European Transport \ Trasporti Europei (2021) Issue 85, Paper n° 5, ISSN 1825-3997

https://doi.org/10.48295/ET.2021.85.5

15-minute neighbourhood accessibility: a comparison between Naples and London

Federica Gaglione[1], Carmela Gargiulo[1] Floriana Zucaro[1*], Caitlin Cottrill [2]

[1]Department of Civil, Building and Environmental Engineering University of Naples Federico II, Naples, Italy
[2] University of Aberdeen, AB24 3FX, United Kingdom

Abstract

The 15-minute city seems to represent a new way of looking at the city and responding to many current challenges, including climate change, aging population, and most recently Covid-19. However, if the 15-minute city idea is useful to guarantee an adequate supply of basic services, its basic principles cannot be adaptable to what we consider a city, especially to the big city. To this end, the paper considers the 15-minute city idea as an approach to be applied to the neighbourhood scale, in which the suitable supply of basic services and pedestrian paths and spaces allows to increase accessibility to places and the quality of life of the inhabitants. In this perspective, the work provides a methodology, based mainly on spatial analysis, aimed at defining 15-minute neighbourhoods by adopting a systemic approach. The methodology is tested on some suburbs located in the cities of Naples and London, whose different morphological, settlement and functional characteristics make them a significant experimentation test.

Keywords: 15-minute city; urban accessibility; walkability; suburbs.

1. The 15-minute city concept

The ongoing pandemic crisis represents another opportunity to rethink strategies and actions to address the challenges posed by climate change and the aging of the population, and the problems of social cohesion and public health. The possibility of further pandemics should guide the choices of urban transformation, improve accessibility to places and services, enhance soft mobility, and reorganize the offer of public spaces and proximity services, especially on a neighbourhood scale. The Covid-19 emergency, with progressive limitations and lockdown, forcing everyone to change the use of urban spaces and routes to reach and use proximity services almost exclusively, has contributed to increasing the "walking appeal" as a topic of interest for public administrations and for the world of research in the urban environment. Many scholars have investigated which physical (related to morphology and pedestrian network) and functional (related to the supply of activities) characteristics of urban areas define and influence the walkability of a neighbourhood (or part of it), that can be defined as the extent to which the built

* Corresponding author: Floriana Zucaro (floriana.zucaro@uinina.it)

environment supports its residents to walk for leisure, exercise, or recreation. To date, the scientific community has principally addressed the nexus between walking and the urban built environment through two different approaches. The first approach is oriented to improve the practicability, safety and attractiveness of the pedestrian network by focusing on the neighbourhood scale. Most scholars concur that connectivity, convenience and pleasantness are included in the physical characteristics influencing walking activities (e.g. Caselli et al., 2021). More generally, street furniture and layout, presence of amenities, pedestrian crossings and proximity to green areas are positively correlated with walking behaviour (e.g. Zecca et al., 2020). Loh et al., (2019) and Gaglione et al. (2019 and 2021) also demonstrated that to increase the walkability of the urban built environment a systemic approach should be used in order to consider it as a feature of urban accessibility based on integration among the localization and distribution of services and open spaces, the characteristics of the network and the "needs" linked to the behaviour of segments of the population. The second approach seeks to define mode-choice models and travel route decision-making of pedestrians, to optimize the use of both local public transport and walking networks. For instance, scholars such as Loebach and Gilliland (2016) used GPS devices to track the actual routes travelled by specific population segments to investigate the frequency of use of some routes and the distances travelled daily.

This brief scientific framework reveals the relevance of pedestrian mobility for regenerating and reconfiguring urban areas, as well as improving the quality of life of the inhabitants (especially vulnerable population segments, such as the elderly and children), and at the same time contributing to promote the need for a city organized such that necessary services are walkable within 15 minutes. The 15-minute city promotes the possibility of accessing all services on foot or by bicycle in this time frame, both in the central areas and in the suburbs. Therefore, there is no doubt that a "15-minute" organization can be pursued at most in the localization and distribution of essential services in very small cities or on a neighbourhood scale in large cities, but certainly cannot find concrete applications for all types of activities and for all users of large cities. The development of the scientific framework on the 15-minute city has contributed to strengthen the belief that there are two key aspects useful for the development of policies, strategies and tools aimed at improving the usability, above all pedestrian, of urban areas: i) definition of the reference territorial unit and ii) the improvement of urban accessibility. Concerning the first aspect, in agreement with Mc Louglin (1973) and Gargiulo and Papa (2021), the city can be defined as the place where an extraordinary quantity of activities, from the more everyday and traditional to the more specialized and innovative ones, coexist in relation to each other. It is the coexistence of different activities and services, many of which are "rare" due to the location and distribution in the territory (e.g. museums, universities) and to the size of the demand, that produces the so-called "city effect" (Agnoletti et al., 2014) and defines the rank of cities (Martinotti, 1999). In this context, the availability of time to reach and use these services may well exceed the time threshold of 15 minutes. The neighbourhood, on the other hand, especially in large cities, can constitute the suitable intervention scale to guarantee the use of essential services by all inhabitants through pedestrian paths. With reference to the second aspect, the location and distribution of essential services (e.g. food and health), the quality of the pedestrian paths useful for reaching them together with the quality of the open spaces and the urban context, and above all people's behaviours can improve accessibility to places and

services and contribute to guaranteeing social equity and raising the quality of life for the inhabitants.

In this perspective, this work focuses the attention on the neighbourhood level and on the pedestrian friendliness of its different parts by considering some main local services and according to geomorphological, physical (related to the spaces and the paths, functional (distribution and location of services), socio-economic (population) and settlement characteristics.

