Mapping living conditions in Rio de Janeiro Metropolitan Area

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EDITORA PUC RIO

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Preface

PUC-RIO AND THE CITY OF RIO DE JANEIRO

As in 2015 we are celebrating the 450th anniversary of the foundation of the city of Rio de Janeiro, we would like to honor this territory that we all love and in whose history this University has had its relevant participation. Although it is just 75 years old, our institution, created in 1940, was the first private and catholic university in Brazil and has soared high, inspiring other confessional colleges to develop in other parts of the country.

The cosmopolitan vocation of the city, where great inspiring and innovating ideas are produced and unfolded to other regions in the country, was certainly present in the minds of those catholic intellectuals who wanted a high-quality university, in which the values of faith and Christian humanism could dialogue with scientific advances. That is how PUC-Rio was founded and developed. Its history is tangled with the history of the country and of the city of São Sebastião do Rio de Janeiro.

Honoring the city is bringing to memory the moments in which the University, as a place of political, social, scientific and academic reference, contributed to the history of this city, many times bringing into the university campus relevant debates, resistance and solidarity actions of local and national perspectives. Together with other main universities in the city, PUC-Rio recognizes that everything that has been done throughout these 75 years of existence has contributed to ennoble the city of Rio de Janeiro. In terms of politics, PUC-Rio has educated students who have later play important roles in the judiciary, executive and legislative powers. In terms of the sciences, its sound humanistic and scientific education has encouraged intellectual careers in different fields of knowledge. In terms of research, the high academic quality of its post graduation studies and its projects of local and national interest have been adding significant progress to science both in the city and in the country. As for social commitment, its present inclusion policies allow poor students from the city's periphery to study in the South Area and to receive the same education offered to any other student. As far as the development of humanistic and Christian values are concerned, it has encouraged interreligious dialogue, in a brotherly environment of respect for different religions and ideologies, complying with the city's multicultural and interreligious ***ethos***. In a cultural perspective, throughout these 75 years, PUC-Rio has seen its teachers, students and alumni achieve a permanent presence in the world of arts, moving-making, media, publicity and so forth, expanding the role of the city in the country's cultural scenery.

For the past years, PUC-Rio has enlarged its contribution to the city of Rio de Janeiro, as much in the scientific area as in its relation with international institutions. As to its scientific contribution, it is easy to see the relevance of the University to the city through its participation in several fields of knowledge, mainly economics, computer science, engineering, education and social sciences, among others. The partnership of the University's International Relations Institute with Rio de Janeiro City Hall has been producing data for BRICS, which once more shows the close relation between the city and PUC-Rio. Finally, we cannot forget that the international vocation of Rio has inspired the growth of internationality in the University, allowing us to exchange hundreds of students with other universities abroad.

Once again showing that the history of the University is closely linked to the history of the city that now celebrates its 450th of foundation, PUC-Rio has made, in partnership with the Université de Bordeaux, the present ***Mapping of Living Conditions in Rio de Janeiro Metropolitan Area,*** so that anyone can have a detailed view of the greatnesses and the weaknesses of our city, which, despite the everyday issues, still is wonderful, enchanting Brazilians and foreigners with its landscapes, reliefs and its informal and warm population. Inspired by the city's personality, the University is always open to receive and live with ethnical, cultural, ideological and religious differences.

Pe. Josafá Carlos de Siqueira SJ
PUC-Rio Rector

Foreword

I was already acquainted with the outstanding work by the professors who are now publishing this book on Rio de Janeiro Metropolitan Area. We have been together on different occasions, and I have often asked them for information in order to find new perspectives for my pastoral procedures. Now, with these new studies and analyzing the region where I presently carry out my mission, I realize the importance of researchers who can help us to see and to question the reality around us, as well as to show us the way to possible solutions for our society.

Statistical analyses show us trends and realities. They can help us to experience reality as it is and, consequently, enable us to plan the future. This is the great opportunity we have now with the present book!

The living conditions of a population can be so diverse that getting to know them requires severe method and precise data. We do have enough data, but they come from different origins and are the result of different methodologies. By gathering them on maps and in other explanatory forms, researchers Cesar Jacob, Dora Hees and Philippe Waniez have made true an outstanding work on Rio de Janeiro and its Metropolitan Area, through the partnership of Rio de Janeiro Pontifical Catholic University and the University of Bordeaux. On the eve of celebrating its 450 years, the city experiences acute lack of symmetry, sharp contrasts, structural urban order issues and quite different living conditions according to the distribution of the population in its different areas. These problems have accumulated over the years and are now part of the city history. However, enlarging our understanding of these issues and being able to identify possible means to overcome present conditions can bring out necessary and urgent insights. By being aware of the city's reality, we may become more committed to our role as responsible citizens.

The present book is divided into 12 chapters, which focus on the following items: distribution of the population, income, demographic structure, migration, households, education, employment, religions, health, criminality, elections and a comparative study of Rio de Janeiro and other six Metropolitan Areas in Brazil. These rich and detailed contents are distributed on easy-reading maps and charts, together with analytical texts that try to interpret the data they present. This kind of presentation facilitates the reader who wishes to go deeper into one of the chapters and get hold of its contents. Surely, what is called people's living conditions in Rio de Janeiro and its Metropolitan Area is nothing abstract. It has to do with every one living here, people who should be respected and considered in the present and in the future. There are some social conditions that the State and civil institutions should commit themselves to change into fairer and better conditions, taking all the chances that the present moment offers to our city.

Next year, we will celebrate the city's 450 years foundation and we want that the 50 years left for the 5th centennial to be a period of diminishing and overcoming contrasts. This is the responsibility of all individuals who live here. It is up to us to improve these rates and take concrete steps towards a more just and brotherly Metropolitan Area.

I thank Rio de Janeiro Pontifical Catholic University to offer us the opportunity to better serve present society. We are pretty aware of the high quality of our university's teaching and research! And I deeply praise the work of the professors that help us understand our society and question our mission. May the reading and the study of the present book help us find concrete steps for the present and the future.

Cardinal Orani João Tempesta, O. Cist.
Archbishop of Archdiocese of São Sebastião do Rio de Janeiro

Introduction

Rio de Janeiro, which, in recent years, has hosted great world events, such as Rio+20 in 2012, the 28th World Youth Day in 2013 and the World Football Cup in 2014, is frequently seen through stereotyped images, both positive, as a city of great natural beauty, and negative, as a dangerous city with high violence rates.

Despite the clichés, Rio represents a great challenge for those who wish to understand it in its true dimension, due to the fact that, side by side with its image of a tropical paradise, there is a city with sharp social contrasts. Through the analysis of a series of maps, the present atlas tries to show the real living conditions of the population in the city, which will celebrate 450 years of its foundation in 2015 and host the Olympic Games in 2016.

2010 Demographic Census

As we know, Brazil has a statistical tradition. In the second half of the nineteenth century, the central government started a net of data collection on environment, economy and society in general. The main institution in charge of this data collecting system, IBGE - Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics), has been producing a great regularly-updated amount of information about reality in our national territory, with different geographic focuses. This information is the result of several researches, as the decennial demographic census, which has been producing a very comprehensive database on the population and housing.

The last Census took place in 2010, and the week from the 25th to the 31st July that same year was established as its reference period. Data collection was based on two questionnaires: Universe and Sample. The Universe questionnaire is applied to the whole population and consists of 37 questions on basic characteristics of houses and their inhabitants, whereas the Sample questionnaire is applied to a fraction of the population in each municipality. This fraction is calculated according to the number of its inhabitants, that is 5% for cities with over 500 thousand people. Through this second questionnaire, which consists of 108 questions, detailed description of households (type of construction, occupation, appliances and environment) and their residents (education, occupation, income, families etc.) are collected.

Free access to the micro data rendered by the Sample questionnaire allows scholars to produce statistical charts, cross data and find the answers to the specific questions raised by researches. Another aspect to be emphasized, which already occurred in the 2000 Census, is the unfolding of a set of data rendered by the Universe questionnaire, in extremely detailed statistical level, that of census tracts.

Urbanization and metropolization in Brazil

Brazil has 51 big cities, including 43 Metropolitan Areas (MA), 3 Integrated Areas of Economic Development (IRED) and five Urban Areas (UA). Together, they comprehended 97 million people in 2010, a little over half of the 191 million inhabitants living in the country at the time (Fig. 1). Urban areas are those that mainly undergo demographic growth, which is 1.42% per year, whereas the country as a whole grows at a rate of 1.17% per year.

With almost 12 million people, Rio de Janeiro is the second MA in the country, falling behind São Paulo, with 19.7 million people. The other big cities cannot compare with these two capitals in terms of their amount of inhabitants: Belo Horizonte has 5.4 million and Porto Alegre 4 million people; an IRED in Brasilia with its 3.7 million people levels with the main capitals in the Northeast, such as Recife, Fortaleza and Salvador.

In 2005, São Paulo and Rio de Janeiro were 4th and 14th place, respectively, according to the demographic classification of the big cities in the world[1]. However, they rate very modestly in terms of population growth, in comparison with most of other big cities in Brazil. In São Paulo there was a 0.97% and in Rio a 0.86% raise, which are lower than the national average. However, we cannot forget that, when these rates are applied to very large populations, they represent a meaningful raise. In São Paulo, they represented 1.8 million people and in Rio, 966 thousand people in the period between the 2000 and the 2010 Censuses.

Rio de Janeiro Metropolitan Area

As far as geography is concerned, an MA consists of a large central city and the region it directly influences, forming a conurbation, in which the physical limits of the municipalities that it comprehends disappear, and the whole area takes up the city's name. In 2010, Rio MA consisted of 19 municipalities of very unequal dimensions and population (Fig. 2). In December 27, 2013, it included other two municipalities, Rio Bonito and Cachoeiras de Macacu, which are located in the influence area of Rio de Janeiro Petrochemical Complex (Comperj), being implemented in Itaboraí. However, for the present work, only the 19 municipalities of Rio MA from the 2010 Census will be considered.

Table 1

Rio de Janeiro Metropolitan Area population according to 1970 to 2010 Demographic Censuses

Municipalities	Area km²	Pop. 2010	Pop. 2000	Pop. 1991	Pop. 1980	Pop. 1970	Growth rate per year 2000-2010 %	% MA Population 2010
Rio de Janeiro	1 200	6 320 446	5 857 904	5 480 768	5 090 723	4 251 918	0,76	53,40
São Gonçalo	248	999 728	891 119	779 832	615 351	430 271	1,16	8,40
Duque de Caxias	468	855 048	775 456	667 821	575 830	431 397	0,98	7,20
Nova Iguaçu	521	796 257	920 599	1 297 704	1 094 789	727 140	0,47	6,70
Niterói	134	487 562	459 451	436 155	397 135	324 246	0,60	4,10
Belford Roxo	78	469 332	434 474	x	x	x	0,77	4,00
São João de Meriti	35	458 673	449 476	425 772	398 819	302 394	0,20	3,90
Magé	388	227 322	205 830	191 734	166 603	113 023	1,00	1,90
Itaboraí	430	218 008	187 479	162 742	114 542	65 912	1,52	1,80
Mesquita	39	168 376	x	x	x	x	x	1,40
Nilópolis	19	157 425	153 712	158 092	151 585	128 011	0,24	1,30
Queimados	76	137 962	121 993	x	x	x	1,24	1,20
Maricá	363	127 461	76 737	46 545	32 618	23 664	5,21	1,10
Itaguaí	276	109 091	82 003	113 057	90 131	55 839	2,90	0,90
Japeri	82	95 492	83 278	x	x	x	1,38	0,80
Seropédica	284	78 186	65 260	x	x	x	1,82	0,70
Guapimirim	361	51 483	37 952	x	x	x	3,10	0,40
Paracambi	180	47 124	40 475	36 427	30 310	25 368	1,53	0,40
Tanguá	146	30 732	26 057	x	x	x	1,66	0,30
Metropolitan Area	5 327	11 835 708	10 869 255	9 796 649	8 758 436	6 879 183		
		2000-2010	1991-2000	1980-1991	1970-1980			
Growth rate per year		0,86	1,16	1,02	2,44			

X: inexistent municipalities
0.47: Mesquita included

Source: IBGE Demographic Census from 1970 to 2010

Rio de Janeiro is the largest of all MA municipalities, with 1,200 km², which represents 22.5% of its total surface. It has the largest number of inhabitants, 6,320 million inhabitants, which corresponds to 53.4% of its total population. Therefore, the difference between the municipality of Rio de Janeiro and those around it lies on the high concentration of people in the central city, which becomes worse when we consider that a large part of central Rio consists of three unoccupied mountain chains (Tijuca, in the east, Pedra Branca, in the center, and Gericinó, in the north). Subtracting the area where the altitude is superior to 100m, the surface that can be occupied is approximately 1,000 km². Consequently, the average population density can reach 6,320 inhabitants per km², or 63.2 inhabitants per hectare. The average density, however, does not reflect the unequal distribution of the population in the municipality.

Besides the city of Rio, other three municipalities have very large populations: São Gonçalo, which has almost 1 million people; Duque de Caxias, which has over 850 thousand, and Nova Iguaçu, which has almost 800 thousand. In these municipalities, the density averages are lower than in the capital: 4,031, 1,826 and 1,527 inhabitants per km², respectively. However, these densities also hide the very unequal occupation of the territory in these municipalities.

Niterói, Belford Roxo and São João de Meriti are municipalities with a population of approximately 500 thousand people each. The other 12 municipalities form a demographic ***continuum*** which starts with Magé, and its 227 thousand inhabitants, and goes down to Tanguá and its 31 thousand.

In general, the average population variation rate per year in Rio MA, which is 0.86%, is relatively low for a city in the Southeast Region. Even so, it means a raise of about 100 thousand inhabitants per year, 48 thousand of which only in the capital city. Naturally, this raise brings out serious economic and social problems.

We can also see that small peripheral municipalities, the least populated in 2010, showed the highest average population variation rate, as Maricá with a 5.2% population raise. Although they are far from the central municipality, they are beginning to absorb the surplus of urban growth. In other words, Rio MA continues to expand, which results in a lot of difficulties as far as transportation and sanitation are concerned, besides the countless problems concerning education, health, labor and safety.

Mapping living conditions in Rio de Janeiro Metropolitan Area

Rio de Janeiro has been the subject of many researches, such as those carried out by IPP - Instituto Municipal de Urbanismo Pereira Passos (Pereira Passos Municipal Urban Institute). The Annals of Statistics of the City of Rio de Janeiro, published by IPP, are valuable documents, which have greatly contributed to the present book[2]. However, due to the very nature of the Institute, their studies refer only to the municipality of Rio and not to its metropolitan area as a whole, whereas, in the present work, both the central city and its periphery will be analyzed, in order to investigate how their inhabitants live in the metropolis and how society relates to this territory.

The creation of a map on the living conditions of the population in Rio MA was possible due to the existing detailed data on all the municipalities that make this urban cluster. The data from the 2010 Demographic Census, which was the main, but not exclusive, source for the present study, were thoroughly mapped. Data analysis, however, is not a mere collection of maps, in which each headcount, effect or rate was the object of a single map. Thanks to computerized cartographic techniques, a set of theme maps and partial synthesis maps were created. They allow the visualization and the understanding of the social and spatial complexity of a metropolitan area such as that of Rio de Janeiro[3].

Mapping living conditions in Rio de Janeiro Metropolitan Area consists of 12 chapters organized according to the following themes: distribution of the population, income, demographic structure, migration, households, education, employment, religions, health, criminality, elections and a comparative study of Rio de Janeiro and other six Metropolitan Areas in Brazil. The source for most of these topics is the 2010 Demographic Census, both the Universe and the Sample questionnaires. The sources for the chapter on health are the data produced by SUS - Sistema Único de Saúde (Brazilian Unified Health System), the one on criminality uses data from ISP - Instituto de Segurança Pública (Public Security Institute) and that on elections makes use of data from TSE - Tribunal Superior Eleitoral (Federal Electoral Court).

In order to show how complex these issues are, a series of maps were created for each chapter. Sometimes, when it is not necessary to include several dimensions of a same issue at the same time, they are simple cartographic representations. On the other hand, economic and social matters, which are generally more complex than they seem, require the use of multivariate analysis techniques in order to cover this great diversity of situations. Among such techniques, the ascending hierarchical classification has been frequently used, because it can produce classes of similar cartographic elements on the theme. As a result, partial syntheses maps were created and showed to be more informative than a collection of analytical maps.

Territory Tracts

The present maps are based on two main territory tracts: that of census tracts and that of Sample Weighting Areas. The boundaries of such tracts are neither political, nor administrative. But they are entirely comprehended in each one municipality, without superposition of a section or an area in several municipalities (Fig. 3). Their importance is the fact that they distribute houses and their inhabitants in tracts within a municipality, which allows a fairly detailed mapping of the different answers to the Census questionnaires.

Census tracts are the smallest territorial unities totally comprehended in the urban or rural part of the municipality to which they belong. Rio MA has 19,507 out of the 316,574 census tracts in the country (Tab. 02). As they are operational space units for the Census, the average number of people per section, which is around 600 in Rio MA, does not show significant differences among municipalities. However, this number can vary from one section to another, depending on the density of buildings. Census tracts are suitable for mapping data collected by the Universe questionnaire.

Sample Weighting Areas (SWA), in the municipal level, are clusters of census tracts. They allow the creation of sample plans, through the use of data related to the sections where Sample questionnaires are to be applied. Weighting areas are much less numerous than census tracts, due to the fact that, in the municipality of Rio de Janeiro, there are 200 weighting areas and about 10 thousand sections, whereas in all MA there are 336 weighting areas and over 19 thousand sections. Some municipalities, despite their large amount of people, have little detailed tracts. Such is the case of São Gonçalo, with only 5 WAs for about 1 million inhabitants. Unfortunately, there is no alternative for data mapping based on the answers to the Sample questionnaire, because weighting areas are the only tracts compatible with present norms in Brazil as far as statistical confidentiality. Census tracts and weighting areas are the Demographic Census operational tracts, known only by their identification number. However, in the analysis of the maps based on these statistical tracts, locations are named the way they are called by the population.

Table 02
Rio MA census tracts, sample weighting areas and neighborhoods

Municipalities	Number of Census Tracts	Pop. 2010/Census Tracts	Number of Weighting Areas	Dwellings Sample Fraction	Number of Neighborhoods	2010 Population
Rio de Janeiro	10 233	618	200	4,8	160	6 320 446
São Gonçalo	1 927	519	5	4,9	108	999 728
Duque de Caxias	1 228	696	23	4,9	40	855 048
Nova Iguaçu	1 257	633	9	5,0	67	796 257
Niterói	892	547	18	9,3	52	487 562
Belford Roxo	720	652	5	4,8	30	469 332
São João de Meriti	719	638	5	9,6	16	458 673
Magé	344	661	7	9,8	-	227 322
Itaboraí	441	494	12	9,6	72	218 008
Mesquita	318	529	9	9,7	-	168 376
Nilópolis	266	592	9	9,9	15	157 425
Queimados	207	666	7	9,4	-	137 962
Maricá	306	417	7	9,4	-	127 461
Itaguaí	157	695	6	9,5	-	109 091
Japeri	149	641	5	9,6	30	95 492
Seropédica	116	674	4	9,6	-	78 186
Guapimirim	90	572	2	9,8	-	51 483
Paracambi	68	693	2	9,8	-	47 124
Tanguá	69	445	1	9,5	10	30 732
Metropolitan Area	19 507	607	336	5,8	600	11 835 708

Source: IBGE 2010 Demographic Census

Districts, which are 600 in all MA, are more numerous than SWAs. IBGE sets the limits of a district, when it gains its legal existence by the municipal House of Legislators[4]. Data from Universe questionnaires on districts are available, but, as mentioned before, they cannot be used in Sample questionnaires. Besides, this database has no official existence; therefore, IBGE cannot provide the maps of 8 out of the 19 municipalities in the MA. Consequently, districts names and boundaries are just a map layer, according to census tracts or weighting areas; the names of the districts allow the clear and certain identification of each part of the city. For the municipalities without officially defined districts, the names of sub districts or administrative districts were used, although it is common knowledge that not always the name of a place is the same that people usually call it.

Notes

1. See: http://www.ined.fr/fichier/t_publication/1300/publi_pdf1_435.pdf

2 - Anuário Estatístico da Cidade do Rio de Janeiro, 1998. Rio de Janeiro: IPP, 2000, 864p.

3 – The maps in the present book were produced with Philcarto, a theme cartography software created by Philippe Waniez, geographer and professor of Mathematics and Interactions at the Math Department of Bordeaux University School of Science and Technology. Waniez is a member of the CNRS (Centre National de la Recherche Scientifique) Joint Commission for Research/University of Bordeaux ADESS - (Aménagement, Développement, Environnement, Santé, Société). Philcarto can be freely found at http://philcarto.free.fr

4 – For districts in the municipality of Rio de Janeiro, see: http://portalgeo.rio.rj.gov.br/bairroscariocas/index_bairro.htm

Chapter 1

The distribution of the population

This first chapter analyzes the distribution of the population in Rio de Janeiro Metropolitan Area, based on census tracts. This type of observation leads to a fairly detailed identification of the differences in Rio's population concentration and the factors that cause them. The slums in the city are also analyzed. They are classified according to their dimensions, that is, according to the number of people and houses they comprehend. Besides, a map of the location of census tracts shows the several kinds of urban and rural areas in Rio MA.

1.1 Population Density

Population density is a basic indicator of human occupation of a given territory, because, as we all know, it is the result of the number of people in a geographic unit (municipality, district, Census tract etc.) divided by its area. It is usually represented as 'number of people per square kilometer'; however, in the case of highly-populated cities, dividing the 'number of people by hectare' suits better. In fact, population density can be interpreted as the demographic pressure on a given territory.

Although calculating this indicator is quite simple, interpreting it is a complex task. First, it is important to consider that calculating indicators implies that population distribution is homogeneous throughout the geographic unit considered for the calculation. The larger the surface of the unit is, the least likely this assumption seems to be true, because of geographic heterogeneity. Due to its reduced dimensions, a Census tract offers more possibilities of homogeneous density distribution. On the other hand, as we know, similar densities can express different situations, depending on the economic and social situation of each given region.

As IBGE does not make available the area of its census tracts, the approximate areas were calculated, based on the surface of the land in each MA municipality. The map on population density in Rio MA shows great contrasts in most part of its municipalities, once values vary from 0 inhab/ha to about 1,900 inhab/ha in the mostly populated areas (Fig. 4). The density distribution on the map reflects the influence of four main factors that favor occupation: the coast, the bay, the low lands and the transportation system network.

The Coast

It is along Rio's South Side that population densities reach the highest rates in the city, generally above 500 inhab/ha, and, in some parts, going over 1,000 inhab/ha. It is a quite narrow strip of land, which, almost continuously, links Flamengo and Botafogo to Copacabana and Ipanema. As we know, the occupation of these districts was facilitated by the implementation of the streetcar system in the city at the end of the nineteenth century. This occupation process continued throughout the twentieth century with new means of transportation, which took the richest population to areas farther and farther from the central part of the city. The wealthiest could now enjoy the beaches, which still contribute to the representation of Rio as a charming city.

The Bay

Since colonial times, Guanabara Bay has provided Rio de Janeiro with a protected location for its port, consequently, for the development of the city. Besides its privileged harbor, downtown Rio also concentrated the country's political life, until the moving of the federal capital to Brasília, in 1960. This concentration heightened the density in districts closer to downtown, which, along the twentieth century, lost its inhabitants, due to the transformation of ***European Rio*** into an ***American city***, with offices in skyscrapers. This change turned this central part of the city almost into a desert on weekends, with densities that are rarely over 300 inhab/ha. On the other hand, the urban density near downtown, favored by the expansion of streetcar lines, spread towards Tijuca. Today, although they do not reach the peaks that the areas by the South Zone beaches do, sometimes their densities reach 200 to 300 inhab/ha.

The importance of Guanabara Bay in the occupation of Rio MA is also related to its sister-city, Niterói, situated on the opposite side of the bay. Niterói was the capital of the old state of Rio de Janeiro until 1975, when, with the merging of the states of Guanabara and of Rio de Janeiro, Rio de Janeiro city became the capital of the state with the same name. As downtown Rio, Niterói central district presents low densities, which are rarely over 100 inhab/ha. The city began to expand towards the south in the 1850's, starting at Icaraí Beach, whose occupation increased at the beginning of the twentieth century and presently presents densities over 400 inhab/ha. However, São Francisco district, next to that of Icaraí, still presents low densities, around 25 inhab/ha, although the land along its coast is completely occupied.

Lowlands

The lowlands in the city of Rio de Janeiro, with its moorlands and sedimentary plains, are located between the massifs of Tijuca, Pedra Branca and Gericinó, where the most important lowlands are Inhaúma, Irajá, Bangu, Campo

Grande, Santa Cruz, Guaratiba and Jacarepaguá. On the northern part of the municipality of Rio de Janeiro, there lies the so-called Baixada Fluminense (Rio Lowlands), which comprehends large areas of the municipalities of Duque de Caxias, Nova Iguaçu, São João de Meriti, Nilópolis, Belford Roxo, Mesquita and Queimados.

The lowlands allowed urban expansion towards the north, but also towards the west and east parts of Rio MA. However, the most important urban concentration is the one that goes from the north side of the city of Rio de Janeiro to Nilópolis, Mesquita, São João de Meriti and Duque de Caxias. In this large area, densities vary mainly from 100 to 200 inhab/ha, gradually decreasing in Nova Iguaçu and Belford Roxo, where they are about 100 inhab/ha.

In the western part of Rio de Janeiro municipality, Bangu Lowlands, located in the north side of Pedra Branca Massif, comprehends several districts with population density between 200 and 300 inhab/ha. Besides Bangu, the districts of Senador Camará, Padre Miguel, Realengo, Magalhães Bastos and Gericinó have the same densities. These fairly dense cores are separated from each other by less occupied areas, with density of hundreds of people per hectare. Still in the West Zone, behind Barra da Tijuca, Cidade de Deus, a neighborhood built in the 1960's for the population that was removed from the slums there were all over the city, has densities of over 300 inhab/ha at present. To the north of Cidade de Deus, other neighborhoods are less populated, generally with less than 100 inhab/ha, like Taquara, Tanque, Pechincha and Freguesia.

On the other side of Guanabara Bay, Niterói developed similarly to the city of Rio. It spread towards São Gonçalo lowlands. However, its high density areas do not reach those of Baixada Fluminense. They have around 100 inhab/ha, although, occasionally, they may reach 150 or 200 inhab/ha.

Transport routes

The occupation of the lowlands was made possible by the drainage of the area and the construction of a network of canals in all Rio Metropolitan Area, from its oldest part, the Center of the city, until most recently occupied places, like Barra da Tijuca. Although the drainage works did contribute to higher densities in that area, it was not enough for the coming of new inhabitants. Transportation means were also necessary. Therefore, urban expansion advanced in the second half of the nineteenth century with the creation of streetcar and train systems, and along the twentieth century, with the construction of large road systems, like Avenida Brasil, Rodovia Presidente Dutra, Rodovia Washington Luís, Ponte Rio-Niterói, Autoestrada Lagoa-Barra, Linha Vermelha, Linha Amarela, as shown by the population density along these large transport routes (Fig. 4).

Density contrasts

As we have seen, in Rio MA, there are dramatic contrasts as far as population densities are concerned. Even in highly populated areas, there are significant differences, because, in certain places, the concentration is even higher than that in other localities, as clearly shown on the detailed scales of the census tracts maps.

This is the case of some neighborhoods in the South Zone of the city. Copacabana, for instance, has very high densities, often above 400 inhab/ha, but on Avenida Atlântica, by the beach, numbers are much lower than those of Avenida Nossa Senhora de Copacabana, which is some blocks from the sea. The same is the case of Ipanema and Leblon, although here differences are less dramatic. In Flamengo, these radical differences do not occur.

The North Zone is characterized by the alternation of sections with over 500 inhab/ha and other sections with less than 100 inhab/ha. These differences reveal the varied types of land occupation, such as buildings, houses and slums. These dramatic contrasts are also related to the characteristics of the environment, available transportation etc.

1.2 The slums

Slums in Rio de Janeiro started at the end of the nineteenth century. Just as it happened then, today they are still the result of the illegal occupation of urban lands by the poor, who occupy areas either on very sharp slopes or on unhealthy lowlands, where they generally build precarious houses. In order to understand irregular urbanizing processes, since the 1991 Demographic Census, IBGE has used the concept of Subnormal Agglomerates (SNAG), composed of a group of census tracts.

SNAG comprehends, at least, 51 residential units, which, in recent past, have been illegally occupying public and private land. The disposition of their buildings is dense and disorganized, and their urbanization has not followed the norms of public organs. Their streets are very narrow, and their plots have very irregular shapes and sizes. Public services, such as waste collection, sewage and water supply, are frequently precarious. Even when they are legalized settlements, they are considered slums.

In 2010, Rio MA had 1,034 subnormal agglomerates, where 1.7 million people live, that is, about 15% of its total population. People living in slums concentrate mainly in the municipality of Rio, where they are 1.4 million people, i.e., 82% of the slum dwellers in the MA. Although the slum population in other MA municipalities is quite considerable, totaling 309 thousand people, it represents just 5.6% of the population in these municipalities, which corresponds to 5.5 million people. The highest numbers are found in Niterói (79.623), Duque de Caxias (61.452), São João de Meriti (47.322) and Belford Roxo (35.480).

The first impression transmitted by the map of the slums in Rio MA is that subnormal agglomerates are present in almost all the municipalities, although in different degrees (Fig. 5). Even in Rio municipality, the importance of slums in the composition of the population of its neighborhoods varies considerably: 0% in the Center, 59% in Maré, 86% in Jacarezinho and 100% in Rocinha.

The Center and the South Zone neighborhoods

This part of the city is characterized by a fairly small number of slums, with less than 20 thousand people living in them. The old historic center, which has undergone deep changes since the second half of twentieth century with the construction of modern buildings for big public and private companies, does not have any slums. However, there are some in its surrounding neighborhoods, like that in Morro da Providência (1,237 inhabitants), São Carlos (1,763), Catumbi (1,717) and Morro da Coroa (1,323). These numbers are relatively modest in comparison with those in the largest slums in Rio, but their presence near the city's business center is a symbol of the type of occupation undergone by the city.

This is the case of Santa Teresa, which is located especially near the city's historic center. Since the end of the last century, it has been going through a period of touristic interest, which has resulted in the restoration of many old colonial houses. However, it has 12 small slums, with about 10 thousand people, which corresponds to almost one fourth of the total population in the neighborhood. For the last years, the *war* between policemen and drug dealers in Santa Teresa has not made the papers headlines, due to the installation of a UPP - Unidade de Polícia Pacificadora (Pacifying Police Unit).

In the South Zone, the neighborhoods of Botafogo, Copacabana, Ipanema, Leblon and Lagoa have 25 slums, with a total of 47 thousand people, which corresponds to 8.3% of the total population living in the neighborhood. The most important slums are Pavão-Pavãozinho (1,840 inhabitants), Morro do Cantagalo (1,428) and Morro Santa Marta (1,176). This relatively low number of slums in this wealthy area of the city is partially due to the policies adopted in the 1960's, which removed the subnormal agglomerates' population from these areas.

The growth of Rio slums is such that it reached the bucolic Paquetá Isle, a touristic attraction in the city, located in the middle of Guanabara Bay, where there are now more than twenty small slums. One of them, Vila Joaniza, comprehends 3,816 houses.

The largest slums

Among the main slums in the city, Rocinha is the largest of all with 23,347 houses, where 69,156 people live, according to the 2010 IBGE Census (Tab. 1.1). It is in fact a small city, located in the South Zone, between Gávea and São Conrado, neighborhoods with the highest income in Rio, which makes visible the extreme social contrast in this urban landscape. Its origins date back to the 1950's, when migrations from the Northeast to Rio de Janeiro increased, but it was mainly in the 1960's and 1970's that its occupation intensified.

The second largest slum in the city, Rio das Pedras, is located in the West Zone, with 54,776 people living in 18,692 houses. It is also a neighborhood originated with the arrival of northeastern migrants in the 1970's and 1980's. Rio das Pedras, created in the 1980's, is known for having one of the first paramilitary militias in town, as a request of local small business owners who used to pay the military policemen to keep drug dealers from controlling the slum.

Rocinha and Rio das Pedras are similar as far as the number of people and houses are concerned. Both have moderate rates of house occupation, i.e., less than three people per house. Smaller than these two, Jacarezinho, with 8,775 houses and 29,651 people, is one of the oldest slums in the city, having started in the 1920's, due to the development of an industrial neighborhood in Jacaré, in the North Zone. In recent years, government programs have implemented draining and sanitation systems and paved the streets of this slum.

Differently from the two largest slums, Rocinha and Rio das Pedras, which are relatively isolated, Jacarezinho is located in a geographic area where smaller slums keep increasing in number. These agglomerates, which have 1,000 to 1,500 houses, constitute another type of precarious settlements, called ***complexo***, a complex of slums.

Such is the case of Complexo da Maré, the largest complex in the city, which comprehends 17 slums, such as Parque União, Nova Holanda and Parque Maré, with a total number of inhabitants almost as high as that of Rocinha. Having started in the 1940's, with the communities of Morro do Timbau, Baixa do Sapateiro and Conjunto Marcílio Dias, Complexo da Maré spread throughout the second half of the twentieth century.

The second largest slum complex in Rio is Complexo do Alemão, whose center is the community that was built on the hill that bears the same name. Nowadays, it comprises 4,321 houses and 15,051 inhabitants. To the north of it, there lies Vila Proletária da Penha and Vila Cruzeiro; to the south, Nova Brasília, Joaquim de Queiroz and Parque Alvorada. The origins of these slums date back to the end of the 1950's, but it is mainly in the 1980's that its demographic boom took place. In total, 15 slums of different sizes form a cluster that can compare to that of Complexo da Maré.

In the area by the northern border of Rio de Janeiro municipality, next to the south border of Duque de Caxias, a new complex seems to be taking form. The slums Parque Jardim Beira Mar and Parque Proletário de Vigário Geral, with 4 people per living unit, have been spreading.

The phenomenon of slum spreading into the West Zone of Rio also takes place along Avenida Brasil. There is a succession of middle and small size slums on both sides of the highway, from Vila Rica de Irajá to Anchieta. A little further south, Vila São Jorge and Antiga Fazenda Botafogo Gleba I have over 11 thousand people each. A little towards west, there are three large slums along Supervia railway to Campo Grande: Vila do Vintém, Fazenda Coqueiro and Nova Cidade.

We have come to the conclusion that slums in Rio are quite different as for size, location, age and level of urban integration.

Table 1.1
Slums in Rio de Janeiro Metropolitan Area with over 10,000 inhabitants

Names	Dwellings	People
Rocinha	23 347	69 156
Rio das Pedras	18 692	54 776
Jacarezinho	8 775	29 651
Parque União	6 621	19 662
Fazenda Coqueiro	5 876	18 229
Vila Proletária da Penha	4 617	17 775
Nova Brasília	4 954	16 177
Morro do Alemão	4 321	15 051
Vila do Vintém	4 728	14 647
Nova Cidade	4 234	14 618
Parque Vila Isabel	4 045	14 007
Nova Holanda	4 126	13 471
Parque Jardim Beira Mar	3 617	13 176
Parque Maré	4 018	12 421
Vila Joaniza	3 816	11 999
Vila São Jorge	3 628	11 877
Gleba I-Antiga Fazenda Botafogo	3 879	11 704
Vila Rica de Irajá	3 035	10 215

Source: IBGE 2010 Demographic Census

1.3 Rural areas

As we can see, Rio de Janeiro Metropolitan Area and its 19 municipalities is a very heterogeneous urban agglomerate with very different demographic densities. In some areas densities are lower than 1 inhab/ha, which is probably due to the presence of massifs and natural reserves. As each census tract is classified according to the location of the neighborhood it refers to, there is an administrative zoning that can be mapped (Fig. 6). According to this classification, more than 99% of the MA census tracts are in the urban region, whereas rural sections, in smaller numbers and less populated, are fairly large and are located out of the borders of the Metropolitan Area.

Chapter 2

Income

When studying the different types of occupation of the urban region of Rio de Janeiro Metropolitan Area, the social and space segregation that there is in the city becomes evident. Rio MA experiences sharp contrasts, which produce extremely different types of environments - the focus of the present investigation. As segregation is one of the most important clues for those who want to understand the structure of a city, evaluating inhabitants' different income can bring out enlightening information.

The 2010 Demographic Census questionnaires produced a great amount of information on this subject. By analyzing those data, we were able to choose some indicators which, transferred onto maps, have allowed a clear view of the income distribution and its role in the urban environment of the city of Rio.

2.1 Nominal average income per month

The indicator used in the present study is the average value of the monthly nominal income of people over 10 years of age in each Census tract, whether or not they have an income. Expressed in ***reais per capita,*** this value is reached by the addition of salaries and other sources, such as retirement, pensions and social programs.

The average value of the monthly nominal income per capita, which used to divide half of the census tracts in July 2010, was R$ 628,00, that is, US$ 278. However, this median hides great intra-urban disparities, because 10% of the sections in better situation had the average income of R$ 2.533,00 or more, whereas 10% of the least privileged made just R$ 377,00, or less. In fact, these extreme disparities mark the environment and reveal the economic segregation in Rio MA (Fig. 7).

As wealth is not just income, but also assets, the indicators used in order to measure the wealth of a given population must consider income rates and the localization in the urban space of the different social categories – rich, middle and poor.

High-income neighborhoods

MA inhabitants with the highest income rate are located mainly in the South Zone of the city of Rio, as well as in Barra da Tijuca, in the West Zone. The very high income classes are concentrated along the beach avenues in Ipanema and Leblon, around Lagoa Rodrigo de Freitas, the highest parts in Jardim Botânico, by São Conrado Beach and on the internal banks of Lagoa de Marapendi. In these areas, income rates are usually above R$ 6.000,00 ***per capita;*** in other parts, they reach amounts above R$ 8.000,00.

