


# “Geographies” of primary healthcare access for older adults in the Lisbon Metropolitan Area, Portugal – a territory of differences<sup>1</sup>


“Geografias” do acesso dos idosos aos cuidados de saúde primários na Área Metropolitana de Lisboa, Portugal – um território de diferenças

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## Abstract

Several authors have reflected upon access to health services considering several dimensions, such as availability and accessibility. Due to the aging of societies, the older population's demands for healthcare increase, and accessibility to these units acquires special importance. Our study aims to characterize the access of older people to healthcare services, facing the possibilities arising from service supply and demand patterns. From the supply and demand confrontation, comes the possibility of identifying intraregional dynamics and associating them with the various socioeconomic conditions of older people, family background, modes of transportation, and type of service. This approach considers two methodological phases: calculating the potential for primary healthcare coverage, considering physical accessibility for pedestrian and highway modes; and confronting these values with services demand, determined from surveys conducted with residents. We concluded that, although healthcare centers were designed as a proximity service, service provision, socioeconomic aspects, and the urbanization model entail meaningful inequalities of access in the context of the Lisbon Metropolitan Area.

**Keywords:** Accessibility; Primary Healthcare; Older Population; Network Analysis; Lisbon Metropolitan Area.

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## Resumo

Vários autores têm refletido sobre a questão do acesso aos serviços de saúde, considerando a existência de várias dimensões, nas quais se inclui a disponibilidade e a acessibilidade. No contexto de envelhecimento que caracteriza as sociedades, a população idosa precisa de mais cuidados de saúde, e a acessibilidade a essas unidades assume importância acrescida. O objetivo do estudo é caracterizar o acesso da população idosa aos serviços de saúde, confrontando as possibilidades decorrentes da oferta de serviços com os padrões de procura. Do confronto entre oferta e procura resulta a possibilidade de identificar as dinâmicas intrarregionais e associá-las às diferentes condições socioeconômicas dos idosos, ao seu enquadramento familiar, modo de transporte e tipo de serviço. Esta abordagem considera duas fases metodológicas: o cálculo do potencial de cobertura populacional das unidades de cuidados primários, considerando a acessibilidade física recorrendo aos modos pedonal e rodoviário; o confronto desses valores com a procura dos serviços, determinada a partir de inquéritos realizados aos residentes. Concluiu-se que, apesar dos equipamentos de saúde prestadores de cuidados primários terem sido programados como serviço de proximidade, a forma de prestação do serviço, as características socioeconômicas da população idosa e o modelo de urbanização apontam para diferenças relevantes no contexto da Área Metropolitana de Lisboa.

**Palavras-chave:** Acessibilidade; Cuidados de Saúde Primários; População Idosa; Análise de Redes; Área Metropolitana de Lisboa.

## Introduction

When it comes to public health policies, the aging process implicates an increasing importance to the accessibility of healthcare services; both primary -which ideally operates and responds to a logic of physical proximity - and hospital - which plays a major role for this age group for the incidence of and mortality caused by diseases that require differentiated care.

This article focuses on the access to health services in the context of population ageing. Our objective is to assess the primary healthcare access for older people by confronting services provision with demand patterns, identifying the main factors to impair their access. For the older population, service proximity and the consequent possibility of reaching it in a short time represents a positive differentiating factor that promotes equity, considering the options of transportation by pedestrian and highway modes.

We compared the supply analysis with the demand analysis, performed by surveys that assessed the primary healthcare access for the older population regarding area of residence, service proximity, mode of transportation, access time, and type of service.

This article is structured into five parts; this introduction corresponds to the first of them. The second part comprises a bibliographic review of the concepts of *access* and *accessibility* -mainly in the context of population ageing- stressing the problems and barriers to the access of primary healthcare services by the older population. The third describes the methodology and the study area. The fourth presents the potential access to primary healthcare and analyzes the patterns of effective demand resulting from the survey, discussing the key factors that explain these results. The final part reports the main conclusions.