2. How to measure a 15-minute pedestrian-friendly city?

The main aim of this work is to provide local decision makers with a quantitative method, mainly based on spatial analysis, aimed at identifying the parts of a neighbourhood that can be defined as 15-minute ones. The proposed methodology has been developed by identifying both the main urban characteristics and local services affecting the 15-minute city idea. Figure 1 outlines the main input and output for each step of the method. 22 variables selected by the authors, as reported in previous studies (Gaglione et al., 2019; Gargiulo et al., 2021a and 2021b), ranging from the urban form (e.g. building density), to the availability and amenities of links (paths) and nodes (built open spaces) of pedestrian networks (e.g. connectivity, presence of pedestrian crossings, presence of benches) providing access to basic neighbourhood services (e.g. education, recreational, economic, health activities) were detected directly in the areas studied and georeferenced using Google Maps. These variables refer to specific urban characteristics that best describe the different parts of the urban system, in line with a holistic-systemic approach that permeates the whole study and the authors' previous works on the theme of urban accessibility (Cottrill et al., 2020; Gargiulo et al., 2021c). Except for the local services taken into consideration, the other qualitative and quantitative variables have been normalised for measurement. Finally, a correlation analysis was carried out through SPSS to identify the type (positive or negative) and degree of association (magnitude of closeness) among the variables considered. Pearson coefficients close to unity allowed for elimination of those variables that do not provide additional information to the set of meaningful data. After defining the urban characteristics that were identified as the most significant for a 15-minute neighbourhood, two spatial analyses in the GIS environment have been conducted to detect the demand and supply ratio. To determine the "demand", the Spider Diagram was used: its output is the distribution of users related to the localization of local services. This diagram represents a proximity analysis providing the matrix of distances from the centroids of the census sections (where users are ideally concentrated) to the closer facilities within a Euclidean range of 900 m. This spatial threshold corresponds to the theoretical distance walkable in 15 minutes to reach specific services. To determine the supply, a Service Areas analysis was developed for all the basic activities taken into consideration. Lastly, the actual distance that users walk to reach a service was measured. In other words, the characteristics of the pedestrian paths (width of sidewalks, state of the pavement, etc.), the characteristics of the urban context (presence of green areas, presence of parking and refreshment facilities, etc.), the location and distribution of services and the willingness to walk (behaviours) of the different types of users (children, elderly, frail people, etc.) have been taken into consideration. It was thus possible to "weigh" the influence of each characteristic through the weighted average and to calculate the accessibility index for each group of services (Cottrill et al., 2020; Gargiulo et al., 2021a). Finally, through the overlay of the demand distribution on the

Service Areas of the basic local services, the urban portions that satisfy the 15-minute city idea have been identified. To confirm these results, a comparative reading was also carried out with the population density and with the distribution of building density.

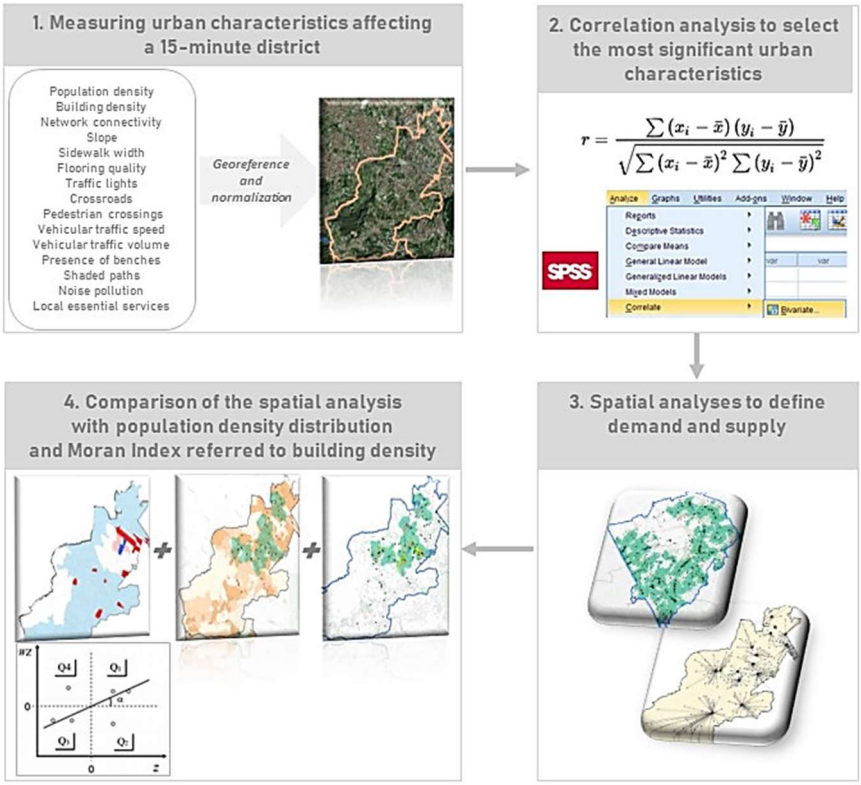

Figure 1: Schematization of the method aimed at identifying 15-minute neighbourhoods.
Source: Elaboration of authors.

On the other side, the kind and the shape of urban fabric resulting from planned or unplanned urbanization is relevant to guarantee a pedestrian-friendly neighbourhood, according to its physical characteristics. In detail, for the building density distribution, the Moran Index has been calculated with the ArcGISPro software. The Moran Index is a spatial autocorrelation measure based on both feature locations and feature values simultaneously. In fact, the Moran Index evaluates whether the pattern expressed is clustered, dispersed, or random according to a set of features and the associated attributes: a negative value of the Index means that the values of the variable in the cells close to the last cell are dissimilar and so shows the presence of outliers that are anomalous values. In other words, this index provides the spatial clustering of the different urban fabrics through a spatial representation and a scatterplot. This last one shows the relationship between the values of the chosen attribute at each location and the average value of the same attribute at neighbouring locations. The Moran Index represents the angular coefficient of a straight line passing through the mean values of the axes (origin of the axes if the variables are standardized). Therefore, if the points are dispersed among the four quadrants, there will be a poor spatial autocorrelation; if instead there is a clear straight line relationship, it will tend to incline towards 45 degrees and the location of the observations will allow for clear interpretation of the existing spatial relationships. The first and the third quadrant represent areas of values with positive correlations (high -

high, low - low) while the second and fourth quadrants represent areas of data with negative correlations (Figure 1).