In Copacabana and in Leme, incomes are also high, but there is a significant difference between them in the area along the sea, where they generally are over R$ 5.000,00, and in the rest of the neighborhood, where they are lower, between R$ 2.000,00 and R$ 4.000,00. The difference between the reality of those living by the beaches and those in the other parts of the neighborhood was revealed by their population densities, as discussed in Chapter 1.

At the foot of Sugar Loaf, in the neighborhood called Urca, as well as along Flamengo waterfront, the average income is about R$ 5.000,00. In some parts of Laranjeiras, such as Parque Guinle, or in the traditional neighborhood called Cosme Velho, incomes are higher than R$ 6.000,00.

Similarly, in Niterói there are rich areas, but not as rich as in Rio, since in wealthiest neighborhoods of Boa Viagem and Icaraí, the average income ranges from R$ 2.500,00 to R$ 4.500,00. To the south, São Francisco, Santo Antônio, Camboinhas and Itacoatiara experience a different situation, in which sections alternate with income averages from R$ 2.500,00 to R$ 4.500,00.

With a little lower income levels, there are areas with nominal average monthly ***income per capita*** between R$ 2.000,00 and R$ 4.000,00. They are relatively less numerous, which shows the levels of contrasts inside the MA. This is especially the case of Tijuca and some tracts, such as Maracanã, Andaraí and Grajaú. Moreover, there are other areas with the same characteristics in Freguesia (Jacarepaguá), Méier, Vila Militar and Jardim Guanabara.

Middle-income neighborhoods

The average monthly ***income per capita*** in the MA census tracts is R$ 1.055,00. For the present analysis, we will consider the average of the monthly income to be that of the census units with incomes from R$ 900,00 to R$ 2.000,00 per person.

These units are located mainly in the North and West Zones, along the old Leopoldina railway system, as Bonsucesso, Ramos, Olaria and Penha; along Central do Brasil, from Engenho Novo to Padre Miguel, and farther on, intermittently, between Campo Grande and Santa Cruz. Besides these areas in Rio municipality, the central neighborhoods in other MA municipalities

also belong to this category, as it is the case of Nilópolis and Nova Iguaçu, on Baixada Fluminense, and São Gonçalo, on the other side of Guanabara Bay.

Low-income neighborhoods

The other MA census units, except the sections that belong to the previous categories, have the average income per capita lower than R$ 600,00 per month. This is the case of almost the whole metropolitan periphery, which goes from Itaguaí, on the west, to Tanguá, on the east. In this large area, here and there, there are some sections which are better situated. They correspond to more developed areas, whereas rural census units are characterized by low income rates.

2.2 Income classes

The map of monthly average income per capita by census tract is the first approach to understand Rio MA spatial income differences. However, it does not allow a differentiated view of the many income levels or, especially, a view of their intermixture inside these census tracts. So, in order to better translate this diversity, a classification with 10 income layers was created, starting with that with ***no income*** and ending with that with ***more than 10 minimum salaries per capita*** *monthly*. This statistic approach resulted in three main classes: the ***lower class***, the ***middle class*** and the ***upper class***, which, in turn, were subdivided into three subclasses, resulting in a total of nine classes.

The lower class

This class is characterized by very low income categories, from that with ***no income*** *to that with* ***1 minimum salary*** *(MS)*. The subclass ***very low*** is characterized by the lack of any income sources and great poverty. Just 4.4% of the MA dwellings belong to this subclass, located especially in Baixada Fluminense census tracts, which is clearly visible on the map (Fig. 8). Several sections in the municipality of Rio also belong to this class, as we can see in the West Zone, as well as in the North Zone.

The subclass ***low income*** presents a larger variety of incomes, between the ***no income*** category and that of 1 MS. It is the case of 11% of the MA houses and, as in the previous case, it is mainly located in the metropolitan periphery and comprehends a large part of rural sections. There are also some census units in slums included in this subclass, such is the case of Complexo da Maré and do Alemão, in the North Zone of the city.

Finally, there is the subclass ***middle low***, which is the most important in the classification, because it represents 23.7% of all MA dwellings. In this class, incomes are, on average, slightly higher than those in both previous subclasses, ranging from incomes of 1/8 of the MS up to 1 MS. Its geographic distribution occurs throughout the metropolitan periphery, from Itaguaí to Tanguá.

In short, the ***low income*** class comprehends mainly the census tracts in the periphery of the Metropolitan Area, making possible the identification of different levels of poverty. It also comprehends the poorest sections in the poorest slums.

The upper class

The three subclasses of the upper class are those with the highest income census tracts in the city. They total 14.9% of the dwellings in the MA and are mainly located by the sea in both Rio de Janeiro and in Niterói municipalities.

The subclass ***very high income,*** *with the predominance of incomes higher than 10 MS*, comprehends just 1.3% of the households and represents the economic elite in the city of Rio. It is found only in some areas along the sea, such as Barra da Tijuca, São Conrado, Leblon and Ipanema, as well as around Lagoa Rodrigo de Freitas.

Still in the upper class, but below these higher income levels, there are sections of the subclass ***high***, characterized by the strong presence of households where family incomes are over 10 MS, but also with a considerable number of census units with incomes between 5 to 10 MS. These areas, which comprehend 4.6% dwellings, are often located near the neighborhoods by the sea mentioned above, but also in Copacabana, Botafogo, Humaitá, Flamengo and Laranjeiras. On the other side of the bay, in Niterói, this subclass is found mainly in Icaraí and Boa Viagem.

In the subclass ***middle high***, which corresponds to 9% of the MA dwellings, the economic level drops, and incomes go from 3 to 10 MS. This subclass comprehends the census units of Recreio dos Bandeirantes, Baixada de Jacarepaguá, as well as Tijuca, Maracanã, Grajaú and Méier. This category also includes Jardim Guanabara, on Ilha Governador, and areas adjacent to Boa Viagem and Icaraí, in Niterói.

The middle class

The three middle-class subclasses correspond to 46% of the houses in the MA and are in the intermediate space between the areas of high and those of low income rates. The accessibility brought out by the development of the transport systems in the city seems to be one of the factors that led to the spatial organization of these subclasses. This organization can be seen in the clusters of subclass ***high-middle income*** census tracts that often correspond to areas near train and subway stations, which aggregate other sectors of subclass ***middle income***, and so on. These units are located in the central area of the city and along Supervia railways, as well as Metro line 2.

Centrality factors

From the point of view of spatial economy, the MA territory can be considered a system segregated in zones that correspond to income gradients (upper, middle and low), in which several factors play the role of centrality.

Rio coast area, where the rich are concentrated, is the true center of the city, not the Center, which is just a place for business. In short, the main centrality factor is the proximity to the beaches and lagoons and the advantages it offers its inhabitants. Next to these highly valued areas, low income categories compete against the upper classes for territory. As a response to that rivalry, the richest have been moving to the beaches and lagoons in the West Zone of Rio and south of Niterói, areas considered to be safer.

In the northern half of the municipality of Rio, which comprehends the neighborhoods with the largest transport systems (Supervia railways, Metro line 2 and Avenida Brasil), the classes with different levels of middle income try to find a place to live according to where they work. In this area, therefore, accessibility is the main factor of centrality, which shows the strong correlation between income and the presence of train and subway stations, as well as bus lines.

On Baixada Fluminense, the poorest part of Rio MA, where the lowest income population concentrates, people keep strong relations with the areas identified as central. So, everyday, hundreds of thousands of workers, with little qualification, arrive at their working place after hours on public trains or busses in very hard conditions of displacement. Like the northern half of Rio municipality, in this region, the proximity to main highways - Washington Luís and Presidente Dutra – is also a factor that influences the localization of Baixada Fluminense inhabitants.

In this context, slums represent a way people find to enjoy the benefits of centrality, without having the necessary income for that. Living in a slum closer to the areas where jobs are seems preferable to living in a better, but faraway place. This has been a great issue for politicians in their attempt to relocate slum dwellers into areas far from the labor market.

2.3 Income from social programs

The Demographic Census collects data on the beneficiaries of two main Federal Government cash transfer programs, PBF - Programa Bolsa Família and PETI - Programa de Erradicação do Trabalho Infantil (Program for the Eradication of Child Labor), which play an important role in the composition of poor population income.

Bolsa Família, created by president Luiz Inácio Lula da Silva in 2003, promotes direct cash transfer to the poorest families, whose monthly income per capita is lower than R$ 70,00. As a counterpart, these families must keep their children going to school and follow the federal government vaccination calendar.

The Program for the Eradication of Child Labor was created by president Fernando Henrique Cardoso in 1996. This Program consists of granting a monthly amount to families with children up to 16 years of age to compensate for the loss of income caused by the interruption of children and adolescents' working activities. In exchange, families must enroll their children at school and make sure they attend classes on regular basis.

The information on both programs is part of the same Census question, which does not allow their distinction. In July 2010, the number of beneficiaries of these programs in the MA was about 327,920 people, 37% of which in the municipality of Rio de Janeiro. In the other municipalities of the Metropolitan Area, the highest numbers are found in Duque de Caxias (32,082), Nova Iguaçu (30,847), São Gonçalo (30,746) and Belford Roxo (25,314).

The map on these two types of cash transfer programs combines two indicators: the number of beneficiaries and their percentage of the population over 5 years of age (Fig. 9). This map reveals a high concentration of beneficiaries in the periphery of the city, which corresponds to areas with the lowest income rates in the MA. There are between 5% and 10% of the population in the metropolitan periphery who are granted this kind of help from the government, with more expressive numbers in Belford Roxo and in Nova Iguaçu. In Rio de Janeiro, it is mainly in Santa Cruz and Guaratiba, in the West Zone, where there are the highest contingents of beneficiaries, whereas on the coastal areas this number is almost zero, except for the slums in this part of town. Likewise, in the Center of the city and towards north of the municipality, it is the slums that stand out as having a high number of beneficiaries, whereas the rest of the region shows low numbers and reduced percentages of the total population involved in these programs.

2.4 Retirement and pension incomes

Similarly to Bolsa Família and the Program for the Eradication of Child Labor, incomes from retirement and pension government plans are important financial complements for a significant part of the MA population. One of the questions in the Census asks whether the person interviewed receives any type of benefit from an official retirement institution, like INSS - Instituto Nacional de Seguridade Social (National Institute of Social Security).

As there are many different types of situations among beneficiaries, the answer ***yes*** has been crosschecked with the person's age. The results show that there are 530 thousand beneficiaries under 60, whereas there are 1.1 million over 60 living mainly in Rio de Janeiro municipality (60.6%).

The map that refers to people over 60 who have either a retirement or a pension income shows that they are concentrated in neighborhoods where the rich and middle-class people of the capital city used to live in the old days (Fig. 10). From Copacabana to Grajaú, passing by Flamengo, Laranjeiras and Tijuca, the numbers are generally situated between 4 thousand and 8 thousand people, and the percentage of the population over 60 years of age who receive theses benefits is, in general, superior to 75%. In the northern part of the municipality, that is, along old Leopoldina and Central do Brasil railways, as well as along Metro line 2, these proportions are lower. Niterói and São Gonçalo have a similar distribution.

As the population in the municipalities on Baixada Fluminense is relatively younger than that in the capital city, the percentage of older people who benefit from retirement or pension income is lower, about 60%, but corresponding

to a significant number of beneficiaries. In this case, there seems to be a number of people who have not contributed to the National Social Security plan, for different reasons, such as undocumented employments or informal activities.

Likewise, the proportion of retirement and pension beneficiaries is also low in the new rich neighborhoods in the city, such as São Conrado and Barra da Tijuca, maybe because in this area people have other sources of income to support them at this time of their life.

Chapter 3

Demographic structures

In the present chapter, the data collected by the Demographic Census, the main source for the study of population structures in the country, are analyzed according to the following aspects: age, sex and skin color.

3.1 Distribution of the population according to age

In order to understand the distribution of the population according to age in the MA of Rio de Janeiro, it is necessary to use the resources of the demographic transition theory. Based on it, a model was created to explain the way the population of a country or a region changes, going from high to low birth and death rates, phenomenon which takes place in two phases.

In the first phase, mortality rates drop drastically due to better food and sanitary conditions. During this period, birth rates are still high, which results in a quick increase of the population. Then, in the second phase, the decrease of mortality rates slows down, while, due to better levels of living conditions, a small reduction of birth rates begins. Consequently, the natural increase, the difference between births and deaths, reaches its peak at the beginning of the second phase, after which the pace of population growth usually decreases. Nevertheless, the population continues to grow, once the age structure remains young.

This demographic transition model has been criticized because of its closed nature, that is, because it does not consider the role of migration. In spite of that, it allows the accounting of Brazilian age structure changes (Fig. 11). On this chart, we can see the evolution of age groups every ten years, during the period 1950-2050, and projections for 2025 and 2050.

In 1950, the age pyramid had a triangular shape, a characteristic brought out by the combination of high fertility and mortality rates. Gradually, the foot of the pyramid diminishes as the consequence of the decrease of fertility rates. Consequently, in 2050, the pyramid should reach a cylindrical shape, at least up to 60 years of age, due to higher life expectancy and reduction of mortality rates. These alterations result in the reduction of the relative weight of the young population and, simultaneously, in the increasing number of the older population. This tendency was observed in many Eastern European countries, but with significant differences between them. In France, for instance, fertility rates are high, due to their policies to encourage births, whereas in Germany, the population undergoes an accelerated aging process.

The age pyramid of Rio MA seems to be ahead of that of the country, as far as demographic transition process is concerned (Fig. 12). As we can see, the participation of young people in the MA is reduced, whereas adult groups up to 55 years of age decrease quite slowly. In other words, the MA shows an incomplete demographic transition, but in a more advanced stage than the in the rest of the country. It is known that, in great urban agglomerations, living conditions are better than those in the countryside, which favors the reduction of birth and death rates. On the other hand, the migration of poor and fertile people from rural areas seems to partially soften this transition. Consequently, the combination of a population on different stages of economic and social conditions shows to be key to the understanding of age distribution in Rio MA.

In order to better grasp this diversity, we carried out an ascending hierarchical classification of every five-year age group of each gender in all census tracts, which resulted in seven classes. The average age pyramid for each class of tracts allows us to interpret each one of them according to the presence of young, adult and aging people in relation with the pyramid of the whole population in the MA.

Young segments

Classes 1 and 2 total 37.5% of the MA population and present a high amount of people between 0 and 24 years of age. However, these two classes differ from each other. Whereas in class 1 there are more youngsters and less people over 45, in class 2, these characteristics are less acute. That means that in class 1 demographic transition is starting, whereas in class 2 the process is more advanced.

Their distribution in the Metropolitan Area reveals that they are located mainly in poor and little urbanized peripheral areas, mainly class 1. In fact, they are areas in process of occupation, which often receive populations from less privileged regions in Brazil.

Young adult segment

Class 3, which concerns just 3.5% of the population in the MA, shows to have a slightly higher number of younger people than the average of the young population, but it is mainly characterized by a higher proportion of young adults between 20 and 39 years of age.

The sections in this class are spread throughout the MA. Some of them can be identified, due to their specific characteristics. Located in the north of the municipality of Rio, the military complex Vila Militar, for instance, has a high concentration of men, about 60 thousand. The same thing is true of the strong presence of men in some sectors of Gericinó, due to the existence of a large penitentiary complex in the area.

Other sections with high concentrations of young adults are found in slums, as in Rocinha, Jacarezinho and Complexo do Alemão. Also, there are sections concerning areas occupied by populations who were evicted from slum, as Vila do João, with its 4 thousand houses built in the 1980's in the old airfield in Manguinhos.

Adult and elderly population segments

In classes 4 and 5, the aging process of the population can be seen in the progressive increase, in comparison with the average in the MA, of groups of adults: in class 4, from 40 to 49 years of age and, in class 5, from 50 to 64. Classes 6 and 7 are characterized by a larger number of elderly people: in class 6, age groups over 45 are above the average, whereas in 7 the groups over 50 are the ones that show higher numbers.

Elderly groups in both classes 6 and 7, who together correspond to one fourth of the MA population, are mainly located in neighborhoods that form a ***continuum*** from Barra da Tijuca to Glória, areas with the best living conditions in the city. A similar situation can be seen in Niterói, where the elderly are concentrated also in neighborhoods with higher income rates along the sea, from Boa Viagem to Charitas.

However, aging populations are found in other neighborhoods in the city, mainly in Tijuca and Grajaú, which, in terms of income, correspond to middle categories. Besides these two, there are also some areas in the MA, which were occupied long ago, as downtown Duque de Caxias, São João de Meriti, Nilópolis and Nova Iguaçu, which show significant numbers of elderly people in the composition of their population.

Also, downtown Padre Miguel, Bangu and Campo Grande, which are not rich neighborhoods, have older populations than their surrounding areas. Consequently, income rates, which surely have a strong relation with longevity, are not the only factor that can explain the existence of neighborhoods with older populations. Besides the economic level, we can still consider the time when the occupation of the neighborhood took place. In old occupations, the population has been able to have access to some collective benefits.

Classes 4 and 5, in which adults predominate, correspond to one third of the MA population, and the sections with these characteristics are located in both old and recently urbanized places. This is the case of Barra da Tijuca, Jacarepaguá, Campo Grande and Bangu neighborhoods, in Rio municipality, as well as Piratininga and Itaipu on Niterói coast.

3.2 Women and men

Gender ratio, that is, the relation between the number of males and females in a given population, expresses the number of men for each group of 100 women. Gender ratio calculated that way is also called masculinity rate, one of the traditional indicators in demography. So, when a value is below 100, it means that the number of women is higher than that of men, and, when it is the opposite, when it is higher than 100, it shows the number of men is bigger than that of women. Masculinity rates vary a lot according to age: among the newly born, gender ratios are usually of 105 boys for 100 girls. However, as male mortality is higher than female mortality, this rate decreases with age, making women become the majority of people in the groups of the elderly.

In Rio MA, masculinity rates are below 100, which is common in urban areas, due to the fact that, in cities, there usually are more job opportunities for women in the service sector, such as housekeeping, store and hotel services (Fig. 13). In fact, only the census tracts in the metropolitan periphery show masculinity rates above 100, which indicates a higher proportion of men than of women.

In order to understand these differences, it is necessary to resort to the age structure of the population, mainly in relation to Copacabana and Tijuca, in Rio, and to Icaraí, in Niterói. In these areas, the population is older and, consequently, women are more numerous. However, in the outskirts, where the population is younger, there are fewer differences between genders.

3.3 Skin color

The Demographic Census asks the person being interviewed about his color or race and gives him or her five possible answers: white, black, yellow, brown or Indian. Since it is an answer in a questionnaire, the interviewee can understand the question his own way and answer it as he wishes, because no parameters for different skin colors is offered to him.

In a way, this question mixes skin color with geographic origin, which can increase the answer's lack of precision, mainly considering the high degree of crossbreeding in the country. Because of that, the Census data on skin color and race must be carefully analyzed and take into consideration only the differences revealed by indicators.

Based on the answers to this question, Rio MA population is mainly 45.9% white, 40.8% brown and 12.4% black. Yellow people are just 100 thousand (0.8%) and Indians are 10 thousand (0.1%). It is likely that the percentage of whites is over dimensioned, due to the fact that this is a ***more convenient*** color in social terms. Likewise, the low number of blacks may be explained for the inverse reason.

In order not to limit the analysis of the answers to the aggregated data, an ascending hierarchical classification of census tracts was carried out. This classification resulted in six classes, which express the proportion of the

three main skin colors indicated by the answers. Due to their low numbers, yellows and Indians do not play any specific roles in the classification.

The map on the six classes clearly shows the contrasts in the composition of the population according to their skin color in MA areas, with the predominance of whites along Rio and Niterói coast, of half bred in the North Zone of the city of Rio and of blacks in the outskirts of the metropolis (Fig. 14).

The white city

The sections in classes 5 and 6 practically show the same figures: 1.1 and 1.2 million inhabitants, respectively. Class 6 has 85.2% of whites, allowing a little percentage of browns (11.4%) and even less of blacks (2.7%). It is interesting to see that these sections form a very homogenous area, almost continuous, from Barra da Tijuca to Glória and from Tijuca to Grajaú, as well as in neighborhoods with higher income rates in Niterói and Ilha do Governador.

In class 5, the proportion of whites drops to 67.7%, which expresses a reduction of almost 20 percentage points, whereas the percentage of browns, who represent almost one fourth of the population, rises. This is mainly the case in middle-income neighborhoods, such as São Cristóvão, Méier, Bonsucesso, Ramos, Olaria and Penha. This class is also present in the Center of Niterói, as well as along the coast in Maricá.

The mixed city

Class 4, whose profile is very close to that of the MA average, is one of those with the highest number of people: 2.8 million. As the map shows, mixed sections are often located around class 5, which expresses the skin color diversity that characterizes old downtown Rio and the North Zone neighborhoods developed along Supervia railways. It is also present in the metropolitan outskirts, in Nilópolis, Mesquita, Nova Iguaçu, São Gonçalo and Maricá.

The brown city

Classes 1, 2 and 3 correspond to what can be called the ***brown city***, since in their sections browned-skinned people have a significant presence over whites and blacks. In numerical terms, class number 3 is the most important with its 3.7 million inhabitants, over 50% of which is brown, whereas whites and blacks represent 32% and 12% of the population, respectively.

Its geographic distribution, which is extremely spread, shows that it occupies not only the majority of the metropolitan peripheral areas, but also many areas in the North and in the West Zone of the capital city. It is noteworthy the fact that many slum sections, as Rocinha and Vidigal, are also part of brown Rio.

In class 2, there are more white people than in class 3, but it is mainly the participation of blacks that makes the difference, since they are more numerous in this class than in the previous ones. The population involved in class 2, about 1.5 million people, is found all over the metropolitan outskirts, but it is more numerous mainly in São João de Meriti, Belford Roxo and Queimados.

Finally, class 1, which comprehends 1.5 million people, could be characterized as the ***black city***, since it is here that we find the highest percentage of black population in this classification system. However, as they represent just 24% of the total number of inhabitants, it seems to be a darker shade of the brown city rather than a ***black city*** itself.

Segregation by income and skin color

Many studies have investigated the possible relations between places of residence, skin color and income. In order to test this hypothesis in Rio MA, the six skin color classes were crossed with ***income per capita*** expressed in nine increasing bands with the minimum salary, which was R$ 510,00 in July 2010. Due to the low number of yellows and Indians, just three representative color categories (white, black and brown) were used to cross check the numbers of the MA residents, according to skin color and income (Tab. 3.1).

Based on this table, a chart shows the distribution of the population according to the income of each skin color group, compared to the average income in all MA (Fig. 15). On this chart, it sticks out the fact that the curves for browns and blacks are very close to each other, regardless of their income. We can also see that the curve of whites crosses that of browns and blacks on the 1 to 2 MS band. On the left of this band, that is, on lower income levels, whites are always the minority, whereas browns and blacks are more present. The gap between curves reached more than eight points on the 0.5 to 1 MS band. From the 1 to 2 MS band on, the relation between curves reverses: whites' income is on average much higher than that of browns and blacks.

If we consider that the level of income is a key factor for the social-spatial segregation in the MA, as it was shown in chapter 2, this chart indicates that high and middle income neighborhoods form Rio's ***white city*** and that, accordingly, low income neighborhoods compose the ***brown city***.

3.4 Family composition

The data unfolded by the 2010 Census do not allow a detailed study on family relations, because in the census questionnaire there is no predefined family composition typology. However, for each Census tract, we have the number of people according to 20 family relations: people (men or women) responsible for the household, spouses of opposite and of the same sex, children of both the head of the family and his/her spouse, or children of just one of the spouses, grandparents, other relations, other people with no relations with the head of the family etc.

Table 3.1
Rio de Janeiro Metropolitan Area population per income and color of skin

Income level	White	White %	Black	Black %	Brown	Brown %	Total	Total %
Below 1/8 MS	290 227	5,4	120 355	8,4	371 392	7,7	791 060	6,7
1/8 to 1/4 MS	131 145	2,4	81 133	5,7	250 107	5,2	467 736	4,0
1/4 to 1/2 MS	464 227	8,6	228 240	16,0	775 019	16,0	1 482 383	12,6
1/2 to 1 MS	1 160 678	21,4	430 777	30,2	1 487 268	30,7	3 109 235	26,4
1 to 2 MS	1 405 710	25,9	373 354	26,2	1 256 698	26,0	3 061 559	26,0
2 to 3 MS	593 581	10,9	96 315	6,8	346 282	7,2	1 045 257	8,9
3 to 5 MS	555 175	10,2	56 402	4,0	205 684	4,2	823 620	7,0
5 to 10 MS	509 835	9,4	28 519	2,0	106 974	2,2	650 236	5,5
Above 10 MS	310 272	5,7	10 685	0,7	41 070	0,8	364 127	3,1
Total	5 420 850	46,0	1 425 781	12,1	4 840 495	41,0	11 795 213	100,0

Obs: in July 2010 the monthly minimum salary per capita was R$ 510,00.
Source: IBGE 2010 Demographic Census

An ascending hierarchical classification of the population in census tracts according to family relations has made possible an approximate view of family composition in each class. For instance, the fact that there is a strong presence of heads of the family, spouses and children led us to interpret this class as the pattern ***couple with children***. Naturally, each Census tract comprehends several types of families. When a section is characterized by one type of family or another, it does not mean that it is exclusive, but it means that it occurs more often, as compared to the average composition in the MA.

Couples with children

Whereas the three categories in the MA, ***head of the household, his/her spouse and child of the head of the family*** represent on average 72.8% of the population, in class 1 these three categories total 77.7%, that is, five percentage points higher. If we consider that in this class the presence of ***child of either the head of the family or his/her spouse*** *is also significant*, we can interpret that class 1 is the one that has the highest number of sections where the classic ***couple with children*** family composition prevails.

This pattern, which represents 15.8% of the population, is no longer the most frequent one in the MA, but it is spread around the whole city. However, it predominates in Barra da Tijuca, where the large number of condos with recreational areas seems be more suitable for this type of family (Fig. 16). Besides this area, it is the characteristic pattern in the municipalities of Rio metropolitan periphery, from Itaguaí to Tanguá.

Blended families

What distinguishes ***blended families*** *from* the type ***couples with children*** *families is the* importance of the category ***children of just the head of the family or his/her spouse***, besides the children of the couple themselves. Class number 3, which corresponds to this specific composition, has on average 16.8% children of one of the spouses, more than the 12.3% in class 1. This family pattern is the most frequent in Rio MA, since it is that of 30.8% of the population and is characteristic in census tracts that have a high number of young people. Its distribution reveals that this class is found all over, but it is on Baixada Fluminense and in the West Zone of the municipality of Rio that its presence is really significant.

Extended families

The sections in class 2 are characterized by a larger proportion of the category ***other relatives***, those who do not belong to the restrict nucleus ***couple with children***. So, the proportion of ***other relatives*** *is*, in this case, 11.1% higher than the average of the MA, which is about 7.4%. Besides, ***extended families*** are similar to ***blended families***, since in both classes the proportions of children of just the head of the family and those of just the spouse are very close. Class 2 comprehends 8.2% of the population in the MA and is located mainly in the North Zone of Rio, extending to the municipalities of Nilópolis, São João de Meriti and Duque de Caxias, on Baixada Fluminense, as well as to Niterói and São Gonçalo, on the other side of the bay.

One-person households

Unlike the geographic dispersion of the previous class, class number 4 is characterized by its high concentration in the municipality of Rio de Janeiro and, in smaller proportion, in Niterói. Totaling 21.5% of the population in the MA, this class stands out for its high proportion of people living by themselves: 42.4%, which is a higher percentage than that of the MA average, which is 33.1%. These sections are those with the oldest population and a larger proportion of women. This is basically the case in neighborhoods by the sea, from São Conrado to Glória, besides the Center, Santa Teresa, Maracanã, Tijuca and Grajaú, in Rio de Janeiro. Likewise, in Niterói, census tracts from the Center to Icaraí also belong to this class.

Chapter 4

Migrations

Population surveys systematically carried out by public institutions in several countries allow the collection of social and economic demographic data about all the people or part of the people living in them. Consequently, we have a fairly reliable set of information to understand transformations in the demographic structure of populations and when they took place.

However, as Brazilian censuses occur every 10 years, migrations cannot be thoroughly analyzed, since a comparative study of populations is limited by the gap between two quite distant dates. It is impossible to investigate the migration flows that took place in between surveys.

Despite these limitations, IBGE 2010 Demographic Census produced relevant information on the population that had not moved out and on the population that had moved into the municipality during this 10-year period, since the year 2000. However, there is no information on those who left to live in other places.

4.1 Native population

The native people in a municipality are those who were born and live in it. Therefore, it is a stable population, even if those people have eventually moved to another place in the same municipality, to another place in the country or even abroad, but have come back to their original home places.

In Rio MA, the number of native people who have never lived away from the municipality where they were born represents two thirds of the total population (Tab. 4.1). If we consider the proportion of people who were born in one of the MA municipalities and who left their original municipality and came back some time later, this number goes up to 70.1%. And those who have migrated from another municipality in Rio MA or from any other municipality in the country into their present municipality correspond to just 29.3% of the population.

The amount of native population is quite different in each MA municipality. In Rio de Janeiro, it is very high, totaling 77.4% of the people. This number decreases more or less dramatically in other MA municipalities, which may have to do with the type of urbanization and time of occupation. So, in the areas of less demographic density, such as Guapimirim, Tanguá, Itaboraí, Seropédica or Maricá, the amount of native population is lower than 60% (Fig. 17). They are territories that are far from the main urban centers, but undergo some urbanization process, brought out mainly by migrants who try to settle in less expensive areas.

In Rio municipality and, in smaller proportion in Niterói, the amount of migrants varies quite substantially from one neighborhood to another. They are in greater numbers by the coast than in the interior of these cities. Those living by the beaches are a remarkable part of the richest segments of the population, who come from other areas of the country or from abroad. On the contrary, in areas far from the coast, such as the North Zone and the West Zone neighborhoods in Rio municipality, natives often represent more than 80% of the population.

4.2 Original regions of migrants living in Rio de Janeiro

In all Rio MA, 1,094,580 inhabitants older than 5 years of age stated that they had moved from one municipality to another between 2000 and 2010. Among these interviewees, 502,832 stated that they were from a municipality within the metropolitan area itself, whereas 95,645 had come from other municipalities in the state of Rio de Janeiro. Therefore, in 2010, there were 496,103 people older than 5 who had lived out of the state of Rio in the previous 10 years, before they settled in one of the MA municipalities.

As the census questionnaire asks the name of the municipality where residents lived before, it is possible to map the origin and the number of people in the MA who moved in during the past decade (Fig. 18). Mapping the previous addresses of those 496,103 people who came to live within the State of Rio de Janeiro reveals the importance of the capital cities in the Northeast and the Southeast, as well as in the Federal District, as migrants' original areas. In fact, the Northeast is the most relevant region, since 45.5% of migrants come from four northeastern states: Paraíba, Ceará, Bahia and Pernambuco. Although capitals are migrants' main places of origin, some inland regions in the Northeast are also starting points of population exodus, such as Sobral, in Ceará, and Campina Grande, in Paraíba.

The second region to provide migrants to Rio MA is the Southeast, the original place of 25.6% of its recent population. In the period between the 2000 and the 2010 censuses, about 50 thousand people, which correspond to 10.9% of newcomers, moved from São Paulo and its enormous urban agglomerate to Rio metropolitan area. Likewise, Minas Gerais, mainly Belo Horizonte MA and the municipality of Juiz de Fora, contributed with 10.5% of migrants. Espírito Santo, with Vitória and its MA, has a secondary role, with 4%. In all these cases, the proximity to Rio MA facilitates migration.

The contribution from different municipalities to Rio MA internal migration in the urban agglomeration generally differs very little in terms of demographic

Table 4.1
Rio de Janeiro Metropolitan Area Population according to birthplace

Name of municipality	Total	Born and always lived in municipality (1)	Born in municipality but lived somewhere else (2)	Not born in the municipality	Born in municipality (1+2)	% Born in municipality (1+2)
Paracambi	47 124	35 564	1 386	10 174	36 950	78,4
Rio de Janeiro	6 320 446	4 635 419	254 418	1 430 609	4 889 837	77,4
São Gonçalo	999 728	653 646	34 759	311 323	688 405	68,9
Duque de Caxias	855 048	543 510	29 567	281 970	573 078	67,0
Japeri	95 492	59 934	2 537	33 021	62 471	65,4
São João de Meriti	458 673	283 410	14 388	160 875	297 798	64,9
Nova Iguaçu	796 257	484 055	29 256	282 947	513 310	64,5
Queimados	137 962	84 115	4 236	49 611	88 351	64,0
Nilópolis	157 425	94 574	5 416	57 435	99 990	63,5
Magé	227 322	131 261	6 597	89 464	137 858	60,6
Niterói	487 562	269 480	25 231	192 851	294 711	60,4
Belford Roxo	469 332	263 120	18 468	187 744	281 588	60,0
Itaguaí	109 091	62 939	2 238	43 914	65 177	59,7
Guapimirim	51 483	28 132	1 329	22 022	29 461	57,2
Tanguá	30 732	15 766	991	13 975	16 757	54,5
Mesquita	168 376	84 392	6 720	77 265	91 111	54,1
Itaboraí	218 008	106 869	4 471	106 668	111 340	51,1
Seropédica	78 186	37 308	1 248	39 629	38 557	49,3
Maricá	127 461	51 273	2 790	73 398	54 063	42,4
Metropolitan Area	11 835 708	7 924 766	446 046	3 464 896	8 370 812	
MA %		67,0	3,8	29,3	70,7	

Source: IBGE 2010 Demographic Census

importance by municipality. There are only two exceptions to that: Rio de Janeiro, which, although it is the main municipality in terms of change of residence (39.8%), is below in terms of demographic relevance (53.4%), and Niterói, where the inverse took place, since 10.6% of its total population, which corresponds to 4.1% of Rio MA, has moved out. Consequently, the municipality of Rio de Janeiro retains its population more than Niterói. However, we should take into consideration the different extension of these two municipalities, which could partially explain the apparently more attractive role of the capital of Rio de Janeiro, where there would be more possibility to move inside the same municipality.

4.3 What are migrants' destinations?

The map on the location of migrants who come to Rio MA shows a reverse distribution as compared to that of native dwellers (Figs. 17 and 19). Migrants represent a significant percentage of the population in the MA peripheral municipalities that are in the process of urbanization, but their numbers are relatively low, as in Seropédica or in Itaboraí. Maricá has a larger population and a larger proportion of migrants.

Out of Rio de Janeiro, we find more significant numbers of migrants in São Gonçalo, Nova Iguaçu, Duque de Caxias, Niterói, Belford Roxo and São João de Meriti. Considering the fact that it is a great urban agglomerate, the relative participation of migrants seems little, although they cause considerable infrastructure problems for the metropolitan area. However, here and there, percentages can go higher, as in Niterói or even Rio de Janeiro, especially in the South Zone of the city.

Migrants originated from the Northeast Region are mainly located in poor neighborhoods in the northern and western parts of Rio municipality, but also

in all the peripheral metropolitan area, mainly in Duque de Caxias (Fig. 20). As we know, this migration is related to poverty; therefore, northeastern migrants comprehend a significant proportion of slum dwellers.

Less numerous than northeasters, migrants from the Southeast Region itself are more frequent along coastal areas in Rio de Janeiro and in Niterói (Fig. 21). Taking into consideration the levels of income in these neighborhoods, we suppose that these migrants, at least part of them, are from high and middle income classes. However, one should avoid hasty generalizations, since they are also found in less rich neighborhoods in the city and even in the peripheral metropolitan municipalities.

Chapter 5

Dwellings and Households

Similarly to most population surveys in the world, IBGE 2010 Census does not only register the number of people and Brazilian population characteristics, but also investigates their dwellings, i.e., residential units occupied by a family. These data are of great importance, because they allow the analysis of the living situation of the population from the point of view of their living places, which is a key factor to the understanding of the structure of a certain social environment.

For the analysis of such structure, housing can be considered according to five complementary aspects. First, we have the characteristics of the different types of construction (apartments, houses etc.) that qualify urban environment in the physical point of view. Besides, it is also necessary to analyze housing and their access to water and sewage systems, electric power etc. It is also important to evaluate residential units as to items that characterize the degree of comfort of their dwellers, such as home appliances (washing machines, computers etc.) and transportation available to them. Next, the quality of environment (urban light, etc.) is investigated and, finally, the type of occupation of the estate (owners or tenants).

According to IBGE terminology, a dwelling is an independent, structurally separated place for the living of one or more people. This separation criterion is respected when the residents of a house can isolate themselves from their neighbors, by means of partition walls, in order to sleep, prepare and eat their meals, and guarantee protection from the outside environment. Dwellers of a living unit are in charge of all or part of the expenses resulted by these activities. The criterion of independence is present when there is direct access in and out of a dwelling unit, without having to pass through another one.

5.1 Types of dwellings

In the Census questionnaire, there are 13 categories of dwellings that manage to comprehend the diversity of types of constructions found in the country. In Rio MA, just three of them correspond to 99.2% of dwellings.

The most common type of dwellings in Rio MA is the house, which consists of an individual construction meant to be an only dwelling unit, regardless the material used to build it (Tab. 5.1). With direct access to a street or a path, its construction can be legal or illegal. Defined as so, the individual house represents 68.6% of dwellings in Rio MA. The municipalities of Rio de Janeiro and Niterói have lower percentages, with 54.6% and 51.8%, respectively. On the other hand, in 12 out of the other 17 municipalities in the MA, 9 out of 10 dwellings are houses.

The second most important dwelling category in the MA is the apartment, which represents just 24.3% of dwelling units. According to IBGE definition, an apartment is a dwelling unit that is found in buildings of one or more floors that comprehend several individual units and common areas, as a ***hall***, corridors etc. The cities of Rio and Niterói show a clear distinction in relation to the other MA municipalities, because they present 37.6% and 42.4%, respectively, of their dwellings in the category apartment. In the other municipalities, the proportion of apartments is lower than 11%, and in 12 of them there are less than 5% of apartments.

Villas or condos are generally in low proportion, representing just 6.3% of dwellings. A villa is a group of houses, frequently twinned, with only one access to the street. A condo is a residential complex with common facilities (playground, parks etc.). The houses in a condo are usually separated from one another. In Nilópolis, the proportion of this type of dwelling is almost three times higher than in the rest of the Rio MA (17.3%). In general, proportions vary a lot from one municipality to another.