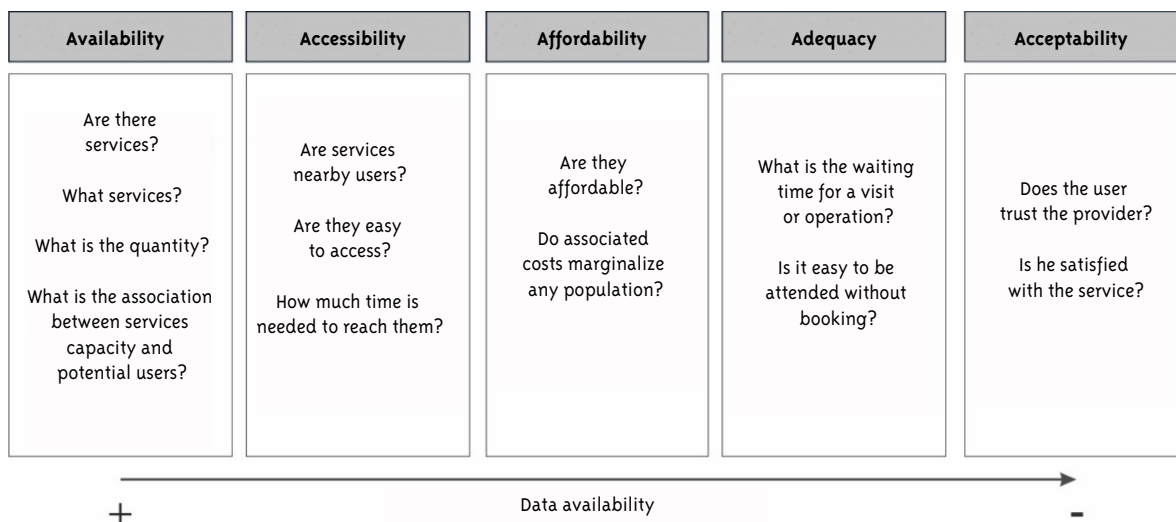
## Discussing access to healthcare services within the context of an ageing society

The access to health services has always been meaningful; both in underpinning health policies, and, in broader approaches, emerging as an equity factor, essential for policies in the fight against vulnerability in its social and territorial slopes. Thus, it is essential to understand the concept of access, often used only as an allusion to physical accessibility. From the 1960s to the 1990s, several authors defined access as a more complex process than simply transportation, adding to the term a conceptual rationale that could translate its various dimensions and define the goals of health policies (Donabedian, 1972; Penchansky, New Year; Thomas, 1981). Donabedian (1972) argued that the access is use of the service, not simply the presence of a facility; outlining that proof of access is more than demonstrating use of a service

Penchansky and Thomas (1981) and Penchansky (2001) provided a theoretical rationale to clearly distinguish access from accessibility. For them, access comprises five dimensions of analysis: availability, accessibility, affordability, adequacy and acceptability. These principles constitute a methodology called **the 5A's of access**, which illustrates, on the one hand, providers' ability to provide health services and, on the other, users' ability to use them (Figure 1).

“Availability” refers to whether certain services are present or absent, as well as their quantity. “Accessibility” poses questions of whether services are nearby users, are easy to access, and the amount of time taken to reach them. A set of analyses, mainly quantitative, must be performed to answer these questions, focusing on calculating spatial and temporal distances and healthcare coverage according to different space/time profiles. “Affordability” associates the cost of service using with users' ability to afford it.

**Figure 1 – Dimensions of analysis of the 5A's of access**



Source: Palma, Marques da Costa and Marques da Costa (2017), adapted from Penchansky and Thomas (1981)

The other dimensions are related to users' expectations towards service provision; for implying greater subjectivity, collecting data on it is more difficult. "Adequacy" refers to service organization and convenience. "Acceptance" refers to user's trust and satisfaction regarding the provided service.

