



Observing cities' social inequalities: a cartographic case study of Aveiro, Portugal

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The aim of the study is to present a methodology and an instrument to study cities through a case study undertaken in the county of Aveiro, in Portugal. More specifically, it is to establish a typology of social areas, via the concerns that define quality of life. The data are from 1991 (the last published census), collected by INE (National Agency of Statistic), and desegregated for sub-sections (each subsection has about 300 inhabitants). Seven indicators were chosen, submitted to principal component analysis, and 4 factors were extracted: socio-professional status, ageing of population and buildings, accommodation capacity and precarious housing conditions. The cluster analysis permitted the identification, within each factor group, of sub-sections with different quality of life: high-medium, medium, low-medium and low.

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Introduction

According to UNDP (1996) “the number of people living in cities will more than double in 35 years. In 1990 the world’s urban population stood at 2.4 billion. In 2025 it is expected to reach 5.5 billion, a trend accelerating in developing countries, whose share of the total will rise from 63% in 1990 to 80% in 2025”. Despite the incentives to keep people in rural areas, they want to go where jobs are, and jobs are seen to exist in cities. There lies an enormous challenge to prepare the cities and the settlements around them, not merely to absorb this population but to assist in finding or creating livelihoods, social ser-

vices, adequate shelter and an environment in which they can flourish.

The world is becoming increasingly urbanized, and the reality of an urban habitat indicates a universal need to become familiar with the methods of governance and management appropriate to urban societies. Urban agglomeration is usually associated with social problems, such as drug addiction, poverty, delinquency, stress, homelessness, which makes this an important topic for local planners and policy makers. As cities are now contexts of high demographic concentration and development, where problems, policies and social change need to be studied, it is necessary to develop social indicators, in order to support planners, policy makers and professionals and to thereby promote the implementation of appropriate urban policies.

Cities are areas with internal differentiation,

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resulting from historical decisions, both private and public. This reflects social and spatial inequalities and urban segregation processes, and differential access to collective services. The peri-urban areas are intimately linked and dependent on the urban centers, so they too also need diagnosis, programs and intervention.

The continued observation of living conditions for individuals and families, and the problems and strategies they use to solve difficulties, constitute a fundamental strategy to understand social phenomena and their extreme variability. Social development, as a field of study, demands the establishment of close interaction between problems, policies, life conditions and processes of change. This article presents a methodology for mapping social exclusion and inclusion in urban areas, using spatial analytical techniques for identifying spatial patterns of this phenomenon. Geographical information is used as a means of improving the awareness of citizens and urban planners about the different dimensions or deprived urban areas (Kingsley et al., 1997). In this context the use of maps has been recognized as a major tool for enabling ways of thinking about urban issues, including social exclusion/inclusion. In many cases local authorities have made extensive efforts to use GIS as a basis for portraying local social and economic conditions.

Social exclusion/inclusion and quality of life

This framework implies the centrality of understanding concepts as poverty, exclusion, inclusion and differentiation. Traditionally, the term 'poverty' was used, however the concept of exclusion has recently been used as a substitute. This has occurred because this phenomenon takes on new social realities, that appear together within capitalist development. The new poverty, interpreted as a process of social disqualification, is justified by the fact that income alone has ceased to be at the heart of citizenship, despite its fundamental importance in that process (Byrne, 1999). Poverty is essentially a socio-economic fact, while exclusion is a social and cultural process. Nevertheless poverty and exclusion are close concepts, and they can reinforce each other (Paugam, 1996). Social exclusion is not limited to resource scarcity (Byrne, 1999; Dupas, 1999; Hespánha et al., 1997), it also involves topics such as discrimination, segregation, weak social relationships, and inadequate social participation. Social exclusion is closely related with citizenship, since it is associated with a citizenship deficit—Bouvier (2000) mentions that those excluded are those "without some thing" (home, job, social/familial roles), while Dupas (1999) describes social exclusion as a multidimensional notion, since it points to a lack of access to goods and services, security, justice and citizenship; it is a phenomenon related to inequalities at different levels, a complex and heterogeneous concept that permits the emergence of diverse types of exclusion. Bruto da Costa

(1998) has proposed a typology of different spheres of exclusion:

- economic (resource absence or privation);
- social (social relationship privation);
- cultural (exclusion occurs due to cultural factors, such as racism, xenophobia);
- pathological (in consequence of psychological motives);
- self-destructive (associated with self-destructive behaviors like drug addiction or prostitution).

This concept has an objective dimension—measurable signs—and a subjective dimension, that is to say, of feeling excluded. Differentiation always comes before exclusion, and it occurs in five major systems: work, income/consumption, social networks, cultural systems and political systems. Social inclusion and exclusion should be always put together since across their life span, individuals are included in some of the social subsystems and excluded from others, and will move into and out of quite a few subsystems. None, however, will be either included in all subsystems or, conversely excluded from them all at the same time.

Another issue of importance is the prevalence of *vicious circles* where a marginal position within or exclusion from one system is associated with marginalisation or exclusion from other systems. In operational terms, this means the prevalence of both vicious circles and virtuous circles, where the former refers to situations where an exclusion or marginalization in one system is followed by an exclusion or marginalization in other, and the latter to situations where a strong position in one system is followed by strong positions in other systems. Luhman (quoted by Hespánha et al., 1997), however, claims that inclusion in one system is seldom linked to inclusion in others, while exclusion from one system probably often involves exclusion from other systems.