Since the other types of dwellings present insignificant proportions, less than 1%, the present analysis will focus on the three most relevant types. Aiming at explaining the importance of each one of them, a triangular diagram was created. First, it was broken into four other triangles (by the method of isosceles triangles of the same area); next, each one of them was broken into four sub triangles, which were also broken into other four sub triangles. So, four large classes were defined, according to the predominant type of dwelling. And, in each one of them, four subclasses allow us to examine the respective importance of each type of dwelling more accurately. The term ***predominant,*** used to describe these classes, should not be understood as absolute, but relative to the average in Rio MA.

Sections where houses prevail

These sections, represented in shades of green on the map, form class B, which encompasses most of Rio MA territory (Fig. 22). This class, which comprehends about 2.4 million out of the 3.9 million of dwellings in the MA, is the most representative. The four sub classes in class B are occupied mainly by class B1, almost exclusively characterized by houses (95.5%).

Table 5.1
Households in Rio de Janeiro Metropolitan Area municipalities, per type

Municipalities	Total Households	Houses %	Villa or condo houses %	Apartments %	Other types %
Niterói	169 237	51,8	5,3	42,4	0,5
Rio de Janeiro	2 144 445	54,6	6,8	37,6	1,0
Nilópolis	50 514	71,6	17,3	10,8	0,4
Mesquita	53 103	82,6	8,5	8,6	0,3
São Gonçalo	325 882	85,9	5,7	7,9	0,5
São João de Meriti	147 450	87,0	9,4	3,1	0,6
Duque de Caxias	269 353	88,2	7,4	3,8	0,7
Nova Iguaçu	248 186	90,1	3,8	5,5	0,6
Itaboraí	69 422	91,9	6,8	0,7	0,5
Paracambi	15 249	92,4	2,2	5,3	0,1
Maricá	42 810	93,5	5,0	1,2	0,3
Belford Roxo	145 677	93,8	3,5	1,9	0,8
Itaguaí	33 910	94,4	3,2	2,0	0,4
Tanguá	9 658	95,8	3,4	0,2	0,6
Magé	70 394	96,4	2,0	1,2	0,3
Japeri	28 409	96,5	2,7	0,5	0,3
Queimados	42 209	96,7	2,3	0,9	0,1
Guapimirim	15 741	97,3	1,8	0,6	0,3
Seropédica	24 256	97,7	1,0	1,1	0,1
Metropolitan Area	3 905 905	2 678 163	246 864	949 811	31 067
MA %	100	68,6	6,3	24,3	0,8

Source: IBGE 2010 Demographic Census

The other sub classes are more diversified, since B2 has, on average, one third of apartments, whereas in B3 and B4 villa and condo houses represent, on average, 33.7% and 16.1% of dwellings, respectively. The geographic distribution of these three sub classes show a remarkable dispersion in urban areas, generally placed close to sub class B1.

Sections where apartments prevail

Class A, which shows on the map in shades of brown, comprehends a small area, which is also one of the most densely populated in the municipalities of Rio de Janeiro and Niterói, and central areas of some municipalities on Baixada Fluminense, as Nova Iguaçu and Duque de Caxias. Whereas the previous class corresponded to a horizontal city, class A refers to the vertical city that grows in limited places.

This characteristic is especially true in relation to subclass A1, which includes 688 thousand out of the 887 thousand dwellings in class A. In geographic terms, class A1 continuously spreads to several South Zone neighborhoods, from Leblon to Glória, and from the Center to Tijuca. Intermittently, class A1 is also present along the sea, from São Conrado to Recreio dos Bandeirantes, areas that are characterized by the construction of high buildings. This phenomenon is similar to densely populated neighborhoods in Niterói, as Boa Viagem, Ingá and Icaraí.

Out of these areas that are homogenous as far as their types of dwellings are concerned, sometimes, subclass A1 plays the role of a maypole around which high buildings seem less important and the presence of subclasses A2, A3 and A4 houses and condos prevail. This phenomenon can be observed in some of Rio neighborhoods, such as Méier, Vila da Penha and Freguesia de Jacarepaguá. This is also the case of downtown Nova Iguaçu, Mesquita, Belford Roxo, Duque de Caxias and São Gonçalo.

Sections where villa and condo houses prevail

These sections, which make up class C, are not numerous and refer only to 90 thousand dwellings in Rio MA. Although they are scattered around the city, in

some areas, these types of dwellings are significant. In these cases, they can be part of a diversified urban fabric, which is often the case, or characterize a type of homogenous urban occupation, as we can see in the central part of Barra da Tijuca, which is rarely the case. They can be situated in isolated areas, as a result of some specific construction enterprise.

Sections with no predominance

Class D includes mixed sections, without the specific predominance of any type of dwelling. In this class, the mixture is the result of the combination of mainly two types of dwellings, as we can see in subclasses D1, D2 e D3, whereas in D4 there is, on average, one third of each type. As a whole, there are about 124 thousand dwellings weaving this mixed urban fabric, that is, out of places where a specific type of dwelling prevails.

We can infer that the geography of these types of dwellings seems to be structured in very homogenously composed subclasses (house, apartment, villa or condo house) and location. Subclasses link homogenous places, making Rio MA urban landscape a picture that is often confused and even disorganized, the fruit of the lack of urban planning.

5.2 Access to services

Public service networks are those that provide the population of a city with the necessary conditions for good-quality living, such as electricity, water and sewage, as well as garbage collection. In a city whose population grows fast, usually occupying new areas, the connection of dwellings with service networks depends on the public organs in charge of the city's infrastructure, which must keep up with the constant urban expansion.

The five statistical indicators used in the present study were selected because of their capacity to explain the diversity of situations found in dwellings, as follows:

· having electric power, but not having a meter is often a sign of illegal installation of public or private services, which, consequently, is an indicator of the marginal situation of the dwelling;

· having more than one bathroom, defined as a room with a shower or tub and a toilet, reserved for the private use of the residents of the dwelling (even when located out of the house), is an indicator of possible personal hygiene;

· being connected to a sewage system or simply to a rainwater collecting network; not discharging used water in the environment reduces the chances of the spread of transmissible diseases;

· having access to running water from a general distribution system is better than drilling for underground waterbeds, which are generally polluted, although no one can guarantee that the general system provides good quality water;

· having access to garbage collect by public or private sanitation companies, keeping waste from lying on the streets and, consequently, lowering risks related to pollution.

These five indicators generally show positive values in all parts of Rio MA, which does not mean, however, that the situation is entirely satisfactory. The four classes established by the ascending hierarchic classification reveal remarkable differences identifiable on the map that represents them (Fig. 23).

In class 4, all indicators are positive: the lack of electric power meter is rare; the existence of more than one bathroom is twice as frequent as the average in Rio MA; the access to water and sewage systems, as well as to garbage collect reaches almost 100% of dwelling units. The location of this class in the city mainly corresponds to areas where apartments prevail, presenting high population density and high income. This favorable situation, far from representing the majority, refers to 15% of the dwellings in Rio MA. Class 3 is the one that comprehends the majority of dwellings, representing 53.8% of all dwellings in the MA. Similarly to class 4, class number 3 is also characterized by positive indicators. However, they show a higher proportion of dwellings without a power meter and a lower percentage of dwellings with more than one bathroom than the MA average. This class also concerns urban areas with higher density, except the sections that make class 4.

Class 2 concerns 18% of Rio MA dwellings. Except for the access to running water, the indicators of garbage collect and power meters reveal a negative or a very negative level. Its geographic distribution shows that this class lies on the margins of sections that are either more urbanized or in the process of urbanization. It is also characteristic in most slums.

Finally, class number 1 mainly concerns areas that are even less urbanized or rural areas in the MA. In it, most indicators are negative, but the same nature of these sections makes the comparison with other classes not pertinent. In spite of that, the item garbage collect shows good conditions.

This classification clearly shows the distribution of basic sanitation in Rio MA and how connections to service networks vary from the richest areas, along the coast, to the most distant inland regions. Still, it is possible to see how illegal ways of structuring urban regions, that is, areas in urbanizing processes and the slums, have a bad situation as for their integration to service networks. Likewise, peri-urban rural areas are clearly situated on a stage that is lower than that of the metropolitan average as far as the indicators used here are concerned.

5.3 Household appliances

Besides the characteristics related to the access to services, the Census provides data on appliances used in people's everyday life in dwelling units. In fact, they are items that express how comfortable life is in dwellings and whose study allows us to review the results previously seen. So, nine statistical indicators were selected to express the diversity of levels of

comfort. They are the percentage of dwellings with a refrigerator, a washing machine, a radio and a computer, with or without connection to the internet. The presence of a car and a telephone (wired or mobile) was added to the list of appliances. Televisions were not considered in the study, because they are present in almost all the dwellings and, therefore, have no differential power.

Some of these appliances are commonly found, other ones are less frequent among the population. In a tropical city like Rio de Janeiro, the refrigerator is present in almost all MA dwellings (98.5%). In over 80% of Rio MA homes, there is a radio (88.8%) and a cellular phone (87.2%), which has outweighed wire telephone lines (68.5%). If, on one hand, there is a computer in only 51.4% of dwellings, on the other hand, 84.2% of these computers are connected to the internet. The least common elements of comfort are cars, present only in one third of dwellings (34.8%), and motorcycles (6.5%).

By applying the ascending hierarchic classification to these nine indicators we can identify eight classes, which, after the analysis of their characteristics, reflect three levels of appliances: low (classes 1, 2 and 3), middle (classes 4, 5 and 6) and high (classes 7 and 8).

Low-level appliances

The first group, in shades of blue on the map, refers to 26% of dwellings and is located, in a concentrated form, in the metropolitan periphery, from Itaguaí to Tanguá (Fig. 24). Besides this extensive area, part of the west of the municipality of Rio also belongs to this group.

Among classes 1, 2 and 3, there are few differences, and almost all indicators are below the average of the MA. Class 1, with 9.9% of dwellings in the MA, which is found mainly in Queimados, Japeri, southwest of Nova Iguaçu and east of Belford Roxo, also characterizes some sections of the municipality of Rio. However, class 2, with only 4.5% of the dwellings, presents a proportion of motorcycles slightly above average, mainly in the census tracts in the complex of Maré and in the west of the MA. Finally, class 3 is characterized by the stronger presence of motorcycles, as we can also see in distant extensive sections in the metropolitan periphery, where this vehicle is certainly the alternative to the lack of good transport systems.

Middle-level appliances

The set of the three following classes, number 4, 5 and 6, is heterogeneous in its composition. In fact, class 4, with the highest percentage of dwellings (38.1%), corresponds to the low middle class, where most indicators present values that are below the average in the MA. The dwellings with these characteristics are found in the West Zone of the city of Rio, from Realengo to Santa Cruz, and in the more urbanized sections of Nova Iguaçu, Mesquita, São João de Meriti and Belford Roxo. Almost all the municipality of São Gonçalo belongs to the low middle level class as far as appliances are concerned.

Class 5 characterizes middle class sections in which some indicators have a higher value than that of the MA average, as cars, motorcycles and cellular phones, as well as consumer goods related to transport and communication. In fact, this class is located mainly in the south-half of Niterói, in all the municipality of Maricá and in some sections in Itaboraí. Its geographic extension is quite defined and characterizes just 2.1% of dwellings. The distance from the central area of the MA and the higher quality of living in relation to Baixada Fluminense may explain the circumscribed location of these census tracts.

In class number 6, which comprehends 20.4% of dwellings, comfort indicators are significantly better, since all of them present values higher than those of the MA average, except for motorcycles. Its geographic location shows that it corresponds to neighborhoods inhabited by middle social categories in the North Zone of Rio, in most part of Ilha do Governador and in a significant area of Niterói.

High-level appliances

In the high level, classes 7 and 8, which are quite different from the previous ones, together represent 13.4% of dwellings in the MA. Despite that, class 7 profile is similar to that of class 6, but it reveals positive deviations in relation to averages significantly higher. Class 7 is continually distributed, from Leblon to Flamengo and from Maracanã to Tijuca. It is also found in some neighborhoods in Niterói, as Boa Viagem and Icaraí. In this class, apartments predominate as the prevailing type of dwelling.

Class number 8 is the least numerous of all classes in the classification, because it comprehends only 1.8% of dwellings in the MA. In this class, indicators are much higher than average and its location shows great geographic concentration, because it comprehends all of Barra da Tijuca and the area surrounding Lagoa Rodrigo de Freitas. It is clearly one of the most privileged areas in the city, which is evident from the high life standards of its population, such as the number of cars per dwelling.

As a conclusion, we can say that indicators of dwelling equipment are able to clearly discriminate the different social and economic levels of the population and indicate the diversified forms of social and spatial segregation that takes place in the metropolitan area of Rio de Janeiro.

5.4 Household environment

The 2010 Census made possible the first analysis of the characteristics of the urban environment in the country. The new data, published in ***Características urbanísticas do entorno dos domicílios*** (Urban characteristics of dwelling environments), aim at contextualizing the life standards of the population, in order to facilitate interurban planning and municipal administration. This part of the Census, which concerns only urban places, does not comprehend all Rio MA. Accordingly, the following urban infrastructure characteristics are investigated: identification of public places, street lighting, sidewalks,

street pavement, sewers, ramps for wheelchairs, trees, open air drainage and garbage dump.

This information allows us to calculate, for each Census tract, the percentage of dwellings characterized by the presence or the absence of a certain environmental characteristic related to the Census. In order to evaluate the quality of the environment, an index, with the average of these percentages, was calculated, taking into consideration that, for open air drainage and garbage dumping, the index considers the absence of both characteristics. The values of dwellings' environmental quality vary from 0 to 100 (100 represents the best situation). The map with the index on the quality of dwellings' environments uses a range of opposed colors, in which the shades of red stress out the areas with bad environmental quality, whereas the shades of green express the areas with better levels of quality (Fig. 25). **Several blank spots refer to non-urban sections**.

As far as the geographic point of view is concerned, we can see clear contrasts in the MA, as we move from Rio's South Zone neighborhoods, with the best environmental quality levels, towards the municipalities in the metropolitan periphery, where rates drastically drop.

In fact, the municipality of Rio is the one that shows the best results in all MA, although its rates are between 50 and 100, which represents a great variety of situations among the several neighborhoods in the city. The Center and the port area are badly situated, whereas Tijuca and Maracanã, as well as Ilha do Governador, present better levels. In the North Zone, intermediate values predominate, which is unexpected, mainly when we consider the economic profile of people who live in it. It is in the West Zone, from Campo Grande to Santa Cruz, that the issue of dwellings' environment tends to worsen considerably.

A similar pattern can be seen in Niterói, where the by-the-sea neighborhoods of Boa Viagem, Ingá and Icaraí concentrate the highest environmental quality levels, which gradually lower as we move towards the municipalities of São Gonçalo, Maricá and Itaboraí.

In conclusion, we can say that the richest neighborhoods tend to present better environmental quality; however, this is not always true, as it is the case of Barra da Tijuca, which does not present the highest levels, despite the high economic status of its population. On the contrary, simple neighborhoods, such as those in the North Zone of Rio, developed many decades ago, are much above the average. Consequently, we believe that, as long as the aspects surveyed by IBGE on the environment around dwellings are related to actions carried out by public authorities, these densely populated areas with consolidated urbanization present good results, whereas those recently occupied reveal less favorable conditions.

5.5 Types of dwelling occupation

The Census defines six types of dwelling occupation:

· owner resident of part or all of a paid off property;

· owner resident of part or all of a property in acquisition;

· tenant resident who pays all or part of the rent, or part of the rent is paid by his employer, as part of his salary;

· dwelling lent by one of the residents' employer, either when there is no cost or when the payment is made by resident through different types of charges;

· dwelling lent for free by nonresident proprietor, who is not the employer, with eventual payment by resident through different types of charges;

· other cases: dwelling connected to a commercial place or an agricultural enterprise, or occupied by invasion.

During the analysis of the table on dwelling distribution by type of occupation, our attention is immediately drawn to the fact that people in Rio MA are predominantly owners of their dwellings (Tab. 5.2). In fact, 72% of them live in houses that have been paid off, whereas 3.8% are still paying mortgage, totaling 75.8% of proprietors. Differences between municipalities are relatively small, since the highest value found is 84.5% in Belford Roxo and the lowest percentage is 73.1% in Rio de Janeiro.

This high proportion of proprietors leaves little possibility for other types of occupation: 19.5% for rented dwellings and 4% for houses lent for free. Whereas the variation of tenants is the opposite to that of proprietors, the distribution of lent dwellings is more erratic, varying from 2.7% in Belford Roxo to 10.6% in Guapimirim.

The ascending hierarchic classification, applied to the percentages of different types of occupation in census tracts, can explain the participation of each one of them in Rio MA. Due to its low participation, the category ***other cases*** was not taken into consideration (Fig. 26).

Census tracts with the predominance of paid-off dwellings

Class number 2 is the most common in the MA, since it comprehends 55.3% of dwellings, 82.2% of which are paid for and occupied by their owners. This category, which is present all over the MA, is very common in areas with the predominance of one-family houses, which occurs mainly in the North and West Zones of the municipality of Rio. It is also found along the sea, from Barra da Tijuca to Flamengo, with the exception of Praia de Botafogo. This wide range reveals that both the wealthiest and the poorest social classes can be owners of the estates where they live, which are obviously of different nature.

Table 5.2
Households in Rio de Janeiro Metropolitan Area municipalities according to types of occupation

Municipalities	Total households	Owner resident of paid-off property %	Owner resident of property in acquisition %	Rented %	Lent %	Other types %
Belford Roxo	145 677	82,8	1,8	12,3	2,7	0,5
Duque de Caxias	269 353	78,4	1,9	15,7	3,6	0,4
Guapimirim	15 741	73,5	1,5	13,7	10,6	0,7
Itaboraí	69 422	73,4	4,5	14,3	6,9	0,9
Itaguaí	33 910	73,6	2,0	18,2	5,6	0,5
Japeri	28 409	83,4	0,7	10,8	4,9	0,3
Magé	70 394	79,7	1,1	13,5	5,3	0,4
Maricá	42 810	67,7	10,4	13,7	7,0	1,2
Mesquita	53 103	75,5	3,4	16,6	3,7	0,8
Nilópolis	50 514	71,3	2,2	22,4	3,3	0,7
Niterói	169 237	70,1	5,0	19,9	4,0	1,0
Nova Iguaçu	248 186	80,3	2,6	12,8	3,5	0,7
Paracambi	15 249	77,8	0,9	15,9	4,7	0,7
Queimados	42 209	80,2	3,4	12,2	3,7	0,5
Rio de Janeiro	2 144 445	68,4	4,7	22,3	3,9	0,7
São Gonçalo	325 882	72,7	3,3	19,1	4,1	0,8
São João de Meriti	147 450	76,5	0,9	17,8	4,3	0,6
Seropédica	24 256	75,6	0,7	14,0	8,9	0,8
Tanguá	9 658	76,6	0,8	12,9	9,2	0,6
Metropolitan Area	3 905 905	2 810 657	149 241	761 593	157 639	26 775
MA %	100	72,0	3,8	19,5	4,0	0,7

Source: IBGE 2010 Demographic Census

Census tracts with the predominance of dwellings in acquisition

Class 3 comprehends 13.8% of the MA dwellings and, although these units in process of acquisition are third place in this class, their percentage is, on average, 4.5 times bigger than that in Rio MA (17.1% against 3.8%). Analyzing their geographic distribution, we can see that the sections in question here are very much clustered, as in the area of Maracanã, Tijuca and Grajaú; in Great Méier, integrated by the neighborhoods of Engenho Novo, Lins de Vasconcelos, Todos os Santos and Cachambi; in Jacarepaguá, in Recreio dos Bandeirantes, as well as the west of Maricá, on the other side of the bay.

In most cases, they are neighborhoods that have benefitted from the recent construction of buildings, as, for example, the urbanization axis of Recreio dos Bandeirantes, Barra de Tijuca and Jacarepaguá.

Likewise, in Méier and surrounding neighborhoods, there has been the construction of many condos, supported by a sound commercial infrastructure and by relatively easy access to other parts of the city.

Census tracts with the predominance of tenants

Rented estates represent 33.6% of class 1 dwellings, which comprehends 26.4% of all MA dwellings. These estates are present in the whole Metropolitan Area, mainly in the municipality of Rio, where they concentrate both in the North Zone and in the South Zone wealthy neighborhoods. In this area of the city, rented dwellings are frequently in the blocks located in the interior part of neighborhoods, opposite the seaside, where dwellings occupied by their owners predominate, which can be clearly seen in Copacabana and Ipanema. Rented dwellings also predominate in the central neighborhoods of Nova Iguaçu, Nilópolis, São João de Meriti, Belford Roxo and Duque de Caxias.

Census tracts with the predominance of lent dwellings

Approximately 25% of class 4 dwellings are lent for free or belong to the category ***other cases***. It comprehends just 4.5% of MA dwellings and its geographic location is mostly in rural sections. It is, in fact, a type of dwelling frequently used to lodge farmhands, as part of their salaries.

Chapter 6

Education

As education plays a key role in social mobility, as it is one of the possible means for an individual to learn a profession and have the chance to improve his living conditions, it is of great importance to understand how people who live in an urban agglomerate as Rio de Janeiro MA have access to education. Therefore, this question will be approached through four complementary aspects: access to school, literacy, educational stages and the importance of private schools (Tab. 6.1). Naturally, these topics are not enough to cover the whole issue, but they allow us to identify the main educational problems faced by the population in Rio.

Table 6.1
Education Indicators in Rio de Janeiro Metropolitan Area municipalities

Municipalities	Never been to school %	Literate People %	Graduated and post-grad %	Nº of students at private schools / per each 100 stds at public schools
Belford Roxo	8,8	93,2	4,7	36,9
Duque de Caxias	8,6	93,5	7,1	47,2
Guapimirim	10,1	91,1	6,8	15,0
Itaboraí	8,2	92,5	6,6	33,7
Itaguaí	8,7	93,3	6,7	24,6
Japeri	10,8	90,9	3,3	18,3
Magé	8,7	93,0	6,1	25,7
Maricá	7,8	94,4	17,2	40,4
Mesquita	6,5	95,0	9,9	61,1
Nilópolis	5,9	96,6	12,4	80,4
Niterói	4,2	96,7	37,9	101,5
Nova Iguaçu	8,6	93,7	8,3	53,0
Paracambi	10,4	94,0	8,2	24,3
Queimados	10,0	92,2	4,8	39,2
Rio de Janeiro	5,6	95,8	24,7	63,5
São Gonçalo	6,7	95,4	9,1	63,3
São João de Meriti	7,4	95,0	7,1	61,2
Seropédica	7,9	93,0	8,4	20,7
Tanguá	10,5	90,6	4,4	14,8
Metropolitan Area	6,6	95,1	18,3	57,2

Source: IBGE 2010 Demographic Census

6.1 Having been to school

Knowing who is literate and who is not is a first step, quite crude, it is true, to evaluate the educational level of a population. The participation of Rio MA residents who have never been to school is just 6.6%, which represents a relatively small proportion, much lower than the national average, which is 9.8%. This percentage places Rio de Janeiro as second of all Brazilian metropolitan areas, right behind Campinas, where there are some of the most important scientific and technological centers in the country, but ahead of Belo Horizonte, Salvador and São Paulo (Tab. 6.2).

Table 6.2
Population who have been to school in the 12 largest metropolitan areas in Brazil

Metropolitan Areas	Total	Never been to school	Never been to school %
Campinas - SP	2 797 137	181 170	6,5
Rio de Janeiro - RJ	11 835 708	781 517	6,6
Belo Horizonte - MG	5 414 701	373 696	6,9
Salvador - BA	3 573 973	248 624	7,0
São Paulo - SP	19 683 975	1 385 109	7,0
Curitiba - PR	3 174 201	224 786	7,1
Porto Alegre - RS	3 958 985	286 850	7,2
Belém - PA	2 101 883	156 712	7,5
Recife - PE	3 690 547	29 2522	7,9
Goiânia - GO	2 173 141	194 777	9,0
Fortaleza - CE	3 615 767	329 647	9,1
Manaus - AM	2 106 322	227 169	10,8

Source: IBGE 2010 Demographic Census

In spite of that, there are considerable differences among the several census tracts of Rio MA, since the proportion of people who have never been to school varies from 1% to 17% (Fig. 27). If the municipality of Rio de Janeiro, with the exception of its west part, and the municipality of Niterói, generally present percentages below the metropolitan average, the municipalities on Baixada Fluminense register higher figures. Therefore, it is in the peripheral areas, mainly in rural regions, that the worst results are found. This is the case of Queimados, Guapimirim, Paracambi, Tanguá and Japeri, where a considerable share of the population, that is, over 10%, has never been enrolled in a school.

The South Zone and, in a lesser proportion, the North Zone of the city of Rio show good levels, except where there are slums, as it is the case of Rocinha, Mangueira and Maré, where percentages are between 9% and 11%. Likewise, the West Zone presents unsatisfactory levels, including Vargem Pequena, Vargem Grande and Guaratiba.

6.2 Being literate

The answer to the question made by the Census whether the interviewee ***can read and write*** allows us to evaluate the dimension of the literate population in the country. The answer ***yes*** is given when the person says that he can read and write a simple note in the language he speaks. In terms of literacy, Brazil has moved forward over the last two decades, since the proportion of literate people increased from 83.6%, in 1992, to 89.5%, in 2010. However, there are considerable regional differences, since, whereas the South, Southeast and Central-West regions show good results, with 94%, 93.7% and 92%, respectively, the same does not occur in the North Region, which present 85.9% and the Northeast Region, which is even lower, with just 80.9%.

The state of Rio de Janeiro occupies the third place in literacy in the country (94.8%), falling behind Distrito Federal (95.1%) and Santa Catarina (94.9%), but ahead of São Paulo (94.7%), in a context of very small percentage differences. Rio MA, with 95.1% of literate people, presents a slightly superior position to that of the state of Rio de Janeiro, where less than 5% of the total population is illiterate. Likewise, the differences among the MA municipalities are relatively small, with the minimum of 90.6% in Tanguá, and the maximum of 96.7% in Niterói. Therefore, the municipality of Rio, with 95.8% of literate people, shows to be well ranked.

On the map with the percentages of literate people over 5 years of age in 2010, Rio MA presents clear predominance of people who can read and write, whereas the lowest rates are concentrated in the rural areas of the metropolitan periphery (Fig. 28). In the urban agglomerate itself, some municipalities in the outskirts, like Belford Roxo, are in a worse situation than others, like São Gonçalo. In relation to education, Rio municipality is characterized by a double asymmetry: east-west, where east is better than west, and south-north, where south is systematically between 95% and 100%, reaching the maximum level in the wealthiest neighborhoods.

So, as far as literacy is concerned, Rio's South Zone presents the best levels in Rio MA, which is also highly rated among the other metropolitan areas in the state of Rio de Janeiro, which, in turn, has the highest rates of all Southeast states.

The migration of people from the poorest regions in the country, mainly from the Northeast, seems to be responsible for lower literacy levels in some places in Rio MA. Besides, the structural differences between urban and rural areas can explain the better conditions of the first in relation to the second environment, as far as going to school is concerned.

6.3 School levels

Going to school or being literate are not consistent indicators to reveal the different levels of education that characterize the social differences in the core of Rio MA. Urban Brazil has developed a more complex educational status that outdates levels of literacy as a factor of social development, with

the exception of some extreme cases. Therefore, it is necessary to thoroughly investigate the differences in education, by means of the analysis of school levels.

In the Census questionnaire, there is a question addressed to people who have had some formal education: ***Which is the most advanced course of studies you have taken?*** The answers are codified into a grid with 14 terms, which go from nursery schools or kindergartens to doctorates, with all intermediate stages. In Rio MA, the most common stages are: 16.9% of the population has finished primary school (from 6th to 9th grades); 33.4% has finished secondary school; 14.8% has a college degree. These figures reveal the level of school education in Rio MA, with 65% of its population included in these categories.

The percentages of the population at each school level in each Census tract were the object of an ascending hierarchic classification. This classification follows 13 indicators related to school levels. Percentages of master's and doctor's degrees were considered as one, due to their very low values. This hierarchic classification has allowed us to identify seven classes that, after the analysis of their characteristics, reflect three school levels: low level (class 1), middle level (classes 2, 3 and 4) and upper level (classes 5, 6 and 7). The term ***predominance,*** used here to describe classes, should not be understood as absolute, but relative to the Rio MA average.

Low educational levels

Class 1, which comprehends 22% of the population in the MA, shows the predominance of low school levels: kindergartens, literacy classes and primary schools (Fig. 29). This means that, for those who belong to this class, school attending was interrupted at an early stage. A large part of the metropolitan periphery, from Itaguaí to Tanguá, as well as the rural sections of the MA, belongs almost entirely to class 1. The west part of Rio municipality also belongs to this pattern, as well as several slums, such as Rocinha, Maré and Mangueira.

Middle school levels

According to this classification, the middle school level consists of three classes (2, 3 and 4). Class 2 profile is similar to that of the average in the MA. In terms of numbers, it is the highest in all the classification, since it comprehends 34.2% of the educated population. It characterizes the urban census tracts in the municipalities in the metropolitan periphery, such as Nova Iguaçu, Mesquita, São João de Meriti, Duque de Caxias, as well as São Gonçalo and Maricá. Some sections in the West Zone of the municipality of Rio also belong to this class, despite their rural characteristics.

Classes 3 and 4 present a particular aspect, because their schooling is related to school levels of the old school system that divided studies before university into: primário (primary), ginásio (gymnasium) and científico (scientific studies) or clássico (studies of humanes). Between these two classes, there is a significant difference, which is the presence, although very small, of undergraduate courses, which have motivated expressions used in the names of these classes, ***middle-middle*** for class 3 and ***middle-high*** for class 4.

These two classes are mainly related to those neighborhoods that have a relatively older population, which justifies the larger presence of ***old*** educational levels***,*** in the municipalities of Rio and Niterói. In spite of that, they are quite different from each other, since class 3 (***middle-middle level***) comprehends 21.2% of the educated population in the MA, whereas class 4 ***(middle-high level)*** corresponds to 8.1% only.

In Rio de Janeiro, the ***middle-middle*** level *r*efers mainly to neighborhoods in the North Zone of the city. In Niterói, it is found in areas close to the Center, like Barreto, Santana, São Lourenço and Ponta d'Areia. The ***middle-high*** level occurs in the municipality of Rio, in sections of the Center, Santa Teresa, São Conrado, Jacarepaguá and Méier outskirts. On the other side of the bay, this class also characterizes downtown Niterói and neighborhoods like Fonseca and Piratininga.

Higher educational levels

Classes 5, 6 and 7, which integrate this level, show greater participation in university studies: graduate, post graduation, master's and doctor's courses. In spite of that, they present low numbers, since they correspond to, respectively, only 6.3%, 2.7% and 5.5% of the educated population. These classes can be ordered in three progressive levels: ***upper-middle*** for class 5, ***upper-high*** for number 6 and ***upper-very high*** for class number 7.

In urban environment, these classes form homogeneous clusters both in Rio and in Niterói. The class ***upper-very high*** occupies the strip of land by the sea from Barra da Tijuca, Leblon, Ipanema, Gávea and Lagoa, as well as the neighborhoods of Humaitá, Botafogo, Flamengo and Laranjeiras. It is interesting to see that Copacabana and Leme do not belong to this level, but to the class ***upper-high****, the same* level found in Maracanã and Tijuca, which reveals the difference in relation with the pattern that characterizes the South Zone. In Niterói, the level ***upper-very high*** is found in the neighborhoods of Boa Viagem, Ingá and Icaraí.

Whereas class ***upper-high*** refers only to the municipality of Rio de Janeiro, the ***upper-middle*** is well represented, as much in Rio as in Niterói. In Rio, it is geographically disperse, characterizing different city areas, like Recreio dos Bandeirantes, the far west part of Barra da Tijuca, Freguesia de Jacarepaguá, Pechincha and Vila Valqueire; it is also present from Vila Isabel to Alto da Boa Vista and from Glória to Catete, as well as in the neighborhoods of Méier, Vila da Penha and in Jardim Guanabara, on Ilha Governador. In Niterói, it comprehends several neighborhoods in the municipality, such as Santa Rosa, as well as São Francisco, Itaipu and Itacoatiara, on the coast.

Finally, it is important to emphasize the successive characteristic that the distribution of the different educational levels lends to the environment. In fact, they significantly decrease as we move from the neighborhoods located

far from the coast towards the periphery, where the lowest educational levels are found. Whereas in Rio MA urbanized part the lowest class rarely shows, in the rural area it is massively present. This spatial structure emphasizes the strong relation there is between income levels and the education of the population.

6.4 Private school students

Out of the 59.6 million of Brazilians who, at the time of the Census, stated that they were enrolled in an educational institution, 13 million said that they went to a private school (21,9%), which shows their relevance to the educational system in the country. If private schools are less present in the North Region, where they have just 14% of all students, in the Northeast they have 19.5%. In the other Regions, over 20% of students go to private schools: 24.9% in the Southeast, 22.3% in the South and 25.1% in the West Central.

Among Brazilian federation units, Distrito Federal stands out, as far as private education is concerned, since it comprehends 38.6% of those who go to school. The state of Rio de Janeiro, with 32.9%, comes second, but it comprehends a greater number of people than that in the Distrito Federal (1.5 million in RJ and 339 thousand in the FD). In Rio MA, 36.4% of the population state they are enrolled in private schools, whereas in the state capital city this percentage reaches 38.9%.

In order to evaluate the importance of private education in relation to the public school system in the different neighborhoods in the MA, it was calculated the number of students enrolled in private institutions for each group of 100 students enrolled in public schools. The range of values varies considerably, from 9 to 650 students of private schools for each group of 100 public school students, which reveals the diversity of situations found in the metropolitan area of Rio.

The map with the results of this calculation shows a major differentiation between Barra da Tijuca and the South Zone and the rest of the city (Fig. 30). It is in Barra where we find the highest relation ***student in private school/ student in public school***, 300 to 600, which makes it a very homogenous environment, as far as education is concerned. Besides Barra, the area from Leblon to Humaitá, around which other neighborhoods cluster, shows slightly lower values, between 200 and 300, as it is the case of Gávea and Jardim Botânico. Copacabana, not Leme, is on this same level. Flamengo registers 210, but other South Zone neighborhoods, like Botafogo (197), Laranjeiras (164) and Ipanema (175), are all below 200.

Other neighborhood clusters, less homogenous than the previous ones, also have high values, as it is the case of Tijuca, Méier, Pechincha, Vila da Penha and Jardim Guanabara, in Rio, as well as Icaraí, Itaipu and Itacoatiara, in Niterói. All these neighborhoods generally correspond to middle-class areas, and the values above 200 correspond to the municipalities of Rio de Janeiro and Niterói.

In other MA municipalities, the highest values are situated between 100 and 150, which means ***one to one and a half student*** in private schools for 100 students in public schools. However, this proportion rarely shows and refers mainly to central neighborhoods of Nova Iguaçu, Nilópolis and Duque de Caxias. In the other census tracts, public schools are either the same or overpass private schools. In general, in distant neighborhoods or in rural areas, public school students predominate. They are poor, far away areas, where private schools, due to the lack of clientele, have no interest in competing with the public school system units.

On comparing the map of school levels to that of the importance of public schools ***versus*** private school, the huge similarity between them becomes evident (Figs. 29 and 30). These maps reveal that the larger the private sector is in the area, the better the educational level of the population is. This fact makes us question if the generalized deficiency of public education would be responsible for Brazilian difficulty to produce the kind of professionals that the country needs. In this case, this deficiency will affect mainly the poorer, whereas the most privileged will systematically resort to private schools in order to make sure their children have good quality education.

Chapter 7

Employment

The questions related to employment and unemployment are generally treated according to the economic point of view. In this chapter, however, this issue will be considered more from a sociological than an economic point of view. Its objective is not to describe the location of jobs in Rio de Janeiro MA, but to characterize workers in their living places, which complements the demographic and social economic analyses above.

Aiming at that, four indicators were selected. The first two on employment rates and on the qualification levels of the economically active population. The presentation of these two variables allows us to identify the main employment cleavages in the metropolitan social environment.

The other two indicators have to do with aspects related to deviations from the laws that rule over employment issues in the country: the lack of legal guarantees for workers without working papers signed by their employers and child labor, whose practice reveals that the country has not yet overcome this old problem.

7.1 Employment rates

Employment rates are the relation between the number of people from 14 to 70 years of age who work for a living and the total number of people in this age group, in the Census reference week, that is, from July 25 to 31, 2010. According to the Census, workers are people over 10 and with no age limit.

For the present study, we have restricted the age group of the active population from 14 to 70, so that the reference population, that is, the rate denominator, is not overestimated. So, we have excluded from the calculation the groups from 10 to 14, which consist mostly of students, and over 70, which consist mostly of retired people. This way we believe we can better measure the number of people economically active.

In terms of employments, the Southeast Region is in an intermediate position, with 56.8% of working people, from 14 to 70 years of age. The Northeast (46%) and the North (47.7%) Regions present the worst employment rates in the country, whereas the West Central (60.1%) and the South (62.6%) show a better situation.

In the Southeast Region, the classification of the states has Rio de Janeiro (55.6%) in fourth place, falling behind São Paulo (60.4%), Espírito Santo (59.6%) and Minas Gerais (57.2%). This means that the state of Rio does not reach a good position in the Brazilian classification of employment rates. The same is true about the Metropolitan Area of Rio (55.5%), which is not well placed if compared to other metropolitan areas in the country, such as Florianópolis, Porto Alegre, Belo Horizonte and São Paulo. These numbers indicate that Rio MA cannot employ all of its work force.

Before interpreting the map on employment rates, one should once again remember that the information on the economically active population was registered at residents' living places, not at their work place. Consequently, the configurations shown on the map do not refer to the localization of their jobs.

