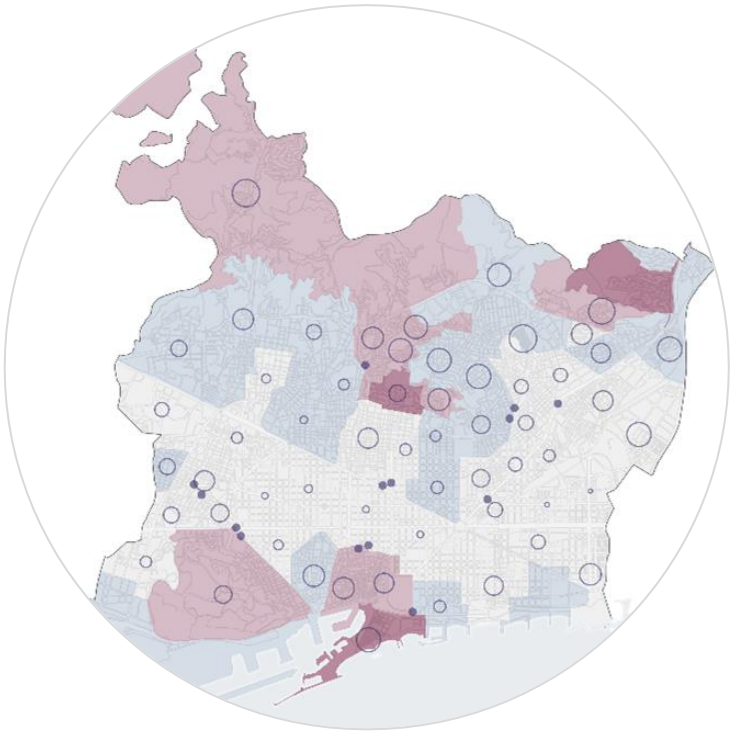
TERRITORIALISATION OF RISKS

RESILIENCE PLAN DIAGNOSIS



Where are the people with the greatest number of factors that condition their everyday walking mobility located?

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Urban Resilience
Department

Ajuntament de Barcelona

TEXT

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Introduction

Global development trends are leading to populations being largely concentrated in urban areas. According to United Nations data, today more than 54% of the world's population is concentrated in cities, and this figure is expected to rise to 68%, or 6.3 billion people, by 2050. Consequently, cities play, and will increasingly play, a key role in human development, in fostering living conditions that guarantee protection, health, equality, equal opportunities and well-being for their inhabitants.

This is the context in which applying the concept of resilience to citizens and urban systems makes sense. Urban resilience is understood as the capacity of a city to prevent, or when faced with unavoidable situations, to minimise, the impact of the natural and anthropic risks it is exposed to, whether acute shocks or chronic stresses, and to recover in the shortest possible time in order to maintain essential functions.

The main shocks that Barcelona is exposed to derive from the effects that climate change may have on the city. On the other hand, most of the stresses that the city is exposed to come from the social, environmental and economic domains.

Thus, within the framework of the development of Barcelona's resilience plan, a study was carried out to identify and define the risks that could affect the city's public spaces.

First of all, with the aim of defining a list of the key risks that threaten Barcelona's public space, a working session was organised in March 2019 with around twenty municipal representatives from the different departments involved in the design, management and maintenance of public space, as well as professionals involved in ensuring peaceful coexistence and the provision of social services in the city. At the meeting, there was a general consensus regarding the concerns and risks that were deemed the most critically important: homelessness and atmospheric pollution. In second place came concerns regarding the heat island effect, intense rainfall, drought, crime, terrorist attacks, tourist pressure, ageing infrastructure and traffic congestion. Based on this classification, the next step was to restructure and refine the resulting table of risks by incorporating the comments received, and so identify a list of questions on how each risk might affect the city's public space.

Finally, based on the questions posed, and focusing the analysis on the most vulnerable groups, a risk assessment procedure was developed in order to map the points at which the places in the city with the highest levels of risk intersect with the areas that the section(s) of the population vulnerable to a particular risk are most likely to use or to live. For those risks that it was possible to map, the information used had in some cases already been studied in other contexts, meaning that it was only necessary to add the perspective of the impact on vulnerable groups. In other cases, work also had to be done on data development to understand the impact of a particular risk.

This document is a compilation of the maps drawn up for the analysis stage of the Resilience Strategy with regard to risks affecting public space, with the aim of gaining a full overview of the city's vulnerabilities differentiated by location, thus allowing the identification of priority measures by area, in response to the identification of one particular risk, or the overlapping of several.

Each risk map is presented in the first part of this work together with the methodological details of the data used. The second section includes the conclusions reached, and explains the measures that the City Council is currently developing, or the possible lines of work to be pursued to reduce the risk and mitigate the impact.

1. What? The question

Where are the people with the greatest number of factors that condition their everyday walking mobility located?

2. Why? The reason

Everyday mobility is based on what has been defined as inclusive mobility. In recent years, inclusive mobility has been included in the policy priorities of many European countries as a reference to the social dimension of transport. This is a concept that originated in France and the United Kingdom, with the aim of reducing the social inequalities caused by forms of mobility that do not respond to people's differing needs, thus putting them at risk of being excluded from the labour market and from opportunities for socialising.

Over the last 20 years, initiatives focused on improving the accessibility of public roads have been implemented in Barcelona, enabling people with functional diversity to go about their daily lives with a great deal more autonomy. Today, through the roll-out of the Barcelona Universal Accessibility Plan 2018-2026, and the Government Measure for the development of the Barcelona Universal Accessibility Plan 2018-2026, Barcelona aspires to be a 100% accessible city for 100% of the population by 2026.

Going one step further, the city has also taken on a commitment to work towards **a city model that places the sustainability of life at the heart of its policies**, so that people can lead

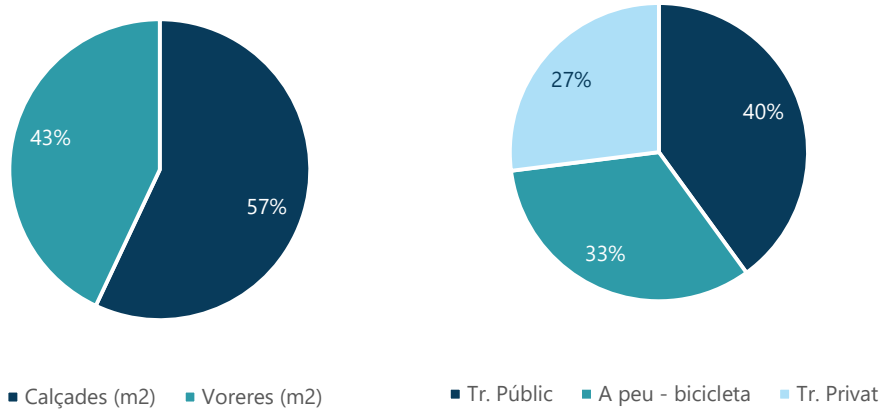
dignified lives and enjoy general well-being in a city adapted to people's needs, rather than one in which people are required to adapt to the existing conditions.

To this end, a number of government measures have been worked on, for example *Urban planning with a gender perspective. Urban planning for everyday life* launched in 2017. This government measure seeks to respond to the needs and wishes of society as a whole, taking into account gender, age, ethnic origin and functional diversity, among other factors, with the aim of making Barcelona a fairer, more equitable, safer and barrier-free city. The political will to create a new city model also revives the care-based values derived from ecofeminism, aiming to make these universal and to apply them to the city's ecosystem: people, society and nature. A model that makes it easier for us to take care of ourselves, of others, and of the environment.

Finally, the *Barcelona Urban Mobility Plan 2013-2018* already included a focus on improving conditions for getting around on foot in the city, for example by aiming to increase pedestrianised public space and to improve the quality of urban life, guaranteeing urban safety and accessibility for pedestrians. These objectives remain valid, and are central to the current revision of the PMU.

Barcelona is now a walkable city, where nearly 35% of city journeys are made on foot. However, over half the space in the city's streets and squares is occupied by motorised vehicles (moving and parked). In relation to their capacity for transporting people, cars are the mode of transport that takes up most space. If this is extrapolated to the intensity of use of Barcelona's streets and squares, it can be seen that each city resident has approximately 4 m^2 of pavement, while each vehicle has 12 m^2 of roadway (see 0) . The introduction of the Superblock Plan makes it possible to modify the existing distribution of public space and significantly increase the environmental quality of the urban environment, and to introduce new concepts in urban design, making it easier and more comfortable to get around on foot.

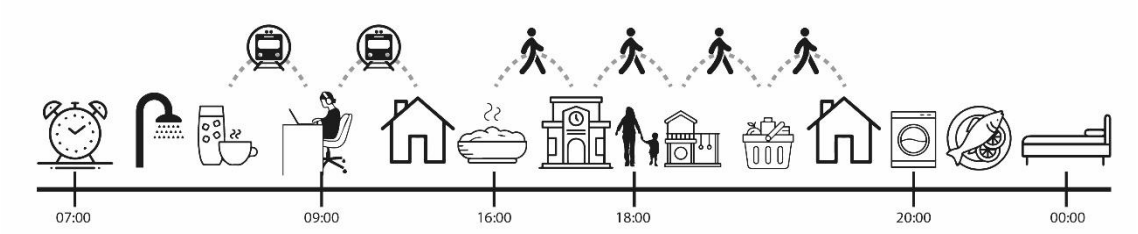
Distribution of road space and modal distribution of journey stages in Barcelona, 2010. DSM



Source: Barcelona's Urban Mobility Plan. PMU. 2013-2018

In Barcelona City Council's *Urban planning manual for everyday life. Urban planning with a gender perspective*, mobility is defined as one of the key factors in the design of cities, and in the organisation of activities to make people's daily lives easier. **It is an essential and independent part of the urban fabric's configuration, along with the uses given to buildings,** including housing and facilities.

Chain of everyday tasks



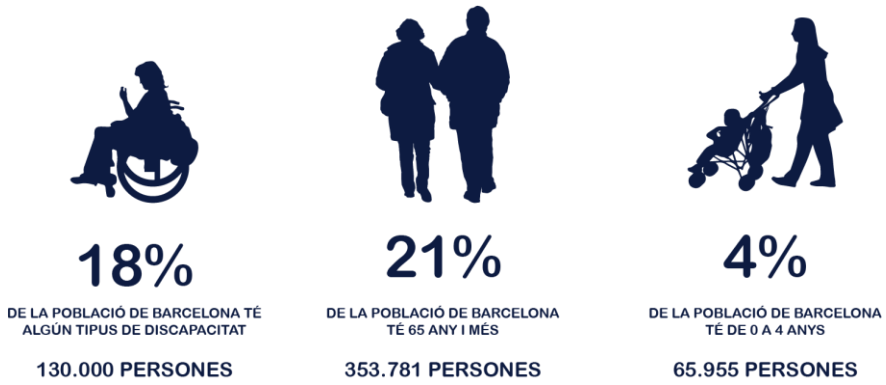
Source: Barcelona Regional

The facility, autonomy and security that people need to access the various places used for socialising means that everyday mobility also has a crucial role to play in the vitality and resilience of a city's social fabric. For the elderly and for people with reduced mobility, especially those with physical limitations, having access to meeting and community spaces near their homes is a determining factor for their emotional and physical well-being.

