessibility. Buses, trams, the subway, and commuter trains are all part of the city's public transportation system, which makes it simple for locals and visitors to move around the city and its surroundings. In addition, most of the time the users can have a seamless transition between means of transport. (*RATP: Public Transport in Paris and Île-de-France: Metro, RER, Bus, Tramway*, 2023)

By the author's broad knowledge of the Parisian public transport system, beyond seamless transitions, there is an increase in frequency on crowded hours, maintaining punctuality. Furthermore, it is accessible to residents and visitors of all abilities, as it has audio announcements and access ramps where needed.

On a 15-minute city scope, with the great network of transports it is possible to get to surrounding neighborhoods within the time frame desired. (Figure 3.15)

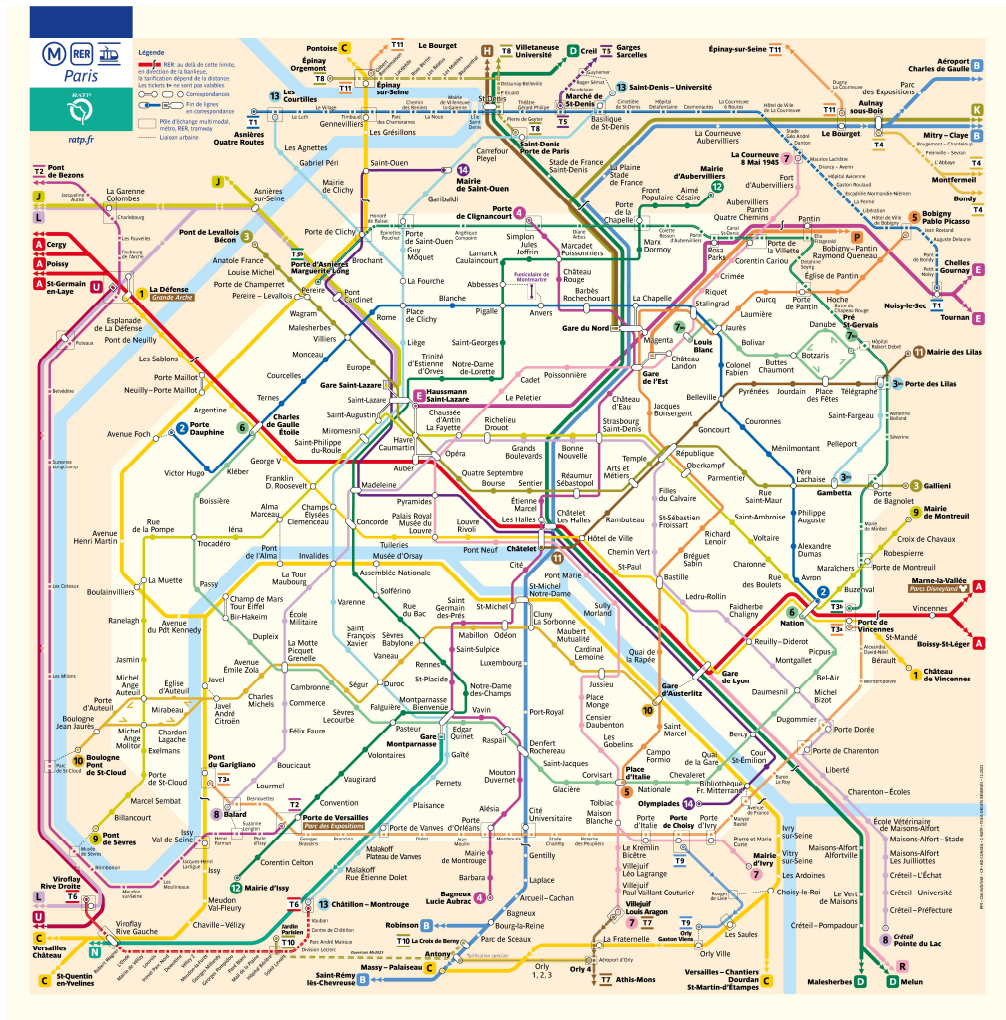


Figure 3.15 - Paris public transport map.

Fonte: <https://www.ratp.fr/en/plans>

3.5 Education

Paris offers a broad and complete educational system, including an extensive variety of educational institutions, from public and private to foreign institutions. The commitment of Paris to offering a variety of educational opportunities and supporting academic success is reflected in the city's educational system. The age of the student, preferred languages, educational philosophies, and particular requirements will all play a role in the school decision. Parents and students can choose from a variety of educational programs to suit their unique needs.

The types of schools to find in Paris are:

- Public Schools;
 - Primary Schools;
 - Maternelle;
 - Élémentaire;
 - Cours Moyen;
 - Collèges;
 - Lycées;
- Private Schools;
- International Schools;
- Specialized Schools;
- Higher education;
- Adult education;

Public schools offer all the mandatory education. It starts with primary schools which are divided into three cycles. The Maternelle cycle is the preschool, and it offers education between the age of three and five. Then, the infants attend the Élémentaire cycle or elementary school between the age of five and nine. The cycles end in the Cours Moyen, or middle school, until the age of eleven. After completing primary school, the students go to the Collèges and finally the Lycées, high schools. The private schools provide the same education from preschool to high schools, although they may follow the French national curriculum or international programs. (Lewis, 2018)

Paris thrives in specialized schools and higher education. The city hosts some of the best specialized schools in the world, such as École des Beaux-Arts, Le cordon Bleu or the Institut Français de la Mode. With regards to higher education, there are also world level prestigious universities like Sciences Po and École Polytechnique and the Sorbonne (University of Paris) (Figure 3.16) where Carlos Moreno, the developer of the 15-Minute city concept, taught architecture.



Figure 3.16 - Sorbonne University.

Fonte: <https://www.pantheonsorbonne.fr/universite>

3.6 Services

In order to provide residents and visitors with a pleasant and practical living space, cities provide an extensive selection of services. In this section, services are considered amenities such as local markets, convenience stores, online and delivery services, cafes and restaurants, workspaces, and digital connectivity.

Paris has to offer a wide variety of markets where residents and visitors can purchase various products from fresh food to antiques and clothing. Two examples are *Marché des Enfants Rouges* and *Marché Bastille*. *Marché des Enfants Rouges* (Figure 3.17) is the oldest indoor market in Paris, located in the Marais neighborhood. The international food vendors there are well-known for serving dishes from all around the world. (*Marché Couvert Les Enfants Rouges, 2023*) *Marché Bastille* is one of the biggest in Paris, is situated in the Bastille district. Fresh food, fish, cheese, flowers, apparel, and other items are available.



Figure 3.17 - Marchée des Enfants Rouges.

Source: <https://www.leparisien.fr/paris-75/paris-et-si-le-marche-des-enfants-rouges-etait-le-plus-d-ile-de-france-11-03-2019-8029011.php>

To accommodate the demands of its citizens and visitors, Paris provides an array of online and delivery services (Figure 3.18). These services range from transportation to groceries and food delivery. Great examples are Aquarelle, an online flower delivery service, Cleanio which provides a laundry service with pick-up and delivery options and pharmacies delivering prescription medication and health products.



Figure 3.18 - Example of food delivery in Paris.

Source: <https://phys.org/news/2021-02-food-delivery-companies-france-pledge.html>

On the topic of restaurants and cafes, residents and visitors can experience everything from traditional French cuisine to global cuisines during your vacation to Paris as the city is home to a wide variety of culinary traditions. With a vast variety of cafes and restaurants that can accommodate a range of tastes and price points. In the "Cafes and Restaurants" category, people can find patisseries, Bistros, Brasseries, fine dining, creperies, food stands, rooftops and bars and even themed restaurants in every neighborhood.

There is a booming flexible workspace industry in Paris that serves startups, remote workers, freelancers, and companies of all sizes (Figure 3.19). In addition to offering a variety of amenities and services, these flexible workspace choices provide as an alternative to standard office leases. Furthermore, many of this companies have working spaces in multiple locations. (*Services-French-Market-Report-by-The-Instant-Group, 2023.*)



Figure 3.19 - Example of a coworking space in Paris.
Source: <https://www.surfoffice.com/coworking/paris>

Regarding connectivity to the internet, mobile coverage, and technological infrastructure, the city is well-connected. Paris provides public wi-fi, tech hubs, data facilities, e-government services and uses the Internet of Things to improve various aspects of urban life such as energy efficiency, transportation, and public services.

3.7 Affordable Housing

Due to the strong demand for property and the scarcity of cheap housing, finding an affordable home in Paris, as in several other large cities throughout the world, is frequently difficult. Nevertheless, the city has put in place numerous initiatives and measures to deal with the problem of cheap housing.

Currently, there are various options for finding affordable housing in Paris. Through social housing programs, the French government provides low-income citizens with subsidized housing. Residents can access the housing authority's website in each department to apply for social housing (*Aides et Démarches / Bienvenue Sur Caf.Fr*, 2023).

To aid qualifying individuals and families with the cost of rent, CAF (Caisses d'Allocations Familiales) offers housing assistance. A person's financial assistance is determined by their financial situation, number of family members, and housing status.

If the above programs do not work for certain individuals, the options range from sharing a house with roommates, staying in temporary housing like hostels or serviced apartments or finally looking for a house on the outskirts of the city.

Nevertheless, a new housing plan for the capital by 2035 was published in November of 2022 and is based on the idea of "adapting the existing," noting the lack of prospects for new building. The project aims to create over 4000 social housing units annually, along with an equal number of "affordable" housing units with rents that are at least 20% below middle-class market rates ("*Adapting the Existing*," 2022)

An illustration of conversion is the Watt Tower in the 13th arrondissement of Paris. The building was raised four stories, and 19 social housing units were built in the extra levels by ICF Habitat, the housing division of France's state-owned railway company, the Société Nationale des Chemins de Fer Français. The project cost €11 million and was finished in 2021. A old car pound near Porte de la Villette located in the 19th arrondissement was transformed into 75 dwelling apartments (*Global Cities and Affordable Housing: Paris*, 2023).

3.8 Inclusive Community

Efforts to promote inclusivity in Paris are continuing and involve participation from the public sector, nonprofit groups, and private citizens. The city values variety and works to fos-

ter a warm, accepting community where everyone may contribute to and gain from the diversity of its cultural and social fabric.

An inclusive community must assure an accessible infrastructure, multilingual services, supportive and affordable services, promote an active participation and encourage cultural sensitivity.

Although Paris is a 15-Minute city example, the accessibility is still an improvement to be made. According to "The Local", a French newspaper, less than five percent of hotel rooms in Paris are wheelchair accessible and only sixty percent of bars, restaurants and public buildings have taken measures to turn the location accessible. However, nearly ninety one percent of public transport is accessible for people with disabilities. Paris is currently developing "The new disability and universal accessibility strategy 2022-2026" which aims to develop public policies by considering disability from the start of the project, so that they are accessible to everyone, including senior citizens people, families with infant strollers, people with reading difficulties, etc. It is based on the principle of "universal design" defined in the United Nations Convention on the Rights of Persons with Disabilities (*Stratégie Parisienne Handicap & Accessibilité Universelle*, 2023). This strategy sits on a three-step plan, beginning with the active participation of people with disabilities in city life, expanding the range of common law solutions and encouraging innovation in the service of universal accessibility.

As in every global city, cultural sensitivity in Paris entails valuing variety and acting with consideration for others' cultures and backgrounds. It improves the caliber of interactions, encourages positive experiences for locals and guests, and adds to the peace of the city. Cultural sensitivity can embrace anything from religion to LGBTQIA+ communities, passing through social and economic inclusion, integration programs and multilingual services. With a thriving LGBTQIA+ community and a wide variety of organizations and events, Paris is renowned for its LGBTQIA+ inclusion. "La Marche des Fiertés", an annual parade that celebrates LGBTQ+ rights, is a well-known event (*Marche des fiertés*, 2023)

Finally, one of the most important aspects of an inclusive community is inclusive education. Equality of opportunity, social fairness, and the idea that all kids can learn well in a variety of school settings are all aligned with inclusive education in Paris. The city is still working to make its educational system more inclusive, realizing that doing so benefits not only children with impairments but also everybody in the school environment by encouraging tolerance, empathy, and acceptance of diversity. According to Martine Caraglio, senior official for disability and inclusion, the key priorities are "from coordination to partnerships," "from support to self-sufficiency," "from specialization to training for all," and "from schooling to social and

professional inclusion," at a time when enrolling students with disabilities in school is becoming more difficult due to the sheer variety of institutions and stakeholders supporting them and their families (*Inclusive Education and its Essence / International Journal of Social Science & Interdisciplinary Research*, 2022).

ESSENTIAL GUIDELINES FOR A 15-MINUTE CITY - A PROPOSAL

A comprehensive strategy and dedication to sustainable urban planning are necessary to build a 15-minute metropolis. It attempts to improve citizens' quality of life, lessen environmental impact, and build thriving and welcoming communities. All interested parties should be included in the process of development and execution, and these principles should be customized to the unique requirements and characteristics of each community.

In this chapter, the author is proposing a set of essential guidelines for a city to be called a 15-Minute one, according to the knowledge acquired and research.

The guidelines are divided into seven categories, such as **leisure, healthcare, transportation, education, services, affordable housing, and inclusivity**.

The general quality of life is improved, a feeling of community is fostered, and the physical and mental health of the population is supported through the creation of accessible and varied recreational choices within a 15-minute city.

A healthcare system which is easily accessible within a 15-minute city encourages preventative care, improves general well-being, and reduces healthcare inequities.

In a 15-minute city, developing efficient and sustainable transportation systems lowers traffic jams, air pollution, and carbon emissions while boosting mobility and quality of life for locals.

To encourage continuous learning and skill development, education in a 15-minute city needs to be easily accessible, diverse, and tightly connected with the neighborhood.

15-Minute cities should be striving to create vibrant, commutable, and inclusive communities where residents have easy access to essential services while fostering a high quality of life and a strong sense of community.

As 15-minute cities promote multiculturalism and integration, there is a need for affordable housing to ensure that citizens from all walks of life may take advantage of the advantages of a carefully designed urban environment.

Lastly, a component of a 15-minute city is inclusivity, which ensures that all citizens, regardless of their socioeconomic level, background, or ability, can take advantage of urban planning initiatives.

4.1 Leisure

The goal with the 15-Minute city model is to create an urban environment where the resident's quality of life is improved with opportunities of relaxation, recreation, cultural engagement, and social interactions, without the need to commute for a long time.

Leisure is referred to as free time or time spent away from work, commitments, or responsibilities. It is the time when people can indulge in the leisurely, enjoyable, and personally fulfilling activities of their choice. Depending on individual tastes and interests, leisure activities can take many different forms, but they are frequently used to decompress, relieve stress, and improve general wellbeing (Kelly et al., 2020).

In this chapter, leisure is divided into six different categories that cover the majority of places and activities where people can enjoy themselves.

Residents can benefit from leisurely activities on four different levels: health, emotional, social and self-fulfillment.

On the health level, leisure activities can increase strength, prevent diseases, lower fatigue, and improve physical fitness. On the emotional level, participating in these kinds of activities can enhance psychological satisfaction, relax tense emotions, eradicate life boredom, and simplify the overall pace of life. Socially, taking part in leisurely activities can help with meeting new people and in general interpersonal relationships and strengthen the connection with friends. Lastly, on the self-fulfillment level, it can improve self-confidence, sense of achievement and stimulate the potential of an individual (Li et al., 2021).