The map on employment rates reveals that there is a gradient that goes along Rio's coastal areas towards the North Zone of the city (Fig. 31). Consequently, by the coast, values are higher. From Barra da Tijuca to Glória, rates vary between 65% and 74%, quite above the MA average. In Tijuca, Méier and surrounding neighborhoods, values slightly decrease, although their rates are around 60%. Rates continue decreasing towards Campo Grande, in the West Zone, where they, however, are close to the MA average.

On the other side of the bay, in Niterói, employment rates are generally inferior to those in the South Zone of Rio, but superior to the average in the MA. This is also the case of São Gonçalo, Mesquita, São João de Meriti and the south part of Duque de Caxias. So, in the most populated areas in the metropolitan periphery, rates are always superior to 50% and, sometimes, even 55%. In the case of farther sections and in rural areas, from Itaguaí to Tanguá, they decrease and can get to very low values, from 40% to 50% approximately.

7.2 Qualification levels

The system of occupational encoding created for the present chapter made possible the identification of the qualification level of each worker, at his only or at his main job, in case several jobs were registered during the Census reference week. The codes used make up a system of 1 to 4 digits, for example: 1= directors and managers; 12= administrative and commercial directors; 122= sales, commercialization and development managers; 1222= advertisement and public relations manager. This system of hierarchic coding takes into consideration the qualification level and the activity sector, simultaneously. Just the first digit was considered for the present statistical approach, which includes 11 different modes and comprehends all qualification levels, such as directors and managers, secondary-school level technicians, qualified workers, elementary occupations etc.

With 21.5% of the active population, the category ***workers in services, trade and market places*** is the most numerous, which confirms the importance of the tertiary sector in Rio MA (Fig. 32). With 15.4%, ***elementary occupations*** *come next. They are activities* that require little specialization, as house work, cleaning, gardening and garbage collect. In third place, ***professionals of the sciences and intellectuals*** correspond to 13.8% of workers, which reveals the traditional importance of education, information and communication.

Each weighting sample area of the Demographic Census can be characterized by the distribution, in percentages, of these 11 categories of the population over 10 years of age that have a job. Once submitted to the ascending hierarchic classification, the table of all the weighting areas was summarized into five classes, and each one of them expresses a determined combination of the initial categories. These combinations can be interpreted as qualification levels: low, low with agricultural activities, medium, high and very high. Their geographic organization, revealed by their mapping, shows to be very well structured, with clusters distributed quite homogenously throughout the MA.

Low qualification levels

Class number 1 is characterized by the massive presence of the working population in the least qualified categories (07, 08 and 09). It represents 42.6% of those in Rio MA who have a job and it is found mainly in the municipalities of the metropolitan periphery of Rio de Janeiro and in the West Zone. This class is also present in many slums, such as Alemão, Maré, Manguinhos, Mangueira and Rocinha. Therefore, it is the class of the working population who live in the poorest areas in the MA.

Class number 2 is the least numerous in all the classification. It comprehends only 4.1% of all workers. Its profile is similar to that of class 1, although, differently from class 1, it has a strong presence of workers in the agricultural sector. In fact, this class occupies places out of urban areas, concentrated mainly in the east and west ends of the MA. As we can see, class 1 refers to urban workers, whereas class 2 refers to rural workers, who, together, make a little-qualified work force ring, with almost half of the workers of all the metropolitan area (46.7%).

Middle-qualification levels

The middle qualification is what defines class 3, for two reasons: first, for its middle profile, which does not differ much from the MA profile, as a whole; second, for the few categories found in it, which are the ***middle-level technicians***, the ***workers in administrative support*** *and the category* ***soldiers, policemen and firemen*** (03, 04 e 10). Most neighborhoods in the North Zone, as well as on Ilha do Governador, in the municipality of Rio, belong to this category. Besides these areas, the west part of São Gonçalo, the south part of Nova Iguaçu and of Duque de Caxias are also part of this class.

High-qualification levels

In classes 4 and 5, the qualification level increases, since they are characterized by the strong presence of ***directors and managers***, ***professionals of the sciences and intellectuals, and technicians and middle-level professionals*** (01, 02, 03). In terms of the number of workers, they show to have about the same weight (9.9% and 8.9%). The difference between them is the degree of their qualification, higher in class 5 than in class 4, and a denser geographic centralization of class 5.

Class 5 shows very high qualification levels in most parts of Barra da Tijuca and of the South Zone of Rio. To these areas, we can add the triangle formed by Praça da Bandeira, Maracanã and Tijuca; Jardim Guanabara, on Ilha do Governador, and, in Niterói, the neighborhoods from Boa Viagem to Icaraí.

Class 4 presents a rather disperse pattern, since it is found in different parts of the city of Rio, such as Recreio dos Bandeirantes, Jacarepaguá, Pechincha, São Conrado, Catete, Glória, Vila Isabel and Andaraí. Furthermore, it comprehends neighborhood like Méier and Vila da Penha, which are situated close to areas with the predominance of class 3. In Niterói, but not in Rio, it presents strong concentration, characterizing most part of the municipality.

Of all the maps in the present publication, the one on workers' qualification is one of the best structured, with well defined delimitations, which allow us to realize the degree of social-spatial segregation in Rio de Janeiro MA.

Finally, it is worth mentioning that the first two maps in this chapter are somewhat similar to those on income and educational levels. The characteristic differences found within Rio's population interfere in one another, resulting in these spatial demarcated configurations. Public policies that could promote better job opportunities would certainly increase the living quality of the people in the MA. Consequently, it becomes necessary to develop workforce qualification, so that people have access to better qualified jobs and benefit from social mobility.

7.3 Informal employment

Both informal work and child labor are two issues related to the breaking of Brazilian laws and, therefore, can be masked. As far as the informal sector is concerned, it is likely that the information given by interviewees at the time of the Census are quite close to reality, since great part of them is subject to employers who refuse to sign their working papers.

Information on child labor is likely to be omitted, since parents often go along this practice as it allows their families to increase their extremely scarce earnings. Anyway, these data must be carefully analyzed, and only the most visible and repetitive patterns on the maps should be considered, not the local characteristics, which can be the result of misinformation.

CTPS - Carteira de Trabalho e Previdência Social (Work and Social Security Card) is a compulsory document, whose objective is to have a person's professional life legally registered. CTPS guarantees workers a number of rights (pay day, overtime, vacations etc.) and gives them the access to several public health services and unemployment insurance.

On one hand, CTPS guarantees rights; on the other, it imposes duties on both workers and employers, such as the payment of contributions to fund Brazilian Social Security Plan. In fact, article 29 of CLT - Consolidação das Leis do Trabalho (Consolidation of Brazilian Labor Laws) demands that employers sign their employee's CTPS in 48 hours after hiring him. Workers whose employers refuse to sign the card have the right to appeal to Delegacia Regional do Trabalho (Regional Labor Agency).

Despite these old devices to protect workers, ***informal*** activities, here defined as working without cards signed by employers, remain endemic in Brazil and is the reality of 30.8% of workers, according to the 2010 Census. In the Northeast and North Regions, this proportion reaches 46.6% and 45.8%, respectively. These proportions drop down in the Southeast (24.3%) and the South Regions (22.7%), where, in spite of that, a fourth of the total workforce do not have their cards signed by their bosses.

In general, metropolitan areas, even those that have the lowest social indicators, present a better panorama than that of the states where they belong. This is the case of Maranhão, with 58.6% of informal workers, whereas São Luís MA registers only 36.3%.

Despite smaller percentage differences, a similar situation takes place in Rio de Janeiro, with 25.1% of informal workers in the state and 23.7% in its MA (Tab. 7.1). This informal work percentage situates Rio MA in 17th place among all the metropolitan areas developed around Brazilian capitals, with 885 thousand workers without signed cards, in a context where 2,850 thousand have guaranteed this rights. On comparing these figures with the 19.6% of informal workers registered in Belo Horizonte and 20.5% in São Paulo, Rio MA still has a lot to improve.

In terms of relative importance, informal work reaches very high percentages, over 38%, in the rural areas of Paracambi, Japeri, Guapirimim, Itaboraí and Maricá, which seems to be in accordance with the general perception that rural workers benefit less from labor laws than city employees (Fig. 33). It is true that, in this case, the number of workers involved is smaller, since rural areas are less dense in demographic terms.

On the contrary, in the most urbanized part of the municipality of Rio, from the South Zone to the North Zone, percentages of informal work are lower, frequently below 22%. This is also the case of Niterói, but in a more localized way, since it takes place mainly in the central part of the city.

Between the most urbanized part of the city of Rio and its rural periphery, a vast area, which comprehends the west of the capital, the east of Niterói, São Gonçalo, and the most urbanized areas on Baixada Fluminense, presents high percentages of informal labor. In Nova Iguaçu and Belford Roxo, for instance, the proportion of workers without their cards signed is almost 30%, which represents a workforce of 112 thousand individuals. In Duque de Caxias and São João de Meriti, the situation is a little less serious, but these municipalities present one fourth of their workers in the informal sector, that is, 106 thousand people.

In relation to informal labor, we can also see there is an east-west opposition, in the municipality of Rio de Janeiro, whereas the south-north opposition seems less relevant than its other aspects already analyzed. Although the municipality presents better results (20.7%) than its MA (23.7%), this percentage corresponds to relevant numbers, since Rio alone has 424 thousand informal workers, almost half of the total number in the MA.

7.4 Child labor

PNAD - Pesquisa Nacional por Amostra de Domicílios (National Household Sample Survey), carried out by IBGE in 2001, indicates that the number of children from 5 to 17 years of age who state that they are ***busy,*** in the sense that they are ***working to make money,*** reached 5.4 million, out of 43 million of people in this age group, which corresponds to 12.6%.

The 2010 Census results for the 10 to 15 age group, however, are more reduced and correspond to quite different numbers: only 824 thousand people, that is, 4% of this age group. The number of children from 7 to 10 was not considered, because of its very little participation, in comparison with that of the 10 to 15 group. We can raise two hypotheses to explain these reductions. First, it is likely that these low numbers are, at least partially, the result of a federal government action, PETI - Programa de Erradicação do Trabalho Infantil (Program for the Eradication of Child labor), whose objective is to have all forms of this type of labor eliminated by 2020. Second, it is likely that this smaller participation is also due to the concealment of this practice by the parents, which reveals certain frailty of this data.

According only to the data provided by the 2010 Census, the State of Rio de Janeiro has the best position in Brazil, with 2.2% of children from 10 to 15 years of age working, which represents almost half of the national average. Still, Rio MA is in a better position, with only 2%, although child labor is present all over the metropolitan region (Fig. 34).

In the municipality of Rio, child labor represents only 1.8%, but, in some neighborhoods, this problem is bigger than in others, since they vary from 75 to 200 children, which can be associated to the presence of slums. The map on child labor reveals that it rarely occurs in Copacabana or Ipanema, neighborhoods with few slums, just Cantagalo and Pavão-Pavãozinho. On Baixada Fluminense, we can see a higher number of children and rates in Nova Iguaçu (2.4%), Belford Roxo (2.2%), São João de Meriti (2.3%) and Duque de Caxias (2.2%). In rural areas, numbers are relatively low, but the proportion is frequently higher.

Table 7.1
Informal employment and child labor in Rio de Janeiro Metropolitan Area

Municipalities	Unsigned Work and Social Security Cards	% unsigned work cards	10-15 year olders who work	10-15 year who work per 1000
Belford Roxo	42 214	29,20	1 207	21,961
Duque de Caxias	69 630	26,00	2 115	21,821
Guapimirim	6 881	43,38	151	25,939
Itaboraí	21 716	31,83	678	28,168
Itaguaí	8 951	27,90	394	31,772
Japeri	8 870	35,07	206	17,611
Magé	20 978	34,22	582	22,078
Maricá	13 336	37,73	240	19,634
Mesquita	13 930	28,05	271	14,902
Nilópolis	11 335	24,49	335	21,925
Niterói	33 184	21,93	741	19,456
Nova Iguaçu	69 295	29,68	2 133	23,500
Paracambi	4 950	36,93	53	11,342
Queimados	11 395	28,21	255	15,533
Rio de Janeiro	423 888	20,68	9 800	17,491
São Gonçalo	77 802	23,37	1 999	20,316
São João de Meriti	36 560	25,04	1 138	23,131
Seropédica	7 927	35,47	183	20,605
Tanguá	2 926	31,69	128	38,167
Metropolitan Area	885 769	23,65	22 609	19,700

Source: IBGE 2010 Demographic Census

Chapter 8

Religions

This chapter can be seen as the updating of the part related to the Metropolitan Area of Rio de Janeiro in the book ***Religião e sociedade em capitais*** *brasileiras (Religion and society in Brazilian capitals)*[1], published in 2006. Whereas this work analyzed the religious phenomenon in 19 capitals, based on IBGE's 2000 Demographic Census, we will now study only Rio MA, based on the most recent data available, those of the 2010 Census.

It is important to remember that, along the period 1980–2010, Brazil underwent deep changes, and that religious affiliation was not an exception to that trend. So, while the population increased, for 30 years straight, in more than 70 million people, the ***biggest Catholic country in the world*** saw the number of members of the Catholic Church lose some of its importance, going from 89% of the population to only 65% (Tab. 8.1). At the same time, Pentecostal churches increased, at least 10 percentage points, going from 3.2% to 13.3%, whereas the group of those with ***no religion*** had its proportion five times folded (1.6% to 8%).

Table 8.1
Relative Evolution of main religious groups in Brazil, in the State of Rio de Janeiro and in its Metropolitan Area

Year	Population	% Catholics	% Missionary Evangelists	% Pentecostal Evangelists	% Not-determined Evangelists	% Other	% No religion
Brasil							
1980	119 009 778	89,0	3,4	3,2	x	2,8	1,6
1991	146 815 795	83,3	3,0	5,6	0,4	3,0	4,7
2000	169 872 856	73,6	4,1	10,4	0,3	4,3	7,4
2010	190 755 799	65,0	4,0	13,3	4,8	4,8	8,0
Estado RJ							
1980	11 063 693	80,6	4,9	3,3	x	6,3	4,9
1991	12 807 194	67,3	4,6	7,5	0,6	6,4	13,7
2000	14 392 106	56,2	7,2	13,4	x	7,4	15,8
2010	15 989 929	46,3	5,6	15,8	8,0	8,8	15,6
RM Rio							
1980	8 758 436	79,8	4,8	3,2	x	7,0	5,2
1991	9 796 649	65,4	4,3	7,8	0,6	7,0	14,9
2000	10 869 255	54,7	6,7	13,9	x	8,0	16,7
2010	11 835 708	45,2	4,8	15,7	8,1	9,8	16,5

Source: IBGE 1980, 1991, 2000 and 2010 Demographic Censuses

These big transformations that took place in the country and in the state of Rio de Janeiro will be examined in this chapter only as far as the metropolitan area of the state is concerned. Accordingly, each of the main religious groups will be the object of a specific analysis and, at the end, a synthesis map will present the distribution of the most important religious beliefs in Rio MA.

8.1 Catholics

Although they are basically members of the Roman Catholic Church, the members of the Brazilian Catholic Church and the Orthodox Catholic Church are also part of this group, which are, however, a minority as compared to the former. From 1980 to 2010, while the population of Rio MA increased in more than 3 million people, the number of Catholics had a loss of 1.6 million members (Tab. 8.2).

Table 8.2
Evolution of the number of Catholics and their percentages in Rio de Janeiro Metropolitan Area municipalities

Municipalities	Catholics 1980	% Catholics 1980	Catholics 1991	% Catholics 1991	Catholics 2000	% Catholics 2000	Catholics 2010	% Catholics 2010
Belford Roxo	x	x	x	x	167 994	38,7	154 091	32,8
Duque de Caxias	458 927	79,7	412 634	61,8	358 970	46,3	304 076	35,6
Guapimirim	x	x	x	x	17 724	46,7	18 469	35,9
Itaboraí	78 947	68,9	92 042	56,6	82 420	44,0	73 346	33,6
Itaguaí	64 782	71,9	62 408	55,2	35 971	43,9	35 975	33,0
Japeri	x	x	x	x	30 827	37,0	25 868	27,1
Magé	124 895	75,0	113 811	59,4	102 166	49,6	90 598	39,9
Maricá	27 835	85,3	31 854	68,4	42 664	55,6	60 645	47,6
Mesquita	x	x	x	x	x	x	58 281	34,6
Nilópolis	119 706	79,0	105 845	67,0	79 027	51,4	61 943	39,3
Niterói	317 641	80,0	304 073	69,7	285 948	62,2	261 688	53,7
Nova Iguaçu	838 992	76,6	724 492	55,8	402 930	43,8	266 708	33,5
Paracambi	24 464	80,7	21 570	59,2	17 583	43,4	16 023	34,0
Queimados	x	x	x	x	46 879	38,4	36 840	26,7
Rio de Janeiro	4 141 059	81,3	3 827 464	69,8	3 581 248	61,1	3 260 686	51,6
São Gonçalo	483 175	78,5	454 612	58,3	446 018	50,1	422 806	42,3
São João de Meriti	312 871	78,4	261 006	61,3	208 498	46,4	169 479	36,9
Seropédica	x	x	x	x	26 155	40,1	21 615	27,6
Tanguá	x	x	x	x	10 331	39,6	9 482	30,9
Metropolitan Area	6 993 294	79,8	6 411 812	65,4	5 943 353	54,7	5 348 619	45,2

Source: IBGE 1980, 1991, 2000 and 2010 Demographic Censuses
x = inexistent municipality in Census years

This decrease, which has been taking place since 1980, is systematic, since, in that year, 79.8% of the MA population stated they were catholic and, in 2010, only 45.2% of people avowed the same belief. When comparing the local situation to that of Brazil, we understand that the reduction of the number of Catholics in the state of Rio and its MA started earlier, in the 1970's, and took place drastically.

In 2010, although Catholics are still the largest religious group in the country, in Rio MA they are no longer the majority group. Only in the municipalities of the capital (51.6%) and of Niterói (53.7%), they correspond to a little over 50% of the population. The map on Catholics shows that, even in the municipality of Rio, they do not predominate in the neighborhoods in the northwest part, from Vila Militar to Santa Cruz (Fig. 35). In fact, as we move towards west, we can see the percentage of Catholics decrease, reaching just 40% of the population.

On the contrary, it is in the region by the sea that Catholicism resists more to this process of religious changes, which can be seen in Recreio dos Bandeirantes, Barra da Tijuca, São Conrado, Leblon and Ipanema. In this area, Catholics generally represent from 60% to 70% of the population. In a less concentrated way, the Center and the North Zone neighborhoods, like Tijuca, are situated on this same level. The percentage of Catholics diminishes, but it is still the majority, with proportions that go from 55% to 60%, in a large area, which comprehends a great number of neighborhoods, from Copacabana to Jardim América, near the north boundaries of the municipality.

Nevertheless, in the areas with a great number of slums in the north half of the municipality of Rio, the proportion of Catholics is seldom superior to 40%, as in Complexo do Alemão (42.3%) and Jacarezinho (42.2%). In the South Zone slums, as Rocinha, there is a higher percentage of Catholics, who represent 60.5% of the population.

It is, however, the municipalities in the metropolitan periphery, from Itaguaí to Tanguá, which present the lowest proportions of Catholics. Whereas Nilópolis, São João de Meriti and Duque de Caxias show values between 35% and 40%, Belford Roxo registers just 32.8% of this religious group, that is, less than one third of its population.

So, although the reduction of the number of members of the Catholic Church takes place in all of the MA, it is in the wealthiest neighborhoods in Rio, from Barra da Tijuca to the South Zone, with the best dwelling conditions, the highest income and educational levels, that the population has showed to be less inclined to change from one Church to another and more faithful to their old Catholic tradition. This same pattern can be found in Niterói, from Boa Viagem to Icaraí.

8.2 Missionary Evangelists

This religious group represents traditional protestant churches, which came from Europe and the United States and settled in Brazil. They are groups of Lutherans, Presbyterians, Methodists, Baptists, Congregationalists, Adventists, Anglicans, Mennonites and others. Their importance in the country never reached 5% of the population and, in the state of Rio de Janeiro, they were a little more expressive: 7.2% in 2000 and 5.6% in 2010. This same tendency is also observed in its MA, where numbers are even a little lower: 6.7% in 2000 and 4.8% in 2010. Throughout the period 1980-2010, following the population growth in the MA, the number of Evangelists missionaries increased in about 154 thousand members, going from 416 thousand to 570 thousand.

Among missionary evangelist churches, the most important of them is the Baptist Church, with about 380 thousand followers in Rio MA, which corresponds to two thirds of this religious group (Tab. 8.3). Methodists come next, with just 11.8%, followed by the Presbyterians (7.8%) and by Adventists (7.4%).

Table 8.3
Distribution of Missionary Evangelists per church
Rio de Janeiro Metropolitan Area

Churches	Population	% Population
Igreja Evangélica Luterana	11 506	2,0
Igreja Evangélica Presbiteriana	44 399	7,8
Igreja Evangélica Metodista	67 415	11,8
Igreja Evangélica Batista	379 485	66,6
Igreja Evangélica Congregacional	24 742	4,3
Igreja Evangélica Adventista	42 138	7,4
Outras	422	0,1
Total	570 107	100

Source: IBGE 2010 Demographic Census

Baptists can be found, although they are few, in the majority of northern and western neighborhoods in the municipality of Rio, such as Coelho Neto (7.3%) and Senador Vasconcelos (8.3%), but are practically none in Barra da Tijuca and in the South Zone (Fig. 36). It is in the metropolitan periphery, however, that their main niches are located, mainly in Nova Iguaçu, Belford Roxo, São João de Meriti and São Gonçalo, that is, in areas of the city where the presence of Catholics is reduced.

8.3 Pentecostal Evangelists

The growth of Pentecostalism is surely one of the most important factors of the religious transformations that have been taking place in the country for the past 30 years and that have led to the reduction of the percentages of Catholics. In the period from 1980 to 2000, the number of Pentecostals doubled at each Census, but this spectacular growth seems to have slowed down between 2000 and 2010. Despite that, we should not hastily come to the conclusion that the increase of 7.8 million of members in this period of time may express the loss of Pentecostal energy.

Whereas the most important Pentecostal churches grew at a slower pace in the last period between censuses, the same cannot be said about the category ***non-specified Evangelists***, which presented expressive increase in the country, going from 581 thousand followers in 2000 to 9 million in 2010. In the state of Rio de Janeiro, as well as in its MA, they have a more important place: 8% of the population, in comparison with 4.8% in all Brazil.

The imprecision of the category ***non-specified Evangelists*** makes it somewhat difficult to analyze the growth of Pentecostalism, but it is important to mention the evidence of their increase in Rio MA. In 10 years, the amount of people going to the known Pentecostal churches increased 1.9 percentage points, going from 13.9% in 2000 to 15.7% in 2010, which represented an increase of 340 thousand followers, since they were 1.515 million in 2000 and 1,854 million in 2010.

Besides the main Pentecostal groups, there is a great number of small churches under the Census category ***others,*** which in 2010 came to represent 23.2% of the total number of Evangelists in Rio MA (Tab. 8.4). With such fragmentation, the analysis of the Pentecostal phenomenon cannot be reduced to the best known churches, but, for the present work, we have limited them to the two most important ones in terms of numbers of followers.

The Assembly of God, with one million members in Rio MA, is the largest of all Pentecostal churches, congregating 55.6% of this religious group. In the capital's municipality, there live 430 thousand followers, who represent 42% of Assembly's members. The map on their distribution reveals that they are rarely present in Barra da Tijuca or in the South Zone, but quite numerous in the north of the municipality (Fig. 37). They become more expressive, however, in the West Zone, in Campo Grande and mainly in Santa Cruz, where they often represent more than 10% of the population. The same pattern is repeated in Niterói, where just 20 thousand of followers are found, whereas, in São Gonçalo, Assembly's congregation grows, reaching 80 thousand of people.

Table 8.4
Distribution of Pentecostal Evangelists per church
Rio de Janeiro Metropolitan Area

Churches	Population	% Population
Assembleia de Deus	1 029 849	55,6
Universal do Reino de Deus	212 885	11,5
Nova Vida	60 059	3,2
Evangelho Quadrangular	27 995	1,5
Deus é Amor	26 460	1,4
Maranata	25 607	1,4
Congregação Cristã do Brasil	20 088	1,1
Comunidade Evangélica	21 708	1,2
Outras	429 236	23,2
Total	1 853 887	100

Source: IBGE 2010 Demographic Census

Table 8.5
Distribution *of other religions congregations*
Rio de Janeiro Metropolitan Area

Religion	Population	% Population
Espírita	529 468	4,47
Umbanda e Candomblé	128 345	1,08
Testemunhas de Jeová	87 342	0,74
Budismo	24 013	0,20
Judaísmo	23 268	0,20
Novas religiões orientais	21 746	0,18
Espiritualista	9 978	0,08
Igreja de Jesus Cristo dos Santos dos Últimos Dias	6 051	0,05
Outras religiosidades	1 703	0,01
Hinduísmo	926	0,01

Source: IBGE 2010 Demographic Census

In fact, it is in the metropolitan periphery that the Assembly of God is more present: 113 thousand members in Duque de Caxias, 102 thousand in Nova Iguaçu, 57 thousand in Belford Roxo and 49 thousand in Magé, reaching about 15% of the total population, and from 18% to 19% in the farther municipalities, as Seropédica, Japeri and Magé.

The Assembly of God is well rooted in the metropolitan periphery, but little expressive in Rio slums, which seems to be the areas where IURD - Igreja Universal do Reino de Deus (Universal Church of the Kingdom of God) has a stronger presence. With 11.5% of Pentecostals in the MA, IURD is the second church as far as the number of followers is concerned, but with much fewer members than the Assembly of God. Despite their reduced percentages, it is spread throughout the city, where it represents, in general, from 1% to 3% of the total population. The map on their distribution shows that its main redoubts are in the slums, not only in the North Zone, as Complexo do Alemão, Maré, Manguinhos and Jacarezinho, but also in the South Zone, as Rocinha (Fig. 38).

The other Pentecostal churches represent, as a whole, less than 10% of the population, which reveals that Rio MA is not the preferred area for its actions.

8.4 The other religions

The participation of other religions among Rio MA population increased between 1980 and 2010, going from 7.0% to 9.8%. Considering the population growth during this period, 2.8 percentage points represent the increase of 543 thousand followers. This group comprehends very different religions in terms of their beliefs, since it encompasses groups of Spiritualists, Jews, Muslims, afro-Brazilian and oriental religions etc. (Tab. 8.5).

Among the 9.8% that ***other religions*** represent, Spiritualism stands out. It is followed by 4.47% of Rio MA population, that is, by 530 thousand people.

Almost all Brazilian Spiritualists (99.9%) follow the doctrines developed by the French Allan Kardec in the1850's. Originated in Europe, this spiritual philosophy was soon all over Latin America.

In Brazil, spiritualism is a basically urban phenomenon, but, in spite of that, it is not found with the same intensity in all the big cities in the country. The metropolises in the South and Southeast Regions are those with the highest number of members, with Florianópolis in first place, Baixada Santista in second, and Rio de Janeiro in third place (Tab. 8.6).

In the metropolitan area, Spiritualists are located mainly in the municipality of Rio and, less expressively, in Niterói (Fig. 39). They are mainly found in the neighborhoods of Maracanã, Tijuca, Grajaú and Méier, besides Pechincha and Freguesia de Jacarepaguá, where they generally represent between 11% and 15% of the total population. Along the coast, from Barra da Tijuca to Glória, they correspond to 7% to 12%, except in Ipanema and Leblon, where percentages are lower, around 5%. Spiritualists are also present in Vila da Penha (10.5%), as well as on Ilha do Governador, where Jardim Guanabara has 8.7%. However, the presence of Spiritualists is very little in the city's slums.

8.5 People of no religion

According to the Census, the number of people ***of no religion*** is the result of the adding of three subcategories: atheists (615 thousand), agnostics (124 thousand) and ***people of no religion*** (14.6 million). The disparity between the last number and the two first ones means that, in Brazil, stating that one is a person of ***no religion*** is not, necessarily, a statement of belief. This fact allows us to interpret the increase of ***people of no religion*** as the result of religious disaffiliation, rather than the product of protest against old or new religions.

Table 8.6
Distribution os Spiritualists in Brazilian metropolitan areas with over 1 million people and with less than 1% of followers

Metropolitan Areas	Total	Spiritualists	% Spiritualists
Florianópolis	1 012 233	49 447	4,9
Baixada Santista	1 664 136	77 566	4,7
Rio de Janeiro	11 835 708	529 469	4,5
Porto Alegre	3 958 985	169 704	4,3
São Paulo	19 683 975	756 819	3,8
Goiânia	2 173 141	73 153	3,4
Recife	3 690 547	101 946	2,8
Salvador	3 573 973	97 943	2,7
Belo Horizonte	5 414 701	142 986	2,6
Campinas	2 797 137	73 205	2,6
Curitiba	3 174 201	60 180	1,9
Natal	1 351 004	20 393	1,5
Grande Vitória	1 687 704	24 014	1,4
Belém	2 101 883	25 851	1,2
João Pessoa	1 198 576	14 515	1,2
Maceió	1 156 364	13 804	1,2
Fortaleza	3 615 767	36 202	1,0
Brasil	190 755 799	3 848 876	2,0

Source: IBGE 2010 Demographic Census

In Rio MA, the participation of those ***of no religion*** in the total population constantly increased between 1980 and 2000: 5.2% in 1980, 14.9% in 1991 and 16.7% in 2000. In 2010, the percentage of this group presents a slight decrease (16.5%), although it had, in absolute terms, an increase of 130 thousand people between 2000 and 2010, because of the demographic growth that took place in this period.

The map on people ***of no religion*** is, to a certain extent, similar to that of the Assembly of God, since these groups are present in the northern and western parts of the municipality of Rio and in the periphery, mainly, on Baixada Fluminense and in São Gonçalo (Fig. 40). In many neighborhoods of Nova Iguaçu and Belford Roxo, about one fourth of the population stated they did not go to church, whereas in Japeri this proportion reaches 30%. The slums in the North Zone also have a significant presence of people ***of no religion***. But his phenomenon is also found in the South Zone of Rio, in neighborhoods where Catholics prevail, as Gávea, Humaitá, Botafogo, Laranjeiras and Santa Teresa, where they represent from 16% to 19% of the population.

The fact that people ***of no religion*** and followers of Pentecostal churches are found in the same sites of the metropolitan area does not seem to take place by chance. Pentecostal spiritual proposition meets the needs of those who have drifted away from traditional religions and mainly of those who are in search of new religious references. So, belonging to a Pentecostal group allows people ***of no religion*** to develop new social relations, which is probably one of the factors that have led to the growing preference of Pentecostalism in urban periphery.

8.6 Religious synthesis

In order to get to a synthetic view of the geography of religion in Rio MA, an ascending hierarchic classification was created, with the percentages of the main confessional groups (Catholics, missionary Evangelists, Pentecostal Evangelists, other Evangelists, Spiritualists, other religions and people ***of no religion***) in the total population of each sample weight area. This classification led to the identification of five classes, characterized by the importance of the different religions in each one of them (Fig. 41).

Class 1 is the most important one in demographic terms, because it comprehends 29.5% of the MA population. It is characterized by presenting proportions of Catholics and Spiritualists that are much above the average and less significant proportions of the category ***other religions***. People ***of no religion*** and all kinds of Evangelists are quite below the MA average. This class clearly characterizes the wealthy seaside neighborhoods, from Barra da Tijuca to Glória, as well as Lagoa, Laranjeiras and Cosme Velho. Praça da Bandeira, Maracanã, Tijuca, Grajaú, Méier, Pechincha and Freguesia de Jacarepaguá also belong to this class, as well as, on the other side of the bay, in Niterói neighborhoods, as Boa Viagem, Ingá and Icaraí, there is the predominance of Catholics and Spiritualists.

Class 2 is also characterized by the relevance of Catholicism and Spiritualism, since it presents the same types of deviation of class 1 in relation to the MA average, although in a less pronounced way. It comprehends 11.9% of the MA population and occupies a large area that goes from the city Center to the northern boundaries of the municipality of Rio, as well as Recreio dos Bandeirantes, great Jacarepaguá and some of the neighborhoods of Ilha do Governador. Still, the major part of Niterói, the west side of São Gonçalo and the land along the sea in Maricá belong to this class.

Characterized by a larger presence of Evangelists, Pentecostals and people ***of no religion***, class 3 is the one that occupies the largest part of the MA, since it goes from Itaguaí to Tanguá, as well as the West Zone of Rio. This combination of Evangelists with people ***of no religion,*** which characterizes almost all the peripheral region and which refers to 23.1% of the population in the MA, seems to identify spaces of religious disaffiliation-reaffiliation.

Class 5, also marked by the importance of Evangelists, but without the presence of those ***of no religion***, shows less stressed out deviations, which makes it the closest to the average profile in the MA. Encompassing 23% of the population in the metropolitan area, like class 3, class 5 characterizes some neighborhoods in Rio North Zone, as Vigário Geral, Anchieta and Realengo, as well as neighborhoods of Campo Grande and Guaratiba, in the West Zone.

It is also present in many slums, as in Complexo da Maré and Complexo do Alemão, in the North Zone, but not in the South Zone slums. Class 5 also characterizes a good part of Niterói, São Gonçalo and Maricá.

Class 4, which refers to 12.5% of the population in the MA, is essentially characterized by the groups ***other evangelists*** and ***other religions***. It is found mainly in the east part of São Gonçalo, part of Nilópolis and of São João de Meriti, as well as in some neighborhoods in Rio, as Bangu and Gericinó.

We can infer that, in Rio MA, there is a clear south-north contrast, based on the opposition Catholics / Pentecostals (classes 1 and 3). Between these two extremes, three classes occupy intermediate positions: class 2, which presents the predominance of Catholics and classes 4 and 5, which are characterized by the stronger presence of Evangelists.

Note

1. Cesar R. Jacob, Dora R. Hees, Philippe Waniez and Violette Brustlein. ***Religião e sociedade em capitais brasileiras***. Rio de Janeiro: Ed. PUC-Rio; São Paulo: Loyola; Brasília: CNBB, 2006. 250 p.

Chapter 9

Health situation

Census data do not allow the study of Brazilian population health, but the last Census included a question related to mortality, which makes possible for us to think about the social and geographic differences involved in this issue. Despite this advance, a specific study of health can only be carried out by the use of other information sources, such as the database of SUS - Sistema Único de Saúde (Unified Health System), produced by its DATASUS - Departamento de Informática (Computer Department).

The production of data by DATASUS aims at the evaluation of the sanitary situation in the country and the results of public health improving policies. The survey of the health status of the population started with the systematic recording of mortality rates. Next, the production of morbidity data helped the efforts to control infectious diseases. From then on, the search for factors that determine health situations required that SUS considered other public health dimensions, such as water supply and sewage system, garbage collect and the social and economic characteristics of the population.

Whatever the quality of the source, the available data on public health are difficult to deal with in an interurban research. Although there is a great amount of data on health in the municipal level, the range of possibilities is considerably reduced when one tries to investigate this topic in a more detailed level than that of the municipalities. This chapter is different from the other chapters in this book, due to its sources and the type of data it analyzes.

9.1 Mortality rates

A good way to evaluate a population's health is to study its mortality. It may seem paradoxical to study health by investigating death causes, but the production of statistics on the topic is an old practice in many countries and the related literature is quite abundant.

Gross mortality rates

The most common mortality indicator is the gross mortality rate, which consists in the relation between the number of deaths in a certain year and the average population that same year, in a certain area. This definition, which seems simple, becomes complicated when one calculates the rate. First, the denominator of the rate, the yearly average population, poses a problem, because in countries where there are no complete or systematic records of the resident population, the only known population is that from the Census reference date. Demographers make population estimates, based on hypotheses that try to be close to real facts, but the results are hypothetic. So, over and over, it is necessary to consider the number of people provided by the survey as the only one we can use.

Another difficulty lies in the statistics on deaths. In countries where Civil Registry works correctly, these data are quite reliable. In counterpart, when it is deficient, either as a whole or in parts of its territory, the number of deaths communicated by official records and the calculation of rates should be questioned. Besides, the reference year of the number of communicated deaths is not entirely reliable either. They are deaths that were registered that year, but which may have taken place the year before. Or is it that this number really refers to deaths that year, which in this case is a really exhaustive number for the territory in question?

In Brazil, the Civil Registry produces statistics on births, marriages, divorces and deaths. The data is published by IBGE on the internet. The most detailed geographic level is that of the municipality, which shows that it is inadequate for the study of this phenomenon on the interurban sphere. In the 2010 Census, IBGE included a question on deaths in order to obtain mortality patterns by age and sex in the country: ***From August 2009 to July 2010, did anyone who lived with you die?*** This item provides us with a second source of information on deaths, with statistics that can be calculated on the level below the municipal level, that of the sample weighting areas.

In 2010, according to the Civil Registry, Rio MA recorded 94,941 deaths, presenting a gross mortality rate of 8.02 deaths for each thousand people, having the 2010 Census population as reference. However, the Census revealed that there were 76,156 deaths from August 2009 to July 2010, which means a gross rate of 6.43 for each thousand people. Consequently, the Census registered less than 18,785 deaths than the Civil Registry. This difference can be explained in several ways. For example, the deaths of those who lived alone could not be recorded by IBGE researchers. Besides, the emigration from Rio MA of families that had a dead member in the year previous to the Census was not recorded. These reasons, however, are not enough to justify such big difference between these two sources. So, we can come to the conclusion that the gross mortality rate in the MA is from 6.5 to 8 per one thousand people.

Gross mortality rates, calculated from the Census sample weight areas, vary from 0.6 to 18 per a thousand people in the MA (Fig. 42). In the South

Zone, Copacabana calls attention to its relatively high rates, about 10 per a thousand, the opposite that takes place in nearby neighborhoods, such as Barra da Tijuca or Laranjeiras, whose mortality is lower than the MA average (6.5 per thousand). Besides Copacabana, other neighborhoods in the city are characterized by high mortality rates, such as Rio Comprido, Maracanã, Tijuca, Grajaú, Méier, Piedade, Oswaldo Cruz and Penha, in the North Zone of the municipality.