Quality of life is usually understood as one of the indicators related to social inclusion and exclusion. For example, the social exclusion/inclusion index composition used by Câmara et al. (2001) includes four categories: autonomy, quality of life, human development and equality. Quality of life indicators vary by different authors: Câmara et al. (2001) selects environment quality, sanitation comfort, poor housing and social services deficit; the Calvert-Henderson Quality of Life Indicators are (Henderson et al., 2000) education, employment, energy, environment, health, human rights, income, infrastructure, security, public safety, re-creation and shelter; while Gatt (2001) defines eight quality of life indicators: health, urban environment, housing, democracy, safety, education, community cohesion and employment and economy.

Our study defines quality of life as the possibility of creating a better redistribution of social and technological wealth among citizens living in a community; and the guarantee of an ecological and participative environmental development, with respect by nature

and people, with the lowest degree of degradation and marginality (Sposatti, 2000).

Why is a social map important?

Spatial analysis was mostly developed in an era when data were scarce and computational power was expensive. Consequently, traditional spatial analysis greatly simplifies its representations of geography. The rise of geographic information science (GISci) and the changing nature of scientific questions at the end of the 20th century suggest a comprehensive re-examination of geographic representation in spatial analysis (Miller, 2000). Existing tools in spatial analysis and new tools available from GISci have tremendous potential for bringing more sophisticated representations of geography to the forefront of spatial analysis, theory and application.

Johnston (1995) has focused on urban social geography, looking at patterns of residential differentiation in Australian and New Zealand cities: this involved exploring new multivariate quantitative techniques for portraying those patterns, their changes over time, and movements between social areas, with later work examining how people perceive the characteristics of different social areas. At the aggregate scale this involved pioneering work using small-area census data and other sources and evaluating a range of multivariate statistical procedures, both for this particular research area and for human geography more generally: it resulted in pioneer descriptions of the various dimensions of residential differentiation in the major cities of those two countries, of neighbourhood change, and of the townscape characteristics of different types of social area.

In general, great attention has been given to the impact of maps in promoting awareness about living conditions, but considerably less attention has been devoted to the use of spatial analytical techniques in conjunction with social exclusion/inclusion indicators (Cámara *et al.*, 2001). The cartography of social-spatial “asymmetries” permits the identification and localization of fragilities in the field of political, economical and social initiatives within the areas included. The map contents may be multiple, incorporating several indicators:

- Related to social inequalities: housing, comfort patterns, lifestyles, education, health and quality of life;
- Related to social capital: welfare facilities distribution; and
- Related to social risk: unemployment, poverty, addictions, violence, criminality.

Besides the scope of the social map it is important to emphasize that it does not simply constitute a tool to represent reality in a spatial scheme, above all it is an opportunity to establish relationships between data and population, promoting a clearer view of life

conditions and their differences. So, showing the city in detail gives a clear image of inequalities, which, most of the time, are not clear or are hidden, and helps us to go beyond indifference or unawareness (Sposati, 1996). Actually, the increasing tendency for citizenship exclusion and the break-up of solidarity, apparently uncontrollable, makes the “danger” of social apartheid stronger.

These reasons justify the importance of the social map as an instrument to promote the knowledge of the city about itself, to promote a shared reflection about the urban community, socio-spatial cleavages and the tendency to differentiation. The map creates a field for discussion between alternative development projects, clarifies the basis of those projects’ dynamics and promotes the expression of “local utopias” centered on autonomy, quality of life, human development and equity among citizens.

The construction of the social map is allied to the ambition (Sposati, 1996, 2002a, 2002b) of social inclusion, utopia, a place characterized by autonomy, human development, quality of life, equity, democracy, citizenship and happiness.

According Sposati (2002a) the map consists of a methodology and pedagogy for social inclusion (collective thinking and decision). As a methodology for analysis and decision it can use a variety of languages:

- Quantitative, able to produce indexes (social exclusion/inclusion index; discrepancy index; movement of the variables for interval of time index).
- Qualitative, setting up hierarchies of social exclusion/inclusion conditions (for example, via rankings of best and worst territorial circumstances).
- Participative, allowing the interaction with population through debates, videotapes, and allowing the collection of information along with citizens’ groups (to organize guides, legends or qualitative maps).

The map can be considered as a pedagogic approach to social inclusion, since it is an objective instrument that links the parts. Thus it promotes communication between different sectors of the population, facilitating collective thinking and decision-making, for the reason that it is understandable by any citizen. The map has, as well, a political nature; it sets up a way to conquest citizenship through the diffusion of basic patterns of inclusion. According to Sposati (1996) this goal is achieved because the map:

- gives objectivity to the collective subjectivity around the concept of social inclusion as a topic of dignity and citizenship;
- allows any citizen to “see” discrepancies between city inhabitants’ life circumstances;

Developers and residents each time pay more attention to the spaces that they inhabit, the map makes each one become much more sensitive to the roles of citizens in making social changes happen (Kirby, 2000).

It is still an instrument for political decision and for the prioritization of public policies. Essentially, this tool promotes thinking and permits the organization of multiple relations from specific interests in the analysis of reality (literacy levels, income and so forth).

Simultaneously it comprises an ethical nature, as the map contains the utopia of the citizen who wishes to be happy in the place where he/she lives. Urban planners need to have instruments that allow a constant scrutiny and up dating to match social changes (Kirby, 2000). Harvey (n.d.) notes that urbanization is not one process, rather it evolves many processes that together create things that we recognize as cities.