4.1.1 Parks, Green Areas, and Shared Spaces

Urban and suburban landscapes are not complete without parks, green spaces, and shared spaces, which have several advantages for both communities and people. These areas are created for a variety of uses and activities, and they improve a community's overall quality of life in several ways (Beatley, 2012).

Having these kinds of areas in a city can help enhance physical and mental health, improve the air quality, promote biodiversity, encourage social interaction, recreation, and leisure and, lastly, there are aesthetic benefits (G. Evans, 2002).

The positive impacts of green areas on both physical and mental health rank among the most important benefits of cities. Spending time in green areas is regularly linked to lower levels of stress, anxiety, and sadness, according to research. The calming effect of nature offers a break from the hectic pace of city life by calming the mind. After accounting for all possible covariates, adults who lived in areas with the fewest parks and green spaces had 16–27% higher chances for depressive and suicidal symptoms than those who lived in areas with the most parks and green spaces (Min et al., 2017).

Green spaces act as free-standing air filters. Air quality is increased because of vegetation, which releases oxygen while absorbing contaminants from the atmosphere. This benefit is especially important in densely populated cities where air pollution is becoming a bigger problem. An urban population with better lung health and fewer respiratory issues will ultimately live longer and healthier lives. As a result, parks and gardens must be carefully considered while designing huge towns. Their benefits include a low pollution zone, pollutant dispersion, breeze formation, increased rainfall, and a reduction in high temperatures (Nowak et al., 2006).

The quality of daily living in cities will decline over the next few years because of rising temperatures and air pollution brought on by global warming. It is the duty of planners to take all feasible measures to lessen negative consequences on the built environment (Makheouf, 2009).

Urban green areas serve a variety of plant and animal species as well as humans, making them important habitats. Conserving biodiversity is essential for keeping ecosystems healthy (Beatley, 2011). These urban oasis areas promote local biodiversity and act as wildlife refuges, enriching the urban environment.

Communities naturally congregate in green environments. They provide chances for social contact, outings, team building exercises, and cultural events. These environments

generate a sense of community, which strengthens social ties and improves community cohesiveness. Social barriers are crossed when people from all backgrounds come together, strengthening the social fabric of cities (Dallimer et al., 2012).

For locals of all ages, parks and green spaces offer leisure options. Green spaces provide a wide range of leisure activities, including playgrounds for kids, sports facilities, walking trails, and quiet picnic areas. The quality of life for city people is improved by these areas' promotion of physical activity, peaceful relaxation, and family outings.

Green areas improve the city's visual attractiveness in addition to their physical benefits. Gardens and parks that are well kept up add to a city's overall aesthetic appeal (Nasar, 1992).

As a result of their numerous benefits for enhancing the physical, mental, and social wellbeing of city dwellers, green areas are crucial elements of cities.

4.1.2 Cultural and Recreational Facilities

Cultural and recreational facilities play an extremely important role in the quality of life of the residents. They are essential elements of flourishing and dynamic communities as they serve as hubs for intercultural communication, amusement, education, community engagement and creative expression.

The potential of cultural amenities in cities to foster cultural enrichment is one of their greatest benefits. Residents and visitors can study history, art, music, and literature in galleries, museums, theaters, and concert venues. These organizations promote an interest for the arts and a broader knowledge of history and society by celebrating the variety of mankind's culture and heritage (G. Evans, 2002).

Additionally, encouraging physical activity and a healthier lifestyle is access to cultural and leisure activities (Giles-Corti, 2006). Sports venues, hiking trails, and community sports initiatives encourage people to exercise frequently, which boosts physical fitness and general wellbeing.

People can join, take part in group activities, and work as a team at community centers and sports teams. By doing thus, they encourage a feeling of connection and belonging and contribute to the development of stronger, more resilient communities (McMillan & Chavis, 1986).

These facilities provide kids and teenagers with secure, supervised areas for activities outside of school, sports, and arts instruction. These experiences can inspire creativity, disci-

pline, and a sense of accomplishment in children, which can have a long-lasting effect on their development (Durlak & Weissberg, 2007).

In short, facilities for culture and recreation are essential elements of healthy cities, enhancing the lives of citizens and adding to the general liveliness of urban surroundings. They support possibilities for education and skill advancement, improve quality of life, stimulate economic growth, and foster community cohesiveness. These amenities are not merely nice to have; they are necessary for the social, cultural, and economic health of cities and the people who live there.

4.1.3 Community Events and Gatherings

The social fabric of a neighborhood or town can be strengthened via the sharing of experiences and relationship-building at community activities. For planning and execution, they frequently rely on volunteers, neighborhood associations, and sponsors. These activities can strengthen bonds between various groups within a community and foster pride and cohesion among locals. Additionally, they make the neighborhood livelier and more vibrant, which improves its appeal as a place to reside.

Local, national, and international tourists and visitors may be drawn to community events and festivals. Events aid in attracting attention and promoting infrastructure and attractions and they enable the rationalization and optimum usage of spaces. The preservation of these areas may have financial advantages as well as promote artistic and cultural heritage. Events and festivals help a region stand out on the map and set it apart from other places with similar features. Events can also have a positive social impact, such as boosting town pride and image (Irshad, 2011.). These activities foster a sense of community and civic pride in a city or neighborhood. Community events, such as local parades, block parties, or cultural celebrations, unite individuals from different backgrounds and foster a sense of purpose and belonging.

Cities are linguistic, cultural, and traditional fusions (Appadurai, 1996). Community gatherings highlight the vast diversity of cultures present in a city to celebrate it. Residents can share their history, customs, and tales with others through cultural festivals, cuisine fairs, and art exhibits.

In addition, holding events can help metropolitan areas regain their vibrancy. In order to attract investments in infrastructure and real estate development, neglected or underutilized locations might be turned into energetic event venues (Carmona, 2021).

Civic participation can be accessed through local events. Residents are inspired to get involved in politics, local issues, and public affairs as a result of their encouragement to do so. Participating in community activities with neighbors might increase one's sense of ownership over the city (Chavis & Pretty, 1999).

Community activities are an essential part of urban life and provide both cities and their citizens with a variety of benefits. They enhance social ties, encourage civic engagement, support cultural variety, and foster a feeling of community.

4.1.4 Cycling and Walking Paths

Besides being a means of transportation, many residents consider cycling and walking as leisure activities.

For communities and individuals aiming to enroll in a healthy, active lifestyle while taking in the natural world, walking, and cycling trails are important resources. Whether they are pedestrian-friendly streets, greenways, or designated lanes, these pathways stimulate active transportation, lessen traffic congestion, advance public health, increase environmental sustainability, and improve urban life in general (Handy et al., 2002).

The quality of life in cities is improved by bike and walking paths. They give locals the chance to walk in the great outdoors, get in touch with nature, and discover their urban surroundings on foot. These roads also promote a sense of community by offering areas for socializing and leisure pursuits. Public parks, greenways, and riverfront pathways provide peaceful respites from the bustle of the city and encourage relaxation and mental health (Cohen et al., 2009).

A major benefit of designated bike and pedestrian pathways is safety. Separated infrastructure lowers the possibility of collisions involving motor vehicles, bikes, and pedestrians. People of all ages, including youngsters and the elderly, are encouraged to utilize these paths with confidence thanks to this safety improvement. Cities grow more inclusive as a result, offering accessible transit options to all citizens (Jacobsen, 2015).

By providing bicycle facilities, one can lessen or even avoid collisions between bikes and cars, as well as build a network of bike-friendly roads. The Safe System Approach premise of recognizing human vulnerability—where separating people in space can improve safety for all road users—is supported by bicycle lanes. (*Bicycle Lanes*, 2023)

As a result, they encourage the use of active transportation, raise public health, lessen traffic, improve environmental sustainability, strengthen local economies, improve quality of life, guarantee safety, and contribute to the general wellbeing of urban communities.

4.1.5 Child-Friendly Playgrounds

Children's physical, social, and cognitive development is greatly aided by kid-friendly playgrounds, which also offer a place for entertainment, recreation, and fostering a sense of community. These areas enhance the wellbeing and happiness of families and communities when they are properly designed and maintained.

Children's playgrounds serve as an open area where children can meet their social requirements in a healthy way. They also serve as a venue for kids to talk about their interests and extracurricular activities, which has wider advantages, like educational ones (Dewi, 2012).

The ability of kid-friendly playgrounds to encourage children's physical activity is one of its main benefits. These areas offer secure and interesting settings where kids may run, climb, swing, and explore in a time when sedentary behaviors are becoming more common. For children's overall health, regular physical activity is essential since it lowers the chance of obesity and other health problems (Fjørtoft, 2001).

On the playground, kids hone their motor skills, coordination, and strength. These fundamental abilities will help children in all facets of life while avoiding accidents, obesity, and other potential health issues. Children have a lot of energy when they first get up in the morning. Children can use this energy in a constructive way rather than destructively on playgrounds. (Michael, 2019)

Playgrounds for kids are excellent places to foster social development. While playing imaginatively with their peers, children develop important social skills like sharing, cooperation, and communication. These environments promote cooperation and empathy, assisting kids in laying the groundwork for wholesome relationships and constructive social interactions.

Every child has a unique, comprehensive experience during their childhood. Community playgrounds may be a great environment for children to learn and have fun. Children require hands-on learning experiences outside of the classroom (White & Stoecklin, 2023).

Children's playgrounds provide a healthy substitute for screen time. These areas encourage kids to explore the outside world by reducing their reliance on electronic devices and by providing fun outdoor activities.

These areas are essential for developing inclusive urban environments that place a high priority on the welfare and development of society's most impressionable citizens.

4.1.6 Pet-Friendly Areas

Since pets provide so many advantages for people, including lowering stress and boosting wellbeing, their significance for people's lives has drawn more attention (Graham et al., 2019). As more people accept pets into their homes, the importance of pet-friendly zones in cities has grown. These designated areas serve pet owners' needs and those of their animal friends, and they have many positive effects on people, communities, and urban settings.

The potential of pet-friendly communities to promote social interaction among locals is one of its main benefits. Pet owners are more likely to interact and build relationships when they take their dogs for walks or spend time at dog parks. These encounters establish local ties and foster a feeling of community, which improves the vibrancy and cohesion of the urban environment (Wood et al., 2015).

Pet owners and their pets are encouraged to exercise in places that allow pets. Pets benefit from regular exercise like walking or fetching to stay healthy and fit. Owners' levels of cardiovascular fitness and health are improved by taking daily walks and engaging in outdoor activities. This win-win situation encourages living an active and healthy lifestyle, which lowers the risk of obesity and associated health problems (Oka & Shibata, 2009).

The beneficial effects of pets on mental health are well documented. Spending time with pets helps ease anxiety, despair, and stress. Pet-friendly settings offer tranquil getaways where people may unwind, relax, and enjoy their pets' company.

Numerous health benefits, including lower blood pressure, cholesterol, triglyceride levels, feelings of loneliness, anxiety, and PTSD symptoms, increased opportunities for exercise and outdoor activities, improved cognitive function in older adults, and more opportunities for social interaction, have been linked in studies to the bond between people and their pets. (*How to Stay Healthy Around Pets and Other Animals _ Healthy Pets, Healthy People _ CDC, 2023*)

Areas that are designated as pet-friendly encourage responsible pet ownership. In these areas, pet owners are more likely to pick up after their animals and follow leash laws. All city dwellers benefit from cleaner, safer urban surroundings because of this conscientious behavior.

4.2 Healthcare

Healthcare systems are a vital part of every society. But they are not just composed of hospitals or pharmacies. In a 15-Minute city it is extremely important to ensure the residents well-being and accessibility to amenities like health centers or telehealth. It is also necessary to guarantee health equity for everyone by doing, for example, community health promotions.

The availability of medical services is one of the main benefits of healthcare in urban areas. Cities have a concentration of hospitals, clinics, doctors, and other healthcare professionals, making it simpler for locals to get the treatment they require.

Public health is improved in cities where there are high-quality medical facilities. Residents have access to health education, early disease diagnosis, vaccines, preventative treatment, and other services that improve overall health outcomes. Urban areas frequently take the lead in public health activities, such as campaigns to help people quit smoking, educate people about nutrition, and work to reduce air pollution, all of which help create healthier populations (Nutbeam, 2000).

Patients benefit from having access to qualified experts and centers of excellence when they have complex or unusual medical diseases. Urban locations frequently have transplant facilities, cancer treatment facilities, and specialty children's hospitals, guaranteeing that locals can get the most cutting-edge care for their unique requirements.

The entire quality of life in cities is improved by having access to high-quality healthcare services. Residents' fear about health problems decreases because they feel confident knowing that medical care is easily accessible. This feeling of safety supports residents' general pleasure with urban living, as well as their physical and mental health.

4.2.1 Pharmacies

To maintain the health and wellbeing of metropolitan populations, pharmacies are essential healthcare facilities. There are a lot of pharmacies in cities, ranging from little neighborhood drugstores to enormous retail corporations. The benefits of pharmacy in cities go beyond only providing access to medication; they also have an impact on community well-being, public health, convenience, and healthcare accessibility.

Cities are densely populated, and urban regions frequently have a variety of pharmacies spread out among them. By ensuring inhabitants have quick and simple access to critical pre-

scription drugs and over-the-counter remedies, this density lowers the obstacles to getting essential healthcare supplies (Luginaah & Kerr, 2015).

Pharmacists are skilled medical professionals who offer knowledgeable advice about drugs. Residents of cities gain from the availability of pharmacists who can respond to inquiries, provide prescription counseling, and give details on potential adverse effects or drug interactions (Hepler & Strand, 1990).

Cities' pharmacies are crucial in assisting underprivileged communities. They frequently take part in government initiatives that give low-income and uninsured people access to prescription assistance. In order to promote health equity in urban settings, this support makes sure that all inhabitants, even those who are disenfranchised, have access to necessary pharmaceuticals.

City pharmacies play a significant role in emergency planning and catastrophe response. They can promptly administer emergency drugs and supplies in times of need, ensuring that locals have access to vital medical supplies when they are most required (Ginter et al., 2018).

4.2.2 Health centers

The adoption of health centers as a core part of the healthcare system, not only helps with the decentralization pretended with 15-Minute city model, but can be a great asset in unloading the larger medical facilities (Huitt, 2021a).

The main goal with a health center is to provide a primary care service such as vaccination, general routine check-ups or basic treatment, thus the importance of having them located throughout the neighborhood. Urban locations feature health clinics placed strategically to give locals quick access to necessary healthcare services.

In order to reduce healthcare inequities within cities, health centers are essential. They provide accessible and affordable healthcare options, acting as safety nets for those without insurance or with inadequate coverage. Health centers frequently cater to cultural differences and offer services in several languages to meet the diverse demands of metropolitan populations. This dedication to equity aids in closing inequities in healthcare access and performance (Betancourt et al., 2005).

These facilities provide urban people with immunizations, screenings, wellness initiatives, and health education. Health centers assist in the early diagnosis of illnesses, the prevention of disease transmission, and the promotion of healthy lifestyles in urban communi-

ties by placing a strong emphasis on preventative measures (*What Is a Health Center?* | Bureau of Primary Health Care, 2023).

They are prepared to offer crucial medical assistance and care amid crises involving public health, natural catastrophes, and emergencies. By enabling cities to successfully address healthcare concerns, health centers help to build urban resilience.