For people aged 65 and over, being able to walk safely and independently enables them to be a part of the social network in their neighbourhood, reducing the risk of loneliness, and also helping them to age in an active, healthy way. This is important if we take into account the fact that in Barcelona, the population of people over the age of 64 is steadily growing, and projections indicate that if the current trend continues, 25% of the city's total population will be over the age of 65 by 2030, compared with the current 21.5%. According to Barcelona's municipal register, in 2018 there were 349,922 people over the age of 64 living in the city, nearly a fifth of its total population, and 25% of them lived alone[1]. The proportion of women gradually increases with age, so that the proportion of men aged over 64 is 18.2%, while the proportion of women rises to 24.3%[2].

Children, mainly younger children (from 0 to 4 years old) are also sensitive to factors that condition everyday mobility. For example, their needs when travelling on foot include the presence of people to look after them and prams or pushchairs. According to the study *Young children and families in Barcelona* (Institut d'Infància, 2010), the most likely scenario is a mother accompanying one or two children with a pushchair, because although nearly 80% of children live in a conventional two-parent household (mother-father), mothers dedicate 19 more hours a week to looking after children under the age of 6 than fathers do. And 86% of single-parent households consist of a woman with her children.

The population most sensitive to factors that condition everyday mobility.



Source: Barcelona Regional, based on data from the 2017 municipal register of residents.

[1]Barcelona City Council (2017) Government measure to promote senior citizens in the city of Barcelona

[2] Barcelona Public Health Agency (2019) Health in Barcelona 2018, Monographic: Living and health conditions of senior citizens in Barcelona

Adapting the city to the differing needs of the people living in it also requires a reflection on travelling times. *Urban planning for everyday life* emphasises the fact that different groups have a different pace of life and different experiences while using the city, and these factors must be taken into account in city planning and management. An elderly person moves at a different speed to an adult with toddlers and a pushchair, someone in a wheelchair or young person or an adolescent. The distances and spatial needs that make a journey comfortable and safe are also different for each group.

Taking as a starting point the importance of personal autonomy and quality of life throughout people's life cycle for general well-being, **this study aims to take a first look at the factors that condition everyday mobility at city level.** Generating an initial snapshot of what is happening in the city could provide the basis for a more complex and detailed study that will enable us to work towards a mobility model based on shared responsibility in terms of three values: **inclusion, care and health.**

3. How? Data and methodology

In regard to the study on mobility, according to the *Urban Planning Manual for Everyday Life*, placing life at the centre of policies means distributing public space by using the following hierarchy of importance: pedestrians, public transport, bicycles, goods transportation and private transport. It also requires a width of 3.6 metres of unobstructed pavement space without any barriers, or kerbs. It also means providing numerous safe pedestrian crossings, in line with the policy of encouraging walking, and ensuring that people walking at different speeds have enough time to reach the other side of the road. Crossings should be clear and easy to understand and should promote visibility and thus also safety. In other words, the space where people move about must be a space for living.

In this study, we have selected data in order to define a series of **factors that condition everyday walking mobility,** each of which has been assigned a score according to its impact. The analysis consisted of evaluating the presence of these conditioning factors for street sections and extrapolating the results to a neighbourhood scale, in order to make a territorial evaluation. The following table shows the conditioning factors taken into consideration and their associated scores.

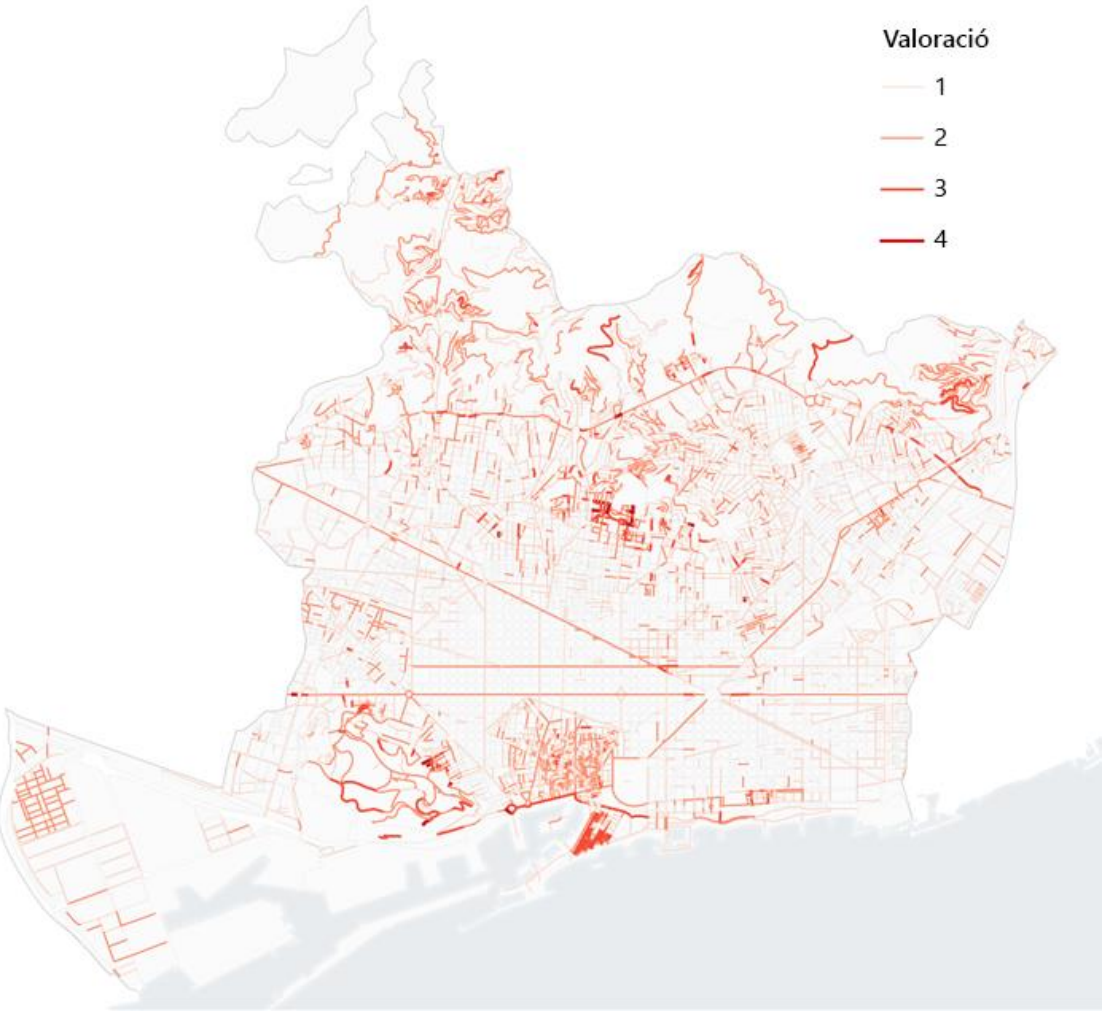
Table 1. Conditioning factors for everyday mobility and associated scores.

CONDITIONING FACTOR	SCORE
Section pavement width of under 1.8 metres	1 point
Section pavement width of under 1.8 metres and vehicles parked alongside	2 points
Section pavement width of over 12 metres	1 point
Sections that belong to one of the main very wide roadways (over 12 metres) with high traffic density	2 points
Section gradient of over 6%	1 point
Sections located within a space that has a 'large influx of tourists'	1 point

Points have been allocated to each street section according to the number of conditioning factors present. It should be borne in mind that not all of the conditioning factors can be present at the same time in the same section. For example, Barcelona streets with broad carriageways (over 12 metres wide) never have pavements as narrow as 1.8 metres. This would be an impossible combination of criteria, which means that the maximum possible value assigned to a street section is 4 points. In the following map the values obtained for each of the street sections can be seen[3].

[3] It may be that some specific street sections obtain a value that does not altogether correspond with the reality. This is because some of the bases used (mainly for pavements and carriageways) could be imprecise in some areas. However, in no case does this have a decisive impact on the overall assessment at neighbourhood level shown on the final maps.

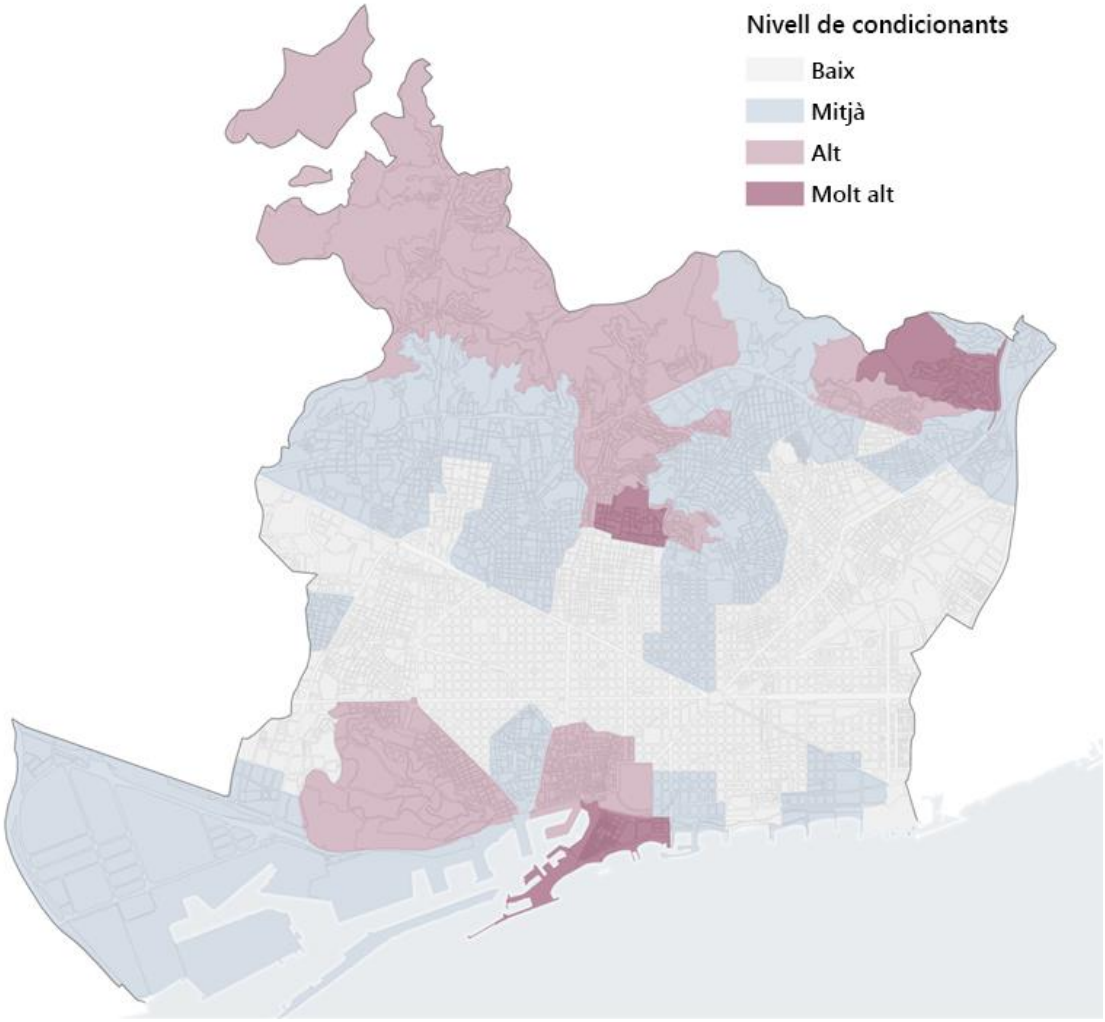
Points corresponding to each section based on the presence of different conditioning factors



There are examples of sections with a score of 4 points in the vicinity of Park Güell. This is because they have the following characteristics: a pavement width of under 1.8 metres with vehicles parked in a row (2 points), a gradient of more than 6% (1 point) and are in a major tourist area (1 point).