For Penchansky and Thomas (1981), measuring access implies evaluating these five dimensions. However, data availability impairs analysis accuracy. Collecting data on the five dimensions was unfeasible; thus, we must consider that the analysis will not represent the full reality, and that "availability" and "accessibility" may suitably reflect transport system efficiency, services distribution patterns, and territorial equity.

Recently, Saurman, Kirby and Lyle (2015) and Saurman (2016) added a sixth dimension, classified as "knowledge." It accounts for the communication and dissemination of knowledge on services and health in general by clinicians, patients and general community.

Levesque, Harris and Russell (2013) developed a new approach to access, assimilating two components: (1) the one that considers accessibility in five dimensions, adopting the perspective of Penchansky and Thomas (1981), - accessibility itself (approachability); affordability; acceptability, availability and appropriateness; and (2) the five corresponding abilities of populations interact with the dimensions of accessibility - ability to perceive, ability to seek, ability to reach, ability to pay, and ability to engage.

Although access to health is discussed and described under different forms, the literature agrees that it stems from the characteristics of people, families, and social and physical environments, associated with the characteristics of healthcare systems and services. These characteristics include age and gender. Service needs, and demand forms and frequency differ according to age. This difference is accentuated when age is combined with income, determining different levels of transportation and, consequently, access to health services.

Population ageing is a major global trend in the 21st century, especially in Europe and

North America; thus, it is important to analyze the healthcare access conditions for the older population. Aging is portrayed within the increasing average age of a population, the strengthening of the older adults' weight, and the growing rates of aging. According to Villaverde Cabral et al. (2013), this aging process can be understood from two perspectives: a positive one, which reflects the economic, social and biomedical progress resulting from public policies of generalized access to healthcare; and a negative one, which reflects the consequences of aging combined with the reduction in fertility rates - population decline and increased health spending (Rodrigues; Martins, 2014).

The growth in the number of older people, as main health services users, foresees an increasing susceptibility to illnesses and request for support services (such as home care and continuous or palliative long-term care), the need for readjusting services and training professionals, and a striking importance of informal caregivers. These changes should be considered when formulating public health policies (Coelho, 2016).

The probability of an older adult using a healthcare center is driven by several factors, including demographic characteristics (age, gender, area of residence, and marital status) and socioeconomic conditions (education and income). One of the main problems regarding healthcare faced by older adults, especially in low-income countries, is the increasing costs of medical services (He; Muenchrath, M.A. Kowal, 2012). Other studies show that the various determinants for accessibility of health services for older adults vary according to area of residence and modes of transportation (MA et al. 2018).

The World Health Organization (WHO, 2015) has identified a set of barriers regarding access to health services faced by older adults. In low- and lower-middle-income countries, the greatest barriers are transportation and visit costs (when paid). According to the study, over 60% of older people did not access healthcare because they could not afford transportation and/or visit. This situation is intensified for people who live in rural areas, as differentiated health care is

concentrated in cities, involving greater transportation and costs. Another important aspect is household composition: older people living by themselves, with their spouse, with family members, or physically nearby to a family member who, as a last resort, can help to bear the cost/expenses and provide transportation, improving the older adults' conditions. Even in high- or upper-middle-income countries, 12.1% and 19.3% of people, respectively, reported having difficulty in transportation; likewise, transportation costs corresponded to 8% and 13.9% respectively. These high values demonstrate transportation relevance in accessing the services. (WHO, 2015). In Portugal, this factor was enhanced by the crisis, which accentuated the difficulties of healthcare access for older adults (Doetsch, 2017).

Siegel et al. (2016) refer to the specificities to healthcare access in rural areas. For van Gaans (2018), improving access to health services could be improved by matching services to the population that they serve.

The analysis rendered a set of determinants for providing healthcare services, which are also common trends to the evolution of the traditionally called social services, so-called services of general interest (Marques da Costa; Palma; Marques da Costa, 2015). Some of these determinants reach a global scale, displayed in several countries with different intensities; while others are local or regional. The multiple determinants and the complex relationships established among them, as well as the different sensitivity evoked by each type of service promote a wide range of contexts and levels of access to care, especially by the older population (EC, 2002). Portugal is an ageing society, impacting not only its demographic dynamics, but also its response dynamics regarding health services and social support (Rosa, 2016).