From an operational point of view, the map is a way to geo-process the language of data aiming to make it "decipherable" and more manageable. The visualization of data might be done using different forms (Sposati, 1996):

- Choropleth maps (polygons): the results are distributed by the territory using symbolic colors;
- Maps of surface trends: cartography that distributes results using the territory population as a reference;
- Maps of occurrences: cartography that locates by icons the occurrences of social exclusion/inclusion within the territory.

This social cartography aims to turn clear and visible the changing that our vision has difficulty in retaining. This objective is attained through a simple strategy: reduce the geographic reality, even if it's a large one, to a scheme printed in a piece of paper. All the processes depend on the election of the indicators that accurately reflect the dynamics of study.

The principal objective and advantage of developing a social map is the cartographic representation of information about citizen life conditions, and about the resources available to satisfy the population needs. This scheme permits the identification of inequalities on resources distribution and turns on an important instrument of knowledge and a solid basis for social intervention.

The county of Aveiro: our case study

The administrative organization of Portugal consists of districts, each divided into counties, which in turn are divided into civil parishes. The country is divided into 29 districts (see *Figure 1*); Aveiro is the capital of one of them, and in turn the county of Aveiro is composed of 14 civil parishes (*Figure 2*). The numbers that follow correspond to the numbers on the maps, below: São Jacinto (1), Cacia (2), Esgueira (3), Vera Cruz (4), Glória (5), Santa Joana (6), São

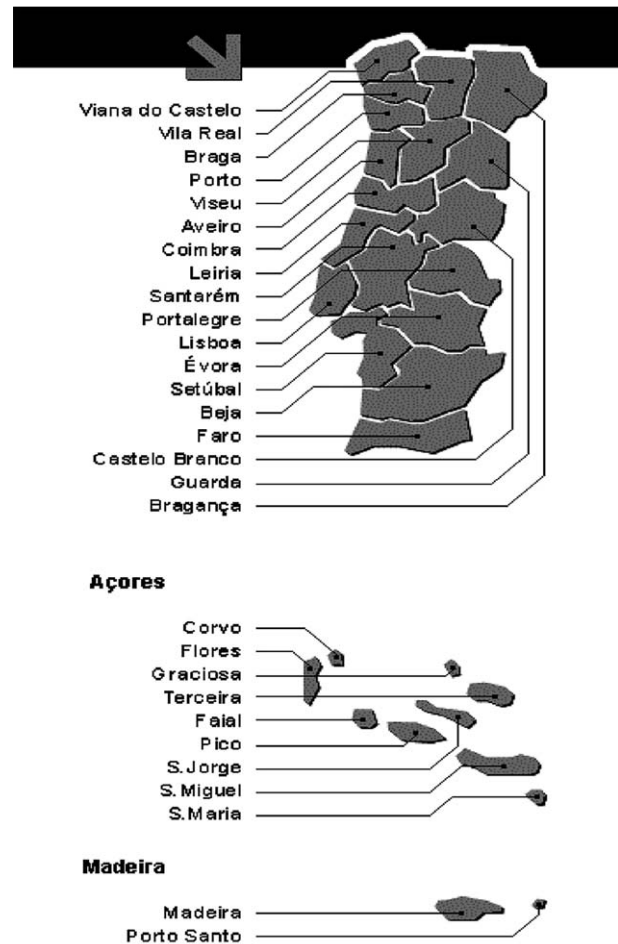


Figure 1 Portuguese districts

Bernardo (7), Eixo (8), Eiol (9), Aradas(10), Oliveirinha (11), Requeixo (12), Nossa Senhora de Fátima (13) and Nariz (14).

The center of the city embraces Glória, Vera Cruz and a small part of Santa Joana. The civil parishes' categorization, according to the Typology of Urban Areas (approved by the Superior Advice Committee of Statistic—1998) is the following (*Figure 2*): urban areas—Santa Joana, Vera Cruz, Oliveirinha, Glória, Aradas, São Bernardo, Esgueira, Eixo e Cacia; suburban areas—Eiol, Nariz, Requeixo, Nossa Senhora de Fátima; rural areas—São Jacinto.

Aveiro is a small county (around 200 km²) located in the west of Portugal, about 70 km south of Porto and 265 km north of Lisboa. The county itself has about 75 000 inhabitants (2001) and it is bordered by a natural lagoon, Ria de Aveiro. Aveiro has a relatively high population density. Aveiro is also the capital of a very prosperous industrial region. During the 1980s and early 1990s, the city grew and registered an intense demographic increase with urban dispersal occurring through the rural areas. The visible growth process in the city implies the transformation of adjacent areas, changing the social functions of spaces and the configuration of former social networks.