They excel at managing chronic diseases, reducing healthcare disparities, providing accessible primary care, offering comprehensive healthcare services, promoting preventive care and health education, providing mental and behavioral health services, fostering collaboration and coordination, interacting with the community, and helping to prepare for and respond to disasters.

4.2.3 Emergency Services

Contrary to health centers, the emergency services' purpose is to give treatment to severe injuries or serious and more complex medical conditions. These kinds of services may be more centralized encompassing more than one neighborhood, if the health centers do their job properly.

The ability for healthcare emergency services in cities to deliver prompt medical assistance is one of their main advantages. Accidents, injuries, and medical emergencies can happen at any time in metropolitan settings. Ambulances, paramedics, and quick response teams are just a few of the emergency medical services that make sure locals who need it can get it right away. In emergency situations, a prompt response greatly increases the likelihood of survival and lessens the severity of injuries (Newgard et al., 2010).

Urban safety and security are aided by health emergency services. Residents' anxiety and terror are lessened by their presence, which reassures them that assistance is easily accessible in an emergency (Khan et al., 2018). The safety of both patients as well as the general populace is also ensured through emergency services' handling of situations involving hazardous chemicals, contagious diseases, and public health risks.

Emergency services contribute to lessening the workload on emergency departments by providing prompt care to patients on the scene and making knowledgeable judgments about hospital transport. Hospitals are able to give patients with the most urgent requirements the highest priority because of this resource efficiency (Brown et al., 2009).

4.2.4 Telemedicine

With telemedicine or telehealth, the healthcare provider does not need an in-person office visit, as the medical appointment is done via messaging, call or video chat.

By resorting to a telehealth appointment, it is possible to access a variety of services from simple prescription monitoring or lab-tests results to more urgent illnesses like infections or migraines. It is also possible to have mental health therapy appointments (*What Is Telehealth?*, 2023).

In a 15-Minute city, telehealth comes to complement the physical healthcare infrastructure by offering a more comfortable and convenient access to healthcare systems and, at the same time, improving sustainability by reducing unnecessary trips.

Urban dwellers may find it difficult to get to healthcare facilities on time due to congestion, traffic, and transit issues. By enabling patients to consult with healthcare professionals from the convenience of their homes or places of employment, telemedicine removes these restrictions. People will have quick access to medical care because of this convenience, especially for non-emergency conditions.

Both patients and medical professionals can benefit from the unmatched ease and flexibility that telemedicine offers. Urban dwellers can plan appointments that work with their hectic schedules, eliminating the need to miss work or negotiate congested city streets. Additionally, healthcare providers may offer more flexible hours, facilitating patient access to care outside of regular business hours.

Telemedicine is essential for advancing health equity in urban areas. Telemedicine makes it simpler for groups who are vulnerable or underserved to access healthcare services, such as those who are less mobile, have little financial resources, or have poor access to transportation. Telemedicine helps decrease healthcare disparities in urban settings by lowering access barriers to care (Bashshur et al., 2016).

4.2.5 Community Health Actions

Community health actions line up with the overall goal of sustainability, accessibility, and well-being of the 15-Minute city concept. These campaigns can have multiple purposes from improving health literacy to blood donations on the spot. Urban population well-being and quality of life are greatly enhanced by community health initiatives. Health issues can be complicated and varied in highly populated metropolitan regions, demanding focused efforts to address them. The promotion of health, prevention of diseases, and improvement of the

general quality of life in cities are the goals of community health actions, which include cooperative projects, health promotion programs, and local efforts (Minkler, 2012).

Reducing health inequities within cities is made possible by community health initiatives. Uneven health outcomes can result from differences in healthcare access, socioeconomic position, and living conditions in metropolitan settings. By offering specialized interventions to underprivileged and vulnerable communities, community health projects are intended to alleviate these gaps (Marmot, 2005).

The foundation of community health initiatives in cities is prevention. These programs concentrate on early intervention, screening, and preventative treatment to spot health problems in the very beginning. Community health initiatives can lessen the overall strain on healthcare systems and enhance long-term health outcomes for locals by addressing health conditions before they get out of hand.

The promotion of public health, the reduction of health disparities, the improvement of community cohesion, the promotion of sustainable urban development, the provision of health education and awareness, the encouragement of collaboration and networking, the support of early intervention and prevention, and the customization of solutions to urban challenges are all made possible by community health actions in cities (Nutbeam, 2000). These initiatives support the resilience and general well-being of urban inhabitants, making cities healthier, more just, and more exciting places to live.

4.2.6 Health equity

First and foremost, health is an undeniable Human Right.

In a 15-Minute city concept, where diversity is a key factor, health equity must be the single most important aspect of the whole healthcare system.

Discrimination, stereotypes, and prejudice against people based on their sex, gender, age, race, ethnicity, or handicap, among other things, frequently make their living conditions worse. Discriminatory behaviors are frequently ingrained in institutional and systemic processes, which causes groups to be underrepresented in or underserved by decision-making at all levels (*Health Equity*, 2023).

By prioritizing health equity, it is created a more inclusive environment for everyone to lead a healthy life and there is a lift, in general, in well-being as economic or social aspects are put aside (Whitehead & Dahlgren, 1991).

Accessibility to medical care, preventive care, and health education may be uneven in cities due to health disparities. Residents are more likely to receive prompt care, adopt healthy practices, and achieve better health outcomes when these discrepancies are tackled, and health equity is promoted. A healthier and more effective urban population follows from this (Nelson, 2002).

In cities, promoting health equity creates inclusivity and social cohesion. Residents experience a sense of social solidarity and belonging when they believe they have an equal chance to obtain healthcare and be in excellent health. Communities that place a high priority on health equity are frequently more tolerant, open, and supportive of various communities, fostering a sense of community among locals.

Greater productivity in cities is a result of health equity. People have a greater likelihood of being effective workers when they're given equitable access to medical service and are in excellent health. A more prosperous urban population results from decreased absenteeism from treatable illnesses and increased general wellbeing (Marmot, 2005).

In cities, promoting health equity helps maintain social and economic stability. By addressing underlying causes of inequality and fostering social cohesiveness, reducing health inequalities, and ensuring that all citizens have equitable access to healthcare services can contribute to improved social stability. The broader metropolitan environment benefits from this stability, which also fosters economic expansion.

Health equity in cities has several benefits that go beyond improving individual health. It advances social cohesiveness, boosts productivity, addresses social determinants of health, encourages sustainable urban development, and promotes social and economic stability. It also enhances public health outcomes and lowers healthcare costs.

4.3 Transportation

In a 15-Minute city, having a solid public transportation system is vital to ensure the connectivity between neighborhoods and avoid the isolation and ghetto enclaves. In addition, to increase efficiency, it is key to have a good combination of public transport and soft mobility modes. Urban regions cannot function without transportation since it promotes citizens' mobility, economic activity, and overall quality of life. Cities can benefit from a wide range of factors from improved public health to reduced congestion to increased accessibility thanks to effective and well-planned transportation networks.

Cities with efficient transportation systems have less traffic congestion and better traffic flow. Smoother traffic flows are facilitated by well-designed public transportation networks, pedestrian-friendly infrastructure, and clever traffic management. Residents not only benefit from less traffic because it saves them time, but it also reduces fuel use, greenhouse gas emissions, and the financial expenses of traffic bottlenecks (Downs, 2000).

Sustainable transportation choices, such public transportation, bike lanes, and electric automobiles, aid in lowering greenhouse gas emissions and air pollution as concerns about climate change increase. These actions help create a more sustainable urban environment, better air, and healthier citizen (Banister, 2008).

Urban social justice can be improved via transportation systems. Affordable and accessible public transit services, along with reduced congestion, ensure that low-income individuals have equal chances for work and social participation. This lessens the difficulties associated with transportation (Giuliano & Hanson, 2017)

Urbanization, economic growth, and city dwellers' well-being all depend on effective transportation. It eases traffic, encourages environmental sustainability, boosts accessibility, improves public health, influences urban growth, promotes social equity, puts safety first, and fosters cultural and social interaction. and access inequities to essential services.

4.3.1 Public transportation

Seeing through the 15-Minute city scope, public transportation is vital to ensure that residents have a convenient, efficient, and sustainable mobility option within the neighborhood, immediate neighborhoods and beyond (Vuchic, 2002).

There are a variety of key factors that are needed to be considered when talking about public transportation in a 15-Minute city, such as local transit networks, frequency, punctuality, accessibility, affordability, real time information and sustainability.

An ideal public transportation system would offer a dedicated transit network with multi-modal hubs where there is a seamless transition between means of transport, an increased frequency during rush hour maintaining punctuality. Furthermore, the price range needs to take everyone's budget into consideration (Vuchic, 2007).

When we consider transportation, we consider journeys to various starting points and ending points. The trips that individuals choose to take will therefore shape a large portion of how people move about the 15-minute city (Huitt, 2021b).

The potential of public transit in cities to increase resident mobility is one of its main benefits. Buses, trams, subways, and commuter trains are just a few examples of the public transportation networks that make it possible for people to move effectively around urban areas. Residents will have easier access to jobs, education, medical care, and social events because of this increased mobility.

Urban mobility that is sustainable is provided through public transportation. By encouraging shared rides and reducing the number of single-occupancy vehicles on the road, it considerably lessens the environmental effect of transportation. Cities become more environmentally friendly because of the usage of electric or hybrid vehicles in public transportation, which also helps to reduce greenhouse gas emissions and improve air quality (Banister, 2008).

Guaranteeing that all locals have access to reasonably priced and easily accessible transportation options fosters social fairness. For those with low incomes who might not have access to private transportation, it is extremely important. By offering transportation options that address economic and mobility gaps, public transit systems put a priority on providing social inclusion.

Passenger security and safety are given top priority in public transportation networks. Accidents and incidents are less likely when infrastructure, stations, and cars are well-maintained. The safety of passengers is ensured by several public transportation systems through the integration of surveillance and security measures, improving the general wellbeing of metropolitan populations (Vuchic, 2007).

Public transportation is an essential part of city life and provides both cities and their citizens with a host of benefits. It promotes environmental sustainability, boosts economic growth, supports social fairness, influences urban development, provides cost savings, lowers energy consumption, and places a priority on safety and security. It also improves mobility and decreases traffic congestion.

4.3.2 Soft Mobility

The literature now shows that soft mobility is an essential component of a smarter city when it comes to a sustainable urban environment. Soft mobility helps the constantly congested and active urban fabric maintain a less toxic atmosphere. Furthermore, soft mobility, aids in preventing a number of traffic issues, such as congestion, traffic jams, or painful accidents (Virtudes et al., 2017)

Soft mobility can be described as an active non-motorized and eco-friendly means of transportation. Those modes of transportation can go from simply walking to electric scooters or bicycles.

There are two ways to incorporate soft mobility in the 15-minute city:

- As a sustainable daily mode of transportation.
- As a support system to the public transport.

Either way, seeing soft mobility as a daily mode of transportation or an aid to the public transportation system, there is a need to ensure that there are well maintained infrastructures, so the residents feel more encouraged to commute this way.

An environmentally friendly kind of transportation is soft mobility. It supports efforts to fight climate change and cut greenhouse gas emissions. People who choose to walk or bike instead of drive over short distances reduce their carbon footprint and help cities maintain a sustainable environment (Pucher & Buehler, 2008).

Numerous advantages to public health come from encouraging soft mobility. Regular exercise like walking and cycling are great ways to fight the rising problem of sedentary lives and associated health issues like obesity and cardiovascular diseases. Cities may enhance the health and wellbeing of their citizens by promoting physical exercise through soft mobility.

Economic savings are provided by soft mobility for both individuals and cities. Compared to motorized transportation, it is a more affordable means of transit and requires less infrastructure investment. People who commute by walking or cycling save money on gas, car maintenance, and parking costs, which helps their own financial situation. Reduced infrastructure expenditures for road maintenance and growth benefit cities (Pucher & Buehler, 2008).

Urban planning and infrastructure that is pedestrian-friendly are encouraged by soft mobility. Cities that place a high priority on walking and bicycling frequently spend money on amenities like wide sidewalks, bike lanes, green areas, and traffic calming measures. These improvements not only make metropolitan areas more aesthetically pleasing, but they also give citizens more comfortable and livable surroundings.

Within cities, soft mobility encourages ties between neighbors. People can communicate with their surroundings and neighbors more easily when they are walking or riding. With the purpose of creating robust, resilient urban neighborhoods and improving the urban experience overall, this sense of community and connectedness is crucial.

4.4 Education

As Malcom X (1964) once said, "Education is our passport to the future, for tomorrow belongs only to the people who prepare for it today". With that being said, education plays a vital role in our society.

Education is a powerful instrument for social mobility, personal improvement, and economic expansion. It gives people the information and abilities they need to have a positive impact on society, pursue fulfilling jobs, and take on challenging global challenges. To promote critical thinking, creativity, and an informed citizenry, high-quality education is necessary (Heckman, 2008).

Cities' economic development and creativity are fueled by education. Urban areas frequently have a concentration of academic institutions, research facilities, and cutting-edge businesses. A workforce with a high level of education increases a city's economic competitiveness by luring in companies and encouraging entrepreneurship. By fostering the development of novel concepts, tools, and socially beneficial solutions, education also fosters creativity (Glaeser & Resseger, 2010).

In cities, education fosters social inclusion and togetherness. Students from various origins are brought together in schools and educational institutions, encouraging interactions and connections that cross cultural, social, and economic barriers. Urban communities can become more inclusive and harmonious by using education as a platform to appreciate and value diversity.

Urban education promotes civic participation and active citizenship. Residents who are informed and educated are more inclined to take part in civic affairs, cast ballots, and make contributions to the city's social and political life. Education encourages good governance and builds a sense of civic responsibility (Levinson & Phil, 2009).

4.4.1 Mandatory Education

The term "mandatory education" refers to rules and laws that mandate that children and teenagers go to school for a set period or until they reach a certain age. Ensuring that all young people have access to school and acquire the fundamental knowledge and skills required for personal and societal growth is the main objective of mandatory education.

The ability to advance social fairness is one of the main benefits of making education compulsory in urban areas. Socioeconomic inequalities are sometimes more severe in metro-

politan settings, which results in unequal access to educational resources. No matter their circumstances, all children must attend school according to legislation requiring them to. This promotes greater social participation and equity by lowering educational disparities and leveling the playing field (Heyneman, 2003).

The prevalence of social problems in metropolitan areas, such as juvenile delinquency, crime, and unemployment, can be lessened with the implementation of mandatory education. It lessens the possibility of undesirable behaviors in youngsters by keeping them engaged in controlled learning contexts. Education gives people the knowledge and abilities they need to find jobs and contribute to society (Lochner, 1999).

Education is crucial for educating people for a changing workforce in today's quickly changing employment environment. Cities are frequently centering of innovation and technology, and compulsory schooling makes sure that city dwellers have the knowledge and flexibility needed to prosper in a competitive employment market.

4.4.2 University Level Education

The intellectual environment and the economic and social circumstances of urban areas are significantly shaped by university education in urban locations. It acts as a hub to produce new knowledge, the training of the labor force, innovation, and cultural growth.

Individuals have the chance to strengthen their skills and grow personally through higher education. It provides pupils with specific knowledge, the potential for lifelong learning, critical thinking skills, and problem-solving talents. Graduates are better equipped to follow their passions and adjust to the constantly changing requirements of the modern work market thanks to this personal development (Arum & Roksa, 2011).

Universities are centers of culture that provide a diverse range of academic, artistic, and cultural experiences. They provide performances, talks, art exhibits, and cultural activities that benefit the community at large as well as the students. This cultural amplification adds to the richness and excitement of urban life.