3. The test areas

The test areas selected for this work are four suburbs located within the European historical densely built cities of Naples and London. For the London metropolitan area, the suburb of Barnet, located in the Northern part, was chosen. For Naples, the areas chosen were Chiaiano, Piscinola and Scampia. All the Neapolitan suburbs are characterized by an orographic hilly conformation that on the one hand has preserved their natural characteristics, and on the other hand has strongly transformed to allow intensive expansion in the post-war period. Suburban neighbourhoods surrounding inner London include a wide variety of urban fabrics: from the tightly packed terraces of the early railway suburbs to the high-rise estates such as Richmond. They are two very different areas in terms of settlement characteristics, functional organization and social composition, which makes them an interesting comparison test. The peripherical neighbourhoods have developed by overwhelming the constellation of villages that once surrounded the city, and this kind of urbanization process has provided London with a unique sense of character not found, for example, in other urban areas such as the American ones. In fact, the predominant residential feature is of low-rise, relatively low-density housing and industrial areas laced with local centres (Figure 2).

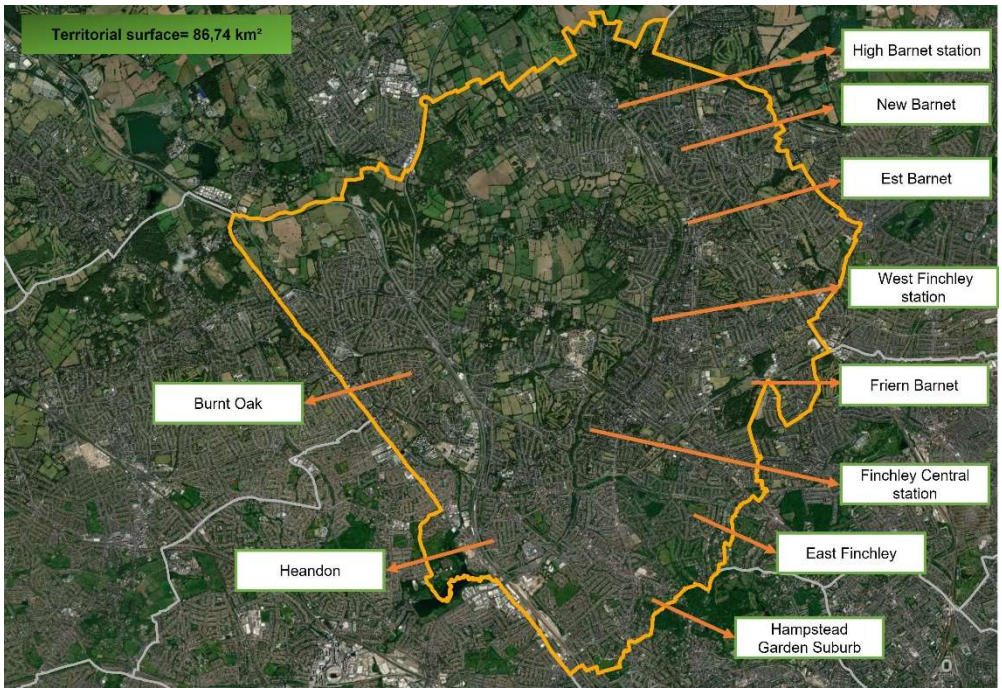

Figure 2: The suburb of Barnet in the City of London
Source: Elaboration of authors.

Nevertheless, London's suburban growth has been very uneven. Two main periods of outward expansion – the first with the advent of public transport towards the end of the 19th century and the latter between the world wars – were followed by periods of consolidation. Since the 1920s to the 1940s, rampant speculation occurred by despoiling the countryside and realizing low building quality. This urban expansion process has been

restrained by the 1938 Green Belt Act, which aimed at preventing the further outward expansion of suburbs within the current Greater London boundary. Barnet is characterised by different townscapes reflecting fully the continuous process of aggregation of villages occurring in the past centuries and the pattern of transport routes. In the first half of the last century, this settlement area, intended mainly for commuter workers, has been transformed into the current district characterized by typical suburban dwellings. After 1945, the neighbourhood expanded more gradually based on increased car ownership and extension of the bus and trolleybus networks. The introduction of the Green Belt in 1947 halted this development, setting the current scene for Barnet. Nowadays, it stands out for a rolling landscape of wide green areas and detached houses cut out by the Thames's tributaries. This morphological configuration required the introduction of Conservation Areas (defined in 1967) for the most naturalistic parts of Barnet, to preserve or enhance them (Greater London Authority, 2002). The built portions of the neighbourhood refer to urban fabrics that follow the conventional perimeter block structure consisting of houses facing onto the street with private enclosed gardens behind, representative of the traditional Victorian and Edwardian urban development. This distinctive structure, combined with the progressive and current ongoing localization of different local facilities for all ages, has provided most Barnet inhabitants with a good quality of life (Barnet Council, 2017). In fact, in the last 150 years Barnet has grown from a population of 6,400 living in villages in the mid-19th century to one of about 400,000 residents, which is further estimated to grow by 5.2% over the next 10 years (ONS, 2019). Whilst Barnet is a generally prosperous neighbourhood, in some areas such as Burnt Oak and Colindale (Northern area) inhabitants have yearly incomes of less than £15,000 (Barnet Council, 2017). In 2018, the percentage of households across the borough who were experiencing poverty was 11.8%, compared to 11.4% across London. The demographic structure of the population is characterized by the prevalence of inhabitants aged 18-64 (62%) and the dependency ratio for Barnet is expected to reduce slightly from 1.9 to around 1.8 in 2030, indicating the dependent population is growing slightly faster than the working age population. This brief socio-economic framework allows us to understand the kind of demand for services in the neighbourhood.