In order to provide an overview of everyday mobility conditions in the city, the scores obtained were transferred to the neighbourhood level. To this end, the length of each section was weighted in accordance with its scores. When the value obtained from the weighted sum of the metres of the road network in a neighbourhood is very different to the unweighted sum, this indicates the presence of a high level of conditioning factors. The classification by level obtained can be seen in Figure 0.

Level of conditioning factors affecting everyday mobility, by neighbourhood.



The criteria taken into account to define the different conditions for walking mobility are explained below:

a) Pavement width

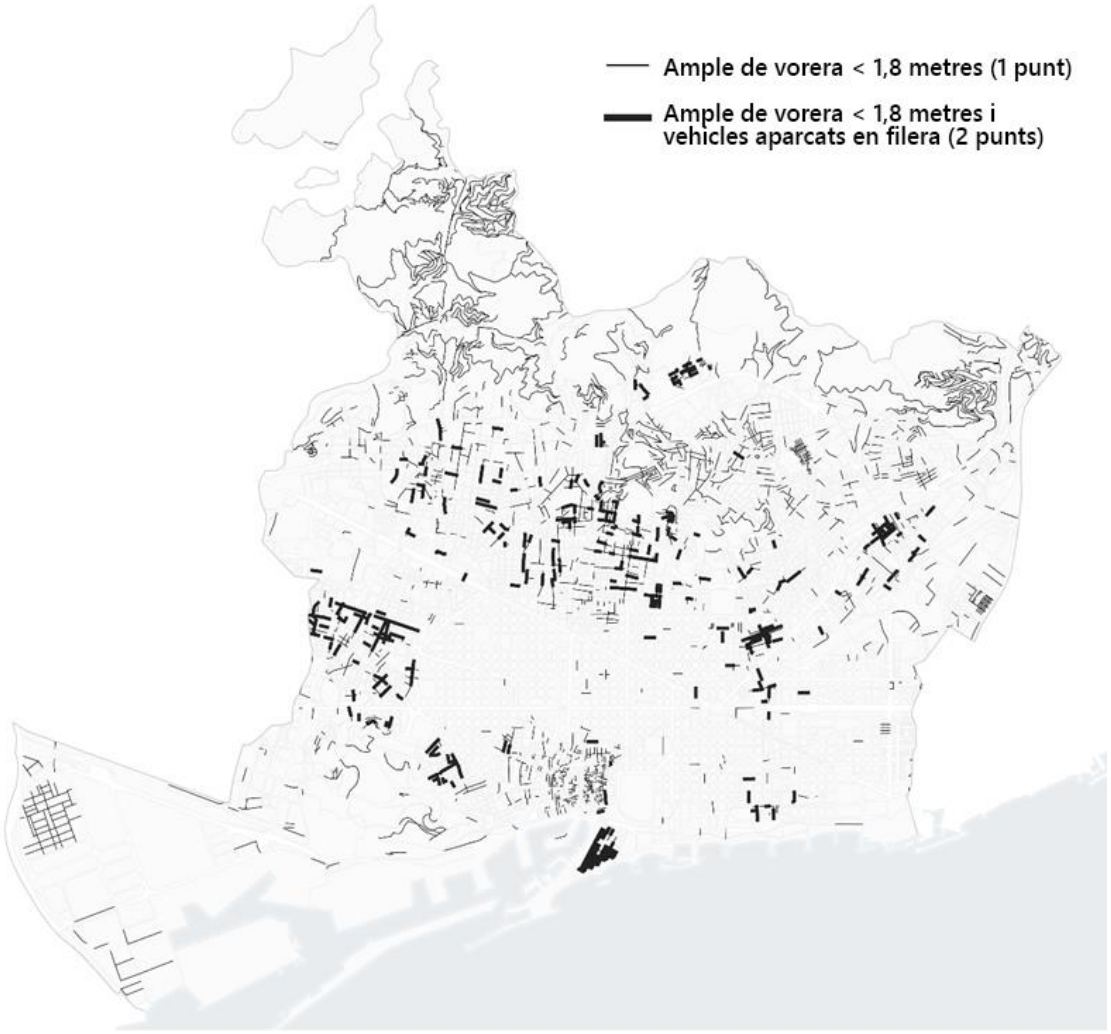
Sections with narrow pavements have been selected as they are more likely to have street furniture (lamp posts, tree surrounds, litter bins, etc.) that negatively impact on the flow of pedestrian traffic.

The presence of car parks on streets with narrow pavements has also been taken into account as a parameter, as this tends to cause pavement encroachment due to the opening of doors, the loading and unloading of goods, etc.

The conditioning factors defined are

- Pavements that are under 1.8 metres in width (1 point)
- Pavements that are under 1.8 metres in width and where there are also vehicles parked in rows (2 points)

Factors conditioning everyday mobility related to pavement width and the presence of vehicles parked in rows.



Pavement width was calculated based on the 2019 Municipal Topographic Cartography 1:1000.

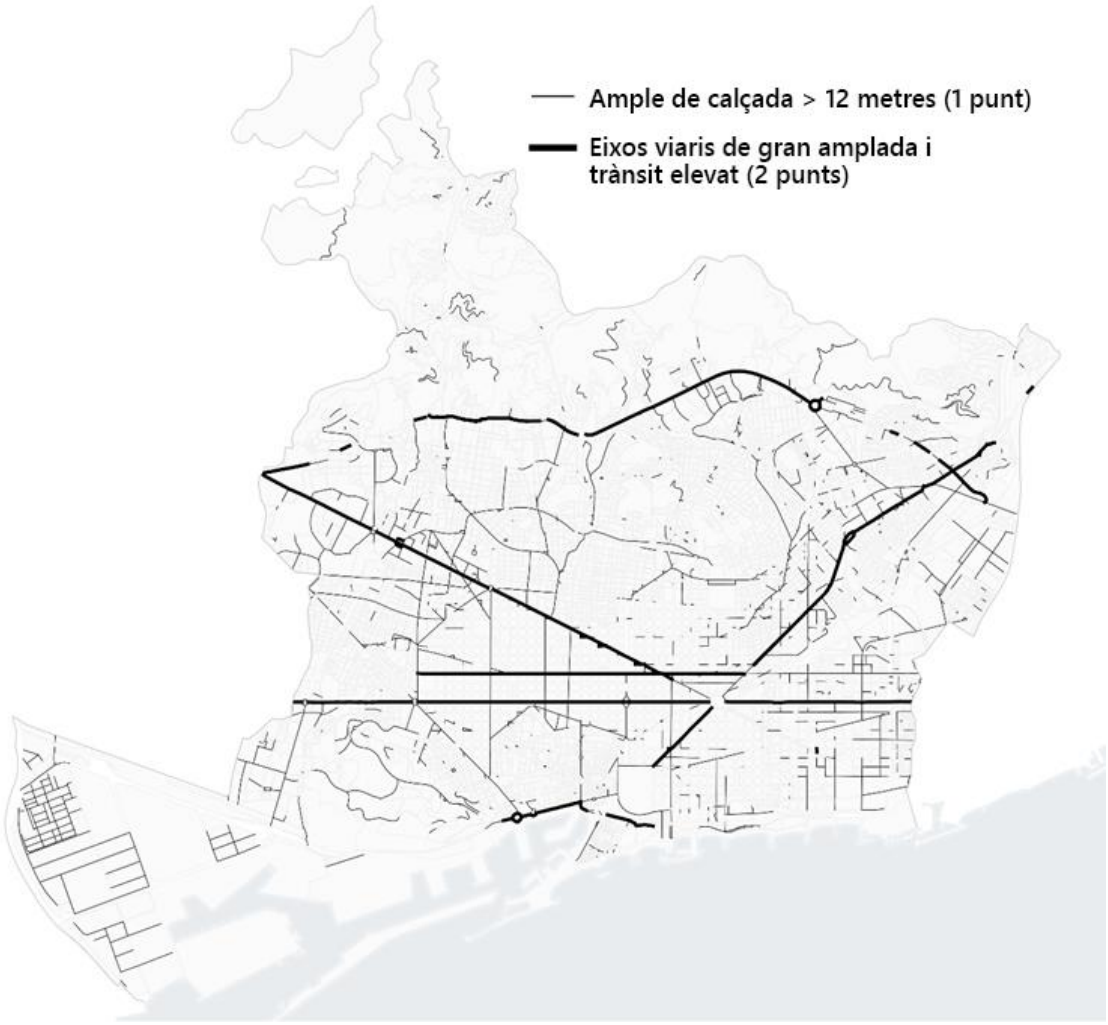
On-street parking data was obtained from the 2019 "Information regarding on-street parking areas in the city of Barcelona" database, available on the Open Data Barcelona portal.

b) Width of carriageway

The fact that in certain streets of the city crossing the road can be problematic (and even dangerous) for elderly people, children or those with reduced mobility was taken into account. With this in mind, the following conditioning factors were taken into consideration in this study:

- Street sections with a carriageway with a width of more than 12 metres (1 point)
- Exceptional cases of roads that have a width of more than 12 metres and heavy vehicle traffic: Ronda de Dalt, Ronda Litoral, Diagonal, Aragó, Gran Via and Meridiana (2 points)

Factors conditioning everyday mobility related to width of carriageway and traffic.