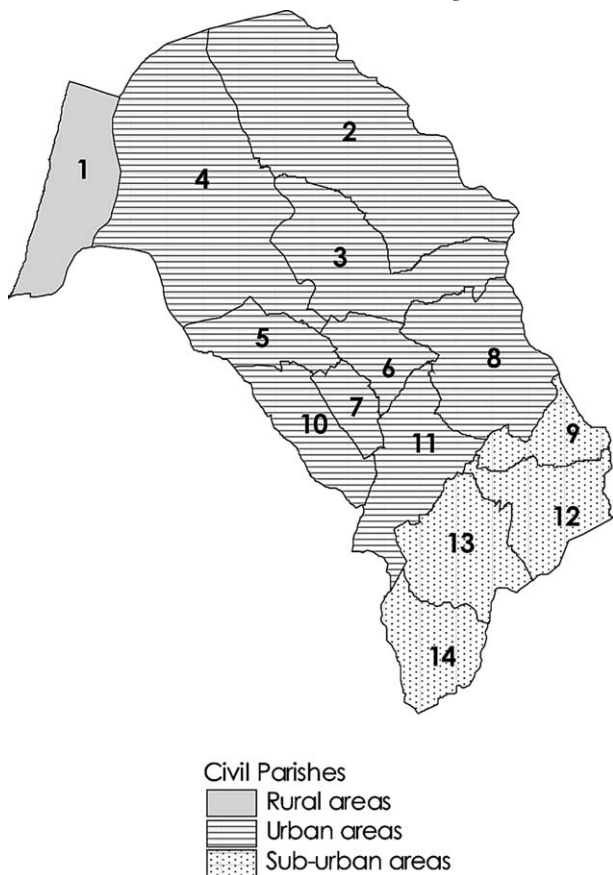


Figure 2 The county of Aveiro and rural-urban typology of civil parishes

Actually, the metamorphosis in rural communities results from distinct processes, such as the industrialization of agriculture, increasingly profitable tourism, labor mobility and environmental preservation. Rural and urban change is not an independent process, they are interrelated and affect each other. These facts give complexity to the analysis of spatial dynamics and to the factors affecting them. These reasons turn our attention to the county and not only to the city.

The demographic dynamics show a constant increasing of population (although more so during the two last decades) in the county and in each parish, and this is above the average growth of the Portuguese population. The population ageing levels are below those registered at the national level. This fact is explained because Aveiro is an attractive center for youngsters and adults, since it is a prosperous area with many jobs on offer. From an economic point of view, the population of Aveiro is characterized as a semi-industrial area, with great amount of agriculture and independent activities (11.8%), and a high point of female activity.

In terms of what concerns the social development, recent studies (Hespanha et al., 2001) indicate that the county of Aveiro has a good position in the country's ranking, whichever indicator is selected: 14th accord-

ing the index of human development (IDH-UN, 1997) and 9th according the index of social and economic development (IDES, DPP, 1997).

Objective

The principal aim of this research is to develop a methodology or instrument that permits the identification of areas of inclusion/exclusion within a city. So, Aveiro was chosen to perform the case study. At this first stage of social map development, the goal was to establish a typology of social areas, distinguishing homogenous (internally consistent) and heterogeneous areas (internally diversified).

More specifically, the objectives are:

- To identify how the quality of life is distributed inside the county;
- To understand which civil parishes have the highest and lowest quality of life;
- To locate the high social risk areas;
- To compare the center of the city with peripheries.

Methodology

This first approach to the social map of the county of Aveiro was performed with indicators desegregated at the level of statistical subsection (areas with around 300 inhabitants), based on the Census of Population and Housing Query performed by INE (National Agency of Statistics) in 1991. An update of data will be done as soon as INE publishes the data from the 2001 Census.

In 1991 the county of Aveiro comprises 598 subsections, of these 58 were uninhabited areas (for example: the lagoon, roads, fields). For the analysis, only the remaining 545 subsections were taken into account. Based on similar studies developed in Portugal (Porto and Lisboa) (INE/DNR, 2000; INE, 1999) and the literature on social inclusion/exclusion from a cartographic perspective (Sposati, 1996), at a first stage 18 indicators were selected (Table 1), and submitted to factor analysis, with results suggesting that just seven indicators explain around 80% of the variance, so the remaining indicators were suppressed.

The identification and characterization of homogenous areas in what concerns quality of life was, consequently, based in seven statistical indicators (Table 2):

- Average age of the buildings;
- Average number of divisions per accommodation;
- Average dimension of families (institutional families were excluded);
- Weight of precarious accommodations;
- Average age of the population;
- Literacy level;
- Weight of socially valued professions.

Table 1 Set of initial indicators

Buildings
Average age of buildings
Residence location—Exclusively residential area; mainly residential area; mainly non-residential area.
Average residential building number of floors
Housing
Sanitation comfort
Number of divisions per accommodation
Ownership
Weight of precarious accommodation
Weight of accommodations with mortgage
Average costs with accommodation leasing
Demographics
Average age of the population
Literacy level
Occupational structure
Weight of socially valued professions
Weight of employed population
% of population owning car
Weigh of population living from their jobs
Household
Household dimension
Household structure

These seven indicators were submitted to principal component analysis (varimax rotation; Kaiser normalization); a 4 factor solution was extracted, explaining 84,2% of the total variance. The contribution of each indicator to the factor solution is shown in *Table 3*.

Basic patterns of social exclusion/inclusion do not work through means or percents, but they should be measured in a ranking, where some groups are clustered and others stay far from inclusion. So, the factors were submitted to cluster analysis, aiming to organize groups inside each one of them. The groups were numbered from 1 (meaning the low quality of life, exclusion high risk) to 4 (high quality of life, socially included).

Table 2 Indicators' medium, maximum and minimum values

Indicators	Maximum*	Mean	Standard-deviation
Weight of socially valued professions	1.00	0.16	0.20
Literacy level	11.10	5.20	1.90
Average age of the population	72.00	36.60	9.30
Average age of the buildings	72.00	30.50	15.60
Average number of divisions per accommodation	12.00	4.80	1.30
Average dimension of families	6.00	3.00	0.80
Weight of precarious accommodation	1.00	0.02	0.08

*Minimum values are always equal to zero (0).