Interestingly, the rates in the slums in this part of the city are close to the average: Jacarezinho (5.3 per a thousand) and Complexo do Alemão and Complexo da Maré (6 to 7 per a thousand). In the area from Realengo to Bangu, mortality is always superior to 9 per a thousand, sometimes reaching 12 per a thousand. Finally, in the west part of the municipality, from Campo Grande to Santa Cruz, rates alternate between over 10 and below 5 per a thousand deaths.

Once again, Niterói shows a similar situation to that in the South Zone of the capital, with rates frequently close to those in Copacabana. In the more urbanized municipalities on Baixada Fluminense, mortality is almost always superior to the MA average, although Nilópolis is in a better position than Duque de Caxias. In the distant periphery we can see many different situations, as low mortality rates in Japeri and high rates in Itaboraí and Maricá.

In general, we can see that in Rio MA high mortality rates frequently occur in areas characterized by older populations. Nevertheless, the fact that some neighborhoods have a younger population does not mean that their mortality rates are low. So, it is necessary to thoroughly evaluate the influence of age in the calculation of mortality rates.

Comparative mortality rates

Gross mortality rates are so called because they do not take into consideration any specific factors that imply risks of death. These gross rates are significant only when populations can be compared as far as these risks are concerned. We know that the age structure of Rio MA people is not identical, varying, for example, between dwellers of the South Zone and those of Baixada Fluminense, whilst the South Zone population is in general older than that on Baixada. Considering at first that the risk of death is higher among older than among younger people, mortality differences measured by gross rates can reflect only differences of the age structures. In order to nullify this effect on mortality levels, it is advisable to use comparative mortality rates, instead of gross rates.

The calculation of these rates is also called ***patterned mortality rates***. It requires the choice of a reference population, whose distribution by age is known. There are two standardizing methods: direct and indirect. Taking into account the available data, the direct standardizing method was chosen, because it allows the calculation of the rates that one would expect to find in the studied populations, if all of them had the same age composition. In order to do so, we use the structure of a population considered standardized, in our case the population in Rio MA, stratified by age, to which it is applied specific rates by the age groups of the population being investigated in each sample weight area. By doing so, we can get to the number of expected cases in each group, as if the populations had the same composition. The standard rate is calculated by dividing the total number of expected cases by the reference population.

When the difference between the gross and the comparative rates is positive, it means that the gross rate overestimated mortality, not taking into consideration the age structure. In this case, it is necessary to improve the calculation of the death rate. If, on the contrary, the difference is negative, there is a panorama of precarious living conditions in the area. The map on these differences is particularly eloquent, showing Barra da Tijuca, the South and the North Zones of the municipality of Rio, as well as most part of Niterói, in much better situation than that on the map of gross rates (Fig. 43). In other places, gross rates sub dimension mortality, as in the West Zone of the city and almost all metropolitan periphery.

With the corrections made by the calculation of comparative mortality rates, the new map shows a quite different configuration from that of gross rates (Fig. 44). So, from Leblon to Gloria, from Praça da Bandeira to Grajaú, in Méier and its outskirts, the rates became the lowest in the MA, with the exception of Leme and Rio Comprido. In these high and middle income neighborhoods, mortality seems to be compatible with the living status already observed in these areas.

On the contrary, the slums of Mangueira, Alemão and Maré came to present a more adverse situation, whereas many neighborhoods in the north and west parts of the city remained practically the same, in contrast with the municipalities in the metropolitan periphery, which, after the new calculation, had their mortality rates risen, mainly in Nova Iguaçu, Belford Roxo and Duque de Caxias.

9.2 Hospitalization

If mortality rates show a clear differentiation of risk of death by place of residence in the MA, it is undoubtedly because the population presents different diseases according to where they live, either in Ipanema or in Complexo da Maré, for instance. In order to understand the state of health of populations according to their living place, it is necessary to know the pathologies that affect their inhabitants.

Health data little adequate for urban studies

Although the data published by DATASUS (Unified Health System Computer Department), in most cases, is quite rich, they can only serve the purposes of an analysis of health problems, such as hospitalization or death in municipal level. Unfortunately, this level is not suitable for the present study, which concerns just the 19 municipalities in the MA, one of which, Rio de Janeiro, has more than half of the MA population.

Nevertheless, when one pays closer attention to DATASUS files, one can see that some of them have the ZIP code of patients' dwellings. This is the case of SIH/SUS - Sistema de Informações Hospitalares do Sistema Único de Saúde (SUS Hospital Information System), meant to ensure the payment of SUS hospitalization. In 1986, this procedure was expanded to philanthropic hospitals; in 1987, to university and teaching hospitals; and in 1991, to public hospitals (municipal, state and federal).

In the municipality of Rio de Janeiro, for instance, every month, about 23 thousand authorizations for hospital admission are issued, that is, Autorização de Internação Hospitalar (AIH). The data collect system is limited to admissions by SUS, not including those covered by private health insurance. The estimate is that SIH/SUS has about 60% to 70% of hospital admittances recorded. This is, therefore, an important source of information, although it is not complete.

For each patient, SIH/SUS records a set of information on demographic aspects (sex and age), medical aspects (the main cause of hospitalization according to the International Disease Codes), accounting aspects (elements on hospitalization expenses) and contextual aspects (place of hospitalization and residence).

Geo-localization of hospitalizations

As one of the objectives of the present work is the localization of demographic and social factors in intra-municipal level, we have used the hospitalized person's Zip code in order to locate him in Rio MA. This code consists of 8 digits. The first five of them define region, sub-region, sector, subsector and subsector divisions; the last three digits form a distribution identifier that, depending on the Post Office net details are either used or not (in case it is not used, the value is 0). When the last three digits are different from 0, which happens in the case of cities, they designate a street, a square etc.

By using the internet geo-localization service, it was possible to identify Zip codes and place them on the map, whose geographic coordinates, sent by the service, are expressed in latitude e longitude. This procedure was followed for the 32,295 different Zip codes in the 2010 SIH/SUS for the municipalities in Rio MA (Fig. 45). As a consequence, we were able to locate the 473,269 people who were hospitalized in 2010 and who lived in Rio MA that year. It was also possible to show the Zip codes of over 2,500 Hospitalization Authorizations (AIH) on the map.

For about 20 Zip codes, it was possible to affirm that these locations almost always correspond to a medical facility, such as hospitals, clinics and so on. (Fig. 46). Except for those cases in which there is a reduced number of Zip codes, as it occurs in less urbanized municipalities, we can infer that the high number of hospitalizations is the result of the distortion of data, because the Zip code must be the patient's residence place, not the hospital's, according to the Hospitalization Authorization recording rules. This can only be possible if the patient's Zip code is not known at the time he is hospitalized.

Therefore, SIH/SUS data show to be fragile. The apparent geo-localization precision does not guarantee the veracity of the information. On the other hand, we can tell that, on average, there are just 15 patients per Zip code, which, after their distribution according to sex, age and disease come up to low headcounts, little significant in the statistical point of view. Besides, there is no Census information on inhabitants per postal sector. However, thanks to Zip code geo-localization, it was possible to aggregate hospitalizations to the level of IBGE sample weight areas, which has allowed us, to a certain extent, to consolidate those data with more significant numbers.

9.3 Hospital morbidity

In the Hospitalization Authorization records, we can find the main diagnoses that justify hospitalization, decoded in three digits. This code is OMS International Disease Classification (IDC). Based on this indication, we can try to evaluate different types of morbidity, according to 21 of the 22 IDC chapters, since the last one is not part of the files.

With almost 21% of Hospitalization Authorizations in Rio MA, the main cause of hospitalizations refer to IDC Chapter XV, that is, pregnancy, childbirth e puerperium (Fig. 47). Next, there are three chapters with headcounts, each one of which between 10% and 11% of Hospitalization Authorizations: X (respiratory diseases), V (mental and behavioral disorders) and IX (circulatory system diseases). Between 5% and 10% of the authorizations are in the following chapters: XI (digestive diseases), I (some infectious and parasitic diseases), II (neoplasias), XIX (injuries, poisoning and other diseases due to external causes) and XIV (genitourinary system diseases). These nine chapters concern 85.4% of all hospitalizations in Rio MA in 2010, with the variation of some points around this value, according to the municipalities.

In this part of the present work, we did not try to relate the numbers of patients of each cause of hospitalization in each sample weight area, with the population of these same units, due to the fragility of the available data, which makes the relation of number of cases with the population very uncertain, taking into consideration the concerns related to patients' residence place, already mentioned. Furthermore, even in the municipal level, this relation often shows to be questionable, especially in municipalities with low population density, such as Japeri and Paracambi (Tab. 9.1).

This limitation, however, is not a reason to leave out SIH/SUS data. But it is necessary to reconcile the sophistication of statistical treatments at hand with the quality of the available data. Consequently, we have limited the mapping to the representation of the number of cases in each sample weight area for each IDC chapter, associated to the percentage in the Census set of units. Accordingly, we have presented only the maps with a consistent geographic component.

Table 9.1

Rates of hospital admissions of inhabitants from Rio de Janeiro MA municipalities per cause of hospitalization, with over 5% of Hospital Admission Authorizations (AIH)

Municipalities	Population 2010	Total AIH	Total AIH/ Pop. p. 1000	Cap. I/ Pop. p. 1000	Cap. II/ Pop. p. 1000	Cap. V/ Pop. p. 1000	Cap. IX/ Pop. p. 1000	Cap. X/ Pop. p. 1000	Cap. XI/ Pop. p. 1000	Cap. XIV/ Pop. p. 1000	Cap. XV/ Pop. p. 1000	Cap. XIX/ Pop. p. 1000
Belford Roxo	469 332	23 040	49,1	8,5	3,1	1,8	2,3	8,3	2,7	2,3	12,3	1,3
Duque de Caxias	855 048	27 808	32,5	2,4	1,8	1,8	2,6	3,0	2,5	1,8	10,2	2,1
Guapimirim	51 483	2 372	46,1	3,2	2,3	2,0	5,5	4,3	4,4	2,9	9,2	1,8
Itaboraí	218 008	12 290	56,4	5,5	2,0	5,6	7,4	10,1	3,7	2,1	9,9	2,7
Itaguaí	109 091	3 731	34,2	1,6	1,9	2,2	4,1	2,8	3,4	1,8	10,1	1,7
Japeri	95 492	6 337	66,4	4,8	2,6	4,8	10,3	13,3	4,7	4,2	15,7	1,3
Magé	227 322	10 619	46,7	3,9	2,1	4,5	5,0	6,2	2,5	2,4	11,0	0,7
Maricá	127 461	3 959	31,1	1,8	2,0	4,0	3,0	2,9	1,8	2,9	4,8	2,4
Mesquita	168 376	3 487	20,7	2,8	1,7	1,3	1,0	2,7	1,7	1,1	5,3	1,1
Nilópolis	157 425	4 474	28,4	2,4	3,2	2,2	5,1	2,9	2,4	1,8	4,0	1,3
Niterói	487 562	15 625	32,0	2,2	2,3	10,6	2,6	2,4	2,8	1,7	2,5	1,3
Nova Iguaçu	796 257	32 553	40,9	5,3	2,2	1,0	2,9	5,8	3,0	2,1	11,4	2,5
Paracambi	47 124	5 605	118,9	10,8	6,5	26,8	18,6	10,2	9,8	9,7	10,3	2,1
Queimados	137 962	9 154	66,4	11,2	3,1	2,1	3,3	14,5	4,6	3,4	17,5	1,5
Rio de Janeiro	6 320 446	218 280	34,5	1,7	2,7	4,3	3,2	2,3	3,0	1,9	7,6	2,3
São Gonçalo	999 728	71 559	71,6	5,6	4,6	8,0	12,7	12,4	4,8	3,0	8,4	1,8
São João de Meriti	458 673	17 802	38,8	4,3	2,5	1,8	3,5	5,8	2,5	1,8	8,1	1,5
Seropédica	78 186	2 570	32,9	1,3	1,5	1,9	5,0	4,9	3,2	2,1	9,1	0,7
Tanguá	30 732	2 004	65,2	7,7	1,9	26,6	3,1	4,2	5,4	2,7	6,2	2,3
Total Rio MA	11 835 708	473 269	40,0	3,0	2,7	4,3	4,1	4,4	3,1	2,1	8,3	2,1

Source: IBGE 2010 Demographic Census and SIH/SUS, 2010

Pregnancy, childbirth and puerperium (Chapter XV)

The main cause of hospitalization is pregnancy and childbirth, which almost reached 99 thousand in 2010, representing 20.9% of hospitalization authorizations (Tab. 9.2). More than half of them (57.6%) refer to ***spontaneous single childbirth*** (O80). Although they are the result of admissions in maternity hospitals, they cannot be considered diseases, in the true sense of the word. The ***single childbirth by caesarean section*** (O82) represents only 9.9% of hospitalization authorizations, which does not seem to well reflect childbirth reality in Brazil. It is known that to resort to caesareans is very common in the country, which can be confirmed by SINASC - Sistema de Informação dos Nascidos Vivos (Live-born Infant information System). It is also true that this type of childbirth is more frequent in wealthy families and in private maternity hospitals, which may explain the relatively low rates calculated with SIH/SUS data. The third main cause of hospitalization is ***miscarriage*** (O03), with 5.6% of admission authorizations.

In Chapter XV, there is an average of 8.3 hospital admissions per one thousand MA inhabitants, which is higher in the peripheral municipalities, such as Belford Roxo (12.3) and Nova Iguaçu (11.4), whereas in Rio de Janeiro (7.6), it is lower. The part of this chapter that discusses the distribution of hospital admission authorizations in each municipality presents higher rates in Belford Roxo, Duque de Caxias, Itaguaí, Japeri, Magé, Nova Iguaçu and Queimados (Tab. 9.1). All of them are peripheral municipalities, where poor classes predominate, with a high amount of youngsters. These general statistics are confirmed on the map about pregnancy, childbirth and puerperium (Fig. 48).

We can see that the number and the percentage of admission authorizations associated with maternity are especially high in the north part of the municipality of Rio, as well as in Baixada Fluminense, whereas, in the South Zone, few cases have been recorded, with the exception of Gávea and Laranjeiras. In the slums of Rocinha, Jacarezinho and Maré, however, numbers are often high, but Complexo do Alemão contradicts this observation. In other words, to a great proportion of young women from poor classes corresponds a high rate of utilization of public maternity hospitals, which seems logical.

Table 9.2
Profiles of Rio de Janeiro MA municipalities per causes of hospitalization, with over 5% of AIH's

Municipalities	Total AIH	Cap. I %	Cap. II %	Cap.V %	Cap. IX %	Cap. X %	Cap. XI %	Cap. XIV %	Cap. XV %	Cap. XIX %	% AIH >5%
Belford Roxo	23 040	17,3	6,3	3,7	4,6	16,9	5,6	4,7	25,2	2,6	86,9
Duque de Caxias	27 808	7,3	5,5	5,6	8	9,1	7,7	5,4	31,5	6,5	86,6
Guapimirim	2 372	6,9	4,9	4,4	11,8	9,3	9,5	6,2	20,1	4,0	77,1
Itaboraí	12 290	9,8	3,6	9,9	13,2	18,0	6,6	3,7	17,5	4,8	87,0
Itaguaí	3 731	4,7	5,6	6,5	12,1	8,1	10,0	5,3	29,5	5,0	86,7
Japeri	6 337	7,3	3,9	7,3	15,6	20,0	7,1	6,4	23,7	2,0	93,2
Magé	10 619	8,4	4,5	9,7	10,6	13,4	5,3	5,1	23,6	1,4	82,0
Maricá	3 959	5,8	6,3	12,9	9,6	9,4	5,9	9,4	15,4	7,6	82,4
Mesquita	3 487	13,6	8,1	6,1	4,7	13,0	8,4	5,2	25,6	5,5	90,2
Nilópolis	4 474	8,5	11,3	7,9	18	10,0	8,6	6,3	14,1	4,7	89,4
Niterói	15 625	6,9	7,1	33,1	8,1	7,4	8,6	5,5	7,7	3,9	88,4
Nova Iguaçu	32 553	13,0	5,4	2,6	7,2	14,3	7,4	5,1	27,9	6,1	89,0
Paracambi	5 605	9,1	5,4	22,5	15,6	8,6	8,3	8,1	8,7	1,8	88,1
Queimados	9 154	16,8	4,7	3,2	4,9	21,8	6,9	5,1	26,3	2,3	92,0
Rio de Janeiro	218 280	4,9	7,9	12,3	9,2	6,7	8,6	5,4	22,1	6,7	83,8
São Gonçalo	71 559	7,9	6,5	11,2	17,8	17,3	6,7	4,2	11,7	2,6	85,9
São João de Meriti	17 802	11,0	6,5	4,6	8,9	14,9	6,5	4,6	20,8	3,8	81,6
Seropédica	2 570	4,0	4,5	5,6	15,3	14,8	9,7	6,3	27,8	2,0	90,0
Tanguá	2 004	11,9	2,8	40,8	4,7	6,4	8,2	4,2	9,5	3,5	92,1
Total Rio MA	473 269	35 924	32 305	50 779	48 974	51 501	36 738	24 474	98 814	24 485	
% MA	100	7,6	6,8	10,7	10,3	10,9	7,8	5,2	20,9	5,2	85,4

Source: SIH/SUS, 2010

9.2 Respiratory diseases (Chapter X)

The most common respiratory diseases in Rio MA are, in first place, *bacterial pneumonia not classified in other IDC category* (J15), which represents almost one third (32.6%) of 51,501 hospitalization (10.9% of all authorizations) in this IDC chapter. This illness is followed by another type of pneumonia, *pneumonia by not specified microorganism* (J18), superior to 20%, whereas a third type, *viral pneumonia not classified in other IDC category* (J12), is responsible for 6.9%. As a whole, these three types of pneumonia represent 60% of all respiratory diseases. To it, we can add *asthma* (J45), which is over 11%, and the *other chronic obstructive lung diseases* (J44), with 5.2%.

It is known that the risk of pneumonia is higher among young and old people, smokers, alcoholics and those with chronic pulmonary conditions, such as asthma. Besides infectious diseases, pneumonia can be caused by chemicals that penetrate in the lungs and cause inflammation. In this case, it is the quality of the air that is the issue here.

The MA average hospitalization rate related to Chapter X was 4.4 per one thousand inhabitants, but it is much higher in Belford Roxo (8.3) and in São Gonçalo (12.4), whereas in the municipality of Rio (2.3) it is the lowest of all (Tab. 9.1). It is important to emphasize the great frequency of authorizations for this type of disease in Itaboraí, Japeri, Paracambi and Queimados. The municipality of Rio presents reduced numbers of hospital admittance due to respiratory diseases, whereas the metropolitan periphery is seriously affected, mainly in São João de Meriti, Queimados, Japeri and São Gonçalo (Fig. 49).

Respiratory diseases are frequently related to air pollution, although it is not the only cause of these illnesses. According to INEA - Instituto Estadual do Ambiente (State Environment Institute), which monitors the air quality:
There are evidences that sulphur dioxide worsens pre-existing respiratory diseases and contributes to their emergence (...). The presence of photochemical oxidants in the atmosphere has been associated to the reduction of pulmonary capacity and to the worsening of respiratory diseases such as asthma[1]. Among

the several sources responsible for the degradation of air quality in the MA, we should emphasize vehicles, which contribute to 77% of pollutant emission.

Mental and behavioral disorders (Chapter V)

The third cause of hospitalizations, mental and behavioral disorders, represents almost the same number of hospital admissions (10.7%) as respiratory diseases (10.9%), with 50,779 and 51,501 cases, respectively. This shows the importance of this type of illness to the morbidity of MA inhabitants. Among the causes of hospitalizations for mental health, in first place comes schizophrenia (F20), which corresponds to about half of admissions (49.7%). Quite below, comes not specified non-organic psychoses (F29) with 14.4%; severe mental retardation (F72) with 6.8%; the other mental disorders are due to lesions and cerebral dysfunction and physical illnesses (F06) with 6%; and, finally, come bipolar affective disorders (F31) with 5.6%.

The occurrence of mental diseases seems to be related to the localization of psychiatric hospitals. On the map, it is easy to identify, in the municipality of Rio de Janeiro, from west to east, Hospital Municipal Jurandyr Manfredini, in Jacarepaguá, Centro Psiquiátrico Engenho de Dentro, o Centro Psiquiátrico Rio de Janeiro, in Saúde, and Instituto Psiquiátrico Philippe Pinel, in Botafogo (Fig. 50). In Niterói, there is Hospital Psiquiátrico de Jurujuba, as well as several clinics that offer psychiatric services, such as Clínica Nossa Senhora das Vitórias and Policlínica Coelho. Even in small municipalities, there are units for psychiatric care, such as Instituto Doutor Manoel Eiras, in Paracambi. In the above mentioned cases, hospital admission authorizations for mental diseases are responsible for over 20% of admissions in the sample weight area where the health facility is located and, sometimes, this percentage is much higher, as in Jacarepaguá with 73%.

Hospital admissions do not seem very numerous out of assistance units, which can be seen in the municipalities on Baixada Fluminense, which have very low numbers. The question that is posed here is whether the mentally sick are really few or they are registered in health facilities and not in the places where they live.

Some infectious and parasitic diseases (Chapter I)

Chapter I is about 7.6% of hospital admissions in the MA, showing, in first place, *bacterial infections of not specified localization* (A49), with 17.3%, followed by *other bacterial intestinal infections* (A04), with 11.1%. Other five diseases correspond to 5% to 10% of hospital admission authorizations: 9.9% for *diarrhea and gastroenteritis of presumable infectious origin* (A09); 9.4% for *other septicemias* (A41); 8.3% for *streptococci and staphylococci* as the cause of diseases classified in other chapters (B95); 5.2% for *dengue* (A90) and 5.1% for *respiratory tuberculosis*, with *bacteriologic and histological confirmation* (A15).

The average utilization rate is 3 hospital admissions per 1,000 inhabitants. The municipality of Rio de Janeiro is little affected by this type of illness, since its utilization rate is just 1.7. So, for a population that represents 53.5% of the MA, Rio records 46.1% of admission authorizations, of which only 29.6% refer to Chapter I. On the other hand, many peripheral municipalities show great deviation in relation to the average rate in the MA, like Belford Roxo (8.5 per one thousand) and Nova Iguaçu (5.5 per one thousand). In fact, the map reveals that infectious and parasitic diseases particularly affect the most urbanized metropolitan periphery, mainly the municipalities localized on Baixada Fluminense, where these diseases correspond to more than 15% of hospitalizations (Fig. 51).

It is well known that infectious and parasitic diseases are the second main cause of deaths in the world. They affect countries differently, according to their geographic localization and their development level. Many factors contribute to the propagation of such diseases: the lack of personal hygiene, promiscuity, the lack of a sewage system, still water and, more frequently, the bad quality of the environment. It is not surprising, therefore, that, in these circumstances, the population of neighborhoods that have no basic sanitation services and whose dwellings are badly built are particularly susceptible to this type of disease. The advancement of urbanization that is not accompanied by the implementation of sanitary infrastructure increases the population's vulnerability. In spite of that, this type of disease is not high in Rio de Janeiro slums, as the map shows.

Neoplasias (Chapter II)

As we know, tumors, which represent 6.8% of hospitalizations in Rio MA, can be benign, easier to be cured, or malign, which requires complex and expensive therapies. IDC discriminates 136 types of tumors (codes C00 to D48), whose high numbers are due to the fact that they can affect all the organs in the human body. The most common tumor in the MA, classified in the group of benign tumors (D25 to D36), is leiomyoma (D25), which represents 12.5% of hospital admissions, a quite high percentage, considering that it only affects women (Tab. 9.3). The other frequent tumors are malignant and also affect only women: malignant neoplasia of the breast (C50) with 11.7% and malignant cervix neoplasia (C53) with 6.9%.

On average, there are 2.7 of admission authorizations in chapter II per 1,000 inhabitants of the MA, a rate that varies from 1.5 in Seropédica to 6.5 in Paracambi. In municipalities with more than 400 thousand inhabitants, the variation goes from 1.8 in Duque de Caxias to 4.6 in São Gonçalo, whereas in Rio the value is the same of the MA.

This does not mean that the proportion of admissions of Chapter II in the whole number of admission authorizations does not vary significantly (Fig. 52). In the municipality of Rio, admissions are almost always above the average (6.8%), whereas in the metropolitan periphery the situation alternates: above the average in São Gonçalo, Niterói and Nilópolis and below the average in Nova Iguaçu and Belford Roxo.

Table 9.3
Most frequent tumors among people in Rio de Janeiro Metropolitan Area

Tumors - Chapter II of CID (2 % or more)	AIH Cap. II 2010	AIH Cap. II %
D25 Leiomioma do útero	4 052	12,5
C50 Neoplasia maligna da mama	3 777	11,7
C53 Neoplasia maligna do colo do útero	2 219	6,9
C33 Neoplasia maligna da traquéia	1 126	3,5
C18 Neoplasia maligna do cólon	1 086	3,4
C54 Neoplasia maligna do corpo do útero	1 086	3,4
C61 Neoplasia maligna da próstata	1 079	3,3
C91 Leucemia linfóide	918	2,8
C43 Melanoma maligno da pele	876	2,7
C16 Neoplasia maligna do estômago	769	2,4
C20 Neoplasia maligna do reto	758	2,3
C67 Neoplasia maligna da bexiga	657	2,0
C44 Outras neoplasias malignas da pele	653	2,0
C56 Neoplasia maligna do ovário	640	2,0

Source: SIH/SUS, 2010

The study of hospital morbidity on the intra-urban level reveals spatial structures whose configuration reminds us of some structures already described in previous chapters. First, subjacent demographic structures, such as age, are naturally determinant, mainly, the youngsters in a population. The map in chapter XV, on pregnancy, childbirth and puerperium, shows that women in neighborhoods with a higher number of young people, mainly in the North Zone of Rio and on Baixada Fluminense, are those who mostly look for assistance at SUS maternity hospitals.

So, social differences are revealed in many manners and under different angles, as, for instance, the greater utilization of SUS services by those who live in less favored areas of the MA. The low numbers of hospital admission authorizations in the wealthy South Zone of Rio, the region of the city with older population and, because of that, more prone to become ill, reveal that public healthcare is not used by the population with higher income, which makes health a factor of social discrimination in the MA.

Social differences can still be seen in other aspects, such as the incidence of pathologies. The maps in Chapter X (Respiratory System Diseases) and in Chapter I (Infectious and Parasitic Diseases) clearly demonstrate the existence of a peripheral tropism, since such illnesses are caused or aggravated by weather and environmental conditions, including floods and landslides. In fact, all of Rio MA is affected by these phenomena, but open air sewages, bad drainage of marshy zones, air pollution and precarious dwellings certainly contribute to the fact that poor neighborhoods are more affected by these diseases.

The observations in the present chapter need deeper investigation through an epidemiological approach, so that risk factors can be better evaluated. For that purpose, it would be necessary to use comparative rates of SUS services utilization, in order to neutralize certain factors, like age, sex, income etc. Unfortunately, SUS available data seem inadequate, because they do not cover all the population in the metropolitan area. Furthermore, the inconsistencies of the recording of patient's places of residence limit the scope of the investigation.

Note

1. See 2009 INEA - Instituto Estadual do Ambiente (State Environment Institute) Annual Report: http://www.inea.rj.gov.br

Chapter 10

Criminality

Safety is one of the main concerns of the population in Rio de Janeiro and, in most of the cases, in Brazilian big cities, where every day new forms of protection are sought, such as private security, closed streets, the increasing constructions of condos, armored cars with dark windows and so on.

10.1 Records of crimes and offences

The official source of information on criminality and delinquency in the state of Rio de Janeiro is ISP - Instituto de Segurança Pública (Institute of Public Security) of the state Security Department[1]. ISP produces statistics on crimes with the Civil Police records registered in the police stations in the state. Criminal occurrences in the state are aggregated under 39 headings, which are presented in the following forms:

• Victims of Violent Crimes: total number of Murders, Physical Injury followed by Death, Armed Robbery (followed by death), Attempted Murder, Intentional Physical Injury and Rape;

• Victims of Traffic Crimes: total number of Wrongful Traffic Murder and Physical Injury;

• Victims of Death with Provisional Classification: total number of corpses and skeletons found;

• Records of Crimes Against Property: total number of Business Premises Robbery, Residence Robbery, Robbery of Vehicles, Cargo Theft, Street Robbery, Robbery of Collective Means of Transport, Bank Robbery, Cash Machine Robbery, Cellular Phone Theft, Robbery of Financial Institutions with Victim as Driver, Vehicle Theft, Extortion Through Kidnapping, Kidnapping, Extortion, Extortion with Momentary Deprivation of Freedom (Express Kidnapping) and Larceny;

• Police Activities: total number of Drug Apprehension, Weapon Apprehension, Arrests, Child/Adolescent Apprehension, Recovery of Vehicles and Execution of Arrest Warrants;

• Other Records: total number of Threats (of victims), Missing Persons, Resistance with Opponent's Death – Justified Deaths, Military Policemen Dead on Duty and Civil Policemen Dead on Duty;

• Total Records: total Robberies, Thefts and Criminal Occurrences.

For the present Mapping, it would have been interesting to have micro data on each crime and offence, so that we could localize each fact precisely and, on mapping them, be able to observe their distribution in Rio MA. Unfortunately, we were not able to have access to this source, due to the very nature of these data. So, the most detailed information source is the one recorded at Police Stations (PS), which are 71 for the whole MA.

ISP provides a map of these Police Stations, with which it is possible to estimate the population that each one of them assists. By gathering the IBGE census tracts in which these stations are located, we could calculate the rates of each one of these crimes. However, it is important to emphasize that these criminality rates not always are representative indicators. For instance, in the 1st PS (Praça Mauá), in the 4th PS (Praça da República), in the 5th (Mem de Sá) and in the 76th (Niterói), where the local population is quite small, rates are always among the highest ones.

This is due to the fact that they are in Rio and Niterói central areas, which are very busy during the day, with great flow of people, which would explain relatively high criminality rates, despite the low presence of residents in these areas. In the present chapter, these four Police Stations will be referred to as ***central stations***. It is important to observe that in the calculations and captions on the maps, the 1th PS has not been taken into account, because its values distort statistical distributions, but have been considered on the maps with the headcounts and colors for the highest rates.

The analysis of these data brings up some questions related to their production and treatment. First, it is important to keep in mind that they are data from Police sources, based on reports. In relation to reports, comprehensiveness is doubtful, because victims not always report to the police. We can infer that certain crime categories are under dimensioned, like rape and theft. Second, the territorial division by Police Stations, which is generally extensive, does not cope with the diversity of situations related to criminal activities. Consequently, they positively do not provide us with a complete and realistic image of criminality; however, they offer us a first approach to the geography of crime in Rio MA.

10.2 Crimes against property

Crimes against property are the most numerous and represent more than twice the recorded number of crimes of the other four categories of criminal occurrences (Tab. 10.1). Rates per one thousand people are a little higher in the

municipality of Rio (1,180) than in the whole of the MA (1,073). Therefore, there is a chance that one per 100 inhabitants will have his property attacked in the period of a year, which is a theoretical probability, as long as some people can be robbed several times and some never go through this experience.

Street robberies or muggings

This type of robbery, which affects those who move around the streets on foot, is one of the crimes with a high number of occurrences: 46,464 in 2012. Rio Police Station circumscriptions are not equally affected by this type of robbery, as we can see in the downtown stations, which present the highest number of records (Fig. 53). So, the map on the distribution of muggings reveals a clear contrast between Rio's South Zone neighborhoods, which present relatively reduced numbers, lower than 500 per 100 thousand, and the ones in the North Zone, where the importance of this type of robbery is much higher, always above 600, reaching 1,178 in Madureira (29th DP).

Naturally, this phenomenon is not limited to the municipality of Rio. In Duque de Caxias (59th PS), on Baixada Fluminense, 1,217 occurrences were recorded. Likewise, in São Gonçalo, there were 617 occurrences in Neves (73rd DP) and 941 in Alcântara (74th PS).

Larceny

Larceny consists of ***obtaining illegal advantages, for oneself or another, harming others, leading someone to or maintaining him in error, through artifices, tricks or any other fraudulent action***. This type of crime is the second of those against property, with 27,660 cases. Larceny takes place more often in the municipality of Rio, since there the rate per 100 thousand inhabitants goes over 300, whereas in the whole MA it is a little over 230.

In fact, the geography of larceny is quite different from that of street robbery, since it is disseminated throughout the municipality of Rio (Fig. 54). An important characteristic revealed by this map is the high occurrence of this type of crime in almost all the South Zone and Barra da Tijuca, with very high numbers: 658 per 100 thousand in Botafogo (10th PS), 853 in Copacabana (12th PS), 611 in Ipanema (13th PS), 827 in Leblon (14th PS) and 755 in Barra (16th PS). If, to this group of neighborhoods, we add Méier (23th PS), with a 620 rate, and Tijuca (19th PS), with 529, we come to the conclusion that for sure the different types of crime against property proliferate in areas with the best living conditions in the city.

The metropolitan periphery is less affected by larceny, with the exception of municipalities' central areas, as we can see in the 59th PS (Duque de Caxias) and the 52nd PS (Nova Iguaçu), whose rates are around 500 per 100 thousand.

Robbery and theft of vehicles

ISP nomenclature distinguishes vehicle robbery from theft, classifying them, however, under the same category of crimes against property. The difference between robbery and theft lies on the seriousness of facts, since robbery implies severe threat or violence against an individual, which is not the case of theft. Consequently, the sentences pronounced on lawbreakers are not the same: from 4 to 10 years for robbery and from 1 to 4 years for theft. Together, these two categories corresponded to 33,500 cases in Rio MA in 2012, which is equivalent to an average of 283 per 100 thousand. Only the capital city was responsible for 18,035 of these cases.

The map of robbery and theft of vehicles has a different pattern from that of mugging and larceny, since the Center of the city and the South Zone are less affected by this problem (Fig. 55). Most robberies took place in Vicente de Carvalho (27th PS), where 1,518 occurrences were recorded in 2012, many more than the MA average. Other North Zone Police Stations, from Méier to Pavuna, also present high incidence, but in a lesser degree. The concentration in this area of the city spreads towards Baixada Fluminense, to Duque de Caxias (59th PS) and in Nova Iguaçu (52nd PS).

10.3 Violent crimes

Violent crimes come in second place in criminality statistics, much below those against property, and there are no significant differences between their occurrence in the municipality of Rio (639 per 100 thousand) and in the rest of the MA (652 per 100 thousand). Intentional physical injuries represent 86% of this category, with 66,287 cases in 2012. In much lower numbers, but quite more severe in the penal point of view, homicides and attempted murders reached 6,200 cases, whose 50% refers to homicides. Finally, there is a dozen rapes per day, totaling 4,491, without taking into account those not reported, which probably occur in great numbers (Tab. 10.1).

Intentional physical injuries

In the municipality of Rio, these crimes occur mainly in the ***central police stations*** *areas*, to which those in Cidade Nova (6th PS) and in São Cristóvão (17th DP) should have and were added, as we can see on the map on intentional physical injuries (Fig. 56). Besides those areas, it is important to also emphasize the occurrences registered in West Zone circumscriptions, such as Taquara (32nd PS), Recreio dos Bandeirantes (42nd PS) and Guaratiba (43rd PS). In the South Zone, the area with the highest population density in the city, violent crimes occur, to a lesser extent, although rates in Copacabana, Ipanema and Gávea are above the MA average.

Police stations in the city, with higher intentional physical injury rates, were added to those from some of the municipalities in the metropolitan periphery, like Duque de Caxias (59th PS), Queimados (55th PS), Nova Iguaçu (58th PS) and São Gonçalo (74th DP).

Table 10.1
Criminal or delinquency occurrences in 2012 and criminality rates per 100 thousand Rio MA and central municipality inhabitants

Types of crimes	Rio de Janeiro Metropolitan Area		Municipality of Rio de Janeiro		
	Occurrences	Rate p/100 thousand inhabitants	Occurrences	% Municipality of Rio de Janeiro	Rate /100 thousand inhabitants
VICTIMS OF VIOLENT CRIMES	**77,110**	**652**	**40,365**	**52.3**	**639**
Intentional Murder	3,040	26	1,201	39 .5	19
Attempted Murder	3,160	27	1,569	49.7	25
Intentional Physical Injury	66,287	560	35,523	53.6	562
Rape	4,491	38	2,004	44.6	32
Other types of occurrences	132	1	68	51.5	1
VICTIMS OF TRAFFIC	**37,528**	**317**	**23,302**	**62.1**	**369**
Intentional Murder	1,350	11	691	51.2	11
Intentional Physical Injury	36,178	306	22,611	62.5	358
REGISTERED CRIMES AGAINST PROPERTY	**126,990**	**1073**	**74,557**	**58.7**	**1,180**
Business Premises Robbery	4,326	37	2,335	54.0	37
Robbery of Vehicles	21,006	177	10,899	51.9	172
Cargo Theft	3,374	29	1,824	54.1	29
Street Robbery	46,464	393	26,185	56.4	414
Robbery in Public Transport	4,517	38	2,681	59.4	42
Cellular phone Theft	4,121	35	2, 465	59.8	39
Vehicle Theft	12,496	106	7,136	57.1	113
Extortion	1,517	13	944	62.2	15
Larceny	27,660	234	19,090	69.0	302
Other types of occurrences	1,509	13	998	66.1	16
POLICE ACTIVITIES	**60,580**	**512**	**33,230**	**54.9**	**526**
Drug Apprehension	6,714	57	3,941	58.7	62
Weapon Apprehension	4,966	42	2,290	46.1	36
Arrests	17,542	148	9,242	52.7	146
Child/Adolescent Apprehension (ECA)	3,841	32	1,609	41.9	25
Recovery of Vehicles	15,593	132	8,906	57.1	141
Execution of Arrest Warrants	11,924	101	7,242	60.7	115
OTHER RECORDS	**65,688**	**555**	**34,569**	**52.6**	**547**
Threats (victims)	60,581	512	31,794	52.5	503
Missing Persons	4,689	40	2,484	53.0	39
Resistance with Opponent's Death	402	3	282	70.1	4
Other types of records	16	0	9	56.3	0
POPULATION 2010	**11,835,708**		**6,320,446**	**53,4**	

Sources: IBGE 2010 Demographic Census and Instituto de Segurança Pública do Estado do Rio de Janeiro, 2012

Homicides and attempted murders

The geographic configuration of homicides and attempted murders shows that these types of crime take place as much in the municipality of Rio as in the metropolitan peripheral municipalities (Fig. 57). However, as the map shows, the occurrences observed in the police stations in the central part of Rio and in the North Zone, especially from Madureira to Pavuna, are far higher. Differently, the South Zone is one of the parts of the city that are less affected by homicides and attempted murders, with the exception of the slums of Vidigal and Rocinha.