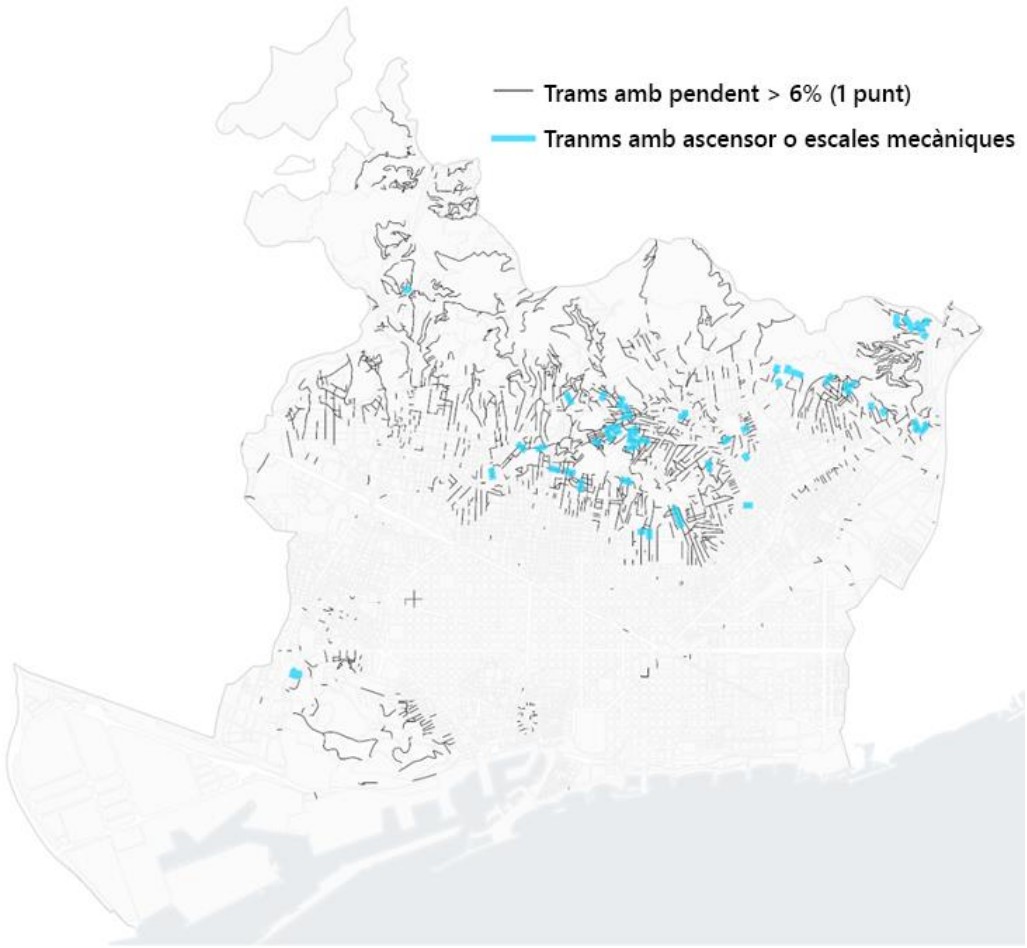
Width of carriageway was calculated based on the 2019 Municipal Topographic Cartography 1:1000.

c) Slopes

The Barcelona Accessibility Plan considers a longitudinal slope (running the length of the street) inaccessible if the gradient is greater than 6%. For this reason, sections where the gradient is above this percentage were assigned a score of 1 point.

The existence of escalators and lifts in the street was also taken into account. These are a determining factor in terms of mobility for people in areas with very steep slopes. In this study, the existence of escalators or lifts in public spaces was considered to be a positive factor. A point for this category was not assigned to street sections where they are available.

Conditioning factors related with slope. Sections with lifts or escalators were not assigned points.

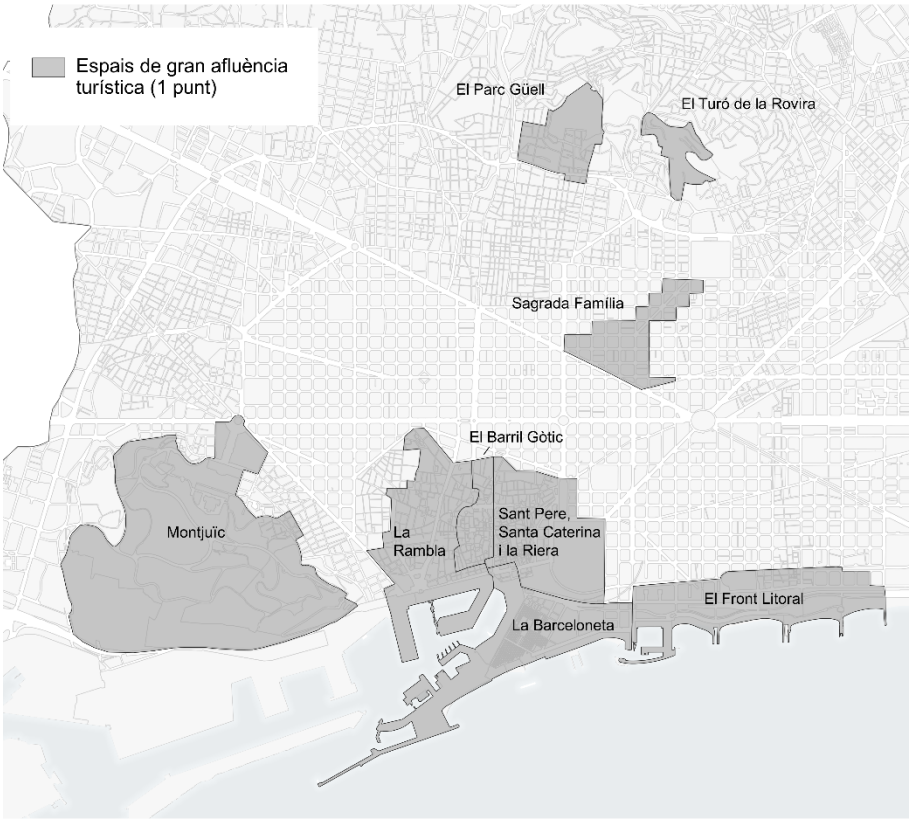


Slope gradient was calculated using a Digital Terrain Model based on 2013 LIDAR data.

d) Overcrowded pavements

In order to take into account non-physical factors that impact on pedestrian space, the Heavily Frequented Spaces defined by the Barcelona Tourism Department in 2019 were added to the analysis. The flow of people attracted to these tourist areas can be extremely high and can therefore result in changes to mobility dynamics for the people who carry out their daily tasks in these areas. To take into account potential pavement overcrowding, one point was assigned to the street sections within these areas.

Conditioning factor related to potential pavement overcrowding.



3.1 Other variables

To complete the analysis of everyday mobility, two more information layers were added to the final map:

a) Percentage of mainly residential buildings that do not have lifts. Data extracted from the report *Accessibility on public roads in Barcelona*, 2018. Municipal Institute for People with Disabilities. Barcelona City Council.
b) Metro and railway stations not accessible for people with reduced mobility. Data from the *Rail Network* study. *Stage 2. Accessibility on the rail network*, December 2019. Barcelona City Council, Barcelona Metropolitan Transport Authority and Barcelona Regional.

3.2 Population

There is no single answer to the question "Where are the most vulnerable populations to be found?" Depending on the time of day, a person may be at home, at work or enjoying their free

time out and about. The population moves around, and therefore determining “where they are located” is something that cannot be resolved directly.

So in order to identify the areas with the highest concentration of population regardless of the time of day, we worked with two sets of data: **the 2018 municipal register of residents** at block level, which gave us a clearer idea of “where people live”, and **the location of public facilities classified by type**, in order to understand where they might potentially spend part of their day.

By using the data from the municipal register, it was possible to define the areas with the highest density of residents, and the information on facilities allowed us to identify the areas of the city that are potentially those in most frequent use.

We know that a substantial number of people spend a significant number of hours a day at their places of work, or moving around the city in order to carry out job related tasks. This information, which could also help us to understand "where people are", unfortunately could not be included in this study, as the city does not have a reliable and comprehensive data matrix that would enable us to know how many people are in a given place for work purposes.

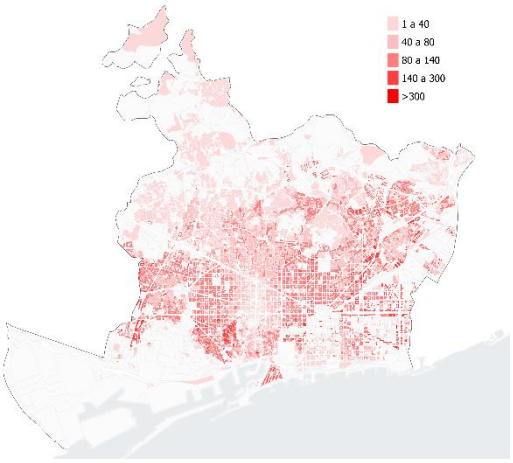
Another factor that needs to be taken into account when assessing vulnerability is the age of the population. As the data from the municipal register of residents is organised in five-year age bands, by subdividing we were able to determine the most vulnerable sections of the population. The same thing was done with the data on facilities, as classification by type allowed us to select those serving each age group. In this case, the age groups observed, in terms of both facilities and population**, were limited to children aged between 0 to 4 and senior citizens aged 75 or over.** These two groups are particularly vulnerable to spatial conditioning factors (pavement width, road width, slopes, etc.), given their need for safety and autonomy in their daily movements.

3.2.1 Delimitation of the most densely populated areas

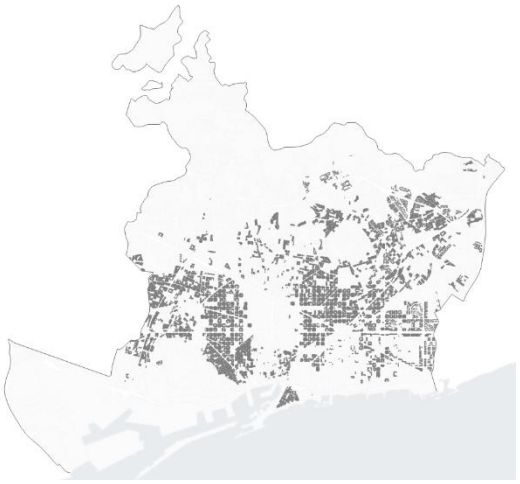
By using data from the municipal register, the aim was to obtain an overview of those areas of the city with the largest resident populations. Superimposing data on the risk factor in question on the map allowed the identification of critical points.

The process followed consisted of calculating population density for each age group and selecting the areas with a population density above the average for the city. Figure 10 shows the result after selection by population density.

Figure 10. *Selection process of areas with an above average population density. Population density is shown on the left, and the selection of areas above the threshold on the right.*



Map with calculation of population density. Inhabitants / km².