Results

Socio-professional status

Regarding the socio-professional status the four groups produced through cluster analysis were (*Table 4*):

- Group 1—Low class (23 subsections—4.2%) includes subjects with low academic level (illiterates or attended primary school only) and having professions without social valorization;
- Group 2—Low-medium class (311 subsections—57.1%) takes in subjects who don't perform a socially valuable profession and that attend school for only 4–6 years;
- Group 3—Medium class (148 subsections—27.2%), characterized by inhabitants with medium valued professions and literacy around the secondary level;
- Group 4—Medium-high class (63 subsections—11.6%) includes subjects with university/ polytechnic educational level, performing highly valorized professions.

The low-medium class and the medium class together represent 84.2% of the total number of subsections. This means that a medium class characterizes the county in the main. The low class and the medium-high class appear in some subsections located at the city center civil parishes (Glória and Vera Cruz).

In general, the visualization of the distribution of the 4 groups of socio-professional classes in the county of Aveiro (*Figure 3*) permits the identifications of peripheral areas as more homogenous than the center of the city. In the two civil parishes, which constitute the city center (Vera Cruz and Glória) it is possible to find all the four types of the socio-professional classes, but as the observation moves away from the center the “color” becomes more standardized, with the low-medium class prevailing.

Ageing of the population and buildings

The 4 groups defined by cluster analyses are (*Table 5*):

- Group 1—Very old buildings inhabited by old people (11 subsection—2%);

Table 3 Factors loadings

Indicators	Factor 1	Factor 2	Factor 3	Factor 4
	socio-professional status	population and buildings aging	accommodation capacity	precarious housing conditions
Weight of socially valued professions	0.93	0.00	0.00	0.00
Literacy level	0.84	0.14	0.23	0.00
Average age of the buildings	-0.13	0.88	0.00	-0.10
Age average of the population	0.25	0.85	0.00	0.00
Weight of precarious accommodation	0.00	0.00	0.00	0.99
Average number of divisions per accommodation	0.44	0.31	0.69	0.00
Average dimension of families	0.00	-0.12	0.94	0.00
Explained variance	32.5%	20.5%	17.3%	13.9%

Table 4 Groups according the socio-professional status

	Group 1 low class (N = 23)	Group 2 low – medium class (N = 311)	Group 3 medium class (N = 148)	Group 4 medium-high class (N = 63)
Weight of socially valued professions (mean: 0.2)	0.02	0.1	0.2	0.4
Literacy level (mean: 5.2)	0.6	4.3	6.3	9.1

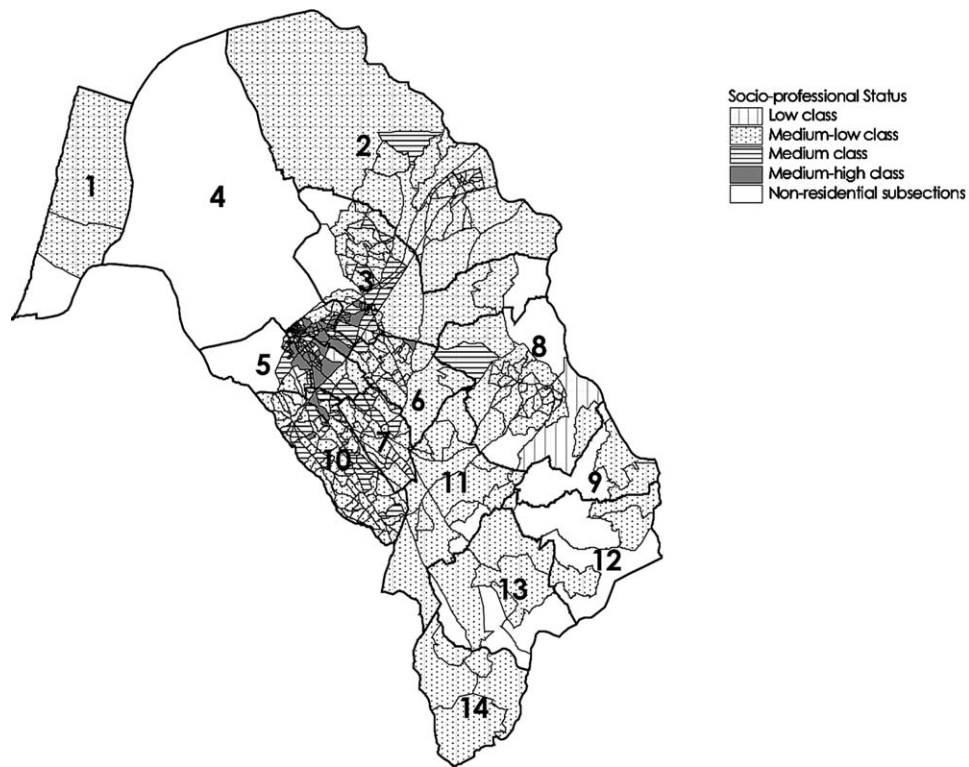


Figure 3 Cartography of the groups according the socio-professional status (subsection)

Table 5 Groups according the mean age of the buildings and the average age of population

	Group 1 very old buildings inhabited by old people (N = 111)	Group 2 old buildings inhabited by adults (N = 250)	Group 3 new buildings inhabited by adults (N = 167)	Group 4 new buildings inhabited by young people (N = 17)
Average age of population (Mean: 36.6)	42.1	39.0	32.5	4.7
Average age of the buildings (Mean: 30.5)	53.6	32.2	15.6	1.4

- Group 2—Old buildings inhabited by adults (250 subsections—45.9%);
- Group 3—New buildings inhabited by adults (167 subsections—30.6%);
- Group 4—New buildings inhabited by young people (17 subsections—3.1%).