If the transformation of the London area surrounding the consolidated urban core took place following dynamics linked to the diffusion of new technologies and modes of transport and to processes of spontaneous urban expansion, the current suburbs of the main Italian cities have developed since the Second World War to respond to the pressing demand for housing from an ever-growing urban population. Intense migratory flows have moved the population from the small cities of central and southern Italy, where the world conflict has substantially annihilated the already scarce rural economies, towards what will be future metropolitan areas where the quality of life can be improved. Starting from the 1950s, the Italian peripheral areas began to be characterized, on the one hand, by new neighbourhoods built based on numerous variations to old urban planning instruments, characterized by high building densities, to the detriment of the provision of public spaces and collective services, and, on the other, spontaneous settlements resulting from "aggressive" building speculation. In practice, the Italian suburbs are beginning to assume completely unpredictable "forms", no longer tied to the traditional methods of subdivision dictated by the need to make the most of the land: "an entity that expands indefinitely, creating houses for those who build houses for those who have some business as a function of those who build houses for those who do some service to those who build houses…" (Fabbri, 1983). In Naples, the housing emergency resulting from the

earthquake of 1980 was superimposed on the intense phenomena of urban expansion that occurred in this period. This catastrophic event made it necessary to try to remedy the damage caused by the wild urbanization of the previous twenty years with the Plan of the suburbs (1980), which aimed at the recovery and enhancement of the settlement system of the ancient farmhouses and the creation of services, equipment and public spaces in the residential building districts that arose in the western area (mainly through private initiative) and in the north-eastern area (for mainly public initiative). The Plan of the suburbs, while representing one of the redevelopment experiences of the most innovative suburbs in Europe (the first in Italy), did not manage to reduce the discomfort and the socio-economic marginality of the areas of new expansion that arose in the years of the "building lot ", nor to stem the rampant phenomena of illegal activities perpetrated at the expense of the territory and the landscape (Macry, 2018). The main effect of this plan is to be traced back to the dynamics of redistribution of the population in a centrifugal sense: the compact and densely inhabited neighborhoods such as Vomero and Arenella are lightened and, vice versa, at least until the 1990s, the peripheries located above all in the northern urban crown of Chiaiano, Piscinola, Scampia, and Secondigliano (Papa, 1990). Characteristic elements of the urban landscape of these neighborhoods are the impressive public residential building complexes, of which the Vele di Scampia is the best known example, which have contributed to accentuating the conditions of extreme degradation and social marginalization (Figure 3).

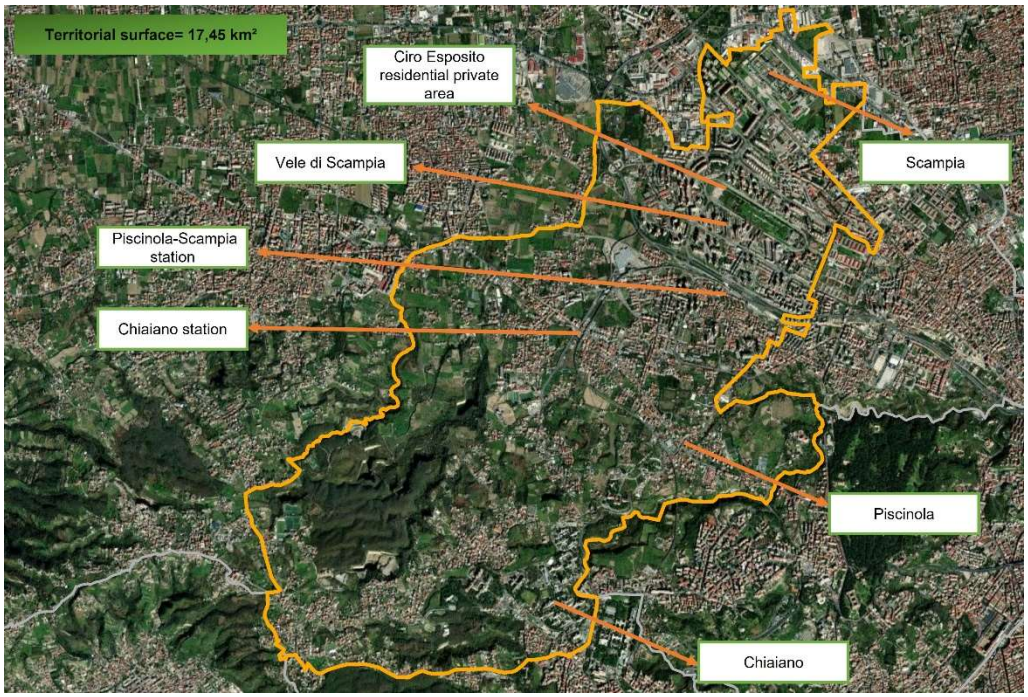

Figure 3: The VIII Municipality in the City of Naples
Source: Elaboration of authors.

However, Scampia, given the distribution of the lots, the high-speed road axes and the elevated rail line, which constitute barriers that limit relations and development potential, the significant presence of buildings intended for equipment that has not actually been completed or made functional and above all the lack of maintenance of the public spaces, seems to be an anonymous neighbourhood that is difficult to use, like the contiguous areas

of Chiaiano and Piscinola. The suburbs of Chiaiano, Piscinola and Scampia are, in general, united by an urban fabric, partly planned, and characterized by blocks of economic and public housing and the absence of services, even those of a welfare type for the vulnerable sections of the population, which has found its place in the low-income population characterised by low school attainment and early parenting. The portions of these three peripheral areas with an agricultural-naturalistic connotation, which for years have been the reservoir of natural resources for the entire city, are also at the centre of various projects aimed at protecting and enhancing them. From the description of the two areas under study it emerges that both have been invested in with different organization and design of the urban fabric, giving rise to transformation dynamics that have differentiated both the settlement and functional characteristics, making it a significant test of experimentation.