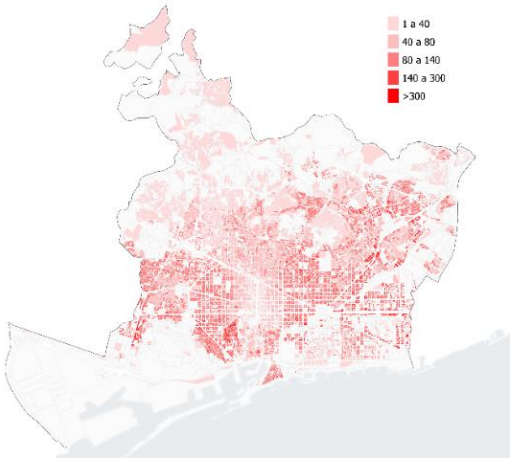


Result: Streets with an above-average population density. Each age group has its own areas.

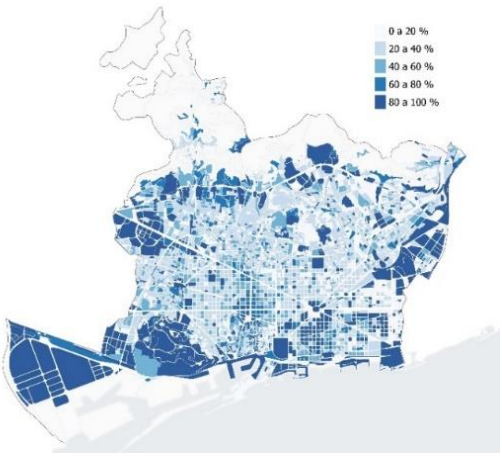
Looking at the result, it is striking that many areas of the city that we would expect to be densely populated in fact are not. This is the case of the area around Passeig de Gràcia and much of Ciutat Vella, to give two prominent examples. In these central areas of the city, a shift towards commercial use as shops, offices or service providers has reduced the housing stock, and as a result we see a population density that is below the average for the city

Figure 11 provides a better understanding of the problem. A comparison of the population density map with the map of non-residential use of premises shows how the one is almost the inverse of the other.

Figure 11. *Map of population density compare with the map of non-residential use of premises*



Population density by city block. Inhabitants / km²



Percentage of non-residential use of premises, by city block.

3.2.2 Delimitation of the most frequently used areas

In order to gain an idea of which areas of the city are potentially most used by the target population (in this case those between 0 and 4 years of age, or who are 75+) the data on the location of the public and private facilities that provide services aimed at these groups has been used. The starting hypothesis was that the areas with the highest concentration of facilities are also those that will be subject to the greatest influx of these groups of people. **Table 1** Shows the complete list of types of facilities, and the age group at which they are targeted.

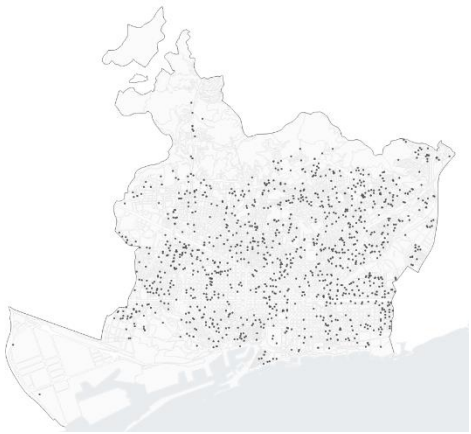
Table 1: Facilities by type, and the age groups they cater to

TYPE OF FACILITY	FROM 0 TO 4 YEARS OF AGE	75 AND OVER
Hostels and shelters for the homeless		x
Children's libraries	x	
Children's activity centres	x	
Specialised day care centres		x
Winter reception centres		x
Family reception centres	x	

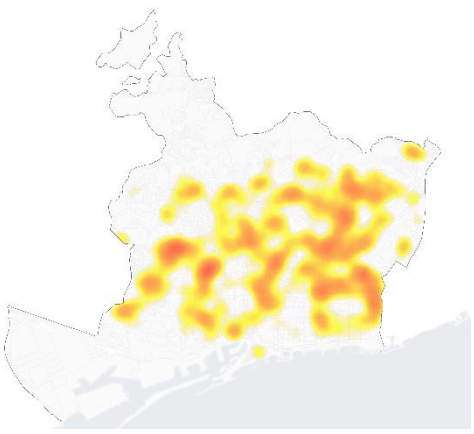
Day-care centres for the elderly		x
Reception centres for children and young people	x	
Day-care centres for the homeless		x
Mental-health day centres		x
Mental health centres for children and teenagers	x	
Adult mental health centres		x
Day nurseries	x	
Kindergartens	x	
Active ageing (elderly people)		x
Assisted housing for senior citizens		x
Hospitals for the chronically ill and the elderly		x
Toy libraries	x	
Care homes for the elderly		x
Children's play area: 0 to 12 years of age	x	
Children's play area: 0 to 5 years of age	x	

From this classification, a heat map was generated for each age group to identify the areas of the city with the highest concentration of facilities.

Figure 12. *Processing of facility locations in order to obtain a heat map*



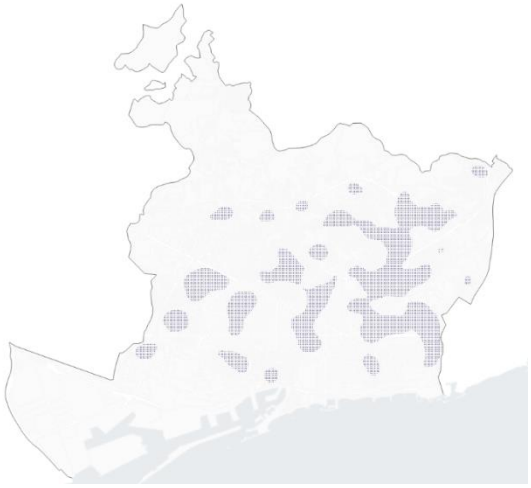
Map showing the locations of facilities targeting a specific age group



Heat map showing the areas with the highest concentration of facilities

The final layer was obtained using the selection of the areas in the heat map with a large number of facilities. The result be seen on the chart that follows.

Figure 13. *Final layer with areas with a high concentration of facilities. Each age group has its own areas.*



4. Vulnerability maps by age group

4.1 Vulnerability maps by age group

As a result of the territorialisation of risk, vulnerability maps have been created for the different data layers cross-referenced by age groups. The aim of this exercise is to qualitatively highlight the areas that show an intersection of the highest risk-of-exposure values, cross-referenced with city blocks that have a higher than average density of registered city residents, and areas that have a high concentration of facilities that target the age group being studied.

It is important to remember that these maps require a broad interpretation, and that risks must be contextualised globally. They have been generated on a city-wide scale, and although a degree of territorial detail was sought, they are an interpretation based on approximations and a specific study will be required on the selected areas of activity.

In this case, the map shows the population by age group (children and the elderly) who live in and/or use facilities located in areas of the city where the characteristics of the environment do

not favour everyday mobility. The correlation of areas with these sections of the population with facilities generates a grid showing levels of vulnerability (6).

Table 2. Degrees of vulnerability

1P. Medium level of conditioning factors coinciding with population density
1PE. Medium level of conditioning factors coinciding with concentrated population and facilities
2P. High level of conditioning factors coinciding with concentrated population
2PE. High level of conditioning factors coinciding with concentrated population and facilities
3P. Very high level of conditioning factors coinciding with concentrated population
3PE. Very high level of conditioning factors coinciding with concentrated population and facilities

4.2 Population most at risk

In general, the map (see appendix 5.1) shows that **a large proportion of Barcelona's urban fabric has a low level of factors that condition people's everyday walking mobility.** This is the case for nearly all the neighbourhoods in the Eixample, with the exception of Sagrada Familia, which has a medium level of conditioning factors due to its pavements being overcrowded with people visiting the Sagrada Família.

As we have seen in the map of registered property use (Figure 11), in the Eixample neighbourhoods there is a significant concentration of non-residential use, which, as we know, corresponds to tertiary uses and services that generate a strong dynamic of movement at different levels: neighbourhood, city and Metropolitan. In this sense, it can be said that both the people who live there, and those who use these services, find fewer conditioning factors when going about their daily lives than those in other areas of the city. In these neighbourhoods, the conditioning factors are related to the existence of sections of streets where the carriageway is more than 12 m wide, and roads that have particularly high traffic flow, such as Diagonal, Aragó, Gran Via and Meridiana. And also to Metro stations that are not accessible to those with reduced mobility, especially in the Dreta de l'Eixample neighbourhood.

The areas of the city with a **medium level of conditioning factors** are mainly located in the neighbourhoods that are close to the edges of the Collserola Nature Park. In these neighbourhoods there are sections of street with gradients of more than 6%, and pavements

that are less than 1.8 m wide, that are in some cases overrun by vehicles parked in rows. The existence of roads with carriageways that are more than 12m wide and roads such as Ronda de Dalt, Diagonal and Meridiana that also present difficulties in terms of everyday mobility (walking) for the people who live in these areas. In this category, we would highlight the neighbourhoods of **Trinitat Vella, Horta, El Carmel, Font d'en Fargues and Can Peguera**, where in addition to the conditioning factors previously mentioned, around 60% of buildings used primarily for residential purposes have no lifts (in the case of Can Peguera and Trinitat Vella the figure is around 80%). Although this factor was not taken into account when scoring street sections, it can make access to public space even more difficult, especially for the elderly, or for people with reduced mobility.

There is a similar problem in the **Raval** neighbourhood. In contrast to the neighbourhoods mentioned above, steep slopes are not a factor that conditions everyday walking mobility, but the overcrowding of pavements by large numbers of people due to the fact that the neighbourhood is attractive to tourists is indeed a significant conditioning factor, particularly for the people who live there, and whose movement when going about daily tasks is affected.

The neighbourhoods with a **high level of conditioning factors** are mainly found at the boundaries of Collserola, Montjuïc and Els Tres Turons. We highlight the neighbourhoods of **Can Baró, Vallcarca i Els Penitents, La Teixonera, El Coll and Les Roquetes**, as the steep gradients combined with a lack of lifts in over half of the residential buildings (in Les Roquetes this rises to 85%) and the existence of Metro stations that are not adapted (the Vallcarca and Els Penitents stations) mean that the everyday dynamics of these neighbourhoods are affected to a greater degree.

The neighbourhoods of **Sant Pere, Santa Caterina i la Ribera and El Barri Gòtic** also have a high number of conditioning factors that affect everyday walking mobility. In these neighbourhoods, the journeys of local residents are not only affected by the large number of visitors walking around, but also by people who use city services or the tourist attractions which are concentrated in these areas. For local residents, the lack of a lift in their building can also limit their journeys; in the case of these two neighbourhoods, over half of the buildings lack a lift.