Observation of the map (Figure 4) supports the former assumption, which indicates that the city center is a heterogeneous area and the periphery has a more homogenous pattern. The newest zones are located in Cacia and Eixo; the oldest areas are in the city center, mostly in Vera Cruz.

The city center is an aged area, with regard to both buildings and population; this is an assumption valid for most of the city centers in Portugal.

Housing capacity

The housing capacity shows four groups that are highlighted from cluster analysis, and are (Table 6):

- Group 1—large families living in small accommodations (2 subsections—0.4%);
- Group 2—small families living in small accommodations (21 subsections—3.0%);
- Group 3—medium size families living in medium accommodations (432 subsections—79.3%);
- Group 4—medium size families living in larger houses (90 subsections—16.5%).

Once more, the homogeneous pattern of the peripheries is underlined (Figure 5). Nevertheless this indicator is, globally, more homogeneous within the county, only 2 sub-sections are identified in the group 1 (large families in small accommodations). Again the city center (Vera Cruz and Glória) shows more admixture than other areas.

Precarious housing conditions

The cluster analysis permitted the definition of the following four groups (Table 7):

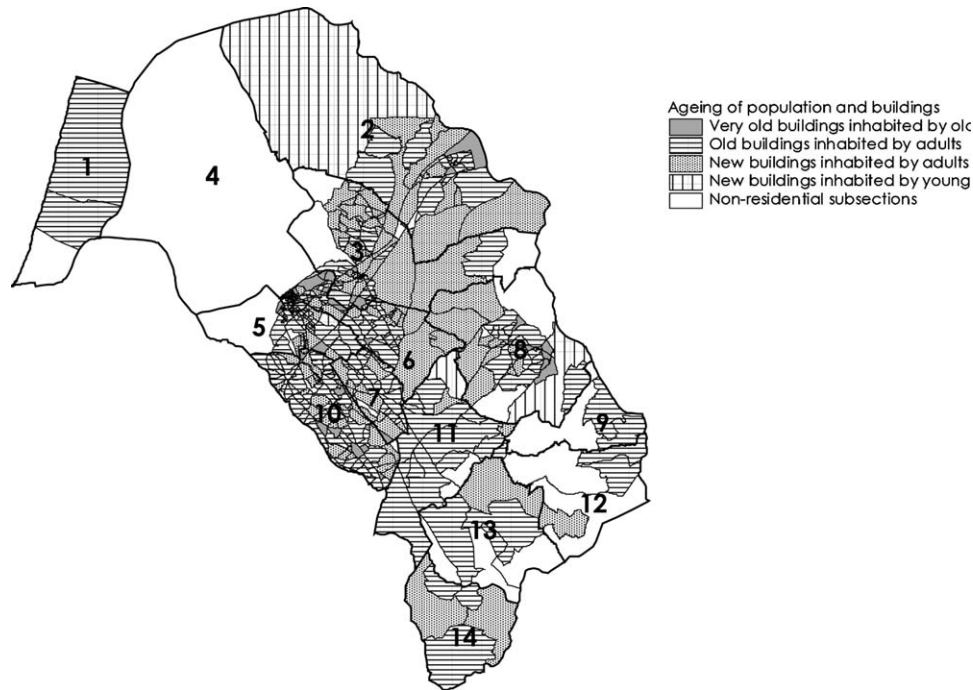


Figure 4 Cartography of the groups according the ageing of the population and buildings (subsection)

Table 6 Clusters according housing capacity

	Group 1 large families living in small accommodations (N = 2)	Group 2 small families living in small accommodations (N = 21)	Group 3 medium size families living in medium accommodations (N = 432)	Group 4 medium size families living in great houses (N = 90)
Average number of divisions per accommodation (mean: 4.8)	0.0	0.0	4.7	6.3
Average dimension of families (mean: 3)	5.5	0.7	3.1	3.1

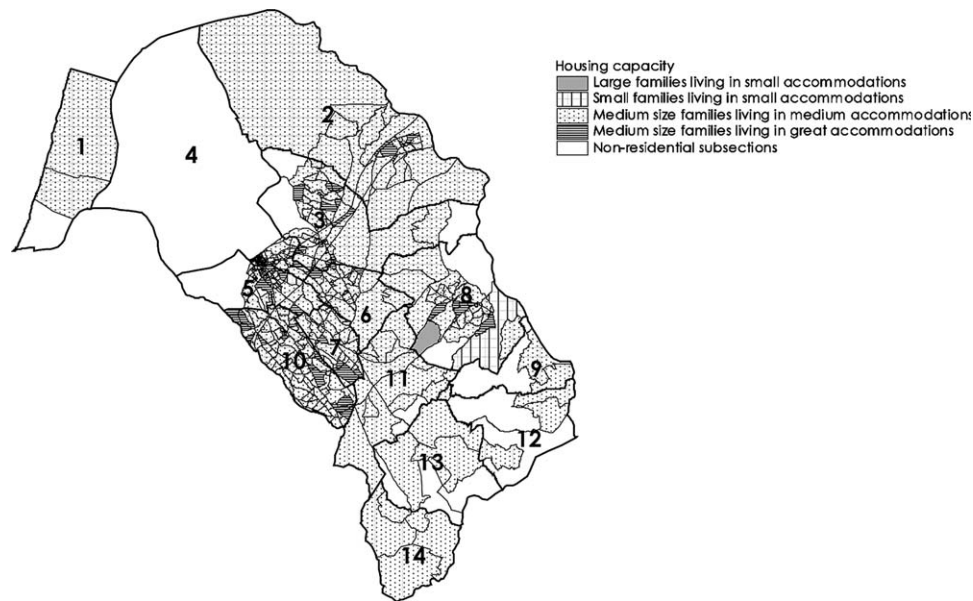


Figure 5 Cartography of groups according to the housing capacity (subsection)

- Group 1—100% of precarious housing conditions (2 subsections—0.4%);
- Group 2—55% of precarious housing conditions (4 subsections—0.7%);
- Group 3—15% of precarious housing conditions (26 subsections—4.8%);
- Group 4—absence of precarious housing conditions (513 subsections—94.1%).