Student leadership and civic engagement are encouraged at the university level. It fosters a sense of civic engagement, interest in the community, and a desire to bring about change (Pascarella & Terenzini, 1991). Urban university graduates frequently go on to become leaders in a variety of disciplines, improving the city and society.

Universities act as centers for information transfer, bridging the divide between academic inquiry and real-world application. Universities support the transfer of research find-

ings and creative solutions to address real-world problems in cities through partnerships with regional businesses and industries.

By investigating and putting eco-friendly ideas into practice, supporting renewable energy, and tackling environmental issues, they support sustainable urban development. This dedication to sustainability is consistent with the objectives of building resilient and livable cities.

4.5 Services

Residents of a 15-minute city can get to services from their houses in 15 minutes by walking, riding a bike, or taking a short trip on the bus or train. The idea intends to lessen the need for lengthy journeys, support sustainability, and improve urban residents' quality of life.

Cities' amenities are essential for fostering both physical and mental health. Recreational areas like parks provide possibilities for physical activity, unwinding, and stress reduction, all of which benefit physical health. Having access to cultural institutions like museums and theaters benefits mental health by fostering creativity and enlarging the mind.

By giving locals places to congregate, socialize, and form relationships, public amenities promote community cohesion. Parks, community centers, and open spaces act as gathering places for a variety of people, fostering social inclusion and neighborhood involvement. A strong sense of community identity and belonging are fostered by shared amenities (Gehl, 2001).

Cities' economic prosperity is fueled by amenities. Cultural institutions, sports grounds, and entertainment venues draw tourists and visitors who spend money locally, boosting the local economy (Getz, 2008).

The general livability of communities is greatly influenced by amenities. Cities become more appealing locations to live, work, and visit when facilities are readily available. A broad population, including young professionals, families, and seniors, is drawn to livable cities, further enhancing the social and cultural fabric of the area.

4.5.1 Local markets and Stores

Local markets and stores are essential in a 15-Minute city as they contribute to the sustainability, vibrance and livability of a neighborhood. Places like these are also great social

hubs where there is an opportunity for multicultural expression and interaction whilst contributing to local economies (Carmona, 2021).

These marketplaces contribute to the diversification of the urban economy and lessen reliance on big businesses by fostering small and regional enterprises. When local markets are frequented by people, a larger percentage of the money spent stays in the neighborhood, stimulating economic growth and job creation.

These markets enable business owners to promote their goods and services, connect with a larger audience, and build a devoted clientele. Local markets promote entrepreneurship by lowering entrance barriers for startups and providing reasonably priced stall locations.

Local markets serve as gathering spaces for neighborhoods, promoting relationships and exchanges between locals. People congregate to shop, chat with neighbors and merchants, and trade stories. This sense of belonging strengthens the urban fabric and fosters social cohesiveness.

In these places there is an encouragement of environmentally friendly consumption habits. They frequently include locally or regionally sourced goods, minimizing the environmental impact of long-distance shipping. Local market patrons are more forthcoming about the sources of their purchases, making it simpler to select goods with minimal environmental impact (Southworth & Ben-Joseph, 2013).

Local markets serve as exhibits of gastronomic and cultural variety. The cosmopolitan character of metropolitan inhabitants is reflected in the great variety of ethnic foods, spices, and traditional recipes they frequently include. This variety in cuisine enriches urban life and promotes cross-cultural interaction.

Regional marketplaces act as tourist destinations that lure people from nearby and abroad. They provide tourists with a view into the local culture, traditions, and handcrafted crafts while offering a distinctive and authentic purchasing experience. The local markets' tourism industry boosts the city's economy.

4.5.2 Convenience Stores

Cities all around the world are filled with convenience stores, which provide rapid access to a variety of necessities. These small retail locations are renowned for their practicality, long business hours, and wide range of product choices.

Convenience stores are well known for their long business hours; they are frequently open around-the-clock, seven days a week. This adaptability considers the various schedules of city people, such as shift workers, students, and individuals with irregular job schedules. Convenience and accessibility are improved by the stores' constant availability.

Convenience stores provide a wide variety of goods to meet a range of demands. They carry necessities including food, drinks, snacks, hygiene, medicine, and even furniture. Urban dwellers won't need to make as many shopping journeys thanks to the large selection's assurance that they can find what they need in one convenient spot.

Convenience stores help local suppliers and provide jobs, which benefits the regional economy. They frequently purchase their goods from area companies, such as neighborhood bakeries, dairy farmers, and produce growers. The economic vibrancy of metropolitan communities is boosted by this support for small local enterprises (Ács & Audretsch, 1990).

Convenience stores frequently stay open during catastrophes or natural disasters when other retailers might close. They provide communities with crucial help during trying times by acting as vital sources of emergency supplies, such as bottled water, non-perishable meals, batteries, and first-aid kits.

4.5.3 Cafes and Restaurants

Despite being considered local stores, cafes and restaurants have a distinctive quality that not many other places have: cultural identity. Food is a structural aspect of a culture identity. It reflects the history, traditions, celebrations, and values of a certain group or community. In addition, cafes and restaurants provide residents with leisure opportunities like relaxing on an esplanade, improving the quality of life of the residents.

Cafes and restaurants act as gathering places for people to eat, interact, and connect. They create settings for social interaction that strengthen bonds between acquaintances, families, and even total strangers. These places foster a sense of community and belonging where people may congregate, exchange tales, and form connections (Ray, 2016).

The restaurant sector is essential for fostering urban economic development. From waiters and cooks to suppliers and delivery drivers, it creates job opportunities at all levels.

They fill empty businesses, revitalize run-down neighborhoods, and turn peaceful streets into thriving neighborhoods. They can increase local economic activity, draw more people to the area, and encourage further investment (Warde & Martens, 2000).

In many cases, districts and neighborhoods within a city have a distinct identity thanks to their cafes and restaurants. Famous restaurants and dining establishments attract both

locals and tourists, contributing to the flavor of the area. These businesses add to the distinct individuality and charm of metropolitan communities.

4.5.4 Online and Delivery Services

Nowadays, it is possible to buy almost everything online. The online and door delivery services promote several benefits that align with the 15-Minute city model, such as:

- Reduced car reliance.
- Sustainability.
- Inclusiveness.
- Comfort and convenience.

However, online services go far beyond the food or shopping markets. Online services provide residents with accessibility to personal services, like home banking or personal training, employment opportunities as telework grows, telemedicine or leisure activities like gaming or streaming platforms (D. Evans, 2011).

Accessibility for city dwellers has substantially enhanced thanks to online and delivery services. They make it possible for people to obtain goods and services without having to physically move around. People who have trouble moving around, busy schedules, or limited access to transportation can particularly benefit from this.

Online and delivery services provide unmatched time savings and convenience. Urban dwellers may quickly order food, clothing, groceries, and other items on their cellphones or laptops. This convenience makes it easier to navigate busy stores and frees up time for other activities.

Digital and distribution services can help with attempts to sustain cities. They lessen the need for private automobiles, which reduces emissions and eases pressure on urban infrastructure. The environmental advantages of their delivery optimization and sustainable packing techniques are furthered (Kariuki, 2021).

Urban living has benefited greatly from the use of the internet and delivery services, which have become indispensable elements. They promote convenience, accessibility, local business support, congestion reduction, and overall urban sustainability.

4.5.5 Flexible Workspaces

The goal with flexible workplaces is to have a more efficient use of space and facilities, increase productivity and, therefore, satisfaction, less distractions, more flexible schedule, reduced energy consumption and lower accommodation costs (Van Der Voordt, 2004).

With the possibility of remote working, there is an opportunity to create coworking spaces that offer the possibility for individuals to network, collaborate or freelance.

Flexible workspaces have become a powerful force for change in urban settings, transforming how people work and engage with their cities. These flexible, shared workspaces provide a host of benefits that address the shifting requirements of the contemporary workforce.

By uniting workers from various backgrounds and industries, flexible workspaces foster creativity and collaboration. Coworking spaces offer chances for impromptu conversations, idea sharing, and information exchange. Urban innovation is fueled by this collaborative environment, which fosters invention and problem-solving.

Work-life balance is greatly supported by flexible workspaces. They give professionals the freedom to select their own hours and locations. Individuals are better able to balance their personal and professional obligations because to this flexibility, which lowers stress and enhances general wellbeing (N. Bloom et al., 2015).

Workspace flexibility encourages inclusivity and accessibility. They cater to people with a variety of requirements, including those who have impairments, and offer a wide range of amenities and accessibility features. This inclusiveness supports urban initiatives to develop environments that are fair to all citizens.

In summary, flexible workspaces are dynamic urban features that have multiple benefits for both people and cities. They encourage creativity and teamwork, promote work-life balance, stimulate economic growth, lessen the stress associated with commuting, and enhance urban sustainability.

4.5.6 Digital Connectivity

The definition of digital connectivity can be characterized as relationships made possible by digital media technologies (Ponzanesi, 2019) or as the deployment and quality of broadband infrastructure (Digital Economy and Skills Unit, 2018).

As the name suggests, digital connectivity cannot be defined in isolation and must instead be seen as a component of a larger digital ecosystem. It must support a variety of use cases and scenarios as well as a technology foundation that is always changing (Lynn et al., 2022).

Digital connectivity represents a core necessity in today's world that enables aspects like commerce, communication, information sharing, and technological innovations. It has the power to shape economies, societies, and people's day-to-day lives. In a 15-Minute city, digital connectivity brings convenience to another level as it permits data sharing, cloud computing, and global reach, which will result in remote work options, e-commerce, and delivery services.

Communication in cities has been transformed by digital connectivity. Residents can connect with each other, acquire information, and engage with businesses and government organizations more quickly and effectively thanks to high-speed internet, mobile networks, and digital platforms. This increased connectivity promotes community involvement and develops social ties.

Digital technologies are being used by cities to improve public services. Residents may easily access necessary services including bill payment, permit application, and access to medical information thanks to online portals, mobile apps, and e-government platforms. Government operations are streamlined and service delivery is enhanced by this digitalization (Kitchin, 2015).

With real-time mobility information, ride-sharing applications, and intelligent traffic control systems, digital connection improves urban mobility. These innovations promote alternate means of transportation like biking and walking while easing traffic congestion and increasing the effectiveness of public transportation.

4.6 Affordable Housing

One of the main goals with a 15-Minute city model is to promote inclusivity and accessibility. By ensuring affordable housing, there are opportunities created for people with lower incomes to have a place to stay in almost every neighborhood and, therefore, these residents will have easier access to essential services, jobs, amenities, and their quality of life will improve as concerns about long commutes or housing insecurity will fade away.

Cities can effectively combat homelessness and offer a stable environment for those in need by offering housing options that are affordable for low-income individuals and families. Initiatives for affordable housing, such as subsidized housing and rent control, assist in establishing a safety net that keeps disadvantaged individuals from becoming homeless (Quigley & Raphael, 2004).

By ensuring that neighborhoods are available to residents from diverse economic levels and backgrounds, affordable housing promotes community diversity. Mixed-income neighborhoods foster social integration, lessen segregation, and dismantle socioeconomic barriers to build an urban fabric that is more inclusive and unified.

Affordable housing enhances a city's overall livability. It makes it possible for a wider variety of people to reside in and work in cities, strengthening their cultural diversity and dynamism (Newman & Wyly, 2006). When residents in the city where they work can afford to live, less traffic, less air pollution, and less burden is placed on the transportation system.

Education and family stability are critically dependent on access to affordable housing. The chances of academic success and long-term prospects are higher for kids who grow up in secure living conditions. Families can preserve stability and avoid disruptions brought on by repeated transfers or unstable homes thanks to affordable housing (Chetty et al., 2016).

By preventing housing from becoming a privilege only afforded to the wealthy, affordable housing encourages social fairness and inclusion. It provides possibilities for people and families to improve their economic situation and quality of life while assisting in addressing systemic imbalances.

4.6.1 Controlled Renting

A system of rent control serves to safeguard the rights of both tenants and landlords. Landlords are in business to make a profit, but they should only be allowed to do so if they offer housing that is both secure and competitively priced. The finest rent control regimes ensure this, requiring modest annual rent increases that are closely tied to advancements in housing quality and safety (Mendes et al., 2021).

The goal of controlled renting, also known as rent control or rent stabilization, is to control the costs and conditions of rental housing in a city. This legislative measure aims to stabilize housing costs and safeguard tenants from escalating rent rises.

Tenants benefit from a sense of security and consistency in their home situation because of controlled renting. Tenants may plan, build roots in their communities, and live bet-

ter lives knowing that their rent hikes are restricted and that they cannot be forcibly removed without cause (Linneman, 1987). Controlled rental housing helps to lower urban homelessness. Tenants are less likely to experience unexpected, exorbitant increases in their housing costs that could result in eviction and homelessness when they are safeguarded from excessive rent increases. The prevention of homelessness requires stable housing (Quigley & Raphael, 2004).

Long-term rentals are encouraged by rent control, which can be advantageous for both renters and landlords. Tenants are more inclined to support their neighborhoods, participate in neighborhood events, and add to the city's general liveliness. Long-term tenants frequently result in lower turnover costs for landlords and a consistent rental revenue.

4.6.2 Land Use Policies

Housing availability and affordability in a particular area are greatly influenced by land use rules. These regulations may help or hinder the construction of affordable housing.

Although the primary goal of zoning regulations was to prevent unhealthful overcrowding, numerous economists have discovered a link between zoning regulations and housing costs. To characterize the effects of these regulations, the term "exclusionary zoning" is frequently used. Nowadays, some zoning laws nonetheless aim to exclude specific groups of people by raising the cost of living in certain areas and making them unavailable to those with lower or middling incomes. (Ikeda, 2015).

To establish a wide variety of affordable housing alternatives, it is crucial for communities to participate in thorough planning and take a combination of these policies into consideration. With the 15-Minute city concept, the aim is to eradicate exclusionary zoning, giving residents the possibility of living anywhere in the city and the access to their desired amenities or jobs, consequently improving life quality.

Enhancing urban sustainability requires sound land use policies. By supporting effective land use, limiting urban sprawl, and safeguarding natural resources and green spaces, they promote sustainable development practices. This method reduces negative environmental effects, saves resources, and promotes urban climate change resistance (Jenks, 2005).

The quality of life in cities is improved through land use policies. They encourage the development of walkable neighborhoods, accessibility to green spaces, and closeness to facilities like schools, hospitals, and recreational sites. With this development strategy, metropolitan areas are more livable and appealing to people.

By designating areas for the construction of affordable and mixed-income housing, land use rules help address the housing shortage. These laws aid in ensuring that housing options are accessible to people from a range of socioeconomic backgrounds, hence lowering housing inequities and raising housing affordability.

4.6.3 Sustainable Design

Affordable housing can use sustainable design concepts to improve both the environment and occupant's well-being. Buildings should have as little of an impact on the environment as possible while also being aesthetically pleasing, functional, and reasonably priced.

According to (Moghayedi et al., 2021), the term "sustainable housing" refers to the use of sustainable building practices, sustainable building materials, and the promotion of greener lifestyle practices.

Social sustainability in housing includes a number of factors that improve the quality of life and general well-being of tenants. Creating surroundings that are safe and secure for families and communities, providing accessible transportation options, influencing how the built environment affects inhabitants' lifestyles, and promoting general wellbeing are a few of these (Ferlito et al., 2022).