A **very high level of conditioning factors** that affect everyday walking mobility is found in three neighbourhoods: **La Barceloneta, La Salut and Torre Baró**. Three neighbourhoods with very different characteristics and dynamics, in which carrying out everyday tasks may mean a significant effort, or even an impediment, for people with reduced mobility, carers using pushchairs, senior citizens, etc.

The Salut neighbourhood stands out in this regard, as in addition to having steep slopes, it also has a population density that is above the average for the city, and a concentration of facilities that provide services for children from 0 to 4 years of age and for the over 75s (see appendix 5.2.3 and appendix5.3.3).

In the analysis of everyday walking mobility, in terms of the most vulnerable age groups, we can see that children aged between 0 and 4 are exposed to a medium level of conditioning factors in the neighbourhoods of El Raval, Sant Gervasi-Galvany, Sagrada Família, El Baix Guinardó, El Guinardó, El Carmel, La Guineueta, La Prosperitat, Sarrià and Trinitat Nova (see appendix 5.2.1 and appendix 5.3.1).

In the case of the elderly, those aged 75+, it is mainly the neighbourhoods of Poble Sec, Font de la Guatlla, Vallcarca i els Penitents and Montbau, where there is a population impacted by a high level of conditioning factors that affect everyday walking mobility. The population of this age group exposed to a medium level of conditioning factors is most notably found in the neighbourhoods of Sagrada Família, El Guinardó, El Baix Guinardó, La Prosperitat, Horta, El Putxet i El Farró and Sant Gervasi-Galvany (see appendix 5.2.2 and appendix 5.3.2).

4.3 Challenges and opportunities

Barcelona City Council has a long track record for turning Barcelona into a walkable city. The most important measures in recent years include the creation of large areas where traffic calming has been introduced, and where pedestrians have priority, such as the superblocks in the neighbourhoods of Poble Nou and Sant Antoni, or the pedestrian priority hubs. In a more indirect way, measures favouring circulation restrictions on the most polluting vehicles are also important, such as the declaration of a 95 km^2 Low Emission Zone in the city, and the recent introduction of a 30 kph speed limit on over 200 kilometres of city streets. These and other mobility planning and management measures in Barcelona, such as parking regulations, fostering public transport and promoting the use of bicycles, along with changes to the city model, all seek to mark the city's political agenda with structural measures that have a positive impact on people's health, the environment and, in general, on improving the quality of people's everyday lives.

A range of plans are being drafted along these lines. On the one hand, the new Urban Mobility Plan (2019-2024) proposes a change in the mobility model that continues along the lines of its predecessor, namely, encouraging walking by creating safe, convenient spaces for pedestrians, and promoting sustainable means of transport (bicycles and public transport). At the same time, the aim is to reduce the use and presence of private motor transport (cars and motorbikes). The main focus of the plan is to achieve safe, healthy, sustainable, smart and equitable mobility. On the other hand, also being drafted is the Barcelona Walking Mobility Plan, which aims to place pedestrian mobility policies centre stage, focusing on the most vulnerable groups, and changing the mobility model in order to improve the city's response to the climate emergency. As envisaged in the Walking Mobility Plan, walking mobility also means improving the functioning of urban services that work together, especially in the hilly neighbourhoods: new escalators and lifts, renovation of the existing escalators and lifts that are approaching obsolescence, removal of telephone poles and electricity pylons, proper channelling of rainwater, improvement of pavements to make them more walkable, etc.

These transformations were accelerated due to the Covid-19 crisis, and the city's public spaces have already moved towards increasing space for pedestrians and low-speed, sustainable personal mobility vehicles, which make it possible to ensure social distancing and contribute to progressively increasing the proportion of public space allocated to pedestrians. The city has launched its Open Streets programme, which consists of traffic calming initiatives in certain streets in the city on the first weekend of each month, turning them into open, healthy places that are free of fumes and the setting for a range of different activities for people to enjoy. The *Protegim les Escoles* programme has also been stepped up, and is expected to reach some 200 schools by 2023, gradually being extended to all of Barcelona's schools to ensure they provide safe and healthy environments for learning. The programme includes both traffic calming

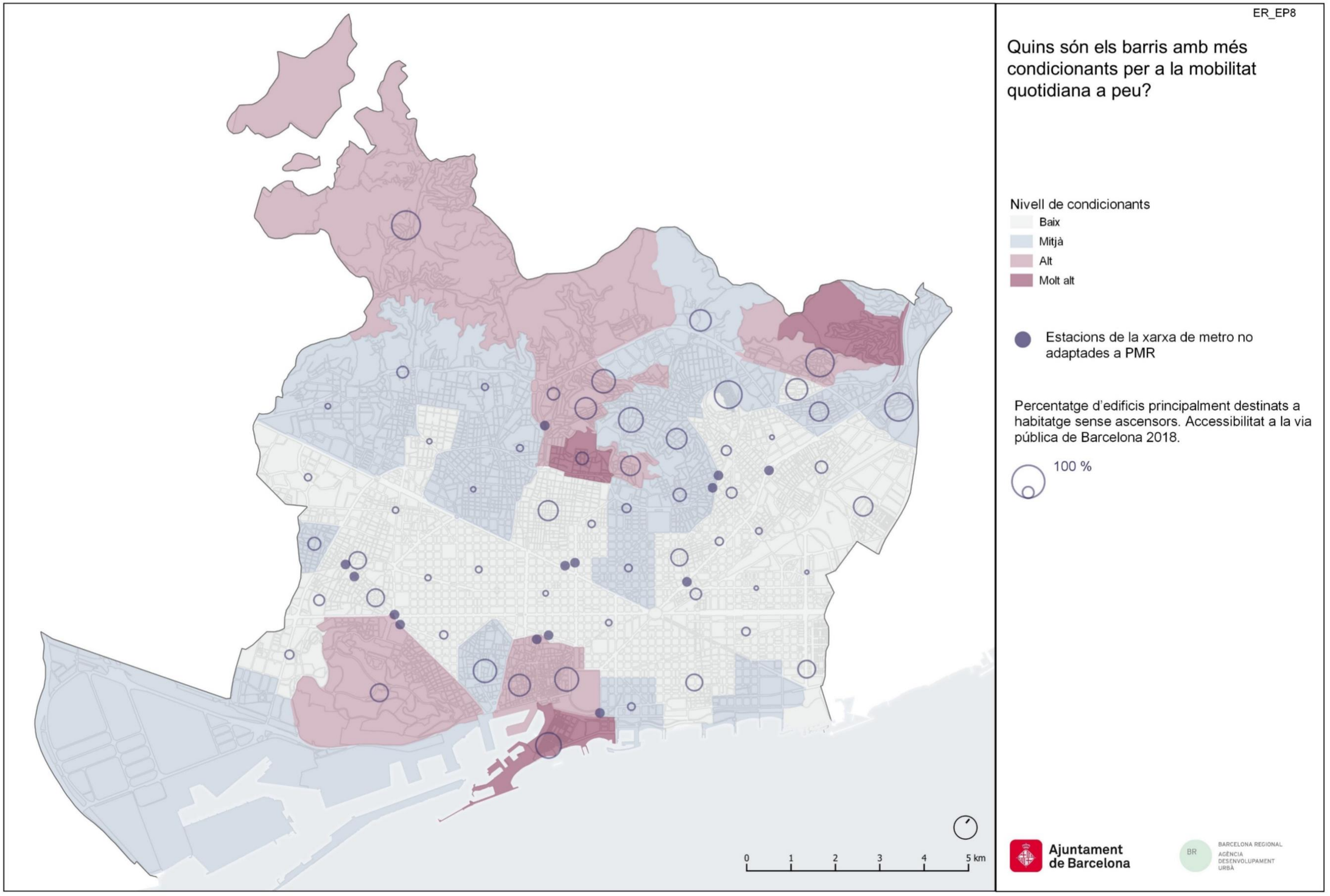
measures and redevelopment initiatives linked to the Superblock and *Ecoxamfrans* [chamfered corners of city blocks where parking is no longer permitted] municipal programmes and the Neighbourhood Plan. Operations began at 22 city schools in the summer of 2020, and it is planned to make improvements to 50 more in 2021

Along the same lines, for over 20 years Barcelona City Council has been working with city organisations, local and supra-municipal administrations, and bodies within the Barcelona Mobility Pact, which acts as a participatory forum and space for social consensus concerning the city's mobility model, high-quality public spaces and a healthy city. More recently, in the context of Covid-19, three lines of action have been defined which favour healthy development, the economy and social well-being. The new opportunities arising from the crisis favour a context in which everyday walking mobility becomes more important, and measures such as teleworking, flexitime and social awareness-raising on the impact of mobility in the city are key factors for accelerating a new, more efficient and sustainable model of everyday mobility for Barcelona and its Metropolitan Area.

Barcelona's Resilience programme is a new opportunity to showcase the city's current efforts on implementing structural measures aimed at improving everyday mobility. Measures such as promoting the Walking Mobility Plan and the introduction of safe school environments, as well as others that promote disincentives for using private vehicles, such as imposing a 30 kph speed limit on 200 kilometres of city streets, are vital for promoting everyday walking mobility, thereby helping to create more inclusive, people-friendly and healthy public spaces, maximising their potential for encouraging civic activities, relations and uses, helping to generate a more cohesive social and neighbourhood fabric, and one which is therefore more resilient.