Defining which parts of an urban settlement fulfil the 15-minute city requirements, namely density, proximity, and diversity of services, by applying the proposed methodology, entails a test area that holds relevant differences of pedestrian accessibility, distribution and kind of activities and built environment characteristics, both to guarantee the reliability of the procedure and to take into consideration some of the main kinds of urban fabrics widespread in densely built European cities. Therefore, a correlation analysis was developed, to remove from the set of variables those that do not add significant increases of information to the data system (Figure 4). The correlation matrix of Naples neighbourhoods shows Pearson coefficients close to unity such as crosswalk, speed of vehicular traffic, volume of vehicular traffic, noise pollution and building height. The crosswalk variable is highly correlated to sidewalk width and state of the pavement (both positively) and with slope (negatively), suggesting that the physical characteristics that contribute to determining the usability of a pedestrian arc, while orography not favourable to the walkability of an area (high slope), can strongly penalize even good quality conditions. The speed and volume of vehicular traffic and noise pollution variables have been eliminated due to their mutual correlation, according to the fact that they refer to the safety and urban quality context that a pedestrian can perceive by walking. The building height is negatively correlated to slope, connectivity and noise pollution and these links underline, also in this case, the attention that should be placed in designing and organizing urban spaces and roads through which to move easily and safely, even in densely built and steeply sloping fabrics.

Chiaiano, Piscinola and Scampia

		Population density	Network connectivity	Slope of the network link
Population density	Correlazione di Pearson	1	-0,027	-0,042
	Sign. (a due code)		0,630	0,455
	N	322	322	322
Network connectivity	Correlazione di Pearson	-0,027	1	-,124*
	Sign. (a due code)	0,630		0,027
	N	322	322	322
Slope of the network link	Correlazione di Pearson	-0,042	-,124*	1
	Sign. (a due code)	0,455	0,027	

Barnet

		Volume of veicular traffic	Benches	Shaded paths
Volume of veicular traffic	Correlazione di Pearson	1	,084**	,274**
	Sign. (a due code)		0,007	0,000
	N	1036	1036	1036
Benches	Correlazione di Pearson	,084**	1	,089**
	Sign. (a due code)	0,007		0,004
	N	1036	1036	1036
Shaded paths	Correlazione di Pearson	,274**	,089**	1
	Sign. (a due code)	0,000	0,004	
	N	1036	1036	1036

Figure 4: Extracts of correlation matrix for the two study areas.
Source: Elaboration of authors.

Moving on to Barnet suburb, connectivity, crossroad, speed of vehicular traffic and noise pollution variables have been deleted. In fact, the first two are highly and positively

correlated to the other variables related to the pedestrian network geometry, indicating the compactness and the density of the walkable paths located in this study area. As it has happened for the three Neapolitan neighbourhoods, the speed of vehicular traffic and noise pollution variables are strictly correlated among them, as both affect the safety and attractivity of the urban context.

4. Results and discussion

The results of the research work are described by highlighting, in accordance with the methodology, maps that identify whether there is a balance between demand (users) and supply (local services) through the comparison of two spatial analyses (proximity analysis and service area analysis) in a GIS environment, which is useful to define the areas accessible within 15 minutes. From an overview of the maps, it immediately emerges that the areas served in 15 minutes constitute only a small portion of the eighth municipality of Naples compared to the suburb of Barnet (Figures 5-6).

In particular, it is clear that the areas accessible in 15 minutes are only a quarter of the entire neighbourhood under study. Access to local services is evident in the areas adjacent to the Chiaiano and Piscinola-Scampia underground line. It is evident from the presence of a high functional mix of local services due to the planning logic that the station areas are strategic places in which to locate new activities. Although the areas have a mix of activities, users served in the area near the Chiaiano station can take advantage of a network of pedestrian paths that are safer and more usable than those in the area adjacent to the Piscinola-Scampia station.

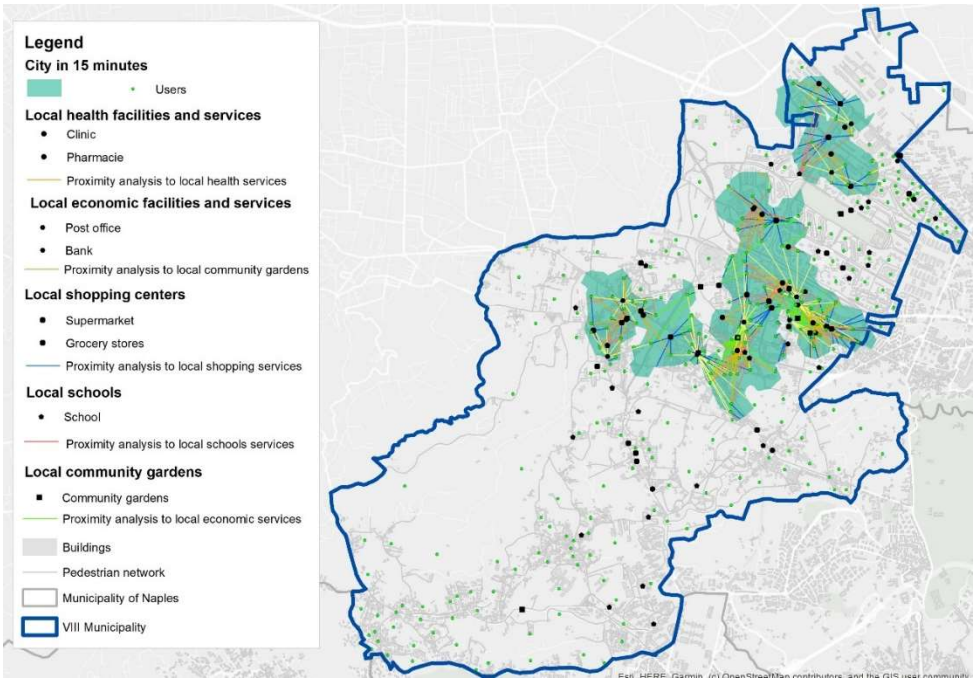

Figure 5: 15-minute city area within VIII Municipality and proximity distances within and out of the 15-minute area.
Source: Elaboration of authors.