Finally, economic sustainability relates to the availability of affordable housing, access to employment opportunities within a community's social context, and the capacity to meet the financial needs of the housing that is provided (Moghayedi et al., 2023).

4.7 Inclusive Community

An inclusive community is one in which every person is valued, respected, and given an equal opportunity to fully engage in all facets of community life, regardless of their background, identity, skills, or differences. In addition to promoting diversity, equity, and social cohesion, inclusive communities also aim to eliminate prejudice, exclusion, and barriers to participation. Collaboration, knowledge, and a dedication to social justice are all necessary for building and sustaining an inclusive community. To create a friendly and just environment for

everyone, citizens, community organizations, local government, and other stakeholders must actively participate.

The ability of inclusive communities in cities to promote social cohesion is one of their main benefits. Inclusion fosters ties between locals from all origins and lessens social isolation (Chaskin & Joseph, 2010). People from various racial, ethnic, religious, and social backgrounds who live in inclusive communities' form bonds, share experiences, and feel a feeling of belonging, which makes those communities stronger and more resilient (Wirth, 1938).

By addressing inequalities and fostering equitable opportunities, inclusive communities support social justice. They are aware of systemic impediments that disproportionately harm marginalized populations and fight to remove them. Efforts to advance equity in areas including education, housing, healthcare, and employment are sought after through inclusive policies and initiatives (Desmond, 2016).

Cultural diversity is abundant in inclusive communities. Residents from many ethnic backgrounds contribute their customs, dialects, and culinary traditions to the urban environment, weaving a tapestry of cultures that enhances the identity and personality of the city. All citizens enjoy a higher quality of life because of this cultural diversity (Wirth, 1938).

Communities that are inclusive aim to lessen prejudice and discrimination. Residents are encouraged to understand and empathize with one another, which challenges prejudices and preconceptions and helps to create a community where people are less likely to experience discrimination on the basis of their ethnicity, gender, religion, sexual orientation, or other traits.

In a nutshell, inclusive communities have several benefits that support social cohesion, stimulate economic development, foster innovation, advance social justice, and improve the general quality of life in cities. They increase civic engagement, enhance public health, foster cultural diversity, and foster conditions where locals can thrive.

4.7.1 Accessible infrastructure

Accessible infrastructure is essential to an inclusive community. It guarantees that public areas, structures, modes of transportation, and amenities are made accessible to people with all abilities, including those who are disabled. Promoting equitable opportunities, engagement, and social inclusion requires accessible infrastructure (Steinfeld & Maisel, 2012).

An accessible infrastructure should be composed by:

- Accessible buildings with ramps and elevators so people with wheelchairs or mobility challenges can move freely. These buildings should also be equipped with automatic doors, wide doorways, and tactile signs.
- Sidewalks and pedestrian paths that have tactile pavement, to assist those with visual impairments. They should also be prepared with curb ramps and a width that allows wheelchairs to pass easily.
- Public transportation should be equipped with access ramps, audio announcements and priority seating.
- Accessible restrooms in public facilities.
- accessible playgrounds so children of all abilities can play together.
- Public services with accessible counters and sign language interpreters.
- Pedestrian crossings with audio announcements and tactile features.

Accessible infrastructure not only benefits individuals with disabilities but also enhances the quality of life for everyone in the community. By prioritizing accessibility in all aspects of infrastructure development, an inclusive community can create an environment where everyone can participate fully, regardless of their abilities or mobility.

4.7.2 Multilingual Services

Offering multilingual services is crucial in an inclusive community to guarantee that people with different linguistic backgrounds have equal access to information, resources, and opportunities. Services that are offered in multiple languages make sure that no one is left out due to a lack of proficiency in a language.

Language and society are philosophically connected to each other. People learn and speak languages as part of the social structure. The study of language in a social context speaks to how people engage with one another socially within a particular linguistic community (Mahmoudi, 2021).

The capacity of multilingual services in cities to foster the integration of immigrants and newcomers is one of their main benefits. It is easier to adjust to life in a new city when one has access to basic services like healthcare, education, and government support in their mother tongue. It aids people and families in adjusting to unfamiliar environments by making them feel loved and supported.

In cities, good communication is essential for maintaining public safety. All locals have access to emergency services, disaster information, and law enforcement help in their respective native tongues thanks to multilingual services. In the long run, this makes cities safer for everyone by lowering the obstacles to reporting crimes, getting help, and receiving essential safety information (Comfort, 2007).

By lowering language-based barriers and building understanding amongst varied communities, multilingual services help to promote social cohesion. Residents are more likely to form bonds, take part in neighborhood events, and get involved in civic affairs when they can talk to their neighbors. This feeling of interconnectedness encourages inclusion and social peace.

Cities that offer multilingual services benefit greatly in terms of integration, economic growth, public safety, social cohesion, and general urban vibrancy. They foster international relations, support tourism and hospitality, make healthcare more accessible, encourage cultural interchange, and enhance educational opportunities.

4.7.3 Cultural Sensitivity

Cultural sensitivity is the awareness, respect, and comprehension of the subtle cultural distinctions and nuances that exist among people and groups from various racial, ethnic, and socioeconomic origins. It means accepting the possibility that individuals from various cultures may have distinctive values, beliefs, practices, traditions, communication methods, and worldviews. Being culturally sensitive is crucial in a variety of settings, including work environments, classrooms, healthcare settings, and society at large.

One must be aware of other people's cultural differences and values in order to be sensitive to them and that awareness includes knowledge, consideration, understanding, respect, and tailoring (Foronda, 2008)

In order to identify how one's upbringing, values, and biases may affect their perceptions of others, one must first take them into account (Al-Krenawi & Graham, 2000). This is where cultural sensitivity also stems from.

Respect refers to the recognition and regard that one displays for the experiences and values of another human being. It is the third crucial component of cultural sensitivity (Guberman & Maheu, 2003).

4.7.4 Active Participation

In a 15-minute city, active participation includes proactively developing your neighborhood, promoting environmentally friendly behaviors, and cultivating a feeling of community among your neighbors. Residents can participate in the development of a more livable, resilient, and sustainable urban environment by getting involved in your community and advocating a way of life that adheres to the 15-minute city's principles.

Participation of the public improves local government's accountability and openness. There is more scrutiny of government actions when residents are actively involved in decision-making, which lowers the likelihood of corruption, nepotism, and resource exploitation. Transparent governance procedures increase public confidence in local government (Fung, 2015).

Participation in urban life gives marginalized groups more power by amplifying their voices and promoting their demands and rights. Engaged individuals from marginalized communities can collaborate to solve systemic injustices and support laws that advance equality and social justice.

Citizens are more likely to exercise civic responsibility when they are actively involved in their communities. Engaged people are more likely to volunteer, take part in community activities, and work to make their areas better, fostering an active citizenship culture (Putnam, 2000).

Urban planning is more successful when there is active participation. Actively participating residents can offer insightful observations, local expertise, and input on proposed projects and regulations. Urban development becomes more responsive, human-centered, and sustainable because of this involvement.

4.7.5 Supportive Services

A supportive community fosters a sense of belonging, well-being, and social cohesion through its members actively helping, supporting, and caring for one another. Supportive communities can improve a person's physical, emotional, and psychological well-being and play a significant part in improving their quality of life (McMillan & Chavis, 1986).

Programs frequently cater to underprivileged and at-risk groups, assisting in bridging socioeconomic gaps. Support services work to build more inclusive and fair urban settings by offering resources including food aid, housing support, and job training.

Cities' supportive services are essential for improving education. Students are given the tools they need to succeed academically through initiatives including after-school tutoring, mentoring, and scholarship possibilities (Darling-Hammond, 2015). To guarantee that all children have access to high-quality education, these programs also aid in reducing educational inequities.

Support services in cities are very beneficial to families. Assisting parents in providing secure and caring homes for their children are parenting seminars, childcare assistance programs, and family counseling services. This assistance helps to make families stronger and creates healthier neighborhoods (Minkler, 2012).

Support services encourage workforce development and employment (D. Bloom et al., 2011). The skills and resources required to find steady employment are acquired by residents with the aid of job training, career counseling, and employment placement services. This results in greater economic empowerment and self-sufficiency.

Programs that deal with mental illness and substance misuse concerns improve community safety in cities. These services help people overcome obstacles and lower the likelihood of criminal conduct linked to untreated addiction and mental health conditions by offering treatment and support.

4.7.6 Affordable Services

Affordable services are essential to building a diverse and sustainable urban environment in a metropolis that can be reached in 15 minutes. Reducing living expenses and raising the standard of living are both aided by making sure that inhabitants can access and afford important services close to where they live (Levine, 2010).

The capacity of affordable services in cities to lessen inequality is one of their main benefits. All locals have equal access to the same fundamental needs and possibilities thanks to affordable housing, healthcare, and education. This promotes a more just society and helps level the playing field.

Residents' access to affordable services in cities increases their economic potential. People have access to jobs, educational institutions, and healthcare facilities because of affordable transportation options (Glaeser & Gottlieb, 2009). Families are less financially burdened by affordable housing, which frees up funds for other essentials like food, education, and savings. This economic stability may result in more job and business opportunities.

For vulnerable groups including low-income families, senior citizens, and people with disabilities, affordable services are especially crucial. Affordable services offer crucial assis-

tance, enabling these groups—who frequently confront considerable economic and social challenges—to have more stable and satisfying lives.

Cities with more reasonably priced services draw more talent and capital. A workforce that is educated, in good health, and supported by accessible healthcare and education is attractive to businesses and industries. Economic expansion and employment creation may result from this inflow of talent and capital.

4.7.7 Inclusive Education

All children's needs are considered, their rights and abilities are respected, and social justice and equality are the goals of inclusive education. The goal of inclusive education is social justice and equality by integrating impaired students into the educational process and modifying secondary institutions to accommodate disabled students (*inclusive education and its essence / international journal of social science & interdisciplinary research, 2022*).

Aiming to give all students equal chances, regardless of their special abilities, impairments, backgrounds, or differences, inclusive education is a method of teaching. It respects variety and acknowledges the individual abilities and challenges of every kid. The goal of inclusive education is to develop a friendly and encouraging learning environment that meets the needs of all students (Booth & Ainscow, 2002).

By including students from all backgrounds and skills in the same learning environment, inclusive education promotes social integration and inclusion. It promotes cooperation, empathy, and understanding among students, resulting in a decline in prejudice, stereotypes, and social divisions. By encouraging a sense of unity and belonging among inhabitants, inclusive schools serve as miniature representations of inclusive cities.

Through education in diversity appreciation, cultural sensitivity, and social interaction, inclusive education equips students for a globalized society. In today's linked and heterogeneous metropolitan contexts, where cooperation and understanding are vital for success, these abilities are crucial (Scott, 2001).

The stigma and discrimination associated with impairments and differences are diminished by inclusive education. Inclusion of disabled pupils in regular classrooms challenges stigmas and fosters a more tolerant and inclusive society. As residents raise their children with a deeper appreciation and acceptance of variety, this has long-term advantages for the community.

As each student has different talents, needs, and learning styles, inclusive education enables personalized learning. All students receive the support and allowances they need to achieve because teachers in inclusive classrooms are trained to differentiate instruction.

5 BENFICA AS 15-MINUTE NEIGHBORHOOD

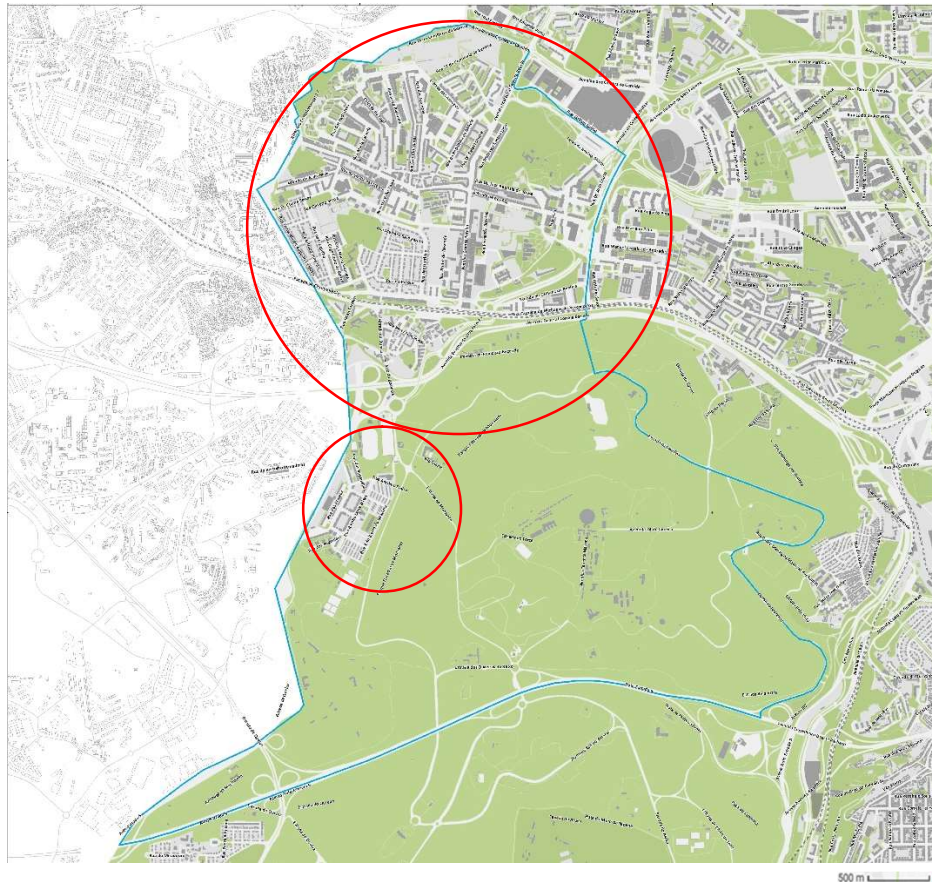


Figure 5.1 - Benfica map.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

Benfica is the third largest and third most populated parish in Lisbon. However, for the most part in this thesis, the author considers Benfica only as the populated nucleus, being the area of most interest for this work (limited by the red circles in figure 5.1).

5.1 Leisure

5.1.1 Parks, Green Areas, and Shared Spaces

Benfica comprehends the biggest green area in Lisbon, as most of the Monsanto National Forest Park is part of the Benfica parish.

Monsanto has numerous pic-nic spots, viewpoints, sports courts and pitches, children-friendly playgrounds, pet-friendly parks, and gardens.

Even when only considering the Benfica neighborhood, there are plenty of green areas and spread around the neighborhood. The best examples of these areas are the Silva Porto Park, the Eucalyptus Garden, or the Market Garden, which are the three main green areas in Benfica.

The Silva Porto Park (Figure 5.2 and 5.3) is a green area that has a child-friendly playground, pet-friendly park, a cafe, padel courts and fitness equipment.