## Methodology and study area

The study was performed in the Lisbon Metropolitan Area (LMA). It is spread over 3015km<sup>2</sup>, formed by 18 municipalities, and has a population of

2,821,876 inhabitants - corresponding to a population density of 936 inhabitants/km<sup>2</sup> (INE, 2011).

This study aims to assess the primary healthcare access for older adults in LMA and confront it with demand patterns. The methodology implies two methodological steps. First, from the GIS-modeling of multimodal complex road network, we will calculate the potential for primary healthcare coverage, considering physical accessibility to the centers. We evaluated different spatial distance and time thresholds -less than 15 minutes, 15 to 30 minutes, 30 to 60 minutes, and over 60 minutes- for pedestrian mode -walking speed of older people set at 3.5km/h and walking speed of older people with disabilities set at 1.6km/hour (Falcão, 2011)- and highway mode - according to the maximum travel speed in the corresponding stretch of road. For the pedestrian mode, the standard value for the walking speed of the general population, set at 4.5km/h, was also considered. This allowed us to contrast the potential access for residents with the older population, which moves at lower speed.

In the second step, we conducted surveys with older adults living in LMA municipalities to identify the demand for primary healthcare within this population. The survey allowed us to analyze three groups of queries:

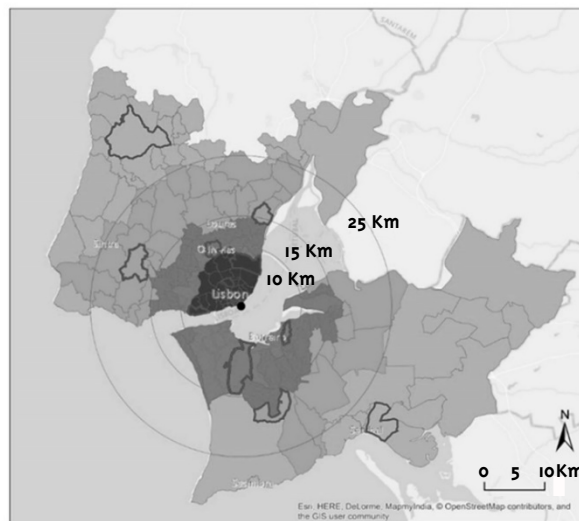
- Who?: characterizing respondents over 65 years old by income, household constitution (whether they live by themselves, with a partner, or with family members) and area of residence;
- Where?: characterizing health services demand, considering their location into three major categories: nearby respondents' residence, within their municipality, and in other municipalities.
- How?: identifying modes of transportation, highlighting walking/cycling, individual and collective transportation, or a combination of modes.

**Figure 2 – Study area: Lisbon Metropolitan Area, Portugal**



Source: DGT (2018)