Threats

According to ISP nomenclature, threats, of all kinds, are considered under the category ***other records***. It is clear that these threats are not necessarily death threats, but they always correspond to a more or less severe kind of violence (Fig. 58). In fact, the map on threats reveals some similarities with that on intentional physical injuries.

Rapes

The cases of rape are more frequent in the MA periphery, as we can see in the high rates of Nova Iguaçu (58th PS), where records show 97 cases per 100 thousand, and in Itaboraí (71st PS), with 63 occurrences per 100 thousand (Fig. 59). In the municipality of Rio, this type of crime occurs mainly in Santa Cruz (36th PS) and in the circumscriptions of the central stations. The South Zone of the city is little affected, as well as the North Zone neighborhoods, where rates are quite below the MA average.

As we can see, rapes do not occur as often in the mostly urbanized areas of the city as in the metropolitan periphery, which consists of a more violent environment, with higher rates of this type of crime. We may think that, in areas where social and economic precarity is more present, this type of crime is more recurrent, which would be a characteristic of social anomy.

10.4 Traffic crimes

The numbers on this type of crime in the MA are related to the victims of traffic accidents, with more than 36 thousand records of involuntary injuries and 1,350 records of manslaughter. We can see a higher rate in the capital city (369 per 100 thousand) than that in the whole MA (317 per 100 thousand), which is probably the result of the heavier traffic in Rio.

Consequently, these accidents must be analyzed taking into account the density of road networks. In fact, we can see high concentration of traffic accidents in the circumscription of police stations located near important roads and highways, such as Avenida Brasil, Avenida Presidente Vargas, Ponte Rio-Niterói, Linha Vermelha, Linha Amarela etc. Naturally, the intense traffic on these roads, which link the neighborhoods to the Center of Rio, causes accidents, as police records show: Bonsucesso (21st PS), with 1,313 victims, and Praça da República (4th PS), with 651 occurrences. Furthermore, high speed on the main roads increases the risk of accidents, as we can see in Campo Grande (5th PS), with 2,252, the circumscription that has the highest number of this type of occurrence, probably due to the great number of cases on the west side of Avenida Brasil (Fig. 60).

The police stations that are not in the influence areas of great roads, that is, those that work mainly with cases of traffic accidents in local circulation areas, such as those in the South Zone of Rio, present a much lower number of records.

10.5 Juvenile delinquency and drug dealing

In the set of statistical data published by ISP, especially two categories have called our attention, because they represent serious problems for Rio de Janeiro Metropolitan Area: the delinquency of children and adolescents and drug dealing.

Arrest of children and adolescents

A study published by ISP[2] states that children and adolescents that break the law are more often victims of crimes (88.5%) than real criminals (11.5%). In fact, a great part of these children and youngsters are beggars' children, street dwellers or marginalized people. As they are part of the homeless population, with no permanent address or, at least, living in temporary dwellings, calculating criminality rates with the population of residents does not make any sense. For this reason, the map on this issue only shows the number of arrested children and adolescents by each police station.

Out of 3,841 children and adolescents in conflict with the law, 1,609 cases are in the municipality of Rio, whereas 2,232 refer to the rest of the MA. The map with the distribution of arrests shows that the highest number of cases takes place in Niterói, São Gonçalo, Belford Roxo and Duque de Caxias (Fig. 61).

In the capital city, three concentrations can be seen: the first one refers to the 5th PS circumscription (Mem de Sá), located in the Center of Rio; the second one refers to North Zone police stations, such as the 22nd PS (Penha), the 38th PS (Brás de Pina) and the 21st PS (Bonsucesso), areas where there are large concentration of slums; and the third concentration is located along the South Zone coast, comprehending the 12th PS (Copacabana), the 13th PS (Ipanema) and the 14th PS (Leblon), the tourist areas in the city.

Drug seizures

The drug seizures carried out by the police concerns all Rio MA, although they take place with different intensity. The capital city is responsible for 59% of the 6,714 occurrences recorded by the ISP.

The map calls our attention to the concentration of drug apprehension in the east part of the municipality of Rio: the presence of a great number of

slums close to Baía de Guanabara is a traffic facilitator, as we can see from the amount of drug seizures that take place in the large area that goes from São Cristóvão police station (17th PS) to that of Penha (22nd PS); in the Center, some areas stand out as sale and consumption places, as those of the 4th PS (Praça da República), the 5th PS (Mem de Sá) and the 6th PS (Cidade Nova); finally, the area along the sea, from Botafogo to Leblon, stands out as an area of drug consumption where clients are from the wealthiest neighborhoods in Rio (Fig. 62).

Notes

1. Information on this institute can be found on http://www.isp.rj.gov.br/
2. Study available on: http://www.isp.rj.gov.br/Conteudo.asp?ident=234

Chapter 11

Elections for president and governor from 2002 to 2010

The results of the elections for president of Brazil and governor of the state of Rio de Janeiro in 2002, 2006 and 2010 were the object of a series of maps on the performance of the candidates that received the highest amount of votes in the Metropolitan Area of Rio de Janeiro. The analysis of the maps for each one of these candidates led us to identify certain regular responses from voters in relation to the main political trends in the MA, which has been translated into a synthetic map through an ascending hierarchic classification system, based on the results of the 24 most important candidates in these elections for president and governor.

Since we intend to identify the main political tendencies in these elections, the candidates who were little voted for were not included in this analysis, which, to a certain extent, masks the diversity of political expression. Besides the votes received by each one of these candidates, we have also included in this classification system the MA results of the 2005 referendum on the prohibition of weapon sales in the country. This statistical treatment resulted in 6 classes of voting sections, three of them with a more leftist profile, two of them more to the right wing and one of them more diversified (Fig. 63).

11.1 The left

The three classes considered more to the left of the status quo (1, 2 and 3) are characterized, in most of these elections, by a high amount of votes for the candidates from PT - Partido dos Trabalhadores (Labor Party) for president of the country. The exception to this tendency, in these three classes, is the case of Luiz Inácio Lula da Silva, the candidate for presidency in 2002, whose total votes in the first round were below the MA average (Fig. 64). Besides Lula, Benedita da Silva (PT), the candidate for governor of the state of RJ, did not have a fair amount of votes in 2002 either (Fig. 65).

Still within the scope of these leftish classes, three other candidates, however, had an outstanding position in 2002 and 2006: Rosinha Garotinho, from PSB - Partido Socialista Brasileiro (Brazilian Socialist Party), running for governor in 2002; Anthony Garotinho, also from PSB, running for president in 2002; and Marcelo Crivella, from PRB - Partido Republicano Brasileiro (Brazilian Republican Party), running for governor in 2006 (Figs. 66, 67 and 68).

Rosinha, Garotinho and Crivella are evangelical politicians. Their presence in the leftish classes does not mean that they are necessarily leftists, but that they had their highest amount of votes in voting sections where, since the second round in 2002, PT has had excellent results for the presidency of the country, as we can see on the maps with the results obtained by Lula and Dilma Rousseff (Figs. 69, 70, 71, 72 and 73).

Likewise, Sérgio Cabral, from PMDB - Partido do Movimento Democrático Brasileiro (Brazilian Democratic Movement Party), reached good results in the 2006 and 2010 elections for governor of the State of Rio de Janeiro in these same MA areas, due to the support from a large coalition of parties (Figs. 74, 75 and 76). It is interesting to see that the 2005 referendum showed that these classes are also characterized by the answer ***yes*** to the prohibition of firearms trade (Fig. 77).

The three classes with a leftish profile differ from one another according to the magnitude of the differences of Rio MA electoral profile average. Class 1 is the most representative of the trends considered as leftist, with very high positive deviations of this political tendency. It is present mainly in São João de Meriti, Belford Roxo, Duque de Caxias, Magé and Guapimirim.

Class 2 also shows outstanding positive deviations, especially in relation to Sérgio Cabral and the evangelical candidates, whereas those of PT have less significant amount of votes. This class comprehends extensive areas in the metropolitan periphery, on the east (Tanguá, Itaboraí, Maricá and a large part of great São Gonçalo) and on the west (Itaguaí, Seropédica, Paracambi, Queimados, Japeri and Nova Iguaçu).

Class 3 profile is less to the left than the previous two, getting closer to the MA average. It is present on the west and north parts of the municipality of Rio, in Mesquita, Nilópolis, São João de Meriti, as well as on the west of São Gonçalo and north of Niterói.

By comparing this map to the one on the religious synthesis, we can see some correspondence between classes with a strong presence of evangelicals and these three classes tending to the left (Figs. 41 and 63). This fact may lead us to think that there is a connection between one's vote and his religion. However, we should not turn towards this direction, because the common characteristic of these leftist voting sections lies mainly in the poverty of their inhabitants, which can be seen on the maps on the income levels of Bolsa Família beneficiaries (Figs. 8 e 9). Precarious economic conditions, the decline of Catholicism and leftist votes produce a syndrome whose central causes are difficult to identify.

11.2 The right

Classes 5 and 6, which express a rightist political orientation, are those that have high amount of votes, above the MA average, for the candidates from PSDB - Partido da Social Democracia Brasileira (Brazilian Social Democracy Party) in presidential elections: José Serra, in 2002 and 2010, and Geraldo Alckmin, in 2006 (Fig. 63). Serra's and Alckmin's performances in these three elections can be seen in details on their individual maps, which confirm the patterns identified on the electoral synthesis (Figs. 78, 79, 80, 81, 82 and 83).

Besides the candidates from PSDB, we should emphasize the outstanding position in these two classes of the following candidates for governor: Denise Frossard, from PPS - Partido Popular Socialista (Popular Socialist Party), in 2006, and Fernando Gabeira, from PV - Partido Verde (Green Party), in 2010, both supported by voters with more conservative profiles (Figs. 84, 85 and 86).

Still in classes 5 and 6, we can see a certain presence, although quite reduced, of Heloísa Helena, from PSOL - Partido Socialismo e Liberdade (Socialism and Freedom Party), in 2006, and Marina Silva, from PV, in 2010, two PT ex-activists who, in these two presidential elections represented an alternative, as much for the candidates from their ex-party, as for those from PSDB, (Figs. 87 e 88).

Finally, Benedita and Lula, candidates for governor and for president in 2002, respectively, present surprisingly good results in these two classes, which could indicate that, in these elections, voters with conservative profile in these wealthy neighborhoods had favorable expectations in relation to the candidates from PT (Figs. 63, 64 and 65).

Class 6 clearly shows a tendency to the right. It comprehends Barra da Tijuca and almost all the South Zone of Rio, as well as Icaraí, in Niterói. They are the wealthiest areas in these cities, as we can see on the maps on income and education (Figs. 8 and 29).

Class 5 is characterized by a similar profile to that of the previous one, presenting, however, more reduced deviations than the average in the MA. In Rio, many scattered neighborhoods belong to this class, such as Glória, the area between Praça da Bandeira and Grajaú, Méier and surroundings, as well as the most part of Ilha do Governador and of Niterói. This class, which presents a quite rightist profile, but less radical than that of class 6, characterizes middle-class neighborhoods in both Rio and Niterói.

We can also see that in classes 5 and 6 voters favored the sales of firearms, in the 2005 referendum, which may be interpreted as a reaction led by the fear the wealthiest felt due to the increasing criminality (Fig. 77).

11.3 Between right and left, a diversified class

Finally, the 36 voting sections that constitute class 4 present a profile close to that of the MA average, with weak characteristics in relation to the classes with rightist orientation, as well as those more to the left. That is the reason that it is considered a diversified class in the MA.

In a geographic perspective, class 4 characterizes intermediate voting sections between class 3 (center left) and class 5 (center right). This class is basically found in the municipality of Rio and corresponds to city areas with different levels of education and income, such as the Center, Laranjeiras, Cosme Velho and North Zone neighborhoods.

Chapter 12

Rio de Janeiro in comparison with six other Brazilian metropolises

On getting to the end of the present atlas, after the analysis of a set of maps with indicators related to the living conditions in the Metropolitan Area of Rio de Janeiro, we can question its situation by comparing it to that of other Brazilian metropolises. In order to find answers, it would be necessary to repeat the same analysis of other cities in the country that can be, a way or another, compared to Rio de Janeiro. As it would be an almost impossible job to carry out, at least for the time being, we have decided to make a series of maps based on four key indicators related to topics that complement each other, which are the occupation of the land, the demographic dynamics, income levels and social programs in six of the main metropolitan areas in Brazil:

1. ***Population density for the delimitation of the city within the metropolitan area.*** It is well known that metropolitan areas, according to IBGE definition, are groupings of municipalities whose peripheral areas comprehend both urban and rural configurations and very different densities. As a city is an agglomeration of people, population density is a good indicator to define urban environment itself and, in the present case, in a highly detailed level, that of census tracts.

2. ***The importance of the elderly in the total population for the analysis of demographic dynamics***. To measure population variation, demographers usually turn to migration balance (the difference between arrivals and departures, during the period in between census surveys) and to natural growth (the difference between births and deaths). Unfortunately, this method cannot be used on census tracts level, since they change between one survey and another, not producing data to compare. In this case, the maps on the elderly were selected due to their capacity to indirectly explain demographic dynamics. The lower the proportion of the elderly in the total population, the younger the population is. Furthermore, we know that female fertility is higher in lower classes and that it is in the metropolitan periphery where young immigrants settle. Consequently, there is a strong relation between age composition, migration and socio-economic level.

3. ***Income levels in the evaluation of degrees of socio-spatial segregation***. Although income levels are basically an economic indicator, their spatial distribution in the urban environment also reveals one of the aspects of social segregation. These maps, which have been created with census tracts as their methodological bases, allow us a pretty detailed view of this phenomenon.

4. ***Beneficiaries of the programs Bolsa Família and Eradication of Child Labor for the localization of the poorest and identification of State interventions to fight poverty.*** These maps, a kind of negative of those on income levels, have been based on sample weight areas, consequently, less detailed than the previous ones.

These four indicators have been calculated and mapped for six metropolitan regions in Brazil: Belém, Salvador, Belo Horizonte, São Paulo, Porto Alegre and Brasília. The diversity these regions represent led to their selection.

12.1 Population density

Metropolitan regions in Brazil have very different surface areas. The extension of Belo Horizonte (the largest MA among the ones analyzed in this chapter) is almost 6 times that of Belém (the smallest one) (Tab. 12.1). The same happens with the radical discrepancy between the number of people in São Paulo, which is 9 times as large as the population of Belém. Even if average population densities are not very revealing, due to occupational processes, there is also a great difference between Rio de Janeiro, with 2,553 people per km², and Porto Alegre, with just 406.

Table 12.1
Population density

	Belém	Belo Horizonte	Distrito Federal	Porto Alegre	Rio de Janeiro	Salvador	São Paulo
Area km²	2 536	14 420	5 788	9 748	4 636	4 354	7 827
Population	2 100 028	5 389 178	2 570 160	3 958 985	11 835 708	3 573 973	19 683 975
Density inhab/km²	828,1	373,7	444,0	406,1	2553,0	820,9	2514,9

Source: IBGE 2010 Demographic Census

The maps allow us to evaluate the population concentration and dispersion differences in these metropolitan areas. The most common model**,** that of density rates decreasing, more or less gradually, from the center towards periphery, not always occur. In Belo Horizonte, the MA central part in, in fact, the densest, which we can also be seen in some of the centers in peripheral municipalities (Fig. 89). Consequently, we cannot consider a constant decrease from center to periphery, since they are population agglomerates in a space with usually low densities.

In relation to other capital cities, São Paulo presents a specificity that is the fact it often shows higher population densities in the periphery than in the center areas (Fig. 90). We know that this situation is caused, on one hand, by strong demographic growth in the industrial areas in the city periphery and, on the other hand, by the 13% decrease of the population between years 1997 and 2007 in the area situated between the rivers Pinheiros and Tietê. As it happens in all the big cities in the world, real estate speculation is one of the main causes of those transformations.

It has already been emphasized the importance of Rio de Janeiro environmental characteristics to explain density differences, mainly the relief, the coast and the transport routes, which play an important role in all the MA, even if in different degrees.

The coastal effect takes different aspects in Salvador, Porto Alegre and Belém. In Salvador, there are two strongly different parts, the one around Baía de Todos os Santos and that along the oceanfront (Fig. 91). However, out of the capital's municipality, densities remain low, with some peaks in the central areas of peripheral municipalities, such as Simões Filho, Candeias and Camaçari.

In Porto Alegre, a city developed by Baía do Guaíba, the coast has a less significant role than that in Rio de Janeiro and its densities spread from the historical center towards its east periphery, from Alvorada to Viamão (Fig. 92). Towards north, from Cachoeirinha and Canoas to Dois Irmãos, urban agglomeration presents a succession of population centers that rarely cluster. Road BR-116 is responsible for this multicentre organization.

Belém, situated by Baía de Guajará, where Rivers Guamá and Acará meet, presents a high density area along river banks. Densities are higher in the south, where there are many slums, and lower in the west part, where the historical town is located (Fig. 93). To the north of the municipality, reaching Ananindeua and Marituba, new neighborhoods stand out for their average density rates.

Finally, the map on the population density in Distrito Federal, which is not in fact a metropolitan area, shows a quite different picture from that of a traditional city, due to the characteristics of its urban project (Fig. 94). In a context of very low densities, below 5 people per hectare, Plano Piloto stands out. It consists of very well delimited blocks, with about 200 inhabitants per hectare, due to the city project, which is based on not so high buildings, in general 4 storey high each, surrounded by green areas. By the banks of Lago Paranoá, the neighborhoods are characterized by the presence of individual houses, where densities are never above 50 people per hectare. Quite contrasting with Brasília rates, densities in its satellite towns are much higher, especially in Ceilândia. In a lesser proportion, this is also the case of the oldest cities in Brasília periphery, such as Sobradinho and Planaltina.

All of these observations point to the fact that the category ***Metropolitan Area***, which is adequate to designate an urban setting of great dimensions, really comprehends considerable differences from one region to another, as much in terms of dimensions, as of population distribution. Although they are traditional, population density maps are still valid, because people distribution on a fairly detailed level can help us understand the diversity in the process of occupation of a certain area.

12.2 The elderly

The analysis of Rio de Janeiro Metropolitan Area age structure shows that, in general terms, it comprehends three main characteristics, which will be compared to those in the other selected metropolises. First, it calls our attention the fact that the elderly are concentrated in early occupied neighborhoods, frequently inhabited by people of middle and high income levels. The young population is present mainly in the metropolitan periphery, in recently occupied areas of very low income. The larger presence of young people in this area is due to its high birth rates and the presence of migrants. Besides these two areas, rural zones are also characterized by a larger proportion of older people. The maps presented here on the elderly in other metropolitan areas generally show the same pattern, with slight differences related to the configuration in each one of them.

São Paulo is probably the best example of this structure, with important presence of the elderly in the center, surrounded by a first ring of very young people and, again, a second ring of older people (Fig. 95). Nevertheless, the first distortion of this model refers to the presence of younger people in the central part of the city. If there is no direct relation between density and demographic aging, we can see that the young periphery, in light shades on the map, corresponds to spaces of the highest population densities, which confirms the existence of suburbs, inhabited by young migrants with many children.

On the contrary, industrial cities like Santo André, São Bernardo do Campo, São Caetano do Sul and Osasco present high percentages of the elderly among the population, with very high densities, which reveals the existence of areas consolidated in socio-demographic terms. Finally, besides the ring of young people, we can find areas with older population in rural zones, which have low densities and are a type of reservation for the future expansion of the metropolis.

When an urban agglomeration occupies just a small part of the MA territory, the surrounding rural areas, with an older population, show more clearly. This is mainly the case of Belo Horizonte (Fig. 96), Salvador (Fig. 97) and

Porto Alegre (Fig. 98). Naturally, many peculiarities can be observed in each one of these cities. In Belo Horizonte, the elderly are concentrated not only in its central part, but also around Lagoa da Pampulha. In Salvador, along the seashore, from Farol da Barra to Itapuã, a stretch that offers excellent conditions for the wealthiest. In Porto Alegre, we have already pointed out the nature of the several population centers comprehended in the MA. Each one of these cities reproduces its general organization in a homothetic form: the elderly in the center and the young population in the periphery.

In Belém, the central core does not correspond to dense areas, which are characterized by the presence of young populations (Fig. 99). However, although the proportion of older people in rural areas is not as high as that in Belo Horizonte MA, for example, we can see that they are more present in the farthest municipalities, such as Santa Bárbara and Santa Isabel do Pará.

Finally, Distrito Federal once again stands out for its specificity: the population in Asa Sul is much older than that in Asa Norte (Fig. 100). The two neighborhoods by the Lake clearly stand out as areas of older population and low densities. On the other hand, satellite towns, which stand out for high densities, are, in their majority, characterized by the presence of young populations.

These examples show the generalized character of the model of rings for the age structure of the population in these metropolitan areas. Even when its spatial organization seems complex, with multiple centers and anisotropic factors (seashore, relief, road systems), it is possible to say that migration movements play an important role in this spatial organization model.

12.3 Income

The maps on income confirm the existence of poverty rings in the metropolitan areas analyzed here. In fact, Rio MA territory presents a segregating system that divides it into areas (south, north and periphery), which correspond to income gradients (high, middle and low), each one affected by different anisotropic factors. In general, the organization in these areas consists of a succession of income levels, shaped like bands or rings, due either to the axial character of occupation, as in the coastal stretch, or its localized character, as in old Center ***versus*** new periphery. So, the different centers have a richer population than that of their most proximate surroundings, which, in turn, are richer than those from more distant areas.

São Paulo presents a succession of rings, having its rich Center as the core and going towards the poor periphery (Fig. 101). This pattern seems coherent with demographic dynamics: the farthest areas are younger because they are occupied by poor families, with more children. In this spatial organization, the center-periphery type, there are, however, some local exceptions.

First, the ABC, to which Osasco must be added, is a special case in São Paulo MA, as we have already shown. Each one of these municipalities reproduces the center-periphery system in a lesser degree. Besides those, some municipalities are characterized by census tracts of very high incomes, mainly in the west part of the capital city, in Cotia, Jandira and Carapicuíba. In Santana de Parnaíba and Barueri, high income rates correspond to those in Alphaville, an urban space based on the concept of ***mini-cities,*** with isolated condos, malls and industrial areas, where very wealthy people live.

In short, it is necessary to emphasize the coexistence, in São Paulo MA, of a global social segregation system, which presents smaller subsystems on municipal level, as the ABC cities or the mini-cities, like Alphaville, a niche of the wealth brought up by a great capitalistic enterprise. With 8 million people more than Rio de Janeiro, São Paulo developed a much more complex socio-spatial structure.

In Porto Alegre, the center-periphery pattern shows very clearly, but in a context of multiple centers, as already mentioned (Fig. 102). As it happens in Rio de Janeiro seaside, the riverside neighborhoods in Porto Alegre stand out for the highest income rates. In Belém, the map on income levels seems coherent with what has been said on the population dynamics in this city, which presents a rich core and a negative gradient towards peripheral areas (Fig. 103).

The map on incomes in Belo Horizonte confirms the presence of a central core with the highest incomes, to which we must add the neighborhood of Pampulha, occupied by the wealthiest classes of the population (Fig. 104). On this same level, Nova Lima, on the south border with the municipality of Belo Horizonte, has been attracting high-income people, where they live in luxury condos. In Belo Horizonte, there are no poverty rings, but there are poverty areas in between the wealthiest centers of the municipalities in the MA periphery.

The distribution of income in Salvador follows a pattern in which the highest levels are found in the seashore stretch, from Farol da Barra to Camaçari (Fig. 105). The neighborhoods of Barra, Pituba and Jaguaribe, in the municipality of Salvador, and Vilas do Atlântico, in Lauro de Freitas, stand out as the highest income areas on the Atlantic coast. This characteristic contrasts with the western part of the city, developed around Baía de Todos os Santos. In general, income levels decrease as we move away from the seacoast, which results in the concentration of low-income people in the interior of the municipality. Consequently, census tracts located near the seashore are the least dense and the wealthiest, whereas those in the interior are among the mostly dense and the poorest. This general pattern of income distribution is similar to that in Rio de Janeiro.

In Brasília, the Federal Capital, it is not surprising the fact that the population is characterized by high income levels (Fig. 106). This is true in Plano Piloto, in Lago Norte and Lago Sul, but also in some of the satellite towns, as Núcleo Bandeirante and Taguatinga. This situation, high income levels both in the Center and the periphery, does not mean there is no poverty in Distrito Federal. In Brasília, it is concentrated in the farthest areas from Plano Piloto, as Ceilândia, Gama, São Sebastião and Planaltina. So, the poverty ring does not spread continuously, since it is made of peripheral urban centers, separated from one another.

12.4 Fighting poverty

In Rio de Janeiro, we can see that beneficiaries from Bolsa Família and the Program for the Eradication of Child Labor are concentrated on Baixada Fluminense, although they are present, in different proportions, in all Rio MA. The criteria required by these social programs give us a simplified image of the different forms of poverty and, probably, a part of the destitute escape from these policies implemented by the federal government, either because they do not meet the programs' requirements or because the impoverish, for several reasons, cannot assert their rights. The maps show the geographic distribution of the beneficiaries of these programs, which serves to an approximate localization of the poorest populations in the metropolitan areas analyzed here.

If there is an aspect that is common to all Brazilian metropolitan areas is the existence of a peripheral poverty ring. São Paulo stands out as a kind of model, in which the center has almost no beneficiaries, whose number remarkably increases from the center towards the periphery (Fig. 107). The compartmentalized spatial distribution is also seen in Distrito Federal, where Brasília presents few beneficiaries, whereas in its satellite towns social programs are implemented in large scale (Fig. 108). This is not the case in Belo Horizonte, where all metropolitan area is affected, however, with larger concentrations in Contagem and Ribeirão das Neves (Fig. 109). Belo Horizonte MA rural areas are also reached by these programs, but in lower numbers.

Due to their particular spatial configurations, Belém, Salvador and Porto Alegre show more complex patterns. In Belém, beneficiaries of social programs are found mainly in the north part of the city, as well as in the peripheral municipalities of Ananindeua and Marituba (Fig. 110). Nevertheless, chronic poverty is also present in areas near the center of Belém, in slums situated in the south part of the city, on the banks of Rio Guamá.

Likewise, Porto Alegre, due to its multi-centric aspect, shows a complex configuration, since the sections that receive most of the benefits from government's social programs are located in the periphery of the many centers that integrate its metropolitan area (Fig. 111). This relative complexity is coherent with the structures revealed by the other maps on this capital city.

The same can be seen in Salvador, where the south shore of Baía de Todos os Santos and the ocean coast present a reduced number of beneficiaries, whereas the population in the rest of the city and that in peripheral municipalities have, in varied degrees, received governmental benefits (Fig. 112). That means that poverty is present almost everywhere, with the exception of touristic or wealthier areas on the coast.

12.5 Rio de Janeiro and the other capital cities

The comparison between Rio de Janeiro and the other six capital cities selected for the present study shows that it is not an isolated case in the Brazilian metropolitan panorama. Naturally, Rio continues to be a city that stands out for its privileged location in an area of great natural beauty. However, the socio-spatial segregation there is in the city is not different from that observed in other metropolitan areas.

After analyzing this set of maps, we come to the conclusion that the concept of poverty rings takes different forms in each one of the metropolitan areas. Consequently, the image of the ring should not be taken literally, although poverty generally concentrates in the peripheral areas.

In fact, the distance from the center, even though attenuated by transport systems, plays a key role in the organization of Brazilian cities. For sure, socio-spatial segregation continues to be one of main challenges for Brazilian society and government in future decades.

Therefore, the center-periphery model, even when modified to meet local situations, is still pertinent for the study of social issues. Both singular and exemplary, Rio de Janeiro MA shows to be a rich observation field for sociological regularities.

Conclusion

After the analysis of a great number of information produced by the 2010 Demographic Census, SUS - the Single Health System, ISP - the Institute of Public Security and the Superior Electoral Court on the municipalities comprehended in Rio de Janeiro Metropolitan Area, mapped in pretty detailed territorial sections, we can understand the great complexity of a city. In spite of that, it has been possible to identify, in general terms, three large areas that differ from one another due to the level of living conditions of their populations. The first one of them, with the best social indicators, consists of Barra da Tijuca, the South Zone, Tijuca and surrounding neighborhoods, in Rio, as well as the seashore areas in Niterói; the second one, with middle living conditions patterns, consists of a high number of neighborhoods in the North Zone of the city, from São Cristóvão to Pavuna; and the third one, where we can find the worst social indicators, comprehends the vast metropolitan periphery area, from Itaguaí to Tanguá, as well as the poor neighborhoods in the West Zone of the municipality of Rio.

Although most maps corroborate this pattern, some are more significant than others, because they make more evident the socio-spatial segregation that exists in Rio MA. So, the maps on income and education levels, on the number of students enrolled in private schools in relation with that of those who go to public schools, on the services rendered by SUS - the Single Health System, as well as social programs reveal the extreme inequalities that characterize urban reality. Likewise, the maps on retired workers and pensioners, on workers illegally hired and on slums identify the areas where social relations of a more or less formal aspect take place. The distribution of people by age, sex and skin color also stresses out the great particularities found in each part of the metropolitan area.

Besides its social and economic aspects, Rio MA is also segmented in relation to more subjective issues, as religion and politics. The maps clearly show the predominance of Catholicism in the city areas with better social indicators, as well as the strong presence of Pentecostals in the metropolitan peripheral municipalities, with worse living conditions.

In relation to politics, the maps on the 2002, 2006 and 2010 elections also bring to light the existence of an electoral division in the MA, since the candidates preferred by voters from areas of high income levels were not successful, as it happens to José Serra and Geraldo Alckmin, for president, and Denise Frossard and Fernando Gabeira, for governor. The candidates who had the support of the people from the poor neighborhoods in the capital city and in the metropolitan periphery, where the majority of voters is, won the elections, as Luiz Inácio Lula da Silva and Dilma Rousseff, for president, and Rosinha Garotinho and Sérgio Cabral, for governor.

Although socio-spatial segregation is nothing new in the MA, it increased during the second half of the twentieth century, with the acceleration of the urbanization process brought about by industrialization, the modernization of agriculture and migrations. So, in the last four decades, there was a significant increase in the number of inhabitants, which went from 6.8 million in 1970 to 11.8 million in 2010, which represented an addition of 5 million new inhabitants, 2 million of which concentrate in the municipality of Rio. Naturally, this increase brings about countless problems in relation to dwellings, sanitation, employments, transport, security, education and health.

Besides these problems, which are not pertaining just to Rio MA, since they also occur in other Brazilian metropolitan areas, as those analyzed in the present work, some political factors that are specific to the city of Rio de Janeiro have contributed to the exacerbation of this difficult situation for the past 50 years. The first one is the changing of the country's capital city from Rio to Brasília, where the federal government started to concentrate its investments. In spite of that, the city of Rio, transformed into the State of Guanabara in 1960, was able to resist the loss of the status of Federal Capital, due to investments that took place in previous periods of its history, from the arrival of Don João VI, in 1808, to the end of president Getúlio Vargas' term of office in 1954. However, the prosperous state of Guanabara did not resist the merger with the impoverished state of Rio de Janeiro in 1975, which meant a real ***drowning embrace****, once the* federal government did not provide the necessary resources for the success of this merging, as it had promised to do.

Nevertheless, if the moving of the capital to Brasília and the merging of these two states were federal government decisions, to which the population could not oppose, the same is not true about the political choices of voters in the city and in the state of Rio de Janeiro, starting at the reestablishment of direct elections for governor of the state in 1982, and for mayor in 1985. From 1982 to 2008, in most of the elections during this period, the candidates elected for mayor of Rio were those who were opposed to state governors, as well as the candidates for governor who were opposed to the presidents of Brazil. For many years, this situation hindered the transfer of more expressive federal resources to the state and the city, as well as created barriers to an articulated action with the three levels of government.

However, due to the choice of Brazil to host the Football World Cup in 2014 and the Olympic Games in Rio in 2016, there has been a greater flow of federal resources into the state and the city. We can already see some of the positive results of these significant fund allocations, such as the revival of the Rio de Janeiro Port area, the construction of houses for the poor population by the program Minha Casa Minha Vida (My House, my Life), the Public Security actions with the creation of UPPs - Unidades de Polícia Pacificadora (Pacifying Police Units) in several slums in the city, the improvement of transport systems with the expansion of the subway towards Barra da Tijuca and the creation of the ***Bus Rapid Transit*** *system*, such as BRTs TransCarioca and TransOeste.

In fact, due to these major international events, the results of the transformation undergone by the city can be evaluated by another analysis job based on the data that will be collected by the 2020 Demographic Census. Then, it will be possible to understand how the several problems pointed out along the present study have been met and the socio-spatial segregation reduced, making Rio de Janeiro a city with better quality conditions for its citizens and more friendly for its visitors.