Finally, in the areas bordering the sails and Scampia Park, planning activities related to economic and social housing also involved the inclusion of some activities such as local

health and economic services to serve these residences. This area is also characterized by suitable pedestrian accessibility both in the west and east of the neighbourhood. The map shows how much higher demand is compared to the supply of local services present. These considerations are completely overturned within the London suburb of Barnet, where demand is largely satisfied by a mix of functions at the local scale, except around the metropolitan green belt, outlining a planning system already responding to an idea of a 15-minute district. Downstream of these considerations, it is possible to note how the infrastructural network of public transport by road and rail within the London area has influenced the location of the urban services that are more widespread in those areas close to the railway stations of Finchley Central, West Finchley, Woodside Park and High Barnet. Furthermore, in the areas adjacent to the stations, as in the cases of New Barnet, East Barnet and Friern Barnet, there is a widespread presence of well-distributed local services connected to the residences. The location and distribution of the activities contributes to guaranteeing an adequate level of quality of life, also evidenced by the monthly rental cost of the houses, which is among the highest in the London city. The same consideration can also be made for areas such as Hendon and Burnt Oak. It is worth noting that East Finchley and Hampstead Garden have a functional mix that is still accessible in 15 minutes on foot, even if the real estate value is lower than the entire Barnet neighbourhood.

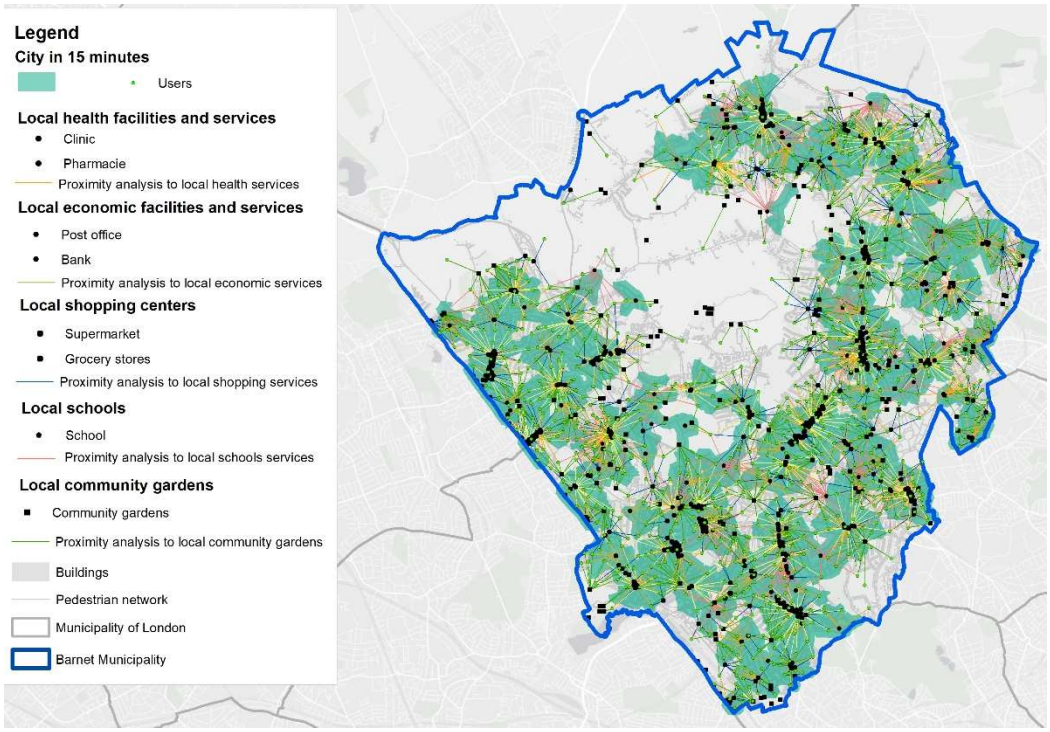

Figure 6: 15-minute city area within Barnet and proximity distances within and out of the 15-minute area.
Source: Elaboration of authors.

In the second part of the research work, the outputs obtained regarding accessibility to urban areas were compared with two urban indicators, the first being the population density and the second the density of buildings. The comparison with the population density for the VIII Municipality shows that the areas accessible in 15 minutes are also

areas with a high population density, even if the areas adjacent to them with a high population density are devoid of necessary services. In detail, the analysis of the total population served in the 15 minutes demonstrates that 34% of the population is served, while 66% is not served. This highlights how the VIII Municipality is characterized as a place of marginalization and degradation. In contrast, the outputs obtained for the Barnet neighbourhood show that areas with a high population density are those that are fully served in 15 minutes. From the partition of urban areas into 3 classes using the natural breaks method with regard to population density, it turns out to be about 85% served and only 15% not served.

This highlights the strong gap in the two territorial contexts even though both are characterized as peripheral places. The suburbs of London can be defined as "independent neighbourhoods" in terms of local services and amenities that residents can easily reach on foot or by bicycle, unlike most of the suburbs of many big Italian cities, that can be considered as places of degradation and social marginalization.