**Figure 3 – Definition of areas where surveys were performed**



LMA rings

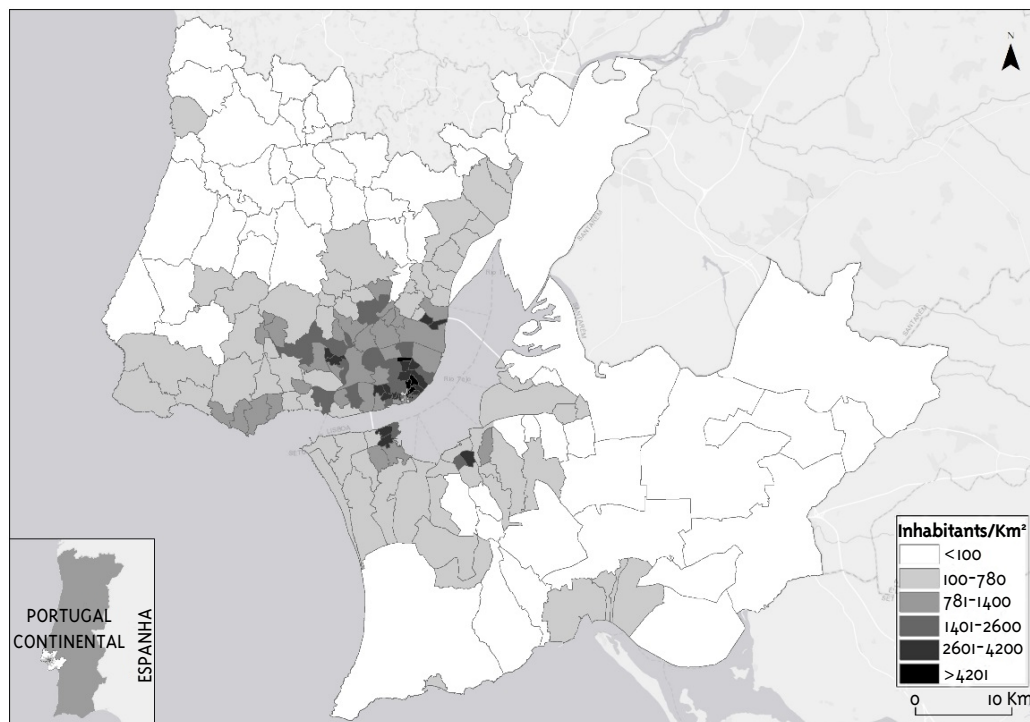
- Central area - Lisbon City
- 1st ring
- 2nd ring
- 3rd ring
- 4th ring
- Study area
- Downtown

Source: Louro (2019)

The survey was conducted in 2017 to 89 households, representing 131 older adults.<sup>2</sup> These surveys were distributed over five study areas, here called rings, considering the central area of Lisbon and four rings characterized according to their distance from it: the 1st ring, which includes all localities less than 10km away from the central

area; 2nd ring, all localities from 10km to 15km away; 3rd ring, all localities from 15km to 25km away; and the 4th ring, localities over 25km away from the central area (Figure 3). Each ring has a different level of population density, building density, older population density, and public transport services.

**Figure 4 – Density of population aged 65 and over, by ring (inhabitants/km<sup>2</sup>), 2011**



Source: INE (2011)

## Accessibility to primary healthcare for the older population in the Lisbon Metropolitan Area: supply versus demand

We aim to confront health services supply and demand regarding the older population. We shall initiate the analysis by services supply and their accessibility potentials.

It is worth mentioning that primary healthcare in Portugal comprises the Groups of Health Centers (ACES), which include family health units (USF) and Personalised

Health Care Units (UCSP). (Decree-Law No. 28/2008) (Portugal, 2008). Figure 5 shows the distribution.

An analysis on primary healthcare indicators, performed in 2019, shows different levels of access to the service according to the ring (proximity from the central area). The potential supply (calculated from the population within the influence area of each health unit) was greater than 100% within all rings, except the 3rd.

However, when analyzing the functioning equipment (until 6 p.m. or 8 p.m.), these values considerably decrease, reaching extremely low values within the influence area of the ring 2. If we consider healthcare coverage based on services