5. Appendices

5.1 Map showing the level of conditioning factors for everyday walking mobility



5. Appendices

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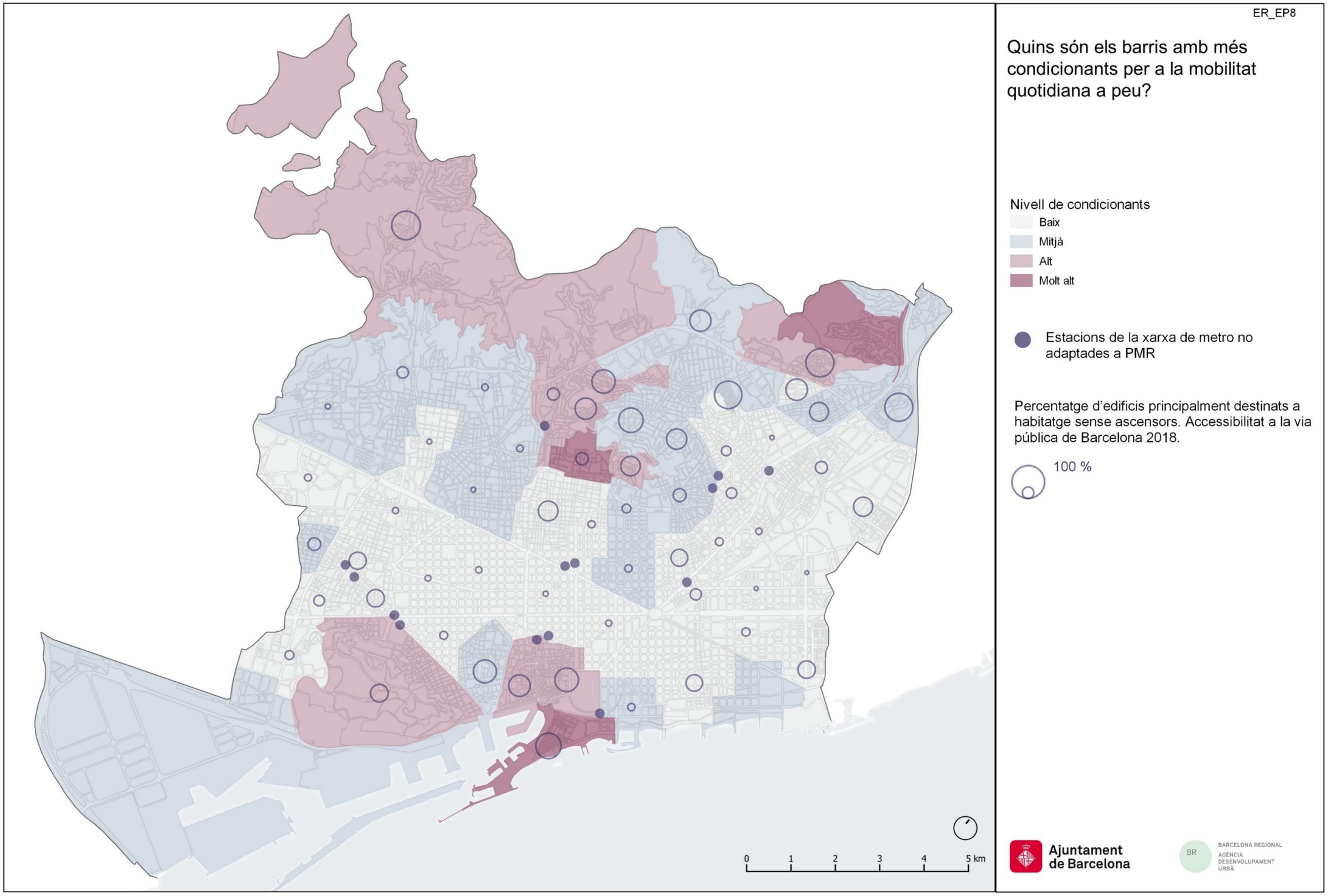
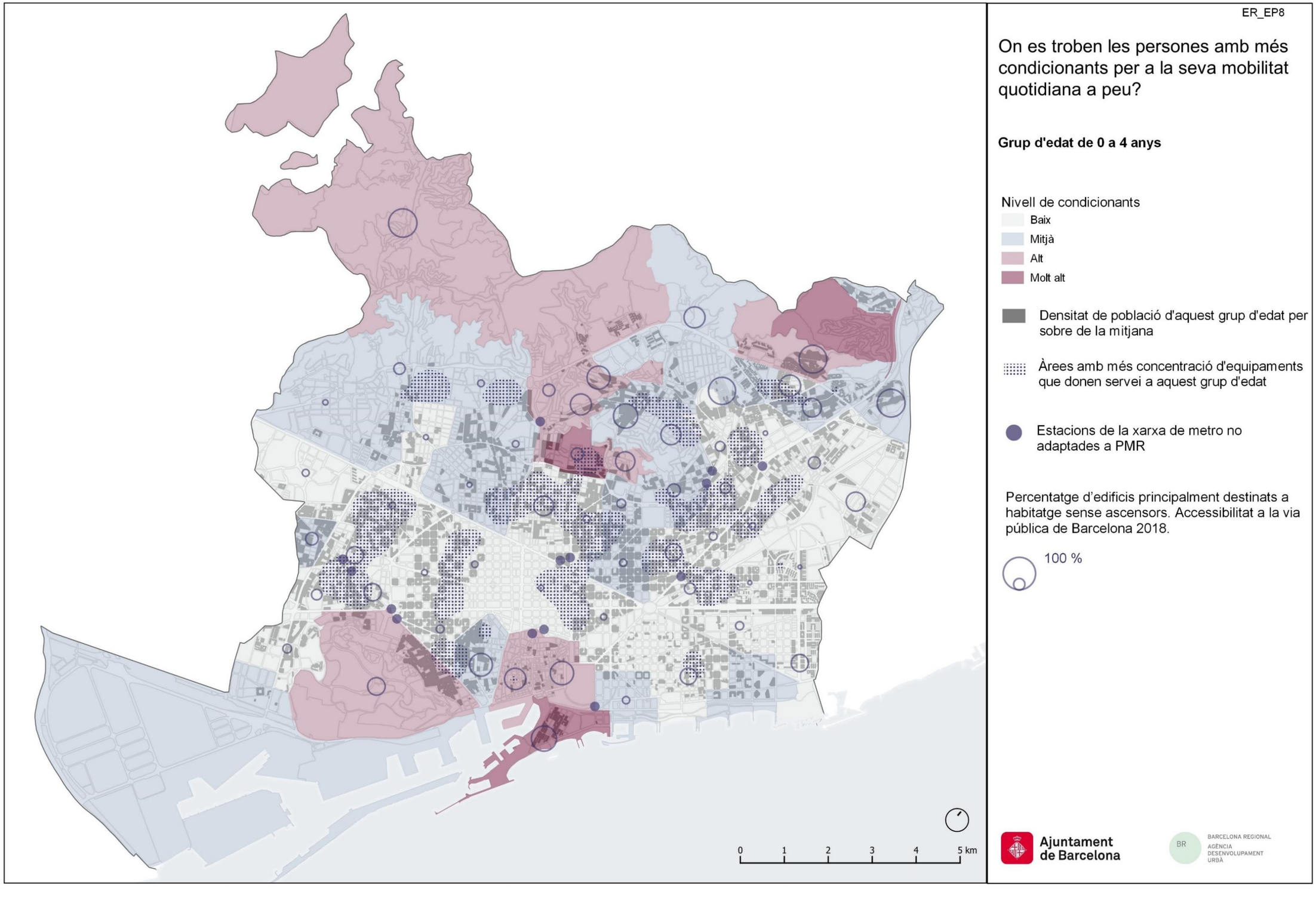
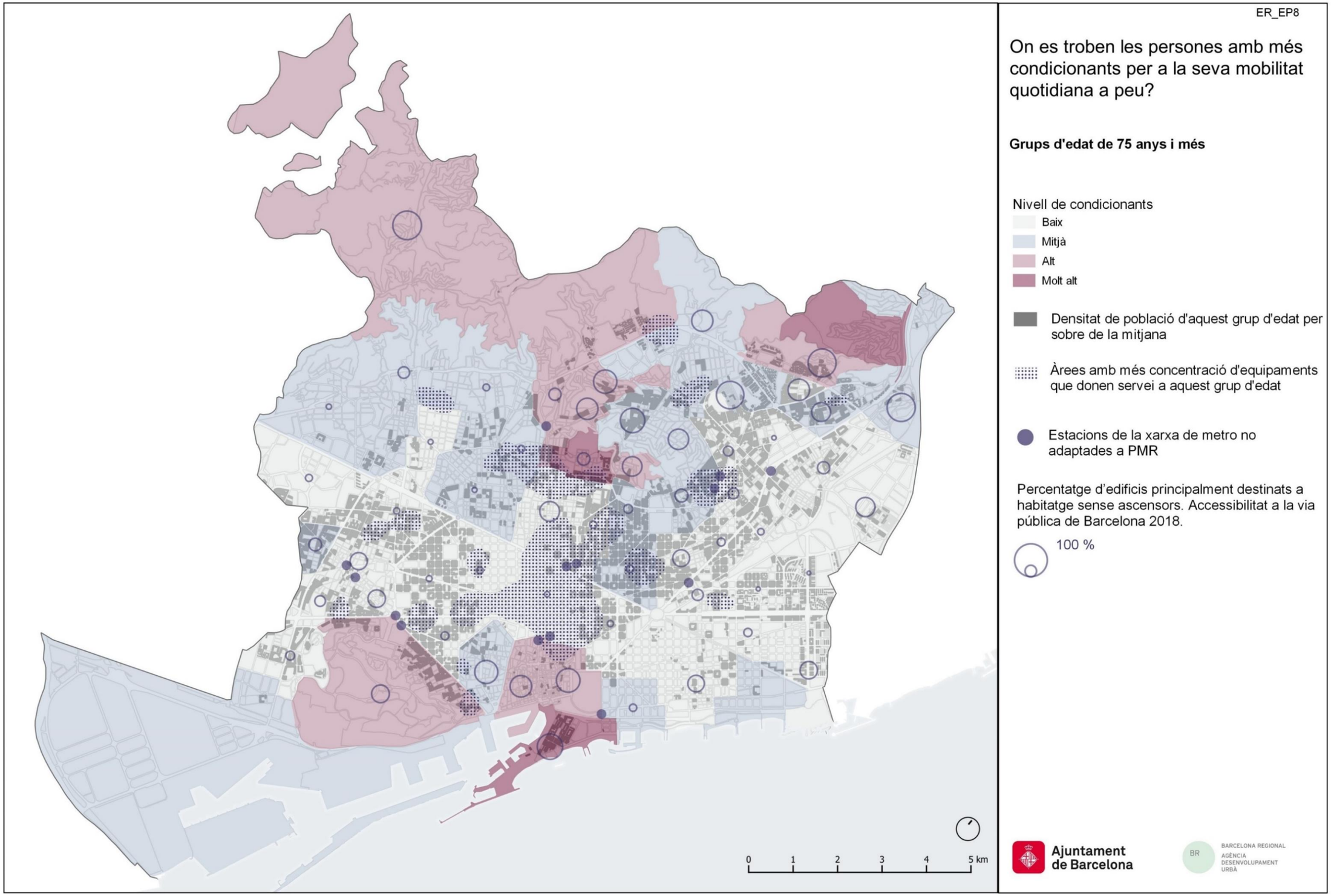