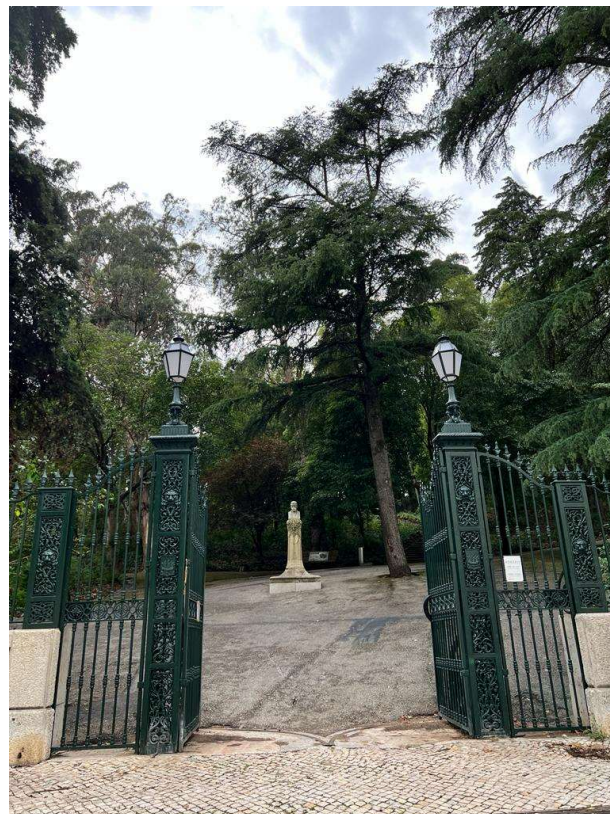


Figure 5.2 - Entrance to Silva Porto Park.

Source: Author



Figure 5.3 - Silva Porto Park map.

Source: Author

The Market Garden (Figure 5.4) is a smaller grass garden with a playground for the children and a shared covered set of tables, where usually the elder ones go to play chess or cards.

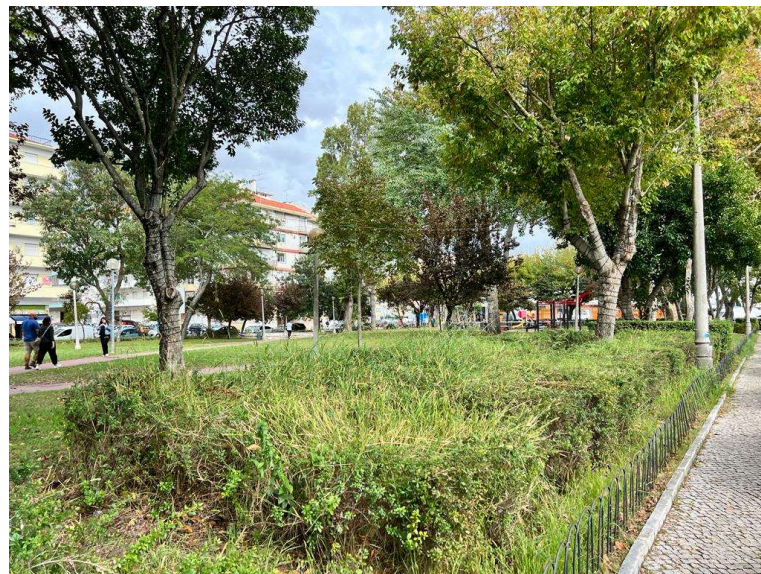


Figure 5.4 - Market Garden.

Source: Author

Finally, the Eucalyptus Garden (Figure 5.5 and 5.6) provides the residents with an amphitheater, a sports court, a children's playground, and a cafe with an esplanade.



Figure 5.5 - Amphitheater in the Eucalyptus Garden, with esplanade in the background.
Source: <https://www.playocean.net/portugal/lisboa/jardins/jardim-do-eucaliptal-de-benfica>



Figure 5.6 - Sports court in the Eucalyptus Garden.
Source: <https://www.playocean.net/portugal/lisboa/jardins/jardim-do-eucaliptal-de-benfica>

Overall, the Benfica neighborhood has eighteen different parks and gardens, each providing a set of useful amenities for the residents.

5.1.2 Cultural and Recreational Facilities

As defined in the sub-chapter 4.1.2, cultural and recreational facilities can range from sports hubs to cinemas and museums.

Starting with recreational facilities, in Benfica the most obvious is the Luz Stadium, home of the 2022/23 football national champion, Sport Lisboa e Benfica. There is also a sports complex in the parish council building and fitness equipment in the parks.

On the cultural side, Benfica provides the residents with three different spaces:

- Carlos Paredes Auditorium;
- Palácio Baldaya;
- Cine Theater Turim.

The Carlos Paredes auditorium (Figure 5.7) is a small welcoming and intimate concert hall, with a capacity for 113 people plus two spots for people with disabilities (*Auditório Carlos Paredes – jf-benfica, 2023*).



Figure 5.7 - Carlos Paredes Auditorium.

Source: <https://bairrobenfica.pt/auditorio-carlos-paredes-2/>

The Palácio Baldaya (Figure 5.8 and 5.9) is multifunctional space, as it offers the possibility to work, read, attend a concert and appreciate art in the exhibitions.



Figure 5.8 - Palácio Baldaya from the outside.

Source: Author



Figure 5.9 - Palácio Baldaya outdoor space for events.

Source: <https://www.nit.pt/fora-de-casa/na-cidade/ha-um-novo-espaco-cowork-lisboa-num-palacio>

Lastly, the newest addition to the Benfica neighborhood is the Cine Theatre Turim (Figures 5.10 to 5.12), an emblematic space with a retro gaming room, a bar and a restaurant.



Figure 5.10 - Cine-theater Turim.

Source: Author

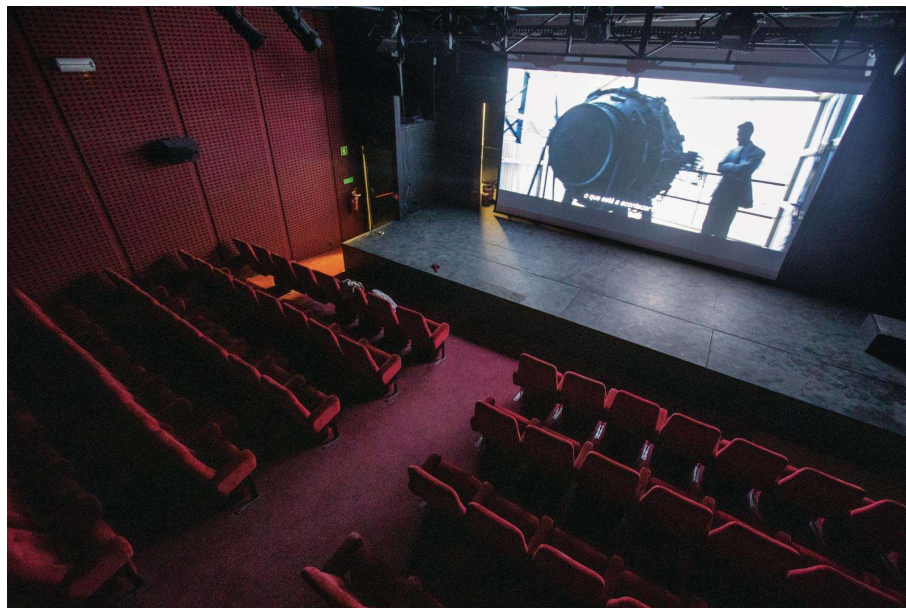


Figure 5.11 - Auditorium in the Cine-theater Turim.

Source: <https://visao.pt/visaose7e/sair/2023-09-15-o-cine-teatro-turim-reabre-com-dois-dias-de-festa-entre-memoria-e-futuro/>



Figure 5.12 - Retro gaming space.

Source: <https://www.timeout.pt/lisboa/pt/noticias/cine-teatro-turim-reabre-em-benfica-dois-dias-ja-definitivamente-em-2023-102822>

5.1.3 Community Events and Gatherings

Throughout the year there are numerous events organized for the community of Benfica.

The main events are the fairs (Figure 5.13) with craft products and traditional Portuguese foods that happen every month, there are many open-air concerts, the medieval fair and the great festival of Benfica. There is also a market every two weekends with a garage sale concept.



Figure 5.13 - Craft and regional products fair.

Source: Author

These events promote a vibrant and livelier neighborhood where the residents can interact with each other. Some of the events encourage the participation of the residents such as the garage sales market (Figure 5.14) or the great festival of Benfica, where groups of volunteers are motivated to have their own stalls.



Figure 5.14 - Garage sale in Benfica.

Source: <https://www.nit.pt/compras/lojas-e-marcas/mercados-cosmetica-biologica/attachment/133674>

Furthermore, the parish council organizes gatherings for people who share the same interests, for example a classic car gathering (Figure 5.15) or a film and photo festival. These create opportunities for the residents to network and get to know new people from the same community with similar interests.



Figure 5.15 - Example of organized gathering, in this case a classic car event.

Source: <https://bairrobenfica.pt/2023/10/27/iii-encontro-de-carros-classicos-do-bairro-de-santa-cruz-de-benfica/>

5.1.4 Cycling and Walking paths

The majority of cycling lanes in Benfica are located in Monsanto, as it is a very requested place for cycling and walking by the residents. In the neighborhood itself there are

not many cycling lanes yet, although it is planned either by the Benfica Parish Council and by the City Council.

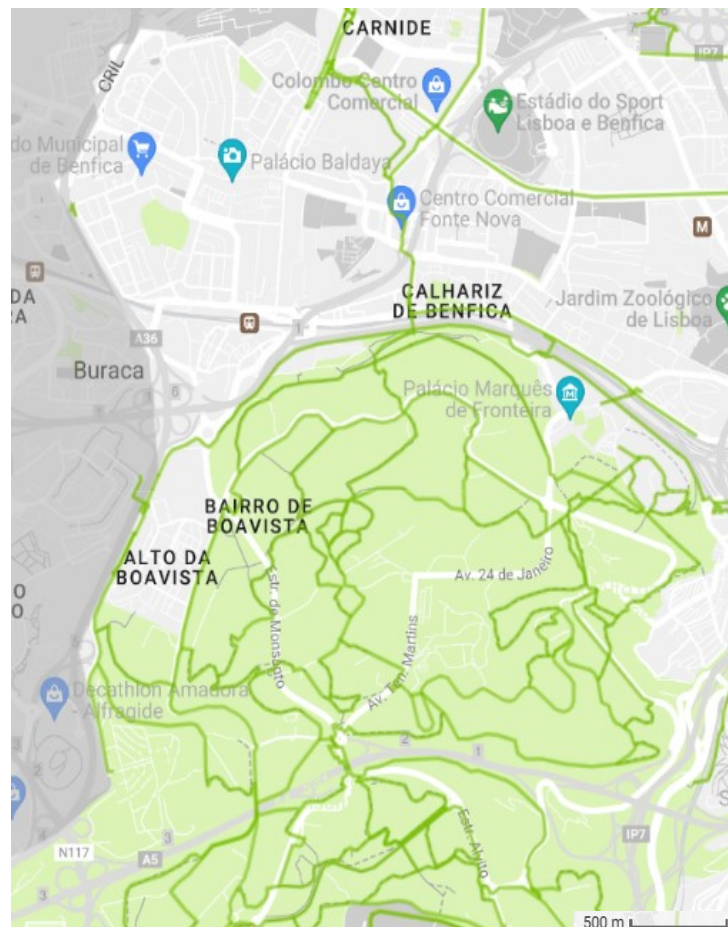


Figure 5.16 Existing bike lanes.

Source: Adapted from <https://www.gira-bicicletasdelisboa.pt/descobre-as-estacoes/>

In figure 5.16, the lines marked green represent the existing bike lanes in the Benfica parish. As it is easily observable, in the Benfica neighborhood there are not any bicycle paths for the residents to use, obligating them to cycle on the road, near cars and increasing their risks. However, the City Council is developing a project to improve the cycle paths in Lisbon. The BICI project considers the addition of fourteen new bike lanes in an extension superior to 10km. (*Programa BICI financia melhorias nas ligações escolares em rede ciclável*, 2023).

In Benfica, the defined improvements are represented in figure 5.17 in a dotted yellow line.

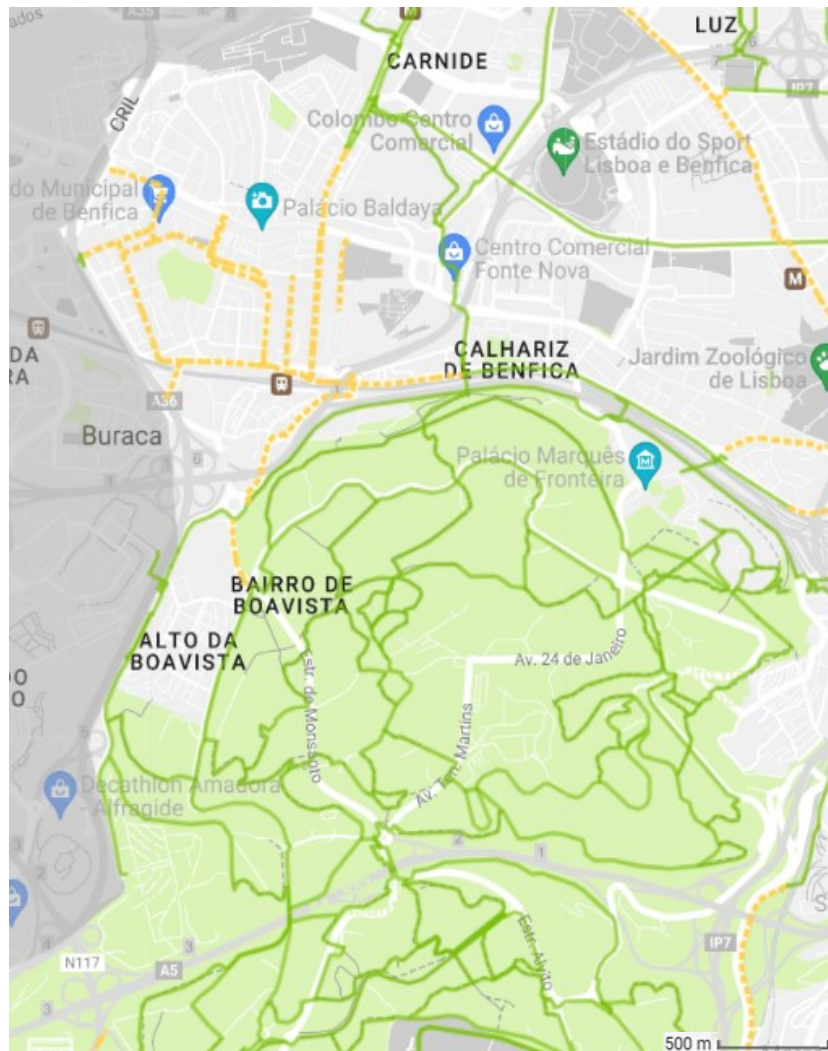


Figure 5.17 Existing bike lanes (green) and in development bike lanes (yellow).
 Source: Adapted from <https://www.gira-bicicletasdelisboa.pt/descobre-as-estacoes/>

5.1.5 Child-Friendly Playgrounds

There are various kid-friendly playgrounds in the Benfica parish of Lisbon, Portugal, where locals may take their kids to play and have fun. Usually, playgrounds are located in or near gardens and parks. In figure 5.18, it is observable that the child friendly areas that Benfica offers are well located in the neighborhood. With this, the residents do not have to walk or cycle for more than 15 minutes to get to a playground (Figure 5.19).



Figure 5.18 Child-Friendly Playgrounds map.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/febec91b-ee0d-429b-9f47-241c140af64c>

There are three more child friendly playgrounds in Monsanto. However, it is more than a 15-minute bike ride and there are not many public transports, as they are considered out of the Benfica neighborhood bounds.