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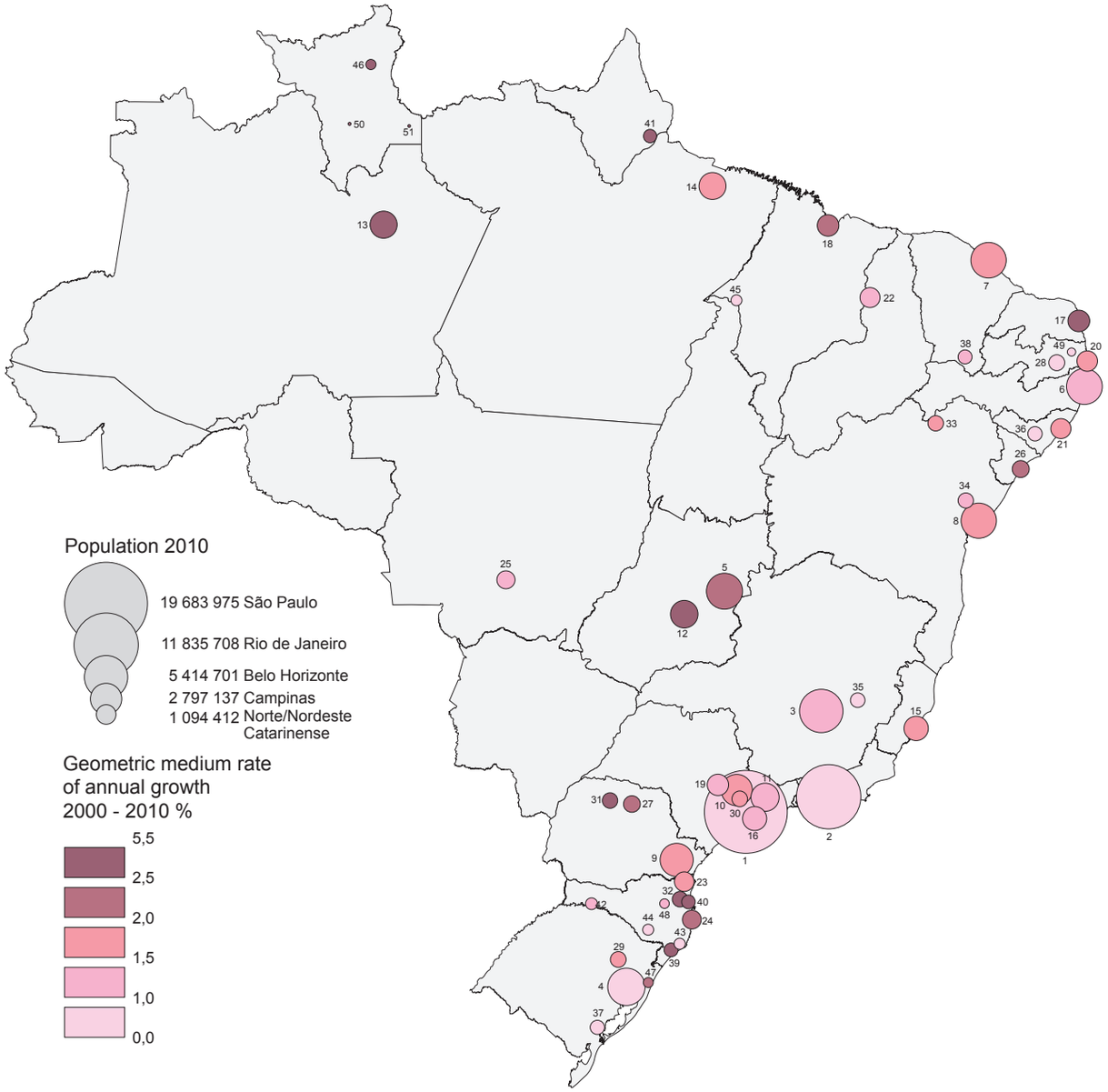
Maps

Population and demographic growth in Brazilian cities 2000 – 2010



Name	Type	Pop. 2010	Anual rate of change
1 São Paulo	RM	19 683 975	0,97
2 Rio de Janeiro	RM	11 835 708	0,86
3 Belo Horizonte	RM	5 414 701	1,17
4 RM Porto Alegre	RM	3 978 470	0,84
5 Distrito Federal e Entorno	RIDE	3 717 728	2,33
6 Recife	RM	3 690 547	1,01
7 Fortaleza	RM	3 615 767	1,94
8 Salvador	RM	3 573 973	1,69
9 Curitiba	RM	3 174 201	1,53
10 Campinas	RM	2 797 137	1,81
11 Vale do Paraíba	RM	2 264 594	1,30
12 Goiânia	RM	2 173 141	2,86
13 Manaus	RM	2 106 322	2,50
14 Belém	RM	2 101 883	1,59
15 Grande Vitória	RM	1 687 704	1,70
16 Baixada Santista	RM	1 664 136	1,20
17 Natal	RM	1 351 004	2,62

Name	Type	Pop. 2010	Anual rate of change
18 Grande São Luís	RM	1 331 181	2,20
19 Piracicaba	AU	1 307 256	1,12
20 João Pessoa	RM	1 198 576	1,66
21 Maceió	RM	1 156 364	1,57
22 Grande Teresina	RIDE	1 150 959	1,33
23 Norte/ Nordeste Catarinense	RM	1 094 412	1,68
24 Florianópolis	RM	1 012 233	2,17
25 Vale do Rio Cuiabá	RM	944 163	1,24
26 Aracaju	RM	835 816	2,17
27 Londrina	RM	801 817	2,16
28 Campina Grande	RM	736 381	0,77
29 Urbana do Nordeste	AU	716 427	1,70
30 Jundiaí	AU	698 724	1,88
31 Maringá	RM	690 303	3,83
32 Vale do Itajaí	RM	689 731	2,50
33 Pólo Petrolina e Juazeiro	RIDE	686 410	1,95
34 Feira de Santana	RM	673 637	1,45

Name	Type	Pop. 2010	Anual rate of change
35 Vale do Aço	RM	615 297	0,89
36 Agreste	RM	601 049	0,77
37 do Sul	AU	578 034	0,37
38 Cariri	RM	564 478	1,28
39 Carbonífera	RM	550 206	5,41
40 Foz do Rio Itajaí	RM	532 771	3,56
41 Macapá	RM	499 466	3,25
42 Chapecó	RM	409 545	1,33
43 Tubarão	RM	356 721	0,95
44 Lages	RM	350 532	0,08
45 Sudoeste Maranhense	RM	345 873	0,62
46 da Capital	RM	298 215	3,62
47 Litoral Norte	AU	283 959	2,07
48 Alto Vale do Itajaí	RM	269 424	1,06
49 Guarabira	RM	193 671	0,28
50 Central	RM	27 094	3,60
51 Sul do Estado	RM	21 633	2,98

Source: IBGE - Demographic Census 2000 and 2010
Elaboration: Emplasa/UDI, 2011 - MA= Metropolitan Area, UA= Urban Agglomeration, AIED = Area of Integrated Economic Development

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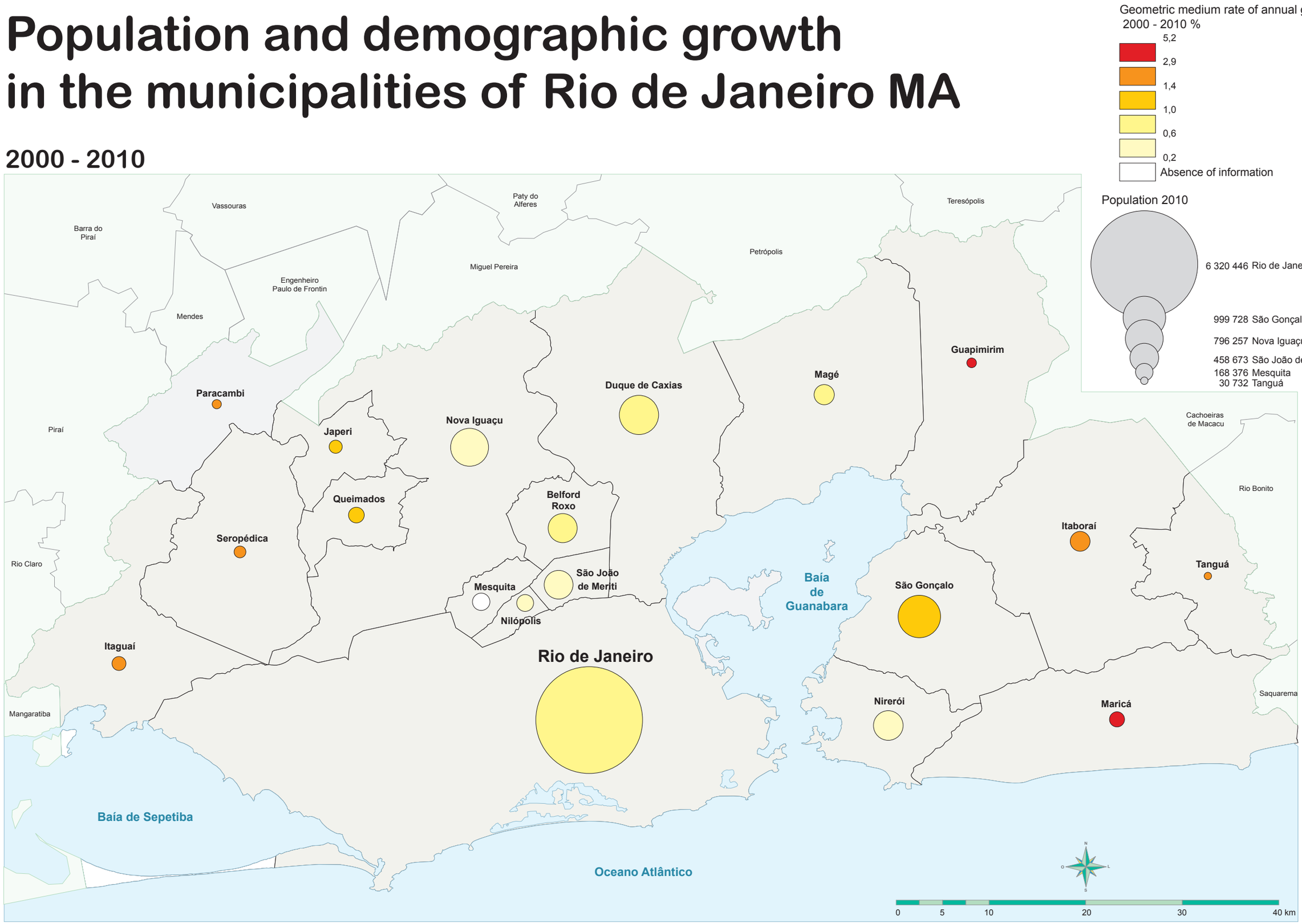
Fig. 1

Population and demographic growth in the municipalities of Rio de Janeiro MA

2000 - 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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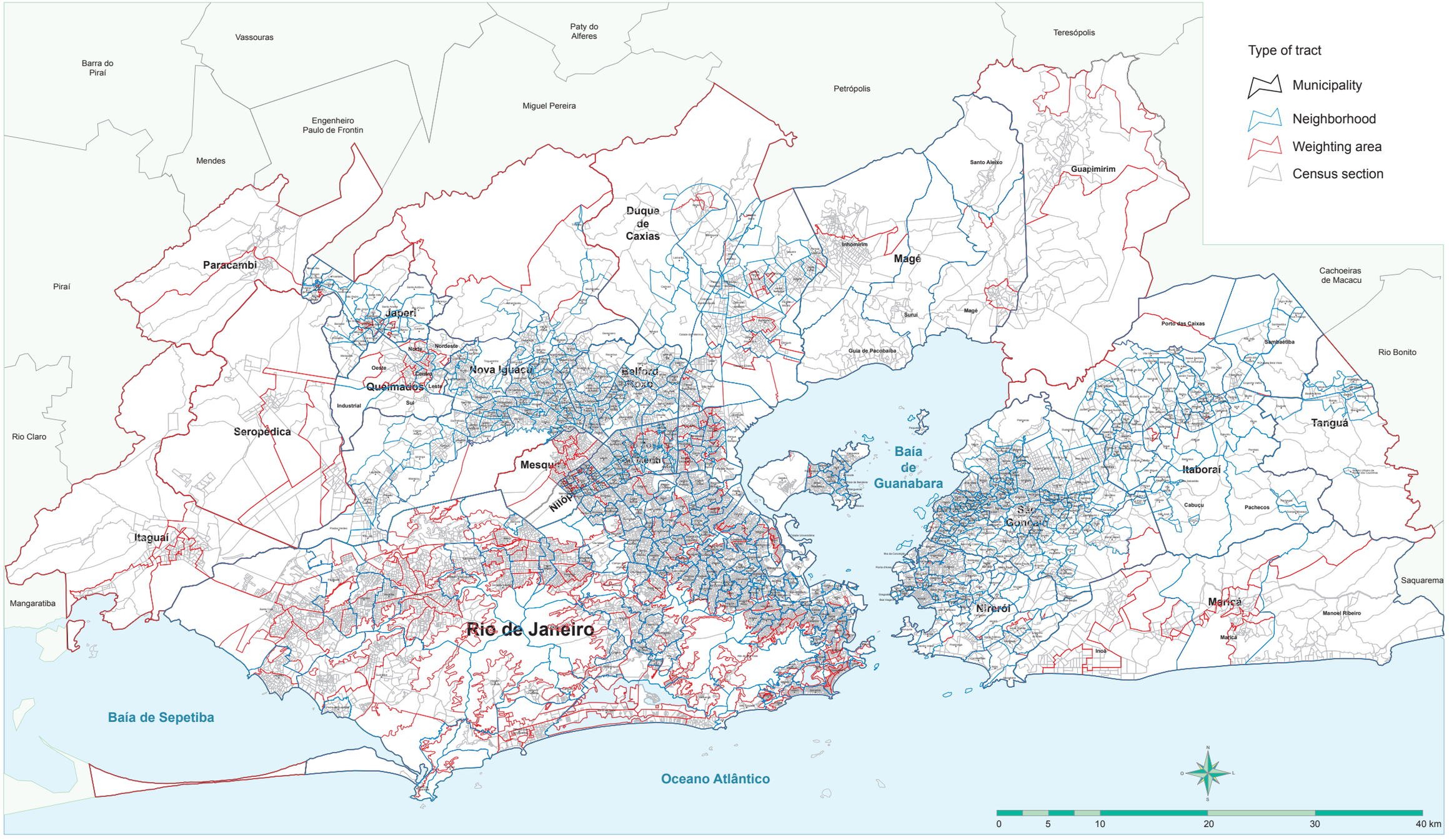
Fig. 2

Territory Tracts

2010



Source: IBGE - 2010 Demographic Census (Digital tracts 2010)

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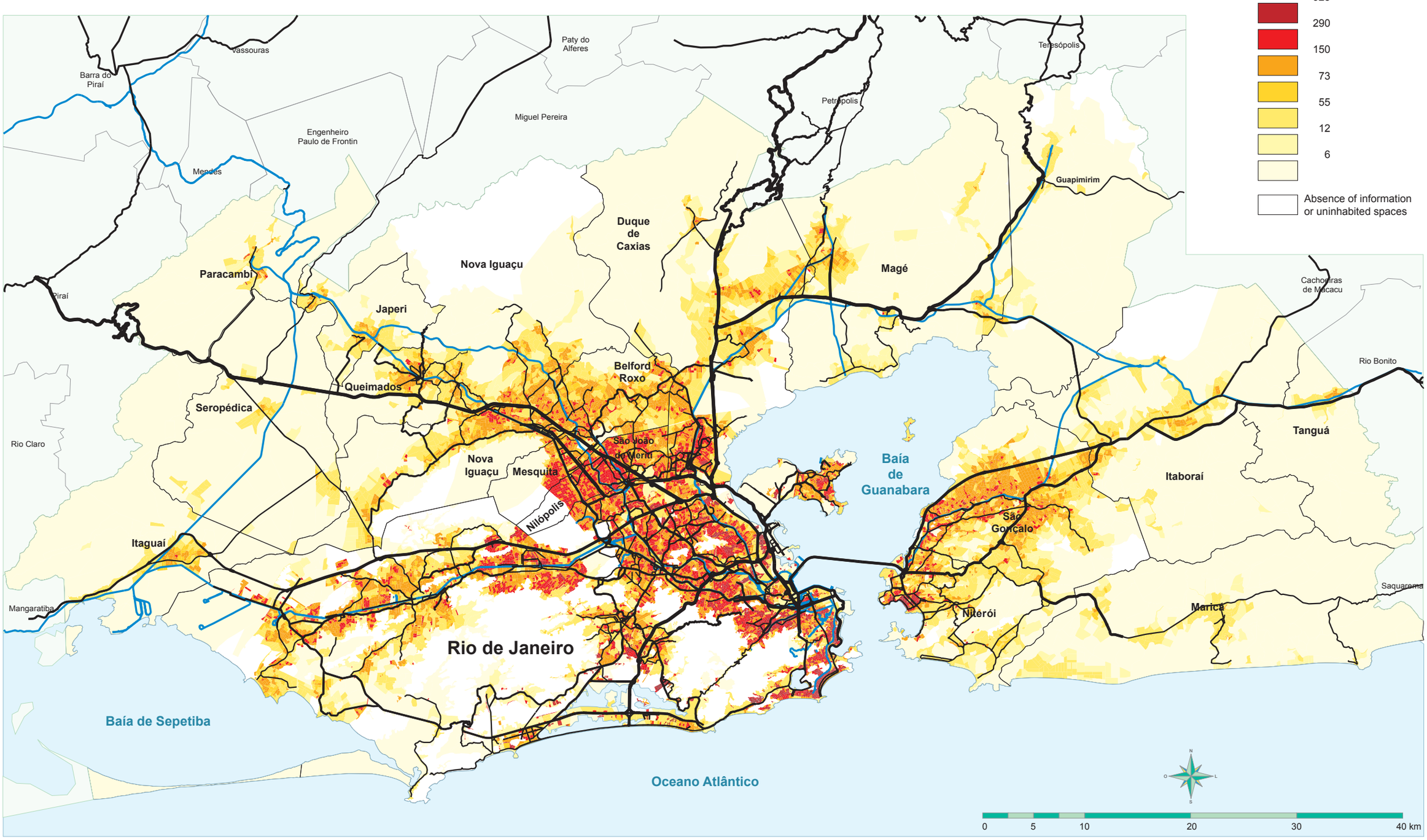
Fig. 3

Population Density

2010



Source: IBGE – 2010 Demographic Census (Universe – Census Tracts)

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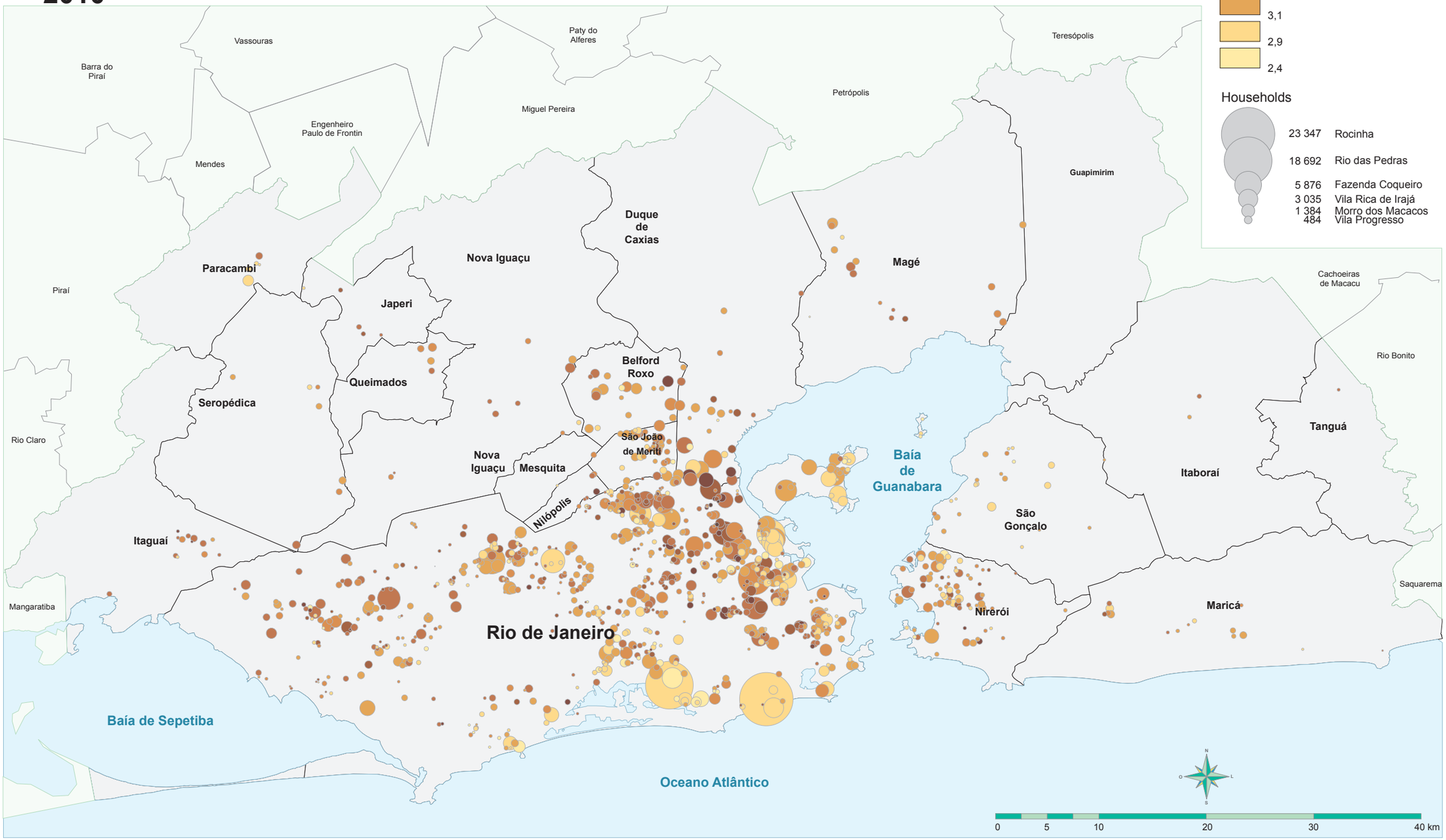
Fig. 4

Subnormal Agglomerates (slums)

2010



Source: IBGE – 2010 Demographic Census (Universe - Census tracts)

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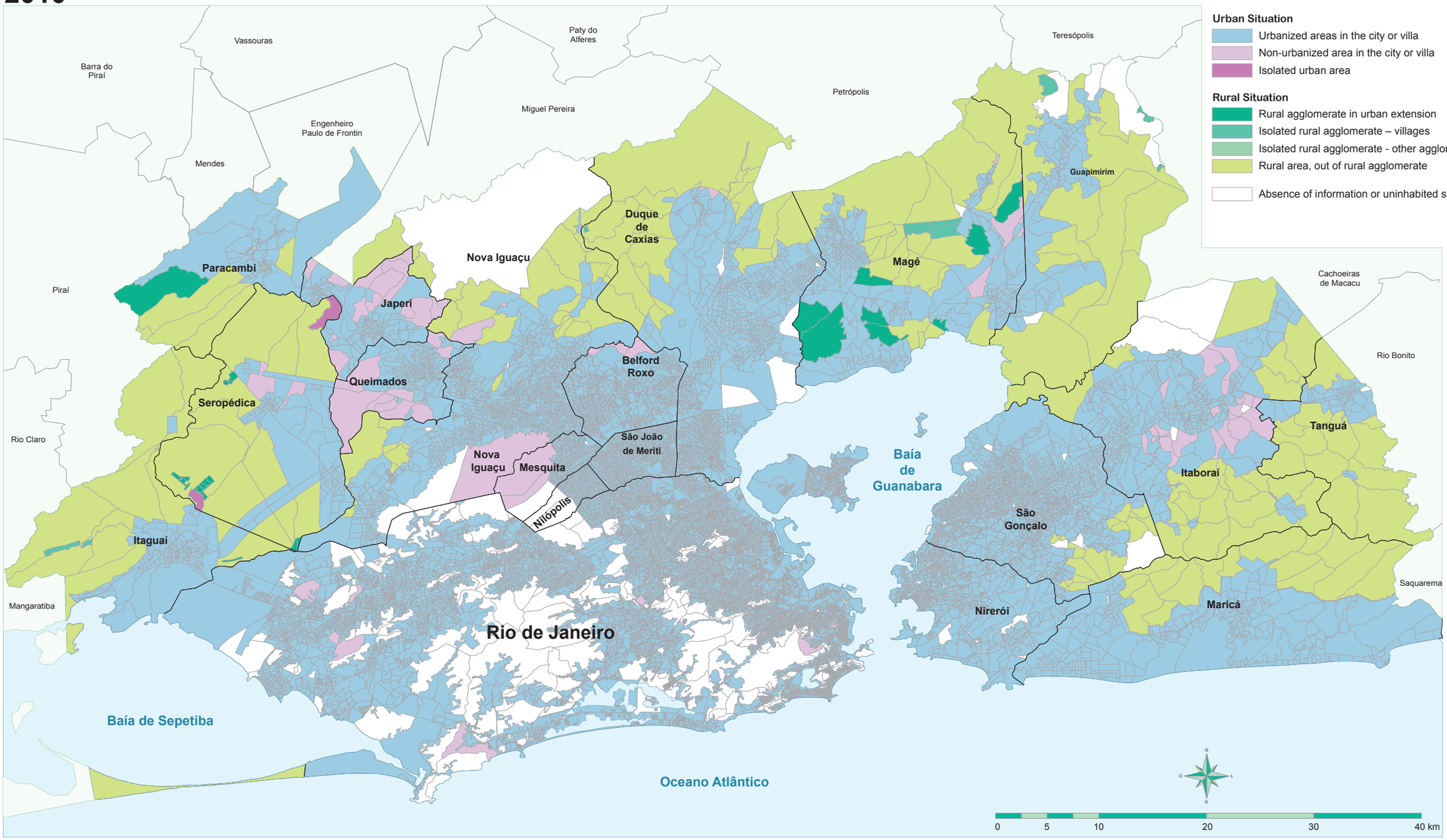
Fig. 5

Census sections situation

2010



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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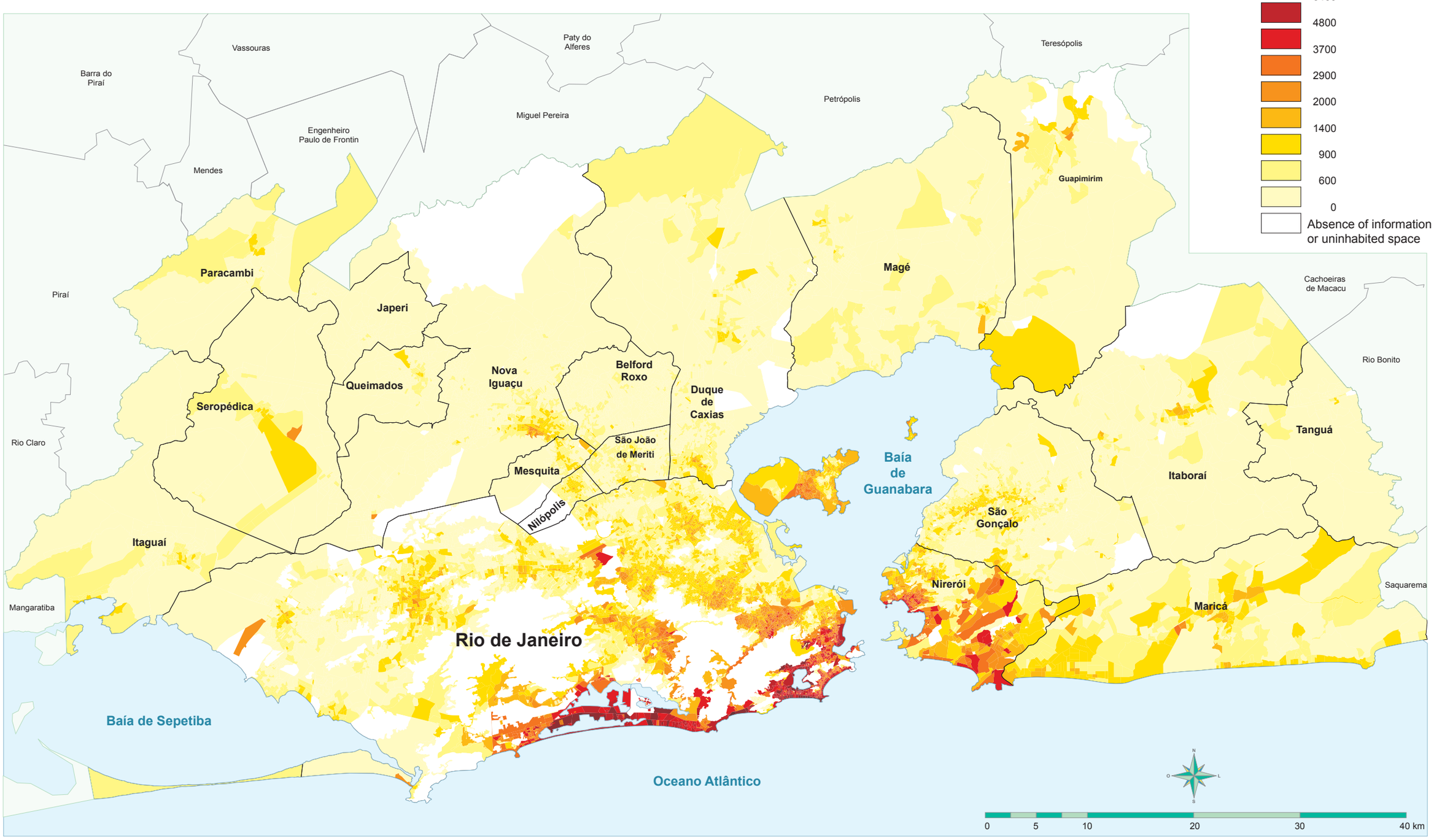
Fig. 6

Value of the nominal average monthly income

people over 10 years old (with or without income) 2010



Source: IBGE - 2010 Demographic Census (Universe - Census tracts)

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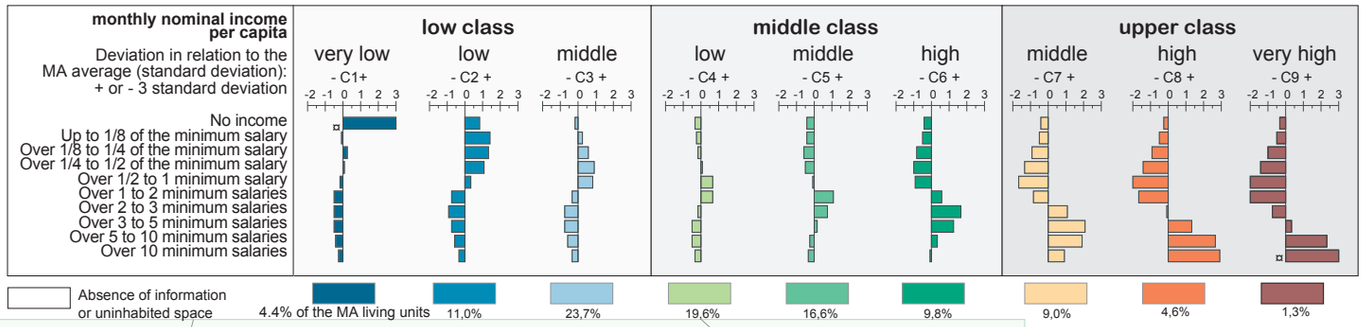
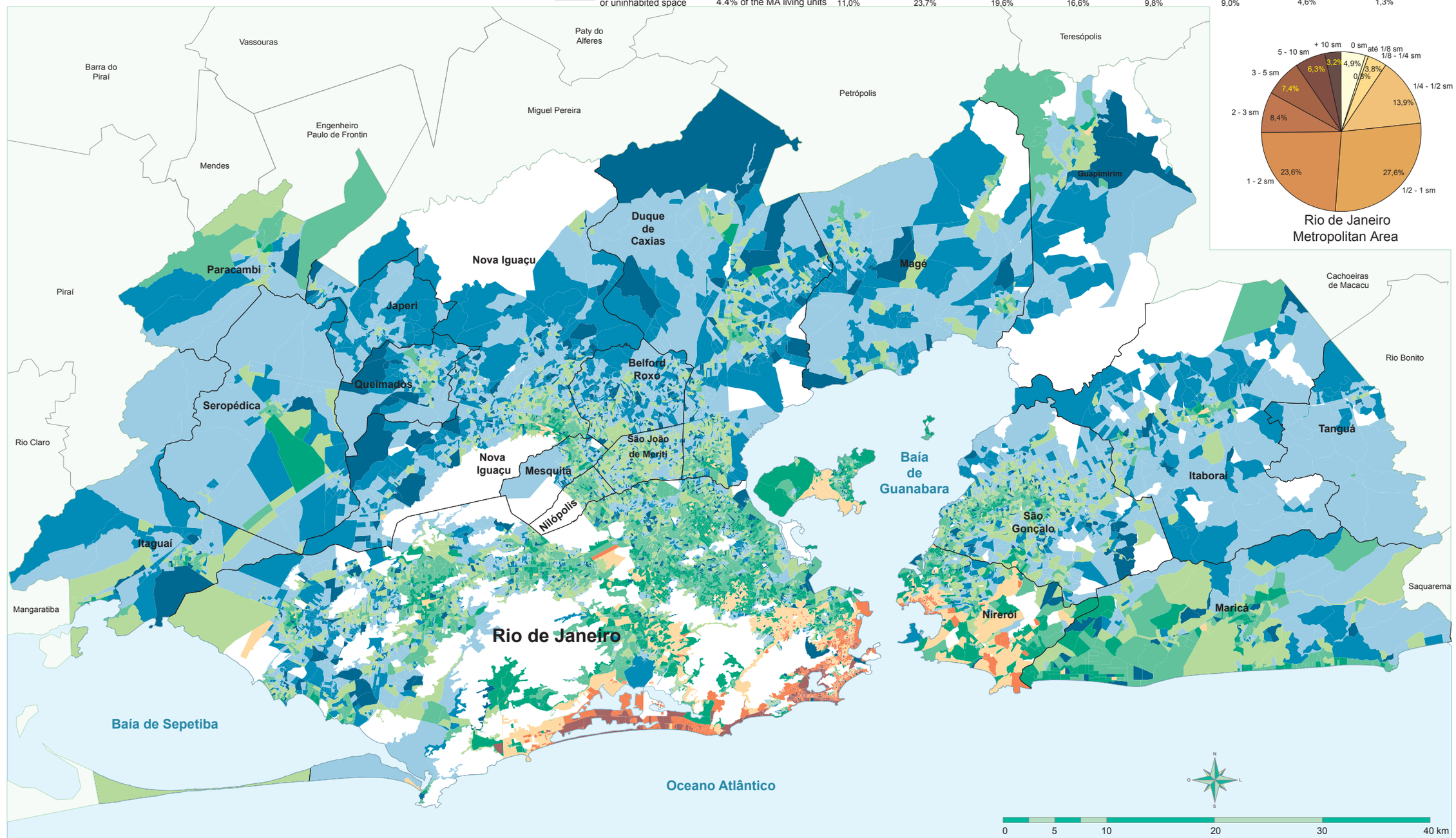
Fig. 7

Income levels

monthly nominal income per household 2010





Source: IBGE - 2010 Demographic Census (Universe - Census tracts)

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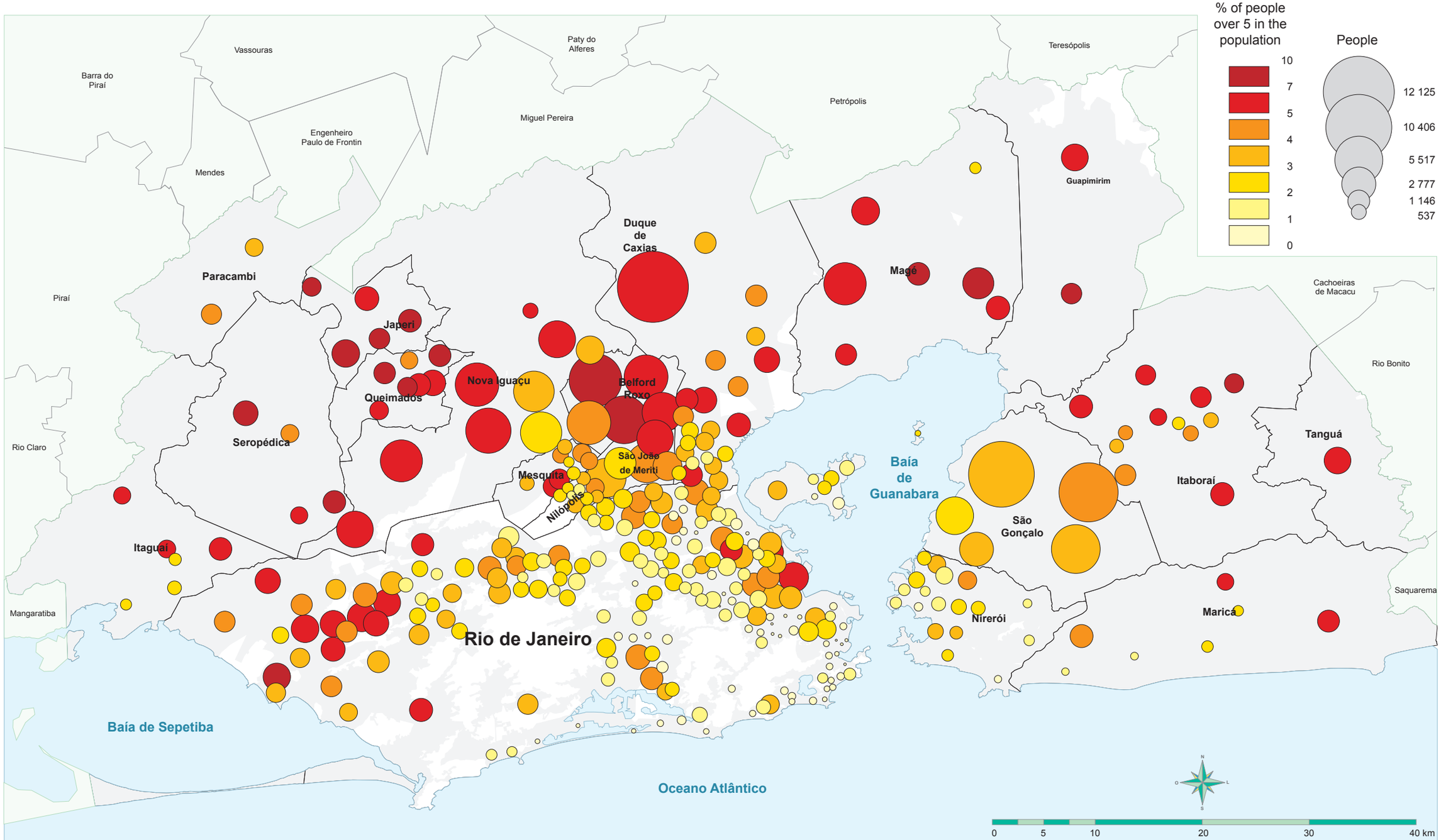
← p.61

Fig. 8

Beneficiaries from Social Programs Bolsa Família or Eradication of Child Labor – PETI

In July 2010



Source: IBGE - 2010 Demographic Census (Sample - weighting areas)

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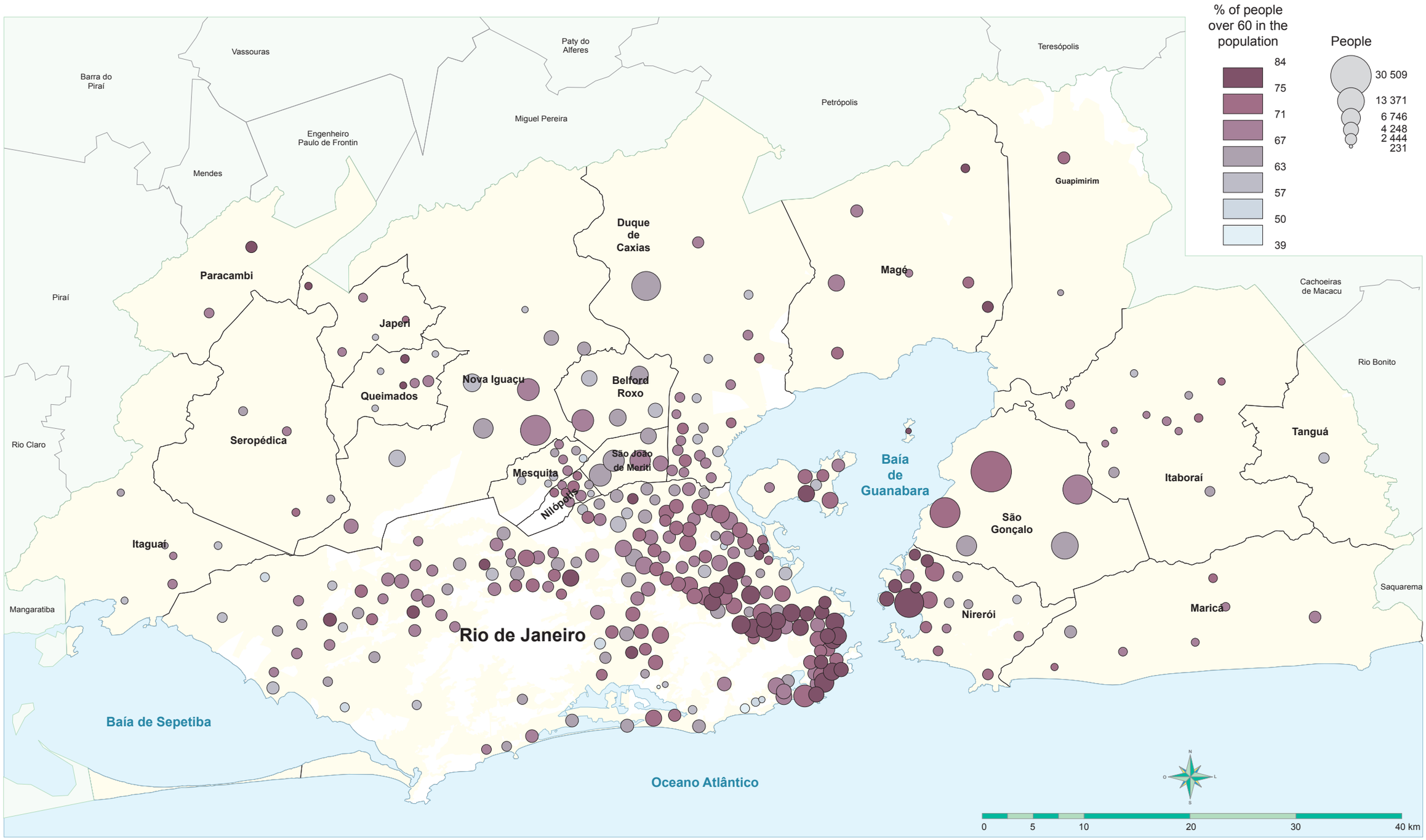
Fig. 9