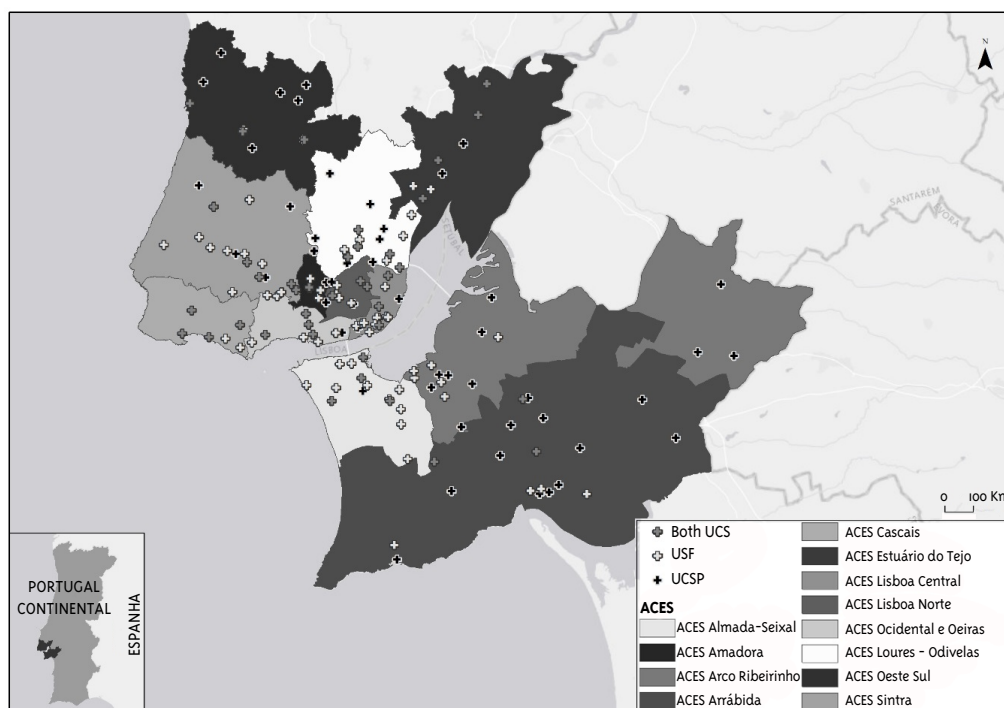
<sup>2</sup> Margin of error at 4.9% at a significance level of 95%.

opening hours on weekends and on public holidays until 2 p.m. the percentage of attended people decreases even more, reaching around 60% and 70%.

Considering the current ACES' distribution, the potential accessibility analysis shows that 40% of the

total population is less than 15 minutes on walking distance (reflecting the logic of proximity). But when considering the older population, only 30% lives within this distance, stressing age differentiation and its territorial consequences (Figure 6).

**Figure 5 – Groups of Health Centers located in the rings and municipalities of the Lisbon Metropolitan Area, 2019**



Source: Prestadores... (2019)

**Table 1 – Indicators of primary healthcare provision in the Lisbon Metropolitan Area, 2019**

	Maximum operating capacity of equipment (No. of inhabitants)	Potential supplied population (%)	Population supplied by equipment open until 18h or 20h (%)	Population supplied by equipment open on weekends/holidays until 14h (%)
Central Area – Lisbon	515.195	101.8	87.9	63.6
1st ring	1.061.269	108.3	95.5	68.9
2nd ring	303.294	110.7	40	40
3rd ring	603.262	97.8	90.5	66.7
4th ring	518.066	113.5	78.3	68.1
Potential supply population	3.001.086	105.9	88.4	78.4
Total LMA population	2.821.876			

LMA: Lisbon Metropolitan Area.

Source: Prestadores... (2019) and INE (2011)



**Table 2 – Population accessibility (distance/time) to primary healthcare services by pedestrian and highway modes, 2019**

Travel time	Pedestrian						Highway	
	Total population		Older population				Older population	
	Speed 4.5km/h		Speed 3.5km/h		Speed 1.6km/h		Maximum travel speed in the stretch of road	
	No.	%	No.	%	No.	%	No.	%
<15 min	1.136.111	40%	154.056	30%	35.883	7%	509.442	99%
[15-30 min[	1.136.364	40%	206.901	40%	98.509	19%	3.041	1%
[30-60 min[	448.580	16%	121.059	24%	223.345	43%	744	0%
>60 min	100.821	4%	31.826	6%	156.105	30%	615	0%
Total	2.821.876	100%	513.842	100%	513.842	100%	513.842	100%

Source: Prestadores... (2019) and INE (2011)

By confronting the supply and demand analyses, performed by the surveys, we found that older population demand for healthcare services depends on several factors. Besides living in different urban contexts, we should consider individuals' household environment, which represent distinct characteristics and income.