Figure 5.19 Example of a Child-Friendly Playground.
Source: Author

5.1.6 Pet-Friendly Areas

Much like child-friendly areas and playgrounds, designated pet-friendly areas are located in or near parks and gardens and are generally in the form of dog parks (Figure 5.20). These places offer a secure and enjoyable setting for people and their pets to interact, exercise, and unwind.



Figure 5.20 Example of Pet-friendly Areas.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

Nevertheless, pet-friendly areas extend further than simple dog parks. In Benfica, pets are welcome in almost every esplanade and outdoor events but, if the owner wants to get on the bus or eat a meal inside a restaurant, pets generally are not allowed, as they need to be in a cage, in case of getting on public transportation, or assistance dogs.

Benfica is on the right track regarding the pet-friendly areas, but it cannot be considered a pet-friendly neighborhood yet.

5.2 Healthcare

5.2.1 Pharmacies

The Benfica neighborhood has nine major pharmacies spread evenly throughout the neighborhood (Figure 5.21 and 5.22). Considering that the Benfica population is on the elderly side, having a vast network of pharmacies is benefic.



Figure 5.21 Pharmacies location in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/febec91b-ee0d-429b-9f47-241c140af64c>



Figure 5.22 Example of a Pharmacy in Benfica.

Source: Author

5.2.2 Health Centers

The Benfica neighborhood is equipped with two health centers (Figures 5.23 and 5.24). Both centers aim for the same goal of providing personalized care to residents who are registered, always acting in three main fronts:

- Prevent.
- Care.
- Rehabilitate.

The population of Benfica is nearly equally divided between both center with one providing healthcare for almost 12.000 residents and the other for a little over 15.000 users. In these health centers, residents can do routine check-ups with the family doctor, take vaccine shots, pregnancy follow-ups, general nursery appointment and post-operation check-ups.



Figure 5.23 Health center in Benfica.

Source: Author

Although it is a very important service, these health centers are only open from 8h00 to 20h00 from Monday to Friday, which means that on weekends and holidays the residents only have the option to resort to hospitals.

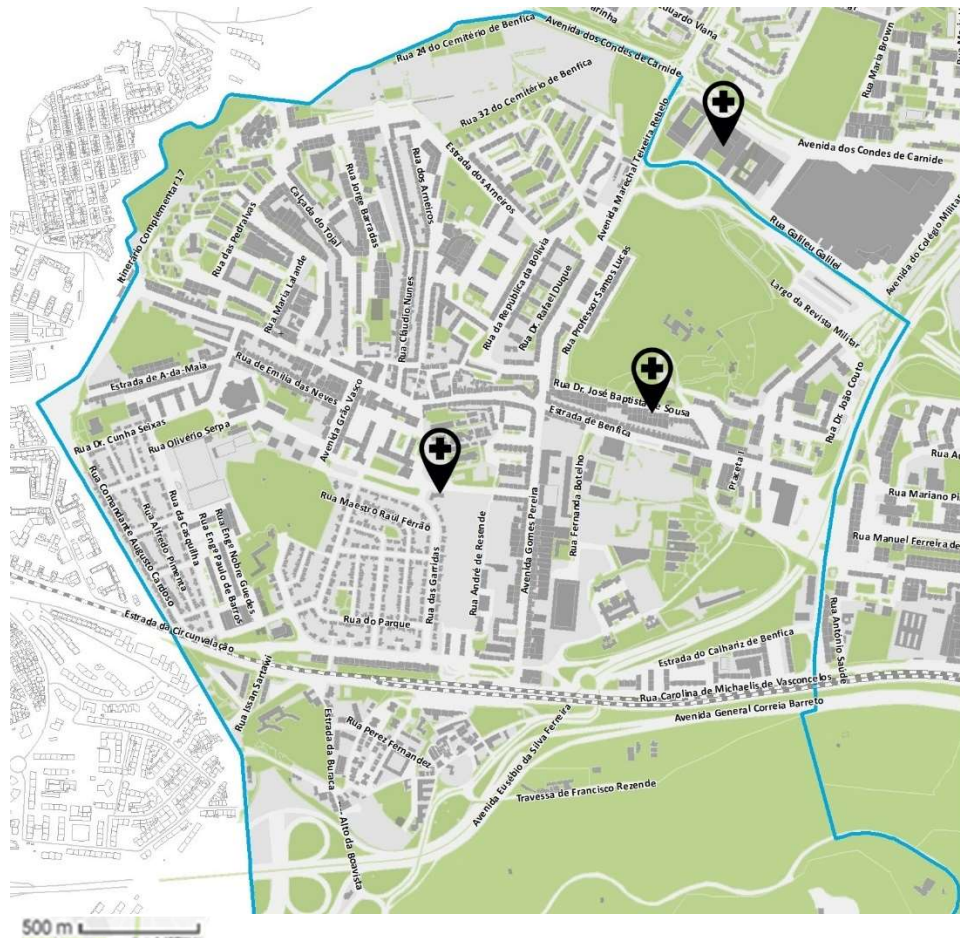


Figure 5.24 Map of health centers in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

5.2.3 Emergency Services

In case of emergencies, Benfica does not provide a hospital inside the neighborhood. However, there are three main hospitals near Benfica, Luz hospital (Figure 5.25) and Lusíadas hospital (Figure 5.26), which are private, and Santa Maria hospital (Figure 5.27), which is a public and major hospital in Lisbon. To get to these hospitals from any point in the neighborhood it takes from 3 to 10 minutes by car, shorter if the individual is in an ambulance. If it is not an emergency and the residents need to go to the hospital, to the Luz hospital takes from 5 to 15 minutes to get to by public transport from any point in the neighborhood. To Lusíadas hospital takes from 10 to 20 minutes and to Santa Maria can take between 15 and 30 minutes by public transport.



Figure 5.25 Luz hospital.

Source: <https://www.hospitaldaluz.pt/lisboa/pt/comunicacao/noticias/novo-hospital-da-luz-lisboa>



Figure 5.26 Lusíadas hospital.

Source: <https://www.lusíadas.pt/noticias/lusíadas-saude-expande-hospital-em-lisboa>



Figure 5.27 Santa Maria hospital.

Source: <https://www.chln.min-saude.pt/>

For minor injuries, the residents can rely on the health centers, as mentioned in the sub-chapter above.

5.2.4 Telemedicine

The telemedicine service is not only exclusive to Benfica, but also a national service called Saúde 24.

There are four main channels to get in contact:

- Via mobile app;
- Website;
- Phone call;
- Service desk;

The mobile app (Figure 5.28) allows the users to access various information and digital services like exam results, vaccines history, appointments or video call appointments. It is also possible to add to one's account people who do not have access to the app, like parents or children.



Figure 5.28 Saúde 24 mobile app.
Source: Author's mobile app

The website is a browser version of the app, but the main goal is to increase health literacy.

The most complete telemedicine service continues to be the phone call, which offers screening service, counseling and forwarding to the right area of the hospital. It is also possible to get psychological counselling or just doubt clarification. This service is provided 24 hours per day, seven days per week (Figure 5.29).



Figure 5.29 Means of contact for saúde 24

Source: <https://www.spms.min-saude.pt/2022/12/2022-e-ano-historico-para-o-sns-24/>

Finally, the service desk provides access to digital services for those who do not have the possibility, guaranteeing proximity with the National Health Service.

5.2.5 Community Health Actions

Serving the community since 1959, the Benfica parish council clinical center has a vast team of qualified professionals of recognized merit and competence, and vast experience that has at its disposal the necessary means for the diagnosis, treatment and monitoring of the patients and families (*Centro Clínico – jf-benfica*, 2023).

The prices charged for this service are adjusted to the income of each family or individual, increasing the access to health services for everyone.

There are also various initiatives to increase health literacy, for example speech sessions about mental health or events to promote healthy habits to the younger ones.

5.2.6 Health Equity

As seen the subchapters above, Benfica provides the residents with the basic healthcare services independently from their background, financial situation, age, gender or culture.

In Portugal, the responsible entity for keeping healthcare available to everyone is the National Health Service. Investment in the NHS ensures a more cohesive, equitable, and integrated health policy that provides universal coverage, addresses the health needs of Portuguese citizens, and provides financial protection against illness-related costs without sacrificing the crucial coordination with the private and social sectors. (*Política de Saúde*, 2023)

5.3 Transportation

5.3.1 Public Transportation

The Benfica parish has excellent access to the city's public transit system. Buses, subway, and trains are the public transportation options available to Benfica residents and visitors for getting around the neighborhood and to other regions of Lisbon.

Only one metro station serves Benfica, however it is well connected to the rest of the Lisbon Metro network. Benfica's Colégio Militar/Luz Metro Station (Figure 5.30) is on the Blue Line. This station provides easy connection to the metro system, enabling locals to go around Lisbon fast.

Several bus lines connect Benfica to other areas of Lisbon, serving the parish. Lisbon's public transportation provider, Carris, runs bus services. To identify bus routes, schedules, and stops in Benfica, locals can consult the official Carris website or use apps for public transportation (Figure 5.31).



Figure 5.30 Benfica's subway station
Source: Author



Figure 5.31 Benfica's bus terminal

Source: Author

You can buy tickets or trip cards at metro stations, bus terminals, or ticket vending machines to utilize Lisbon's public transit system (Figure 5.32). The Viva Viagem card, which can be loaded with a variety of tickets and is accepted on both buses and the metro, is a popular choice.

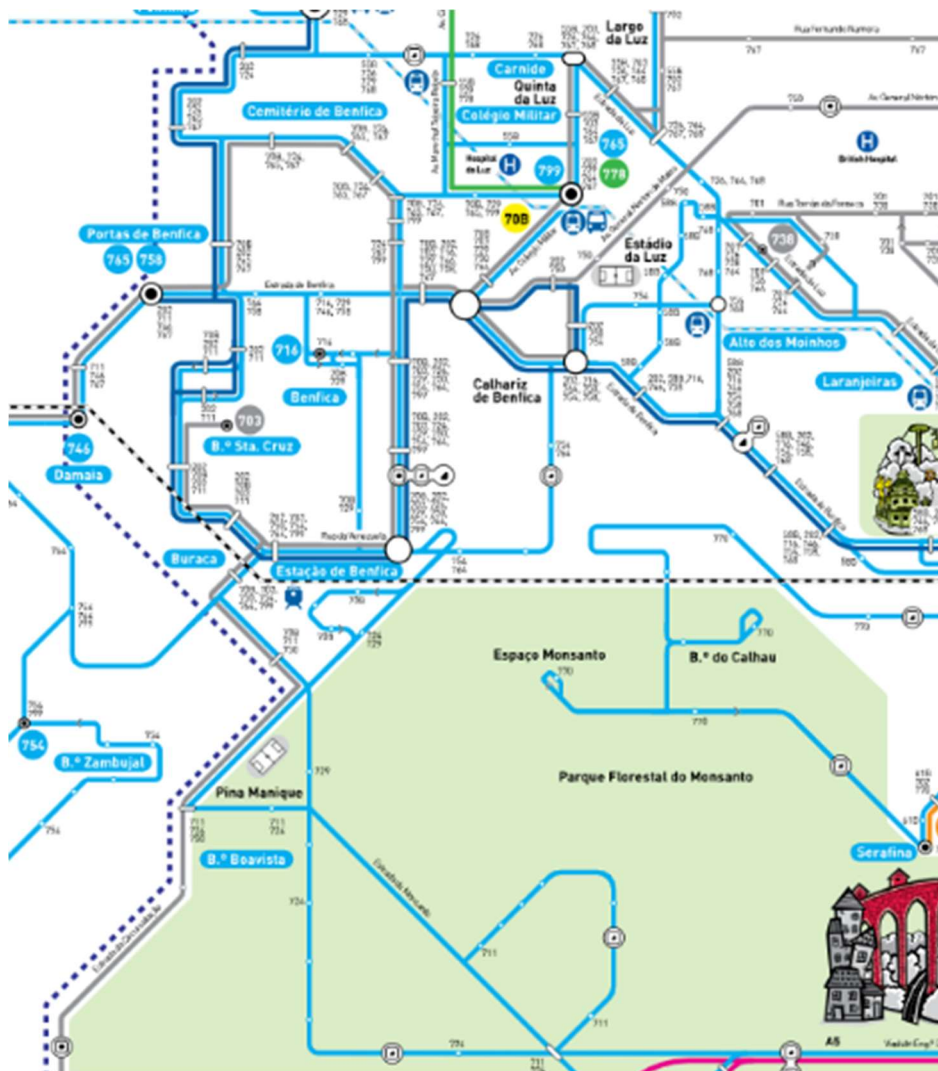


Figure 5.32 Public transportation map in Benfica

Source: <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

5.3.2 Soft Mobility

In recent years the Lisbon City Council has been making efforts to improve and promote the soft mobility. There is an ongoing program, called MOVE 2030, which aims to reduce the use of private automobiles in 28% by 2030.

In Benfica, these efforts have been noticeable with the addition of shared bicycles docks and parking spaces dedicated to shared electric scooters (Figure 5.33 and 5.34).



Figure 5.33 Scooter parking spot.

Source: Author



Figure 5.34 Sharable bicycle docks.

Source: Author

The Benfica Parish was built with sidewalks and pedestrian-friendly streets to make it easy to walk about. Residents do not need to take short automobile journeys because they can walk to the neighborhood stores, schools, and parks.

With dedicated bike lanes and bike-sharing schemes (Figures 5.35 and 5.36), Benfica is becoming more and more bicycle-friendly. Cycling is a clean, healthy form of transportation that lessens traffic and pollution. The bicycle infrastructure in Benfica, which includes bike lanes, bike racks, and bike-sharing schemes, is being improved. This encourages more individuals to commute and make quick trips on bicycles.



Figure 5.35 Bike sharing docks.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.36 Electric scooter parking spaces.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

5.4 Education

5.4.1 Mandatory Education

Benfica is home to a vast network of schools that provide education from pre-school until high-school (Figures 5.37 and 5.38). The majority of these schools are public and they either integrate the Benfica School Grouping or the Quinta de Marrocos School Grouping.

School groupings promote collaboration, efficiency, and improved educational outcomes by pooling resources, expertise, and support services, ultimately benefiting both students and educators within the educational community. One other advantage of school groups is that it is much easier for the parents to find the next school for their children.

In addition, the overall distribution of schools around the neighborhood is in line with the 15-Minute city principals, as the residents do not have to commute for more than 15 minutes.



Figure 5.37 Basic and High-Schools in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.38 Pre-Schools in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>

5.4.2 University Level Education

When it comes to higher education, there are three public universities in Benfica: the University of Education, the University of Music, University of Social Communication (Figure 5.39 to 5.42).

Although the majority of universities are outside of Benfica parish, it is convenient for locals to pursue higher education because they are close by and easily reachable via public transit from Benfica. Being a part of a city with a strong academic and cultural history benefits students in Benfica.