5.2 Overlay maps by age group

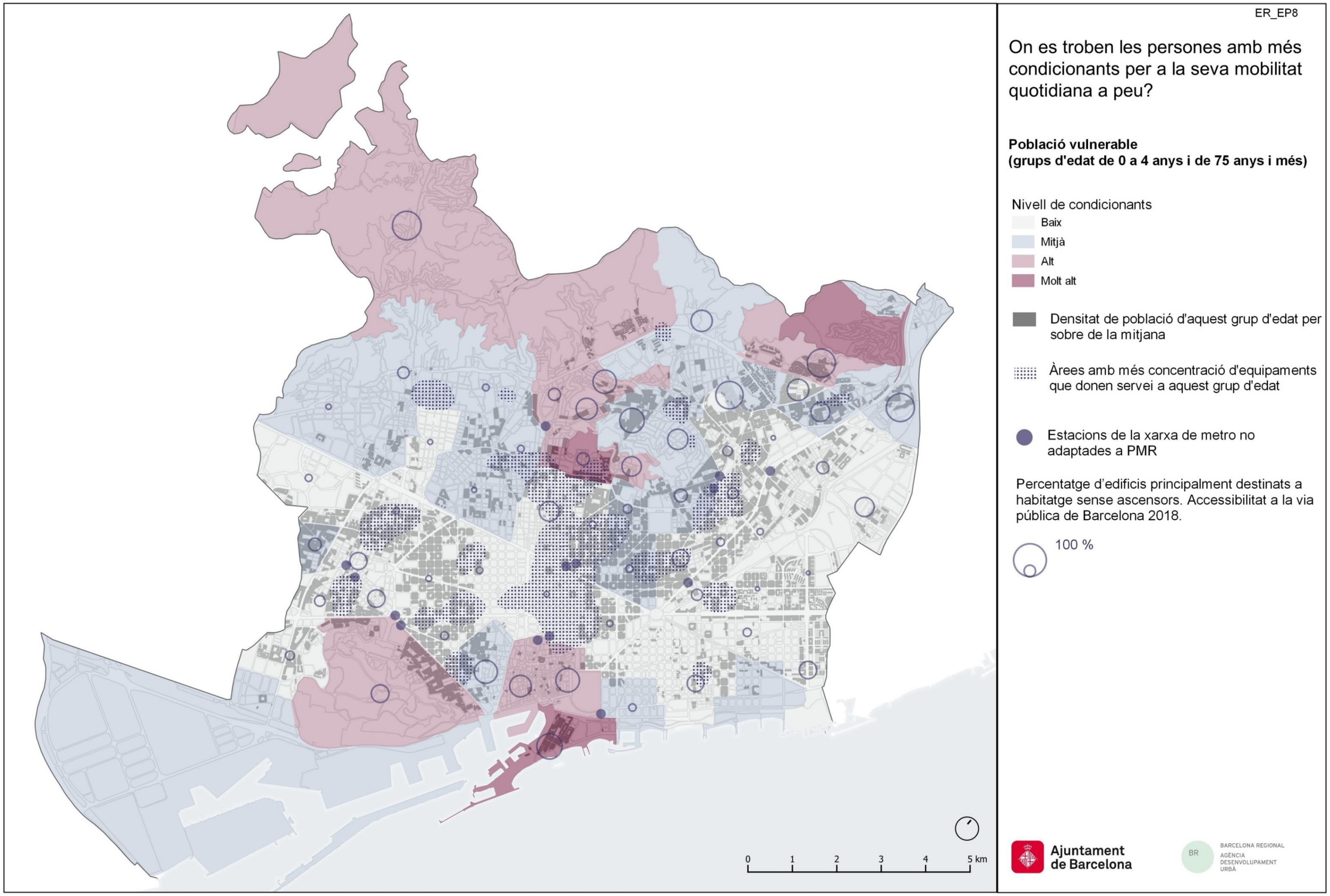
5.2.1 Map for age group 0-4 years of age



5.2.2 Map for age group 75+ years of age

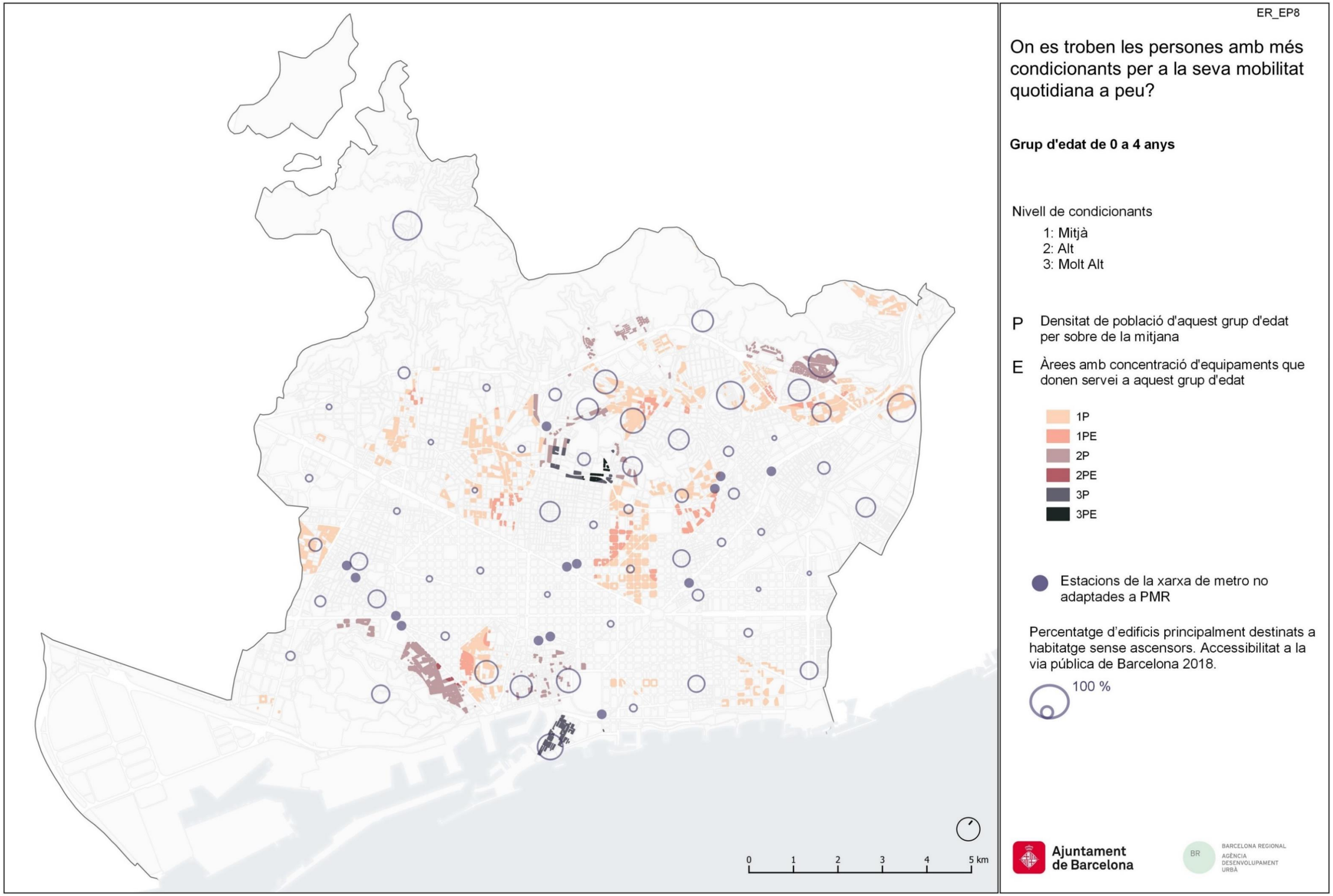


5.2.3 Map for vulnerable age groups (0 to 4 and 75+ years of age)

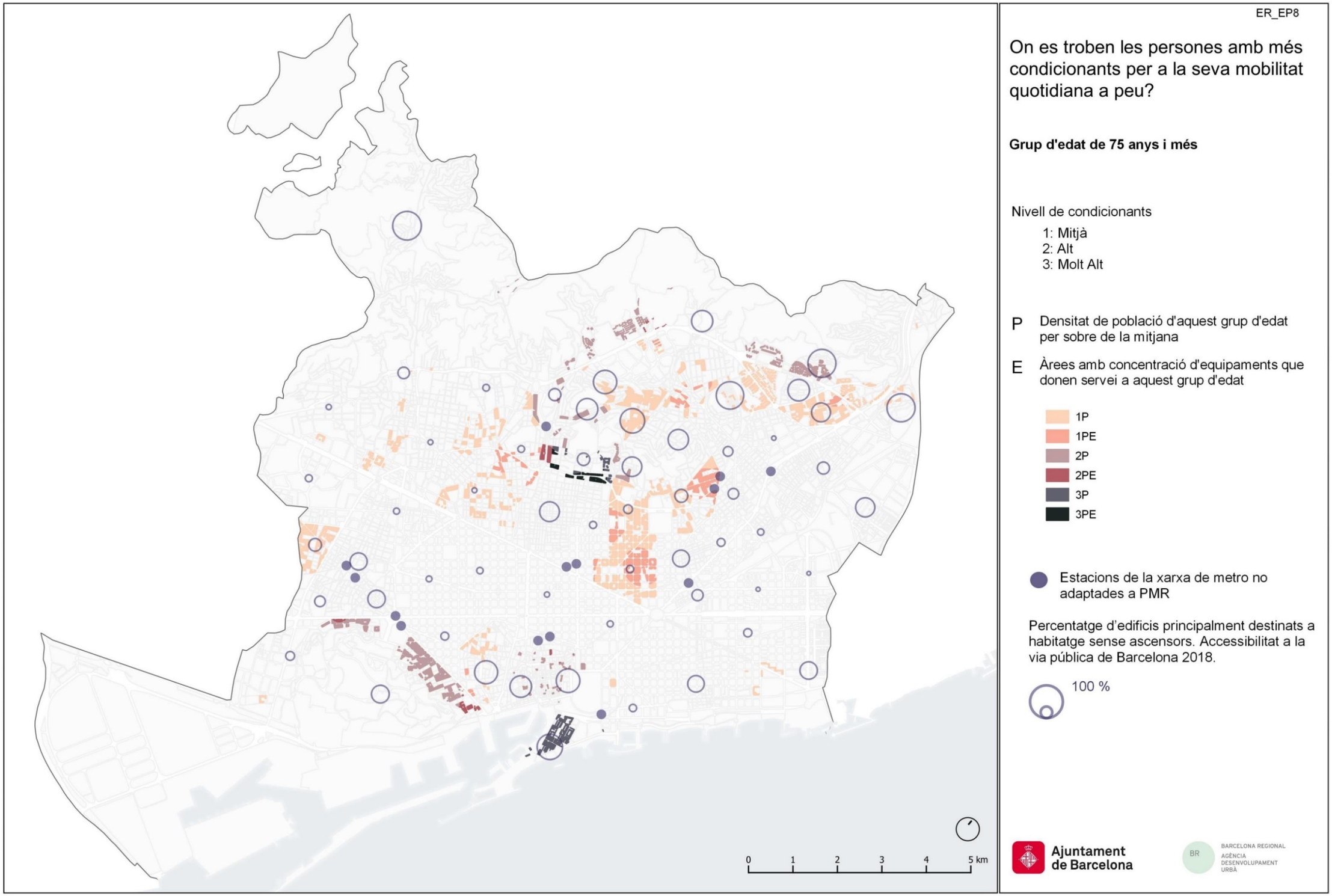


5.3 Vulnerability maps by age group

5.3.1 Vulnerability map 0 - 4 age group



5.3.2 Vulnerability map 75+ age group



5.3.3 Vulnerability map for age groups 0 - 4 and 75+