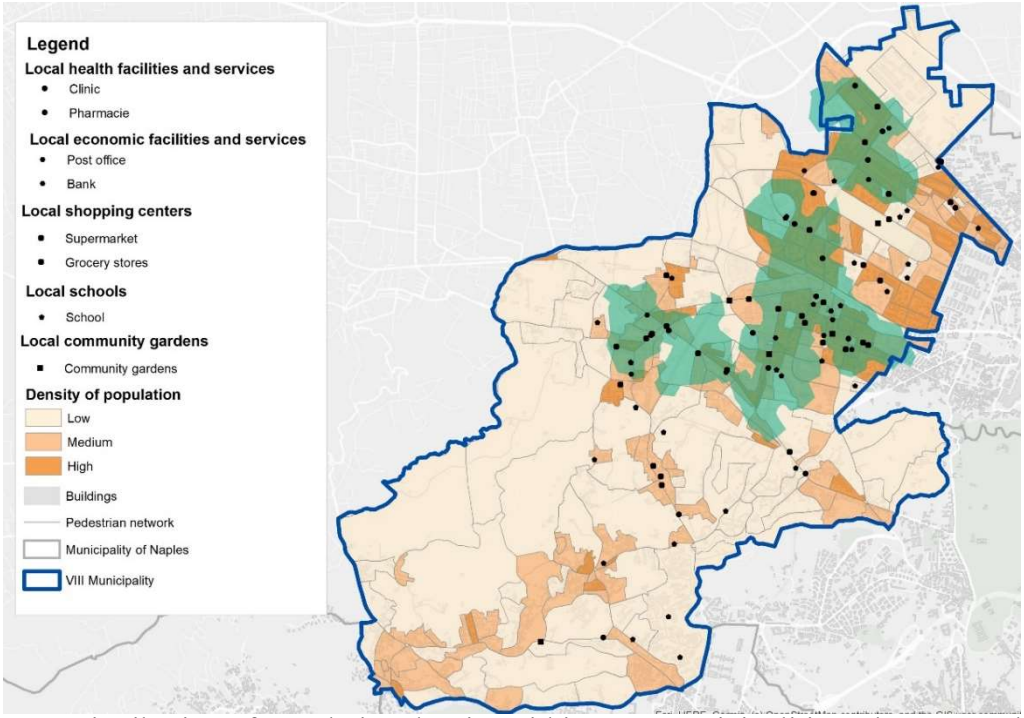

Figure 7: Distribution of population density within VIII Municipalities. The areas colored in green are the 15-minute ones.
Source: Elaboration of authors.

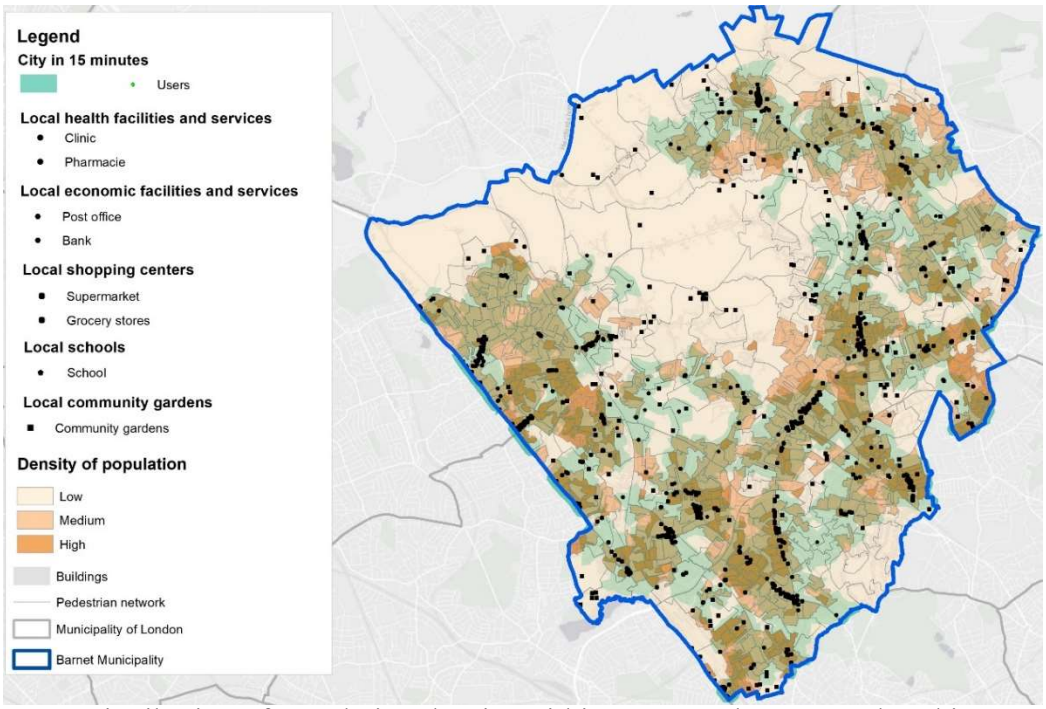

Figure 8: Distribution of population density within Barnet. The areas colored in green are the 15-minute ones.
Source: Elaboration of authors.

The second comparison with the building density has been made by measuring the latter through the Moran Index. This Index defines how much a variable is autocorrelated by making a comparison between the value that a variable (the building density) assumes in the i-th cell and the values assumed in the contiguous units. In practice, this index allows to identify the parts of the urban fabric characterized by similar values of the building density. Figures 9 and 10 allow to identify the following five clusters: the HH cluster consisting of high significance values; the LL cluster consisting of low values; the HL cluster consisting of mainly low values around an anomalous value; the LH cluster consisting of mainly high values around an anomalous value. In particular, Figure 9 highlights that the south-eastern part of Naples suburbs is the result of a process of spontaneous and uncontrolled urban transformation that has progressively urbanised highly natural areas, according to the values of the Moran Index that classifies this area as an LL area. The northern area of the Neapolitan suburbs, on the other hand, is the result of a regeneration project of economic and social housing which, however, has determined the isolation of this part of the neighbourhood compared to the neighbouring territory (see also Figure 3). The comparison between Figure 7 and Figure 9, which show the overall outputs of the proposed methodology, highlights that the 15-minute area consists mainly of the original nucleus, which extends between the districts of Scampia and Piscinola and around to which the planned and unitary urbanization process took place. With reference to Figure 10, it is possible to note that the London district has been interested by a broader and more careful urbanization process, compared to the Neapolitan case, carried out by urban partitions, and which has determined a high-density residential fabric in a more consolidated part and a more recent fabric. In fact, the Moran Index is characterized by a high fragmentation of clusters classified between HL and LH. The comparison between Figure 8 and Figure 10 shows that the expansion of the urban fabric took place with the

aim of satisfying both residential and functional demand linked to local services. The comparison between Figure 7 and Figure 8, which contain the overall outputs of the proposed methodology, highlights that the 15-minute neighbourhood is made up of the original nucleus around which the planned and unitary urbanization process took place. Instead, for the London suburb, Figure 10 shows that the district has been the subject of a wider and more careful urbanization process carried out by urban partitions and which has determined a residential fabric with a high building density in the most consolidated part and a fabric of more recent training aimed at favouring the coexistence of different functional and settlement characteristics. For this reason, Figure 10 shows a high fragmentation of the clusters identified by the Moran Index between HL and LH. From the comparison between Figure 8 and Figure 10, we see that the expansion of the urban fabric took place with the aim of satisfying both the residential demand and local services.