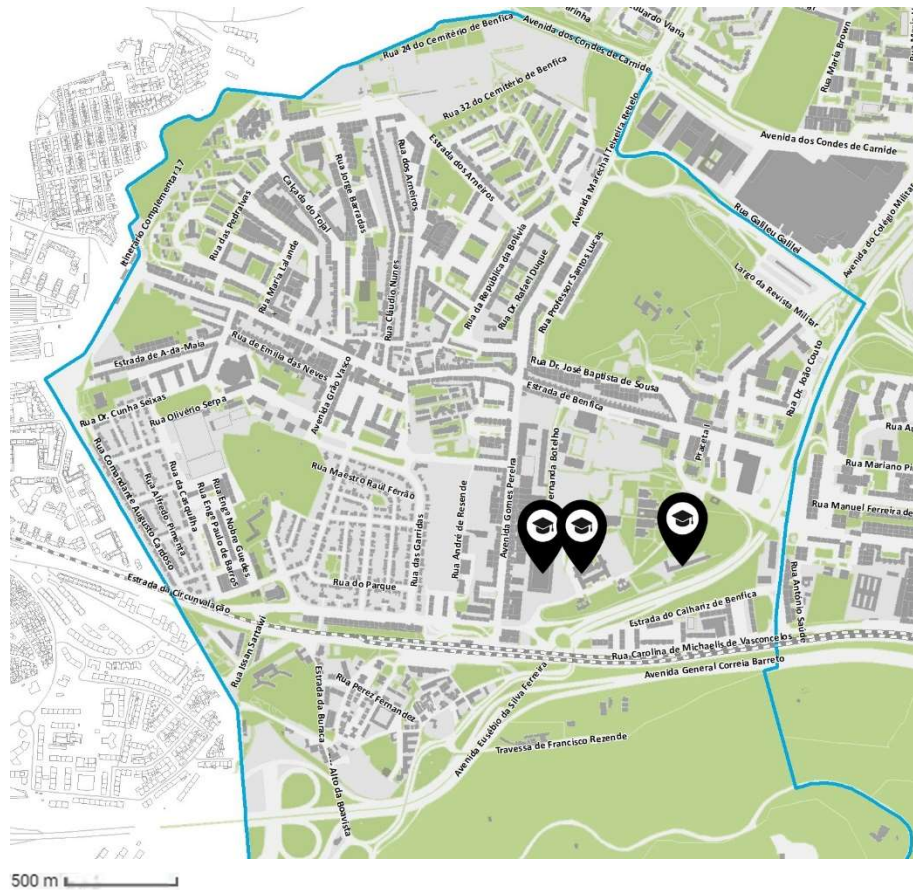


Figure 5.39 Universities in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.40 Education University.

Source: Author



Figure 5.41 Music University.

Source: Author



Figure 5.42 Social Communication University.

Source: <https://www.escs.ipl.pt/en/school/welcome-to-escs>

5.5 Services

5.5.1 Local Markets and Stores

There are numerous local markets and shops in the Benfica parish where locals and guests may buy food, fresh vegetables, clothes, and other items (Figures 5.43 to 5.50).

Fresh produce, including fruits, vegetables, meats, seafood, and other food items, can be found in the neighborhood market known as Mercado de Benfica. It's a terrific location to find locally sourced ingredients and take in the ambience of a traditional market.

Additionally, Benfica is still a very traditional neighborhood where the residents prefer to go the butcher, fishmonger and bakeries, rather than buy these products on larger supermarkets. As a result, it is observable the number of establishments from that nature spread throughout the neighborhood.



Figure 5.43 Groceries shops in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.44 Example of a grocery store.

Source: Author



Figure 5.45 Bakeries in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.46 Major bakery in Benfica.

Source: Author



Figure 5.47 Fishmongers in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/febec91b-ee0d-429b-9f47-241c140af64c>



Figure 5.48 Example of fishmongers in Benfica.

Source: Author



Figure 5.49 Butcher shops in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/feb91b-ee0d-429b-9f47-241c140af64c>



Figure 5.50 Example of a butcher shop in Benfica.

Source: Adapted from <https://dados.cm-lisboa.pt/dataset/plantas-de-freguesia/resource/febec91b-ee0d-429b-9f47-241c140af64c>

5.5.2 Convenience Stores

There are numerous convenience stores where you can buy a variety of goods in Benfica. These shops often stock a variety of foodstuffs, snacks, drinks, toiletries, and other items.

Local mini-markets or convenience stores serve the urgent requirements of locals in Benfica and stay open either 24h or until very late at night.

Typically, this kind of stores are owned by non-Portuguese people. This is a great example of an inclusive community, part of a 15-Minute city.

5.5.3 Cafes and Restaurants

In Benfica, the residents and visitors can indulge in a diverse range of cuisine, from traditional Portuguese dishes to international ones (Figures 5.51 and 5.52).



Figure 5.51 Example of a restaurant in Benfica

Source: https://www.yelp.com/biz_photos/restaurante-edmundo-lisboa?select=ykyetwuR5S-uyzgD2c8hWg



Figure 5.52 Examples of restaurants with esplanades in Benfica.

Source: Author

In addition to various great restaurants, Benfica's strongest aspect are the kiosks with large esplanades (Figure 5.53). There the residents can get a moment of relaxation, have a peaceful moment with friends while enjoying a drink or a quick snack.



Figure 5.53 Example of a kiosk esplanade.

Fonte: Author

5.5.4 Online and Delivery Services

Urban regions like Benfica have seen a rise in the use of online and delivery services, particularly as a result of shifting customer preferences and the convenience they provide.

In Benfica, the online and delivery services focus primarily on food delivery (Figure 5.54). In Benfica, a few food delivery services are available, enabling you to purchase meals from nearby eateries and have them brought right to your door.



Figure 5.54 one of various delivery services in Benfica.

Source: Author

Online ordering and delivery services for prescription drugs and over-the-counter goods can be provided by some pharmacies in Benfica.

For example, services like laundry and dry cleaning could offer pickup and delivery options in the parish of Benfica. You can arrange for a pickup, get your clothing cleaned, and then receive it back.

In Benfica, the major barrier to this kind of services is that the residents normally need a smartphone or computer with internet connection to access these services in order to place purchases or arrange for deliveries. For ordering and delivery tracking, each service provider may have their own app or website.

5.5.5 Flexible Workspaces

Co-working spaces (Figure 5.55), sometimes referred to as flexible workspaces, have grown in popularity as a practical and flexible solution for professionals and business owners in metropolitan locations.

Although many individuals opt for working in cafes, the Benfica Parish Council recently renovated an old library and transformed it into a multi-purpose cultural space. It offers the opportunity to co-work, read in the library, and see art exhibitions.



Figure 5.55 Coworking space in Palácio Baldaya

Source: <https://www.diarioimobiliario.pt/Actualidade/Palacio-Baldaya-abre-espaco-municipal-coworking>

5.5.6 Digital Connectivity

Like in many urban regions, digital connectivity is a necessity for modern life. It enables locals and businesses to stay in touch, conduct business remotely, use online services, and take advantage of a variety of digital experiences.

Free public Wi-Fi connectivity may be available in some public areas including parks, libraries, and government structures, enabling locals and visitors to use the internet while outside.

Smart city initiatives exist in some urban regions with the goal of improving the digital infrastructure and services available to locals.

Online payment systems, e-government services, and digital platforms for municipal information are only a few of the online services that the local government makes available to the public.

5.6 Affordable Housing

5.6.1 Controlled Renting

In Lisbon, there is an ongoing program in order to help housing accessibility. The program is called "HABITAR LISBOA" and it aims to ease access to affordable housing to low income families. As a way to better help residents in need, there are three different sub-programs inside the main one:

- Accessible rent program.
- Municipal subsidy for affordable rent.
- Supported rent program.

The Accessible Rent Program is focused on families with intermediate income that cannot access the private renting market.

The Municipal Subsidy for Affordable Rent is a monetary aid, paid by the city council, for residents that have a registered renting contract.

Finally, the Supported Rent Program is a financial aid for families with low income that are in habitation and socioeconomic need.

5.6.2 Land Use Policies

Lisbon has a problem with housing affordability, which land use rules may solve by requiring builders to incorporate affordable housing units in new constructions or by offering incentives for building affordable housing.

In Benfica, there was an announcement that the project for building 266 new housing units to face the affordable housing crisis. However, the majority of new buildings being built in Benfica continue to be expensive and luxury housing, like the "Fábrica 1921" (Figure 5.56) or the "Garridas 1867" projects.



Figure 5.56 Fábrica 1921

Source: <https://www.teixeiraduarte.pt/noticias/empreendimento-fabrica-1921-vence-a-categoria-cidade-de-lisboa-do-premio-nacional-de-reabilitacao-urbana/>

In addition, even with all the programs, the Benfica community continues to be segregated as the marginalized individuals with lower income or from specific ethnicities tend to live in a social housing out of the urban center of the neighborhood and near its outside frontiers.

5.6.3 Sustainable Design

Lisbon has worked to include sustainable practices in its urban development and planning.

Lisbon has launched urban regeneration initiatives in a few districts to rehabilitate and repurpose vacant or underused spaces, making them more livable and sustainable.

Lisbon promotes the use of energy-efficient building techniques and sustainable architecture. Green building techniques, such as energy-efficient lighting, insulation, and materials, are frequently used in new construction.

5.7 Inclusive Community

5.7.1 Accessible Infrastructure

For all inhabitants, including those with disabilities, to be able to have fulfilling lives and actively engage in their communities, accessible infrastructure is crucial.

There are accessible public transportation options available in Benfica, such as buses with wheelchair lifts or ramps. Elevators and tactile pavement are available at train and metro stations for those who are blind or visually impaired (Figure 5.57).



Figure 5.57 Lowered sidewalk with tactile pavement.

Source: Author

In Benfica, sidewalks are frequently made wheelchair-accessible, including tactile pavement for orientation and curb cuts at crossings. For pedestrians who are blind or visually impaired, crosswalks have auditory signaling.

Public structures, such as city halls, libraries, and community centers, are frequently built with amenities that make them accessible, including ramps, elevators, and handicapped

restrooms. In addition, Benfica has accessible public restrooms with grab bars and bigger stalls for those with impairments.

5.7.2 Multilingual Services

In order to accommodate locals and visitors who speak different languages, multilingual services are crucial. These services aid in fostering community inclusivity, accessibility, and effective communication.

In Benfica, the majority of services can be accessed speaking in Portuguese or in English. Although there might be some places where people speak other languages, Benfica is not particularly multilingual inclusive.

5.7.3 Cultural Sensitivity

Benfica is home to a diverse population, and efforts are made to promote cultural sensitivity and appreciation.

In Palácio Baldaya Art galleries, concerts, and cultural exhibitions feature the creations of artists and producers from various cultural backgrounds. These exhibits encourage cultural sensitivity and respect.

Policies that support inclusion, non-discrimination, and equal opportunities for all citizens, regardless of their cultural origin, are implemented by Benfica parish.

5.7.4 Active Participation

The Benfica Parish Council is dedicated to strengthening participatory democracy in order to further the Parish's ongoing, sustainable development. The Council sees citizen and civil society organizations' involvement in Parish governance, particularly when it comes to the distribution of resources for local public policies, as being particularly crucial. (Guedes, 2021).

In Benfica there is a participation budget which is aimed at including proposals from the residents that then go through a voting process. The ones the community feel are the most adequate are generally implemented within the set budget.

5.7.5 Supportive Services

Benfica provides its residents with a vast range of support services.

Firstly, there is the "project "Baby Stuff" aims to support and promote maternity and the first months through solidarity campaigns, Lamaze classes, baby-sitters, parental development classes and others.

Then there is a family direct aid program that is composed by a social laundry, solidary transport, food bank, and public bathhouses. These amenities are designed to help individuals with socioeconomic needs in the Benfica neighborhood, giving them a little more quality of life and a sense of empathy from the community.

5.7.6 Affordable Services

This chapter does not entirely apply to Benfica, as the cost of the services is very dependent on country laws or municipal taxes. As a result, Benfica does not set the prices for essential services.

Nevertheless, as seen in chapters above, there is a multitude of ongoing programs to help those who needs the most.

5.7.7 Inclusive Education

In Portugal, schools for children with special needs are all private. This creates a barrier to the families who cannot provide that opportunity for their children, as they will have to attend the regular school system and face all the challenges that may impose.

In Benfica there is not any school of this kind, forcing the residents to commute for longer with their children to other parts of the city.

5.8 Overview on Benfica as a 15-Minute Neighborhood

In this section, it is presented an overall impression of Benfica as a 15-Minute neighborhood, summarized in table 5.1. It was utilized a color scheme to evaluate the implementation of the guidelines, with green being good, yellow being on development and red not implemented.

Guidelines to a 15-Minute City		
Leisure	Parks, Green Areas and Shared Spaces	Green
	Cultural and Recreational Facilities	Green
	Community Events and Gatherings	Green
	Cyclind and Walking Paths	Yellow
	Child-Friendly Playgrounds	Green
	Pet-Friendly Areas	Yellow
Heathcare	Pharmacies	Green
	Health Centers	Yellow
	Emergency Services	Yellow
	Telemedicine	Green
	Community Health Actions	Yellow
	Health Equity	Green
Transportation	Public Transportation	Green
	Soft Mobility	Yellow
Education	Mandatory Education	Green
	University Level Education	Green
Services	Local Markets and Stores	Green
	Convenience Stores	Yellow
	Cafes and Restaurants	Green
	Online and Delivery Services	Green
	Flixible Workspaces	Yellow
	Digital Connectivity	Green
Affordable Housing	Controlled Renting	Red
	Land Use Policies	Yellow
	Sustainable Designs	Green
Inclusive Community	Accessible Infrastucture	Green
	Multilingual Services	Yellow
	Cultural Sensitivity	Yellow
	Active Participation	Yellow
	Supportive Services	Green
	Affordable Services	Yellow
	Inclusive Education	Green

Table 5.1 Overview of Benfica as a 15-Minute neighborhood.

Although many of the guidelines are checked green and yellow, there is one key point that makes Benfica not a 15-Minute neighborhood. If the reader observes the figure 5.1 in the beginning of this chapter, Benfica is represented by two red circles. The smaller circle is representing "Bairro da Boa Vista", a marginalized area of Benfica, segregated from the center of the neighborhood, where lower income individuals generally of a specific ethnicity or race live.

6 FINAL CONSIDERATIONS

6.1 Conclusion

In conclusion, this dissertation has explored the 15-Minute city concept and what is needed for a city to be considered one. Through an extensive analysis of bibliography and in loco research, it was possible to propose a set of essential guidelines, in order to evaluate if a city or neighborhood can be categorized, or not, as a 15-Minute city.

With the findings in this thesis, it is possible to conclude that the 15-Minute city to its full potential is still a utopia and, as a result, no city can be considered a 15-Minute one. However, if the guidelines proposed in this dissertation can be followed, it is possible to affirm that a city has the minimum conditions to be considered a 15-Minute city in the current society.

Regarding the case study of Benfica, according to the proposed guidelines, the neighborhood cannot yet be considered a 15-Minute one, although it is making great progress and is definitely on the right course. This research contributes to the existing body of knowledge by presenting a set of guidelines that can be followed and used to make this somewhat abstract concept more tangible.

6.2 Future Research

While this study has provided valuable insights, it is essential to acknowledge its limitations, essentially the objectivity of the guidelines proposed. These limitations point to areas for future research, and it is encouraged that scholars explore each area of the guidelines more in depth, as they need be further dissected to flow seamlessly through every part of the community and promote the integration between communities.

In the broader context of Civil Engineering, this thesis underscores the importance of sustainable construction, housing rehabilitation and economic transportation. It is a goal of

this dissertation that the research done will inspire further inquiry and contribute to ongoing discussions in the field.

Finally, an expression of gratitude is made to the Benfica Parish Council and Nova SST. Their support has been invaluable in making this research possible.

This thesis conclusion serves as a reminder that understanding is a never-ending process and that our discoveries represent just one step in that process. I anticipate the ongoing discussion of ideas and our joint efforts to increase our knowledge in this field.

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