Our study sample was mostly formed by older adults living by themselves (53.9%) or with a partner (23.5%). This high percentage of aggregates composed by a single element explains the strength stalling low-income classes (21.3% of the sample earn below 500 euros/month, and 44.9% between 500 and 1000 euros/month).<sup>3</sup>

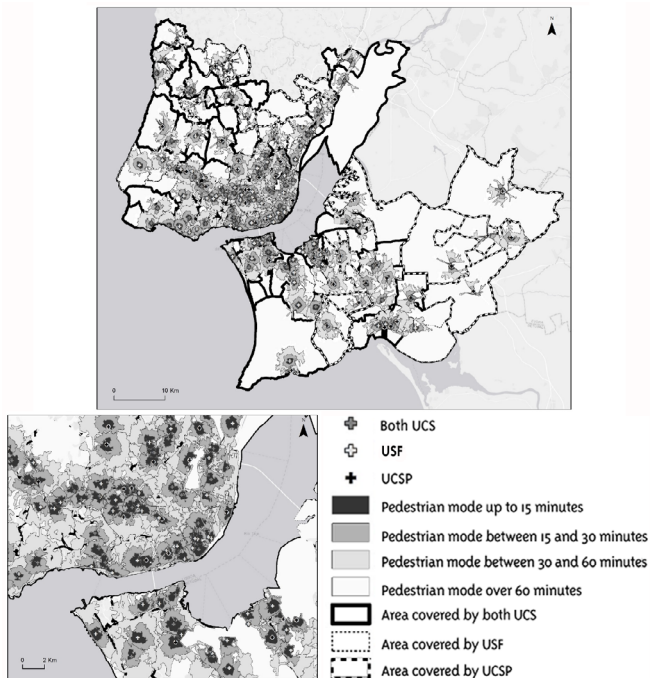
Our analyses on the pattern of demand for healthcare services by older adults revealed that: 49.4% use services within their ring of residence; 21.3% use services in other rings, but still within the municipality; and 18% use services in other municipalities. The remaining use services in several other locations, presenting no place of preference.

Regarding mode of transportation, 35.2% of the sample reported taking less than 15 minutes by

pedestrian mode, 14.3% reported taking between 16 to 30 minutes. Although we have discussed proximity of healthcare services, a high percentage of older people use individual transportation (48.1% for travels below 15 minutes and 28.6% for travels between 15 and 30 minutes) (Table 3). This reflects two situations: on the one hand, the possibility of resorting to a private primary care provider that may not be in close proximity, forcing a great distance travel and the use of automobiles (which explains both the 33.3% for travels between 30 and 60 minutes, and the high percentages for travels below 30 minutes); on the other, the miscellaneous occupation processes within the LMA rings caused some of them to present lower and more dispersed density, allowing health services to be located in the logic of proximity, demanding less frequent public transport services and encouraging the use of individual transport - including by older adults (Louro, 2019; Marques da Costa, 2011). We also found that higher income and education level translate into a greater possibility of possessing automobiles, which guarantees the access of the older population to healthcare services in less time.