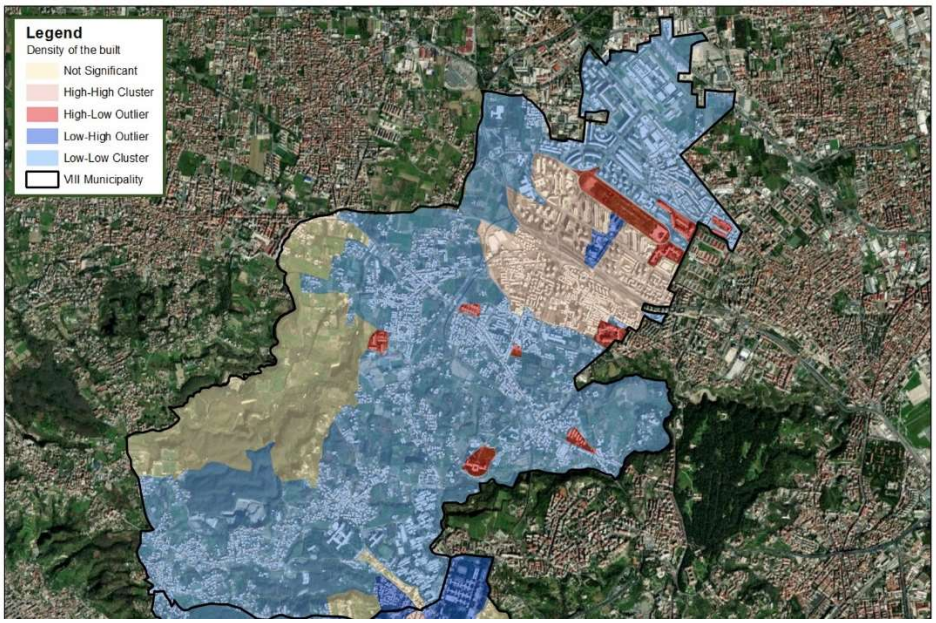

Figure 9: Moran Index of building density within VIII Municipality (Naples)
Source: Elaboration of authors.

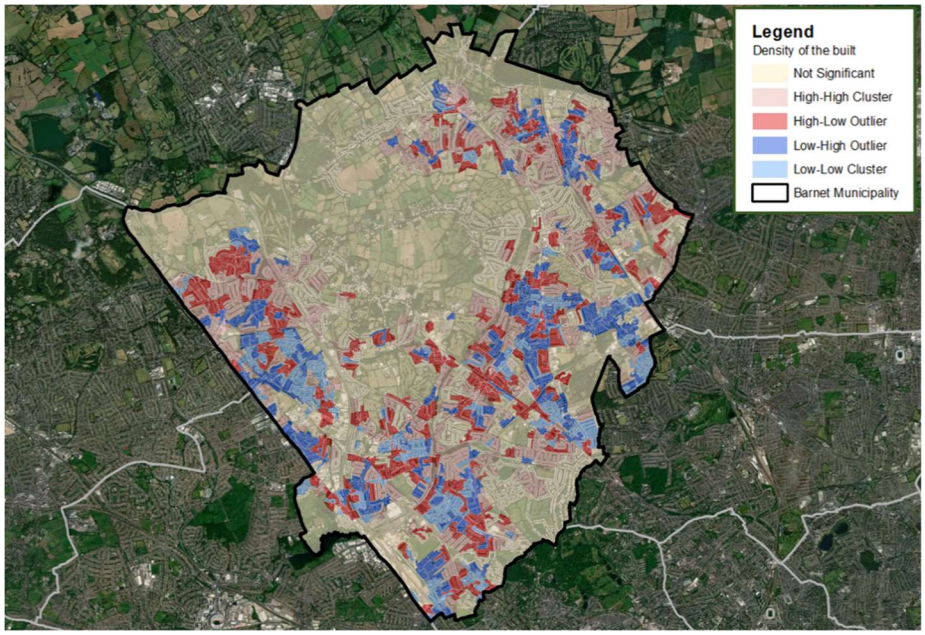

Figure 10: Moran Index of building density within Barnet (London)
Source: Elaboration of authors

5. Conclusions

This work aims at achieving a twofold objective: on the one hand, to offer useful insights on the idea of the 15-minute city, due to the intrinsic characteristics of an urban system and the governance of urban and territorial transformations; on the other hand, to provide a quantitative method whose results can support local decision-makers in defining useful solutions for a city that is more accessible (above all for pedestrians) and consequently more liveable. In relation to this last goal, a spatial analysis procedure was developed to identify the advantages and shortcomings of some suburbs located in the two densely built European cities of Naples and London. The operational results can constitute a first support for public administrations oriented to make neighbourhoods safer, more accessible and well connected for pedestrians, to offer high quality public and open spaces and to provide services that support local life. This work also highlighted that the idea of a 15-minute city already characterizes the urban transformation processes of large cities such as London. Here, in fact, the construction of a city in 15 minutes takes place both by working on the individual neighbourhoods and by promoting the connection between each of them and the remaining urban context of which they are part. A note is that, as the analysis was undertaken based on administrative districts, the findings may be subject to the modifiable areal unit problem (MAUP) at the district boundaries. In general, it is possible to affirm that the idea of a 15-minute city can be a renewed opportunity to trigger positive changes in urban regeneration and revitalization, capable of contributing to guaranteeing greater well-being, social equity and even climatic benefits. This means, first of all, intervening on spaces and canals, accentuating their pedestrian usability and their attractiveness so that these spaces, especially in the peripheral areas, can favour the carrying out of activities of aggregation and social inclusion. In this way, it can be possible to improve health, well-being and reduce carbon emissions for the future of our communities and for post-COVID recovery.

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The work, although the result of a common reflection, was divided as follows: Gargiulo C. wrote paragraph 1; Gargiulo C., Gaglione F. and Zucaro F. wrote paragraph 2; Zucaro F. wrote paragraph 3; Gaglione F. wrote paragraph 4; Cottrill C. wrote paragraph 5.