In fact the data confirm the idea that in the county of Aveiro problems related to poor housing conditions are scarce, indeed 94.1% of the subsections have no accommodation in precarious conditions.

Taking into consideration that 2 subsections contain 100% of the precarious accommodations, it was decided to carefully explore them. These subsections are located, one at Aradas and the other one in São Bernardo. Both include just one accommodation, i.e., 100% means 1 “shack”. In the subsection in Aradas

Table 7 Clusters according to the weight of precarious habitation

	Group 1 100% of precarious housing conditions (N = 2)	Group 2 55% of precarious housing conditions (N = 4)	Group 3 15% of precarious housing conditions (N = 26)	Group 4 Absence of precarious housing conditions (N = 513)
Weight of precarious accommodation (mean: 0.02)	1.00	0.55	0.15	0.00

lives one family, comprising one couple and 3 children, while in the São Bernardo subsection lives one older person alone.

The same analysis was done to the 4 subsections having about 50% of precarious habitation: two are placed at Aradas (Aradas A; Aradas B) and two at Vera Cruz (Vera Cruz A; Vera Cruz B). Together these subsections have a housing low density: Aradas A contains 4 accommodations, of these 2 are "shacks"; Aradas B includes two accommodations, of which one is a "shack". Vera Cruz A includes 3 accommodations, two of which are precarious; Vera Cruz B comprises 150 accommodations, of these 83 are precarious. Vera Cruz B seems to be a peculiar situation, because it was categorized as high socio-professional class, therefore it was given a special attention. Through the overlapping of an air photograph (using the software Arc View) of the county of Aveiro, the exact localization and characterization of this area was found. This subsection is placed quite at the center of the city, near an exhibitions center enclosing a set of high rise buildings and another group of degraded buildings. Currently, this last group does not exist; it was demolished and transformed into a parking area. It is important to underline that the data used in this investigation go back to 1991, and this indicator shows a precarious quarter which was eradicated in the mean time. *Figure 6* portrays the map of this indicator.

It is possible to conclude through the observation of the map that this is not a discriminating indicator, since the majority of subsections do not have precarious accommodation.

Social areas of the county of Aveiro

To identify the social areas of the county the mean of clusters on 3 of the factors (socio-professional class;

housing capacity; aging of the buildings and population) was calculated. The weight of precarious accommodation was removed because, as shown it is not a discriminating variable. The cluster of each factor were numbered according increasing order, that is 1 means a low quality of life and 4 the highest quality of life. Thus, the mean of each subsection in the set of the clusters was calculated. This methodology, theoretically, permits us to obtain 4 groups or social areas:

- Group 1—areas of low quality of life;
- Group 2—subsections of low-medium quality of life;
- Group 3—subsections showing medium quality of life;
- Group 4—subsections that have medium-high quality of life.

After performing the calculations (*Figure 7*) 3 groups were found: 2, 3 and 4. The results show that within the county of Aveiro there do not exist areas that are highly impoverished. Group 2 involves 174 subsections (31.9%), group 3 contains 368 (67.5%) and group 4 includes just 3 subsections (0.6%). Given that just 3 subsections are included in group 4 (high quality of life), it was decided to look at them in detail: one of these is Vera Cruz B (already described above), the other 2 are placed in Glória (Glória A; Glória B). For each subsection the professional characteristics and literacy level were observed.

- Vera Cruz B, described above because it contains 55% of precarious accommodation. It's an area of contrasts; two types of employment prevail: university teachers and unspecialized workers; the same occurs with literacy levels, the prevailing groups are: primary school and university degree.

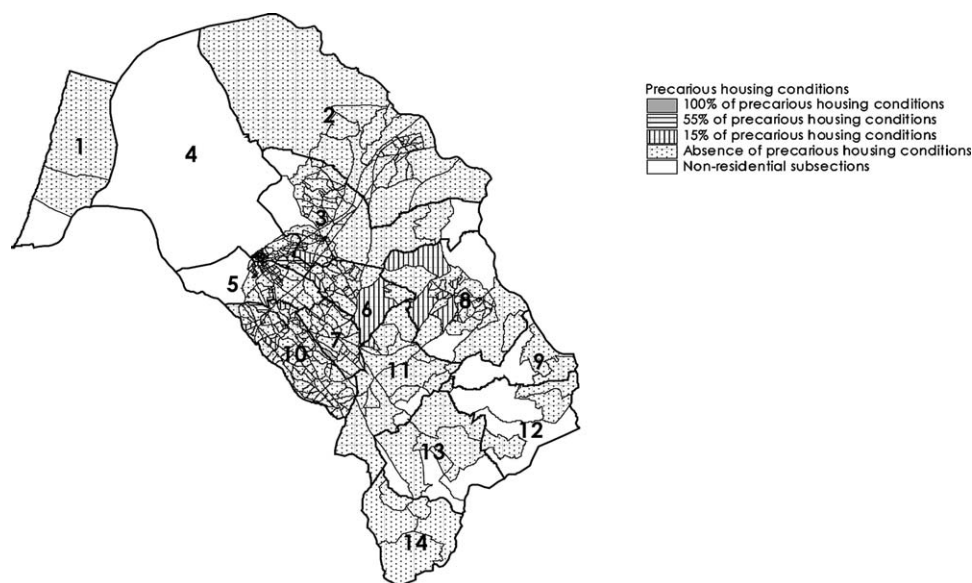


Figure 6 Cartography of the groups according to the weight of precarious housing (subsection)