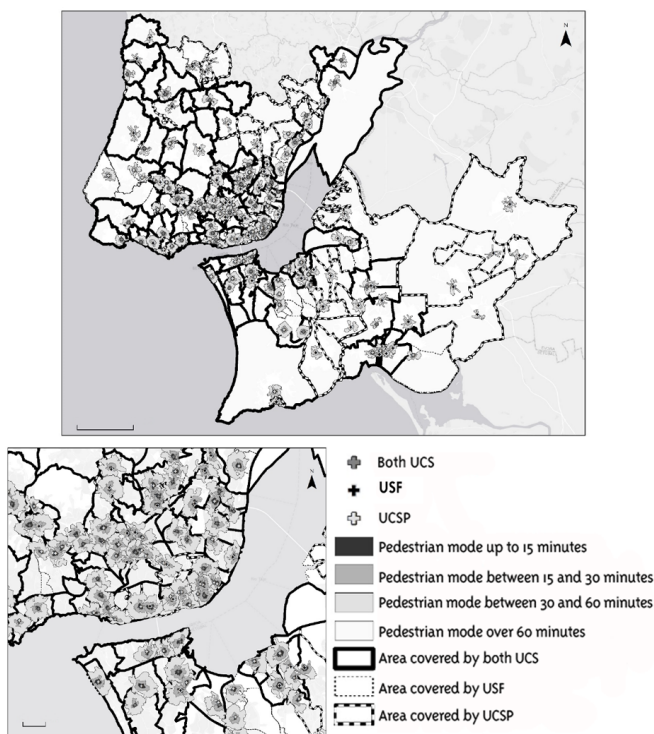
3 For reference, in 2018, the minimum wage in Portugal was 649.83€, whereas in Luxembourg it was 2,071.10€ (MINIMUM..., 2020).

**Figure 6 – Accessibility to primary healthcare services (distance/time) of the older population by pedestrian mode, 2019 (speed 3.5km/h)**



Source: Prestadores... (2019)

**Figure 7 – Accessibility to primary healthcare services (distance/time) of the older population with disabilities by pedestrian mode, 2019 (speed 1.6km/h)**



Source: Prestadores... (2019)

**Table 3 – Modes of transportation used by the older population to access primary healthcare services (%), 2017**

Mode of transportation	15 min	15-30 min	30-60 min	Did not answer	Total
Individual transport	48.1	28.6	33.3	12.5	39.3
Public transport	7.4	47.6	33.3	0	18
Smooth modes	35.2	14.3	0	0	24.7
Modes combination	9.3	9.5	33.3	12.5	11.2
Did not answer	0	0	0	75	6.7
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Louro (2019)

Demand analysis showed that human mobility by pedestrian mode are more expressive in Lisbon central area, decreasing in importance from the center to the rings 1 to 4. In the central area, pedestrian mode is the most expressive, but individual transport also plays a significant role, denoting the presence of residents with economic capacity to resort to private services, to which they travel by automobiles. In the 4th ring, automobiles are the most used transport. This territory comprises a lower population density and a greater fragmentation of the urban fabric, so that its population requires an automobile to access the closer health service.

## Final considerations

This study showed the determinants factors of primary healthcare access for the older population in LMA. The results indicate two major groups of factors:

- the first corresponds to a set of social determinants associated with the population socioeconomic characteristics (such as income and automobile-ownership) that provides greater travelling flexibility and, consequently, access to services. We found that higher income and education level translate into a greater chance of possessing an automobile and choosing the service, as well as more freedom to access it by its preferable mode of mobility;
- the second corresponds to settlement and distribution of primary healthcare units. The rings with higher population and building

density naturally represent the areas with greater health services density. For rings with lower and more dispersed population density, to the existing primary health services to reach minimum demand thresholds to function, their area of influence needs to be wider; thus, access times are higher. That is, considering the analyzed rings, Lisbon central area presents greater population density, older population density, and primary healthcare services density; as we move away, to the rings 1, 2 3 and 4, population and building density decreases and services area of influence increases. Thus, some LMA rings do not meet the desired coverage levels: to reach a primary healthcare service within less than 15 minutes by walking.

The determinant factors for accessibility to proximity health services are accentuated in the older population - characterized by lower income and mobility. This reinforces the need for deepening the studies of their accessibility to healthcare services, so that public policies may be more effective.

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### Authors' contribution

Eduarda Marques da Costa was responsible for the theoretical component; support for the collection of information related to health services; discussion of results and conclusions. Nuno Marques da Costa conducted information collection, systematization and processing, including the calculation of health services accessibility indicators; discussion of results and conclusions. Ana Louro conducted information collection, systematization and processing related to health services; surveys looking for health services; and discussion of results. Marcela Barata conducted information collection, systematization and processing, including the calculation of health services accessibility indicators.

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