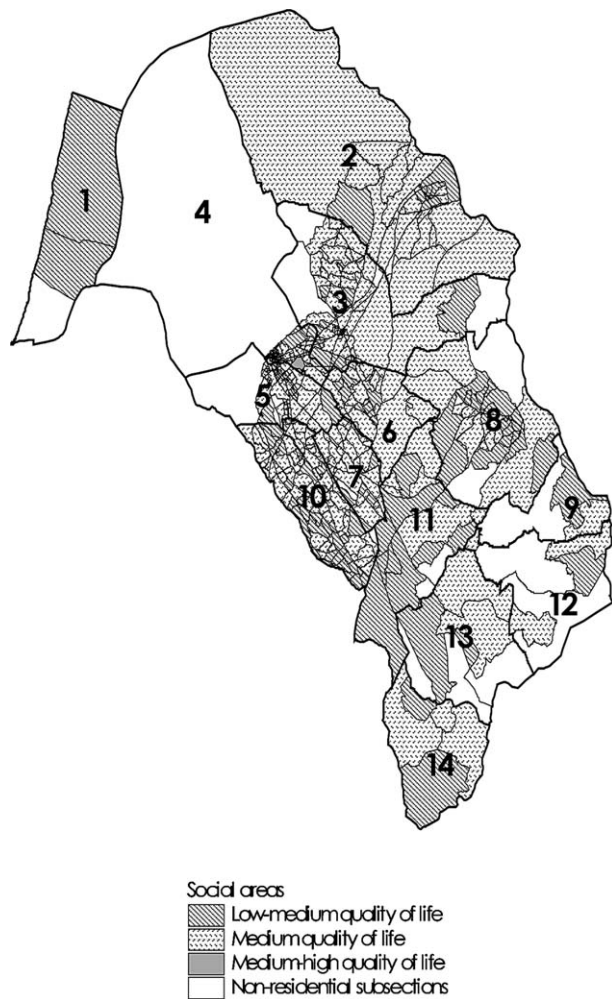


Figure 7 Social cartography of the county of Aveiro (subsection)

- Glória A and B are bordering, together include 29 accommodations, built between 1971 and 1980, the predominant professional class are university teachers (the University of Aveiro stands contiguous).

Glória A and B were observed through the air photograph, they contains the Gulbenkian neighborhood, near the center of the city, a new area.

The next step comprises the comparison of the 3 areas (2, 3 and 4) in what concerns gender, age average and amount of unemployed population. This was performed comparing the expected frequencies with the observed frequencies, within each group (2, 3 and 4).

Regarding gender, no differences were found between the groups. In what concerns age average, group 2 shows an incidence of population with a higher mean age (40 years or plus); the youngest population (age mean less than 40) prevails in group 3. Group 2 includes the greatest amount of unemployed people.

Final remarks

Although this is a first approach to social cartography in the county of Aveiro and, above all, it was performed with data from 1991, it should be valued as the development of an instrument for the study and understanding of the county. The intrinsic potential of this tool arises from the results. For example, it is possible to cartographically demonstrate demographic variations, population ageing indexes, relate facilities distribution with population ageing groups concentration and so forth. This is an important instrument for: local policy, citizens, city planning and promotion, local-level planning, community organizations and decision-support systems.

The principal findings in the county of Aveiro show: great homogeneity of peripheral areas; asymmetries at the center of the city; in general the county is characterized by medium quality of life, despite some restricted areas with some focus of problems; areas of low quality of life were not found. Glória and Vera Cruz, city center civil parishes, are those showing more contrast in quality of life, and also have the more aged groups and oldest buildings, and concentrate the fewest areas of social high risk.

Futures developments include the necessity to form a working group for the map, involving urban planners, local authorities, citizens, and researchers. Its potentialities can, so, be explored and decisions about new indicators would be made. It is also essential to construct and maintain a database. It is of main importance to systematize questions identified in previous diagnoses, establish patterns of social inclusion and diffuse results. It is, also, our concern to organize a history of the city in maps, arising the evolution of indicators, showing how the city expands.

This first development permits some questions to come forward and to establish some strategies. First, the construction of a social map demands three previous conditions: territory geo-processed; the territorial aggregations should be compatible with census data; making exclusion measurable (decisions about what indicators should be use, and assessing of discrepancy level). Second, addressing the matters raised by this methodology requires a co-operative effort by local and central government, community, organisations, business and citizens. Third, measuring quality of life should become a regular exercise contributing to the development of more effective partnerships. Four, some of the indicators used may prove to be less useful over time, and there are indicators not included that need to be developed to aid decision-making.

It's our understanding that by monitoring the complex factor interplay in assessing quality of life, we can continue to address these issues and pinpoint areas for further action. There has been a growing acceptance of the need for public policymakers to embrace a model of community involvement in decision-making.

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