Retirees and Pensioners over 60 years of age

In July 2010



Source: IBGE - 2010 Demographic Census (Sample - Weighting Areas)

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Fig. 10

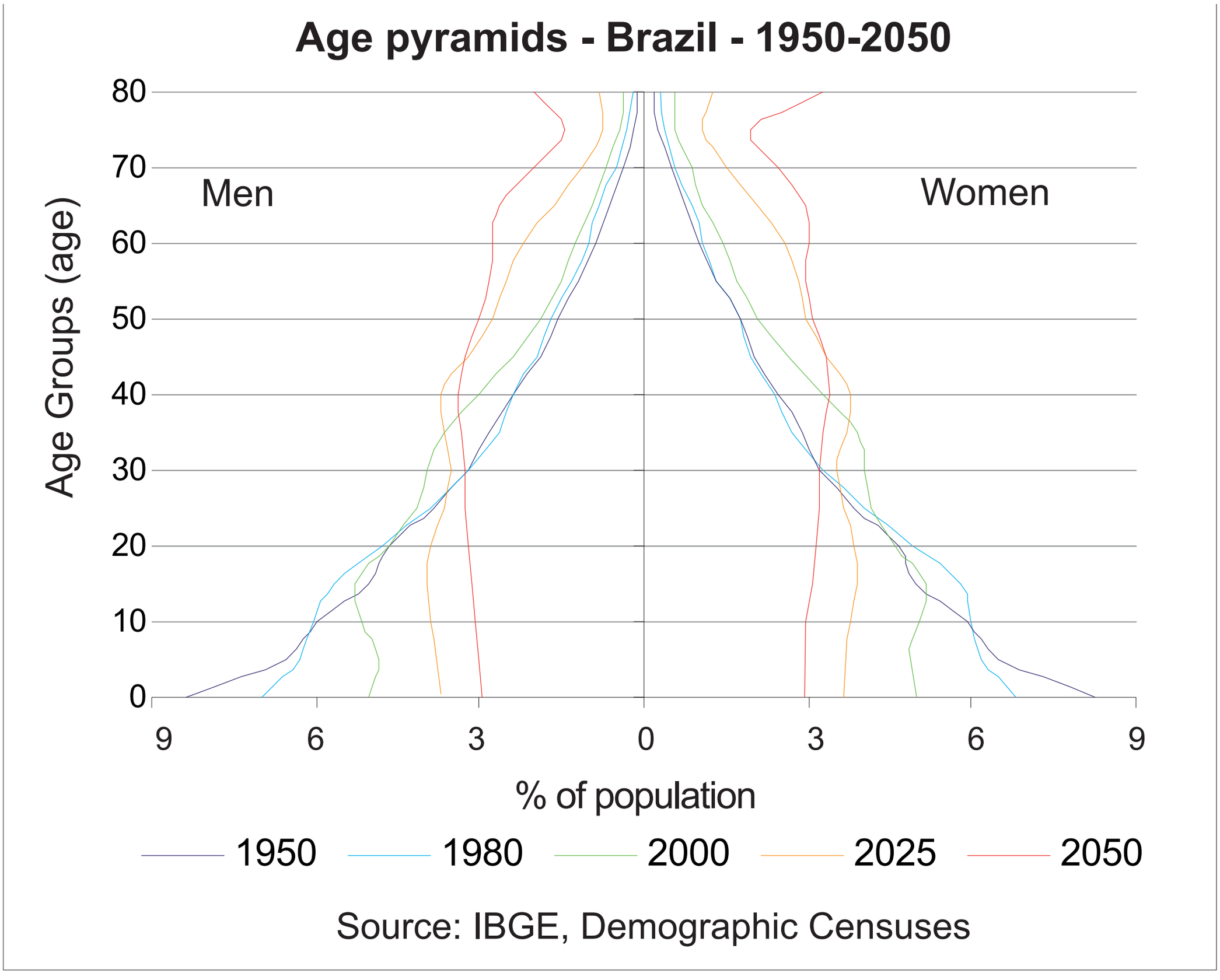

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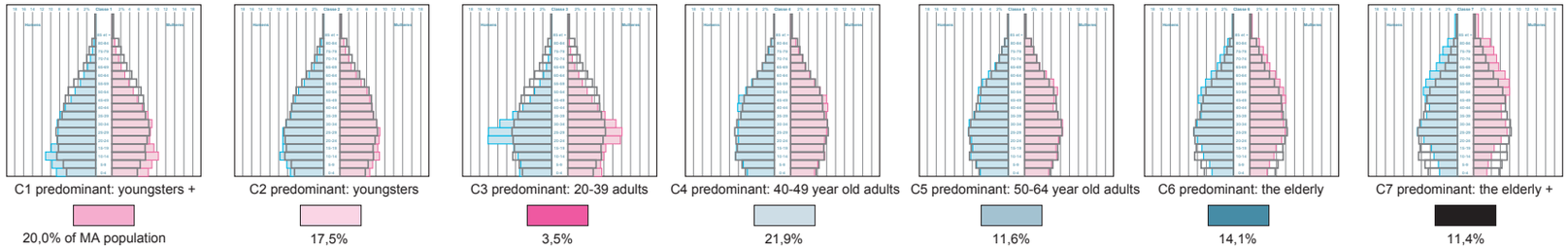
Fig. 11

Age structure

2010



Source: IBGE - 2010 Demographic Census (Universe - Census tracts)

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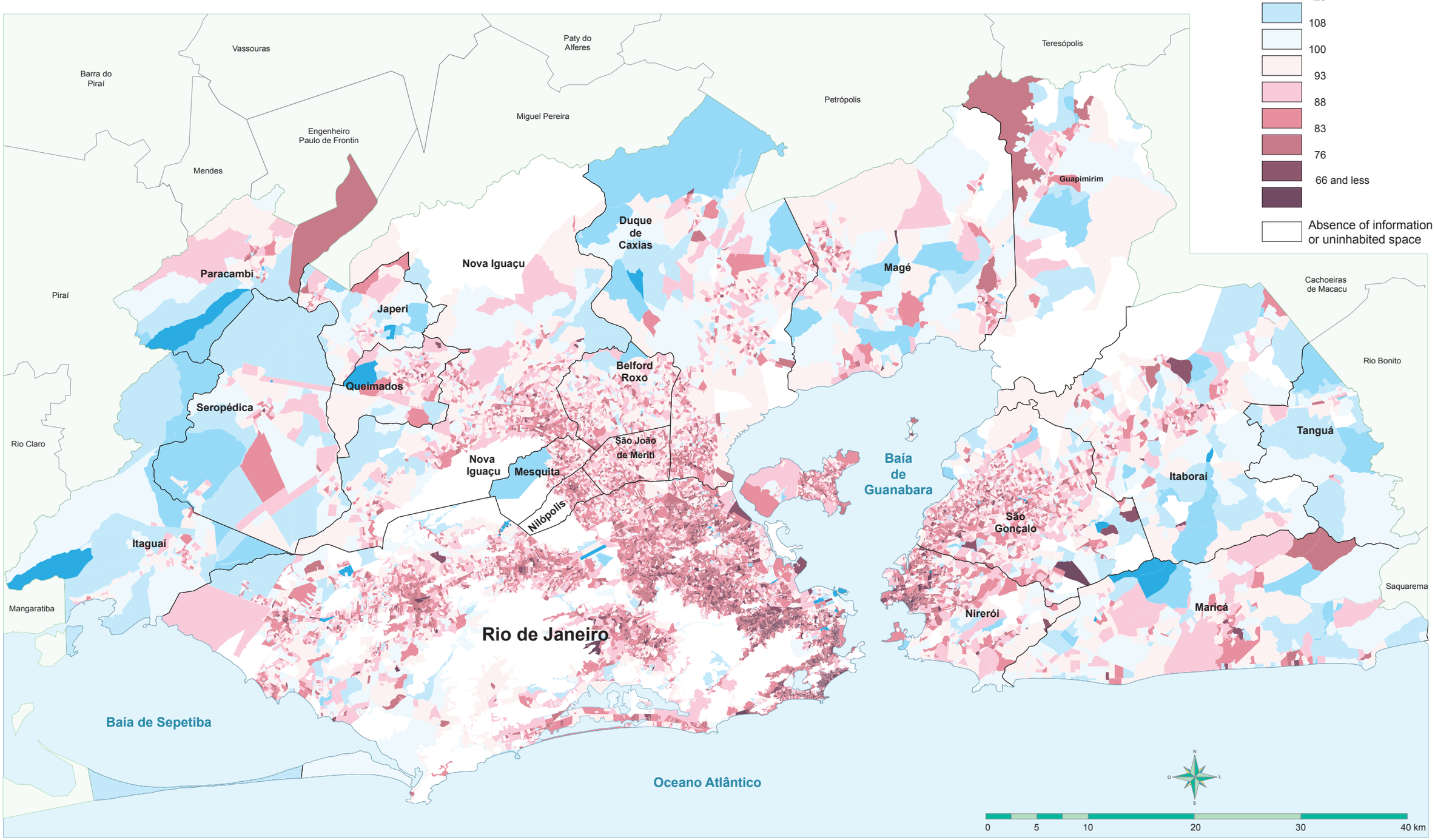
Fig. 12

Masculinity proportion

2010



Source: IBGE - 2010 Demographic Census (Universe - Census tracts)

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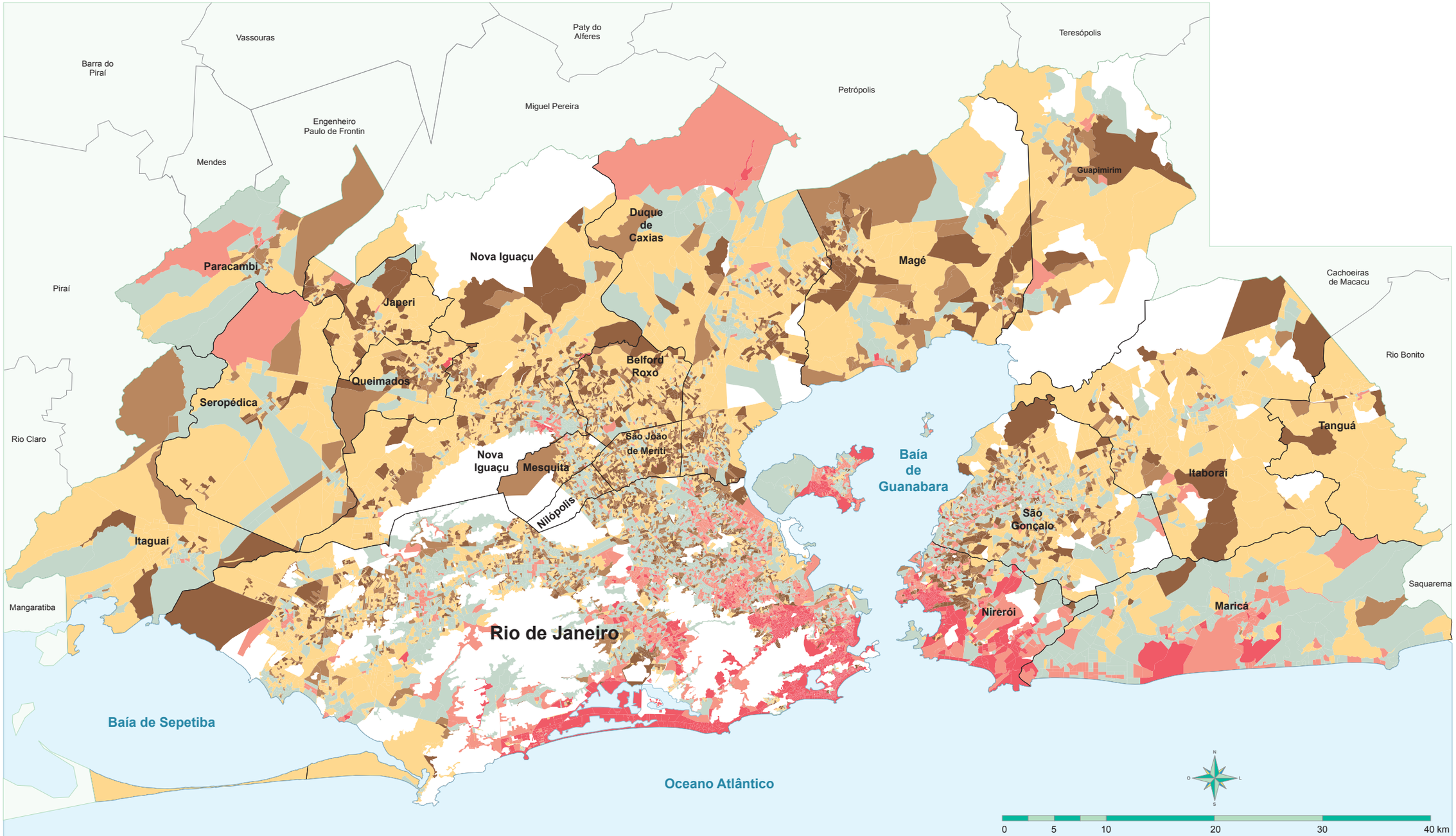
Fig. 13

Color or race

2010

Class		Predominant	Population	% White	% Brown	% Black	% Yellow	% Indian
1		Brown and Black ++	1 456 824	26,8	47,9	24,0	1,2	0,1
2		Brown and Black +	1 471 607	40,0	41,3	17,5	1,0	0,1
3		Brown and Black	3 702 556	32,4	54,1	12,5	0,8	0,1
4		Mixed	2 835 634	50,7	38,4	10,0	0,6	0,1
5		White	1 111 271	67,7	24,9	6,7	0,5	0,1
6		White +	1 246 594	85,2	11,4	2,7	0,6	0,1
RM RJ			11 824 486	46,0	40,8	12,4	0,8	0,1
		Absence of information or uninhabited space						



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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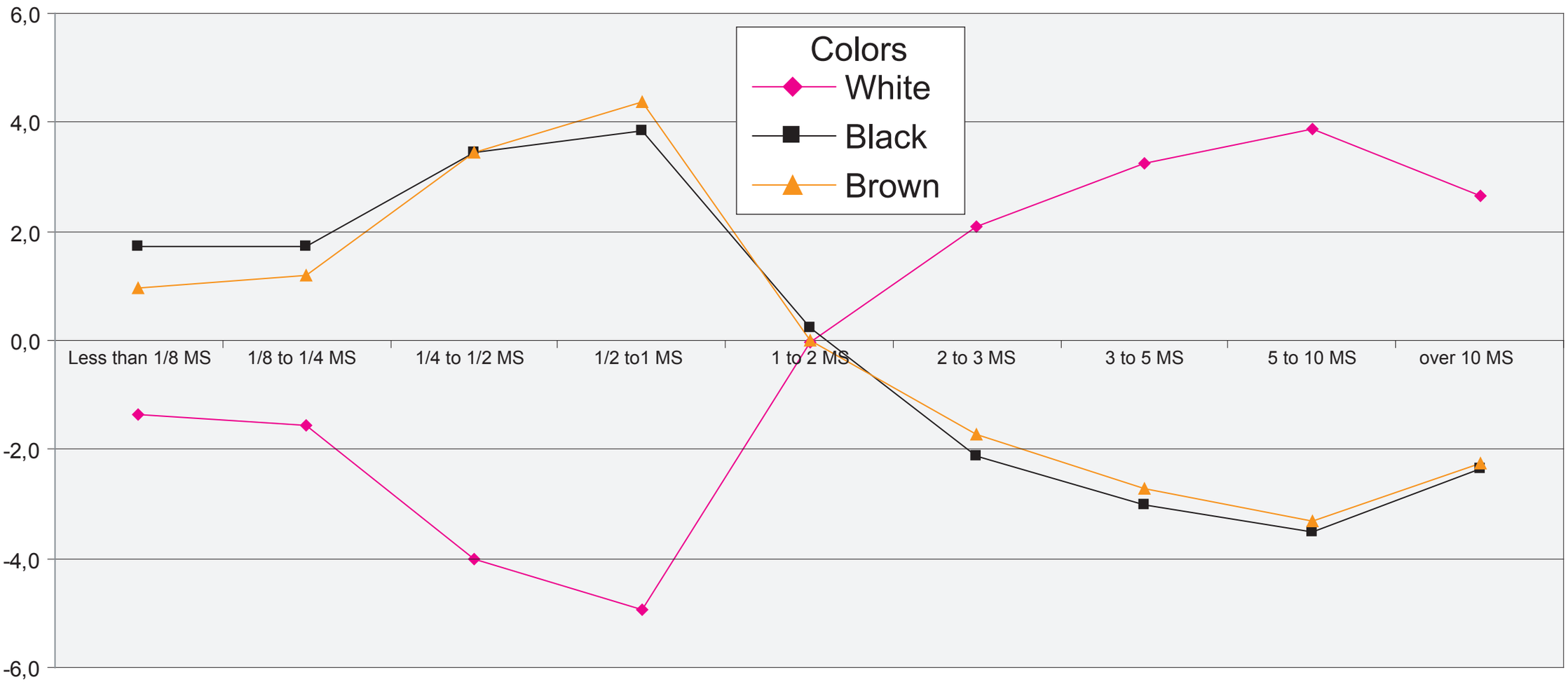
Fig. 14

Monthly income per capita and per color - minimum salaries – July 2010
Differences with Rio de Janeiro Metropolitan Area average profile
in percentage points



Source: IBGE - 2010 Demographic Census (Universe questionnaire)

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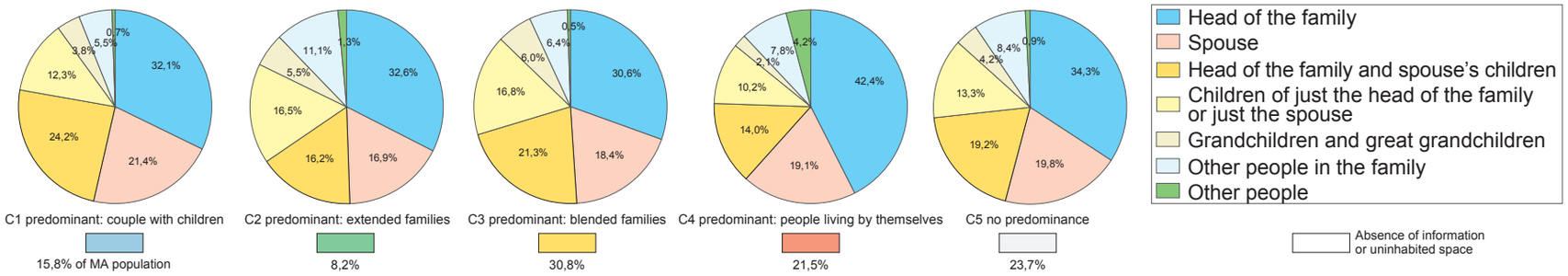
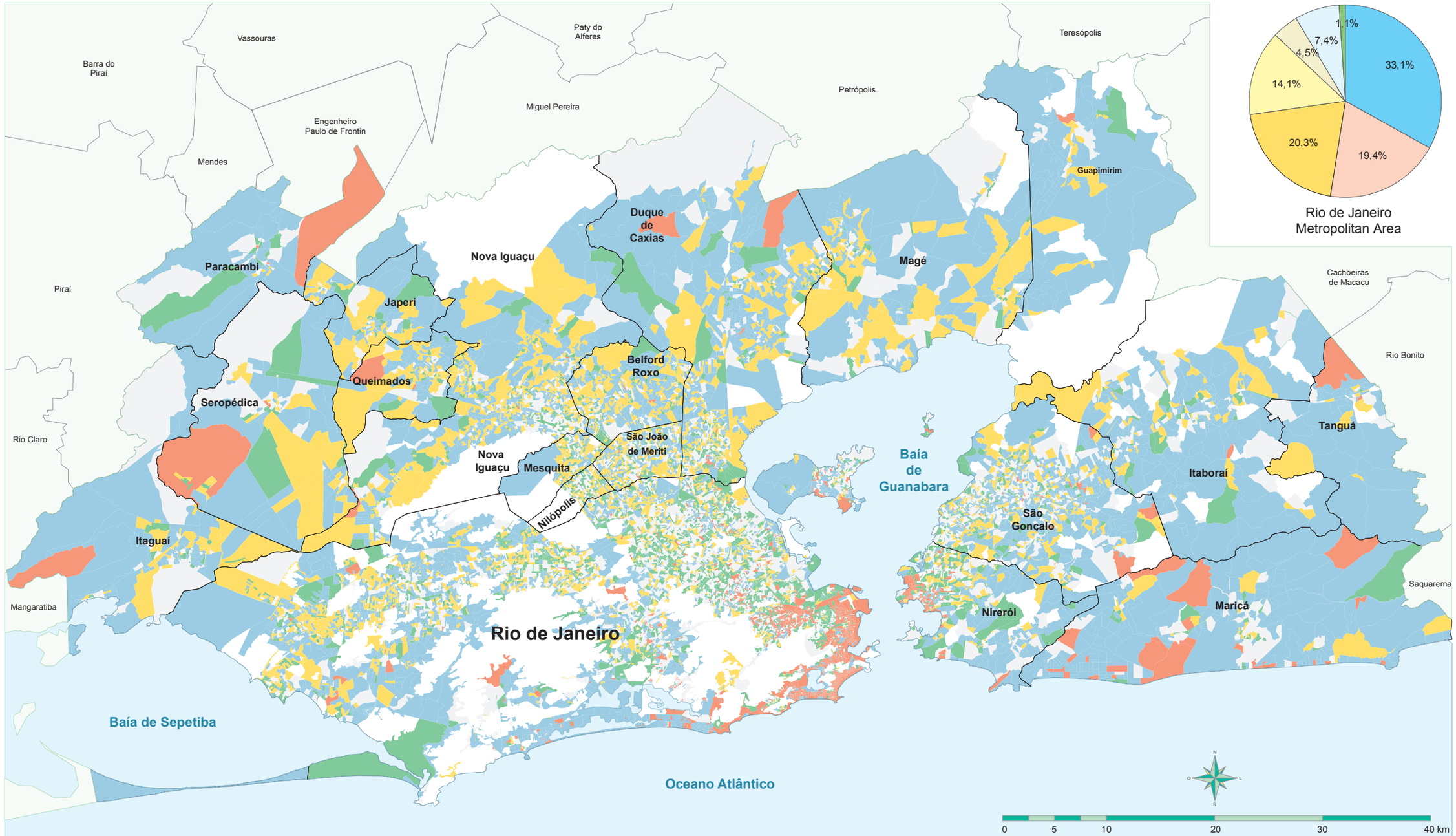
Fig. 15

Family relations

2010





Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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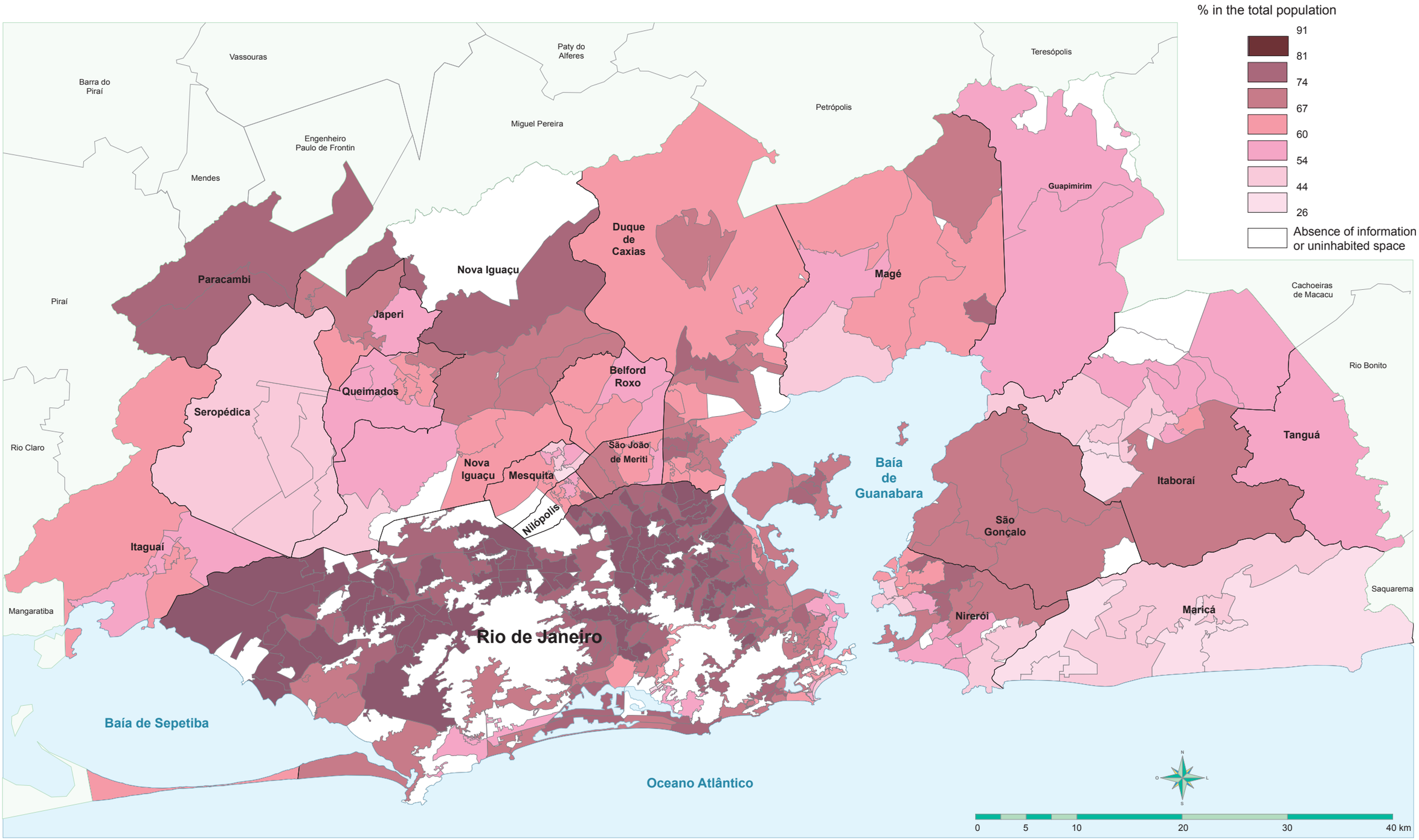
Fig. 16

People born in their residence municipality

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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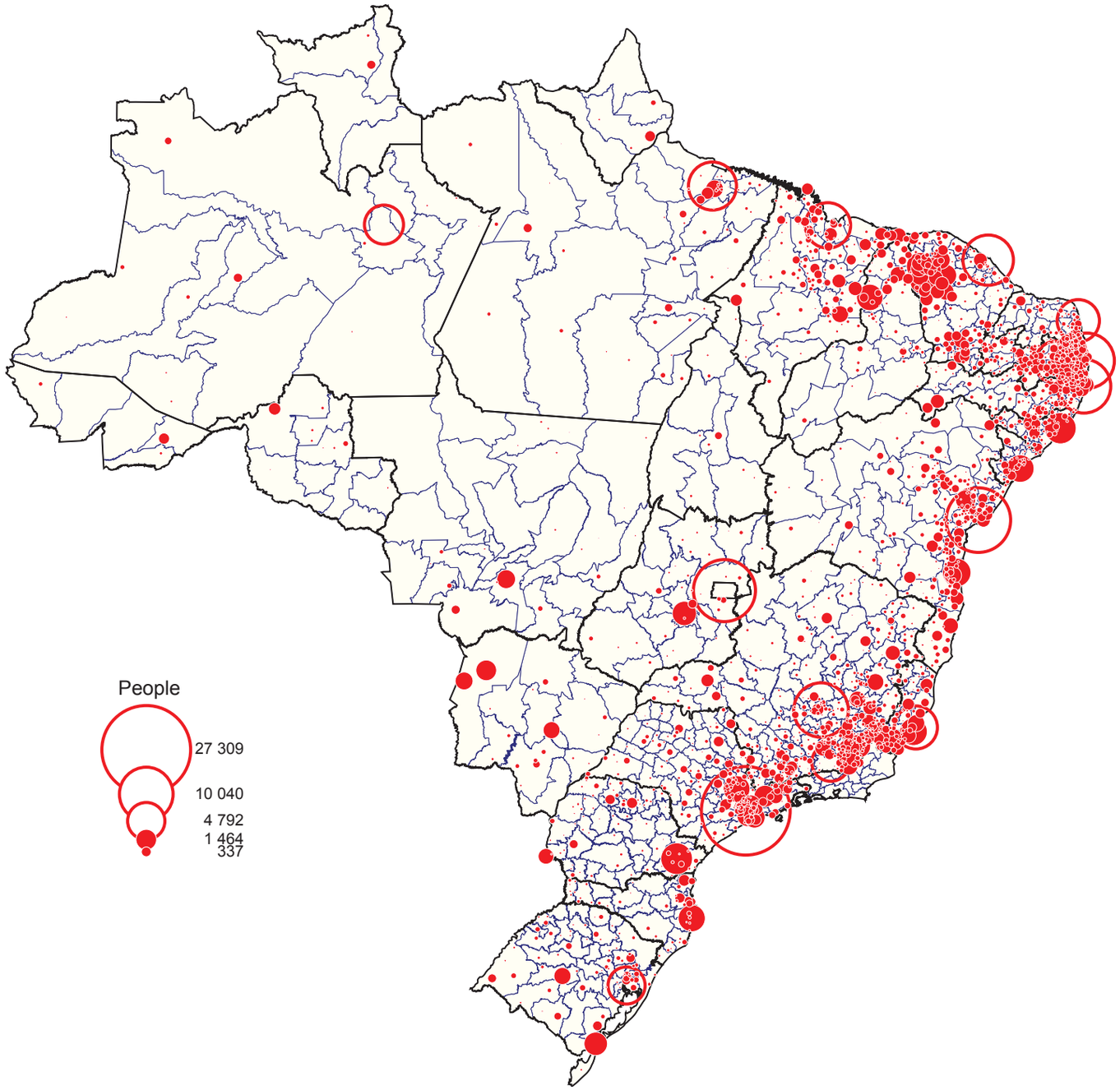
Fig. 17

Micro regions of previous residence* of new Rio de Janeiro Metropolitan Area inhabitants, 2010



*excluded municipalities in the State of Rio de Janeiro

Source: IBGE - 2010 Demographic Census (Sample)

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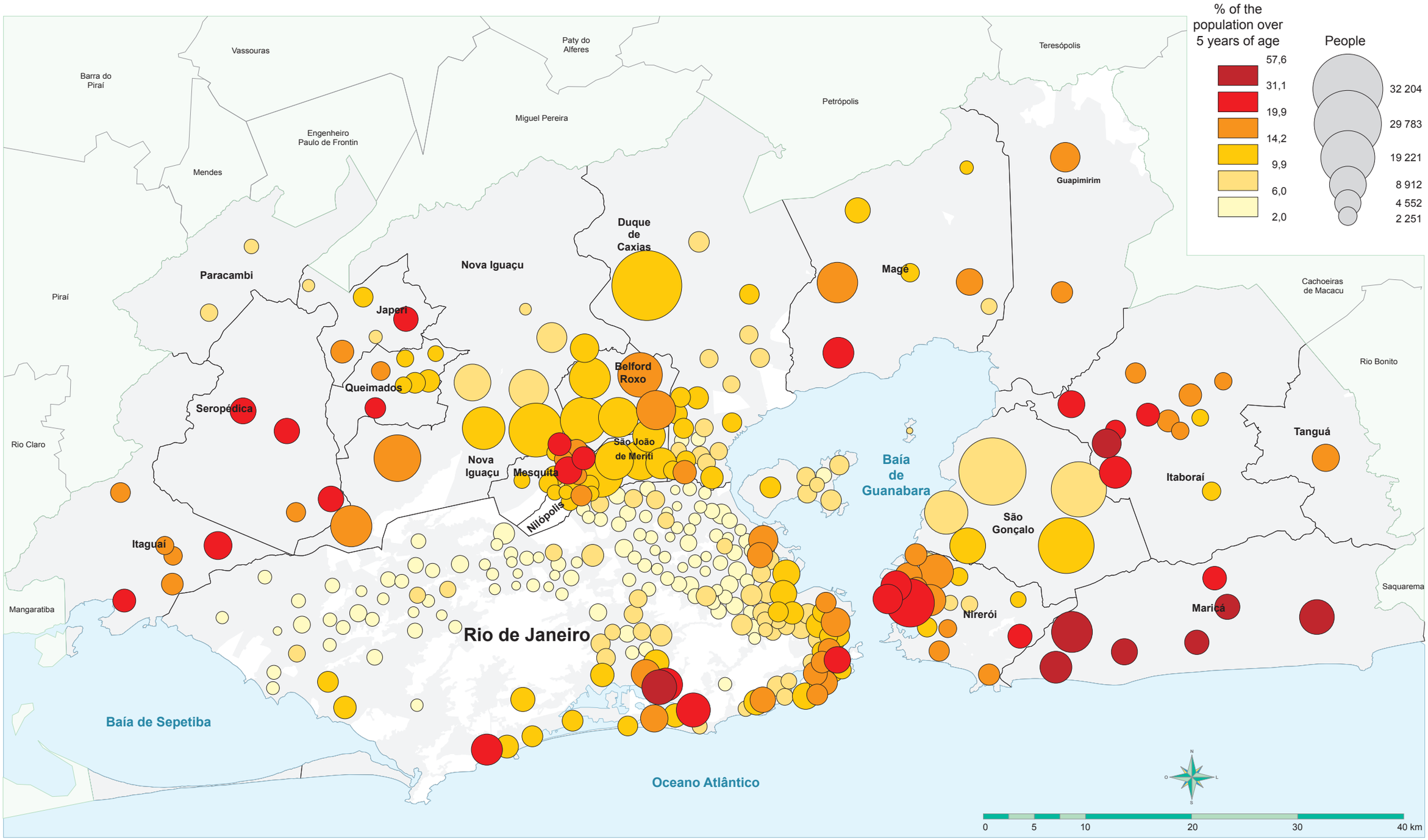
Fig. 18

Migrants

2000 - 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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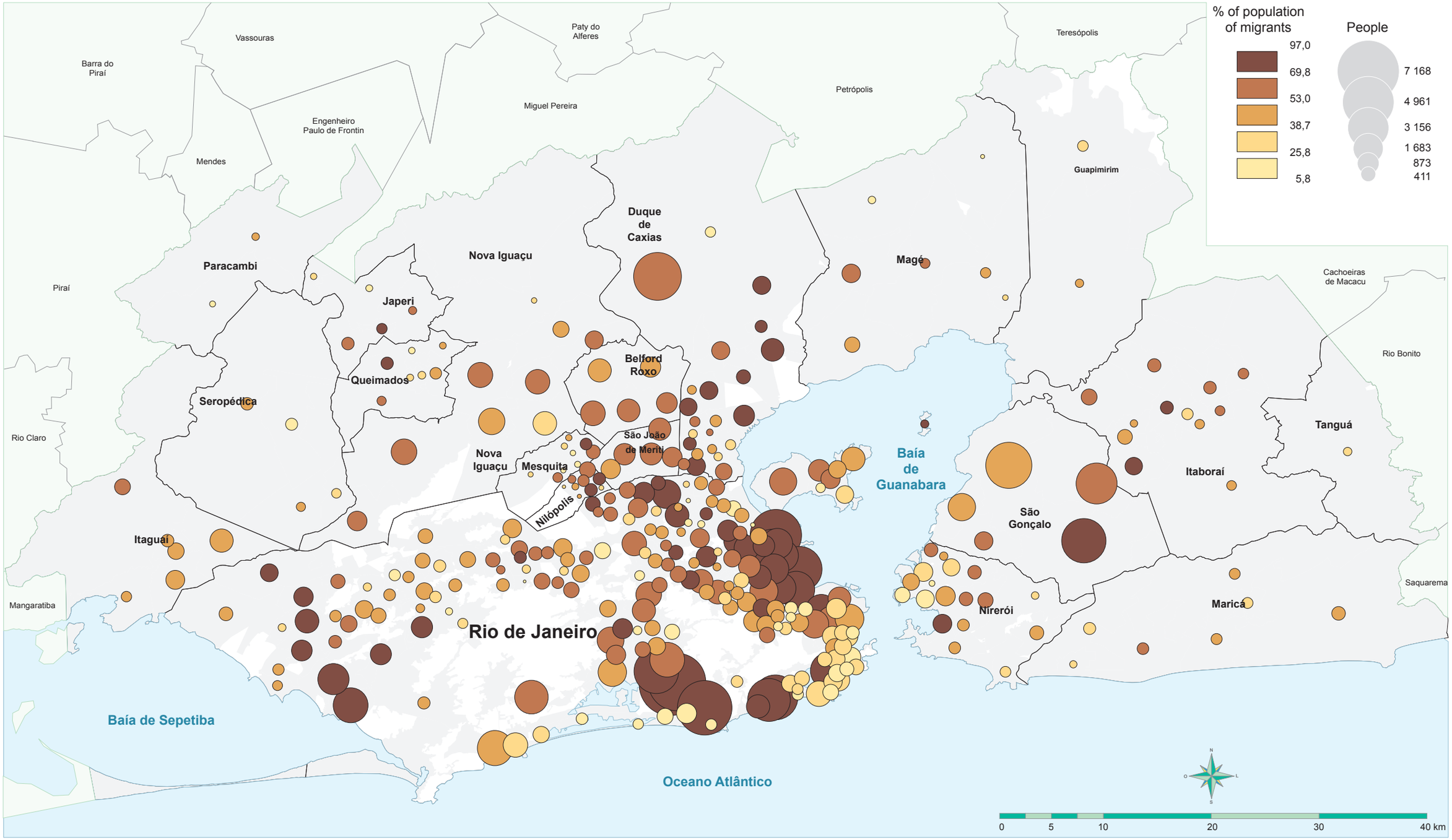
Fig. 19

Migrants from the Northeast Region

2000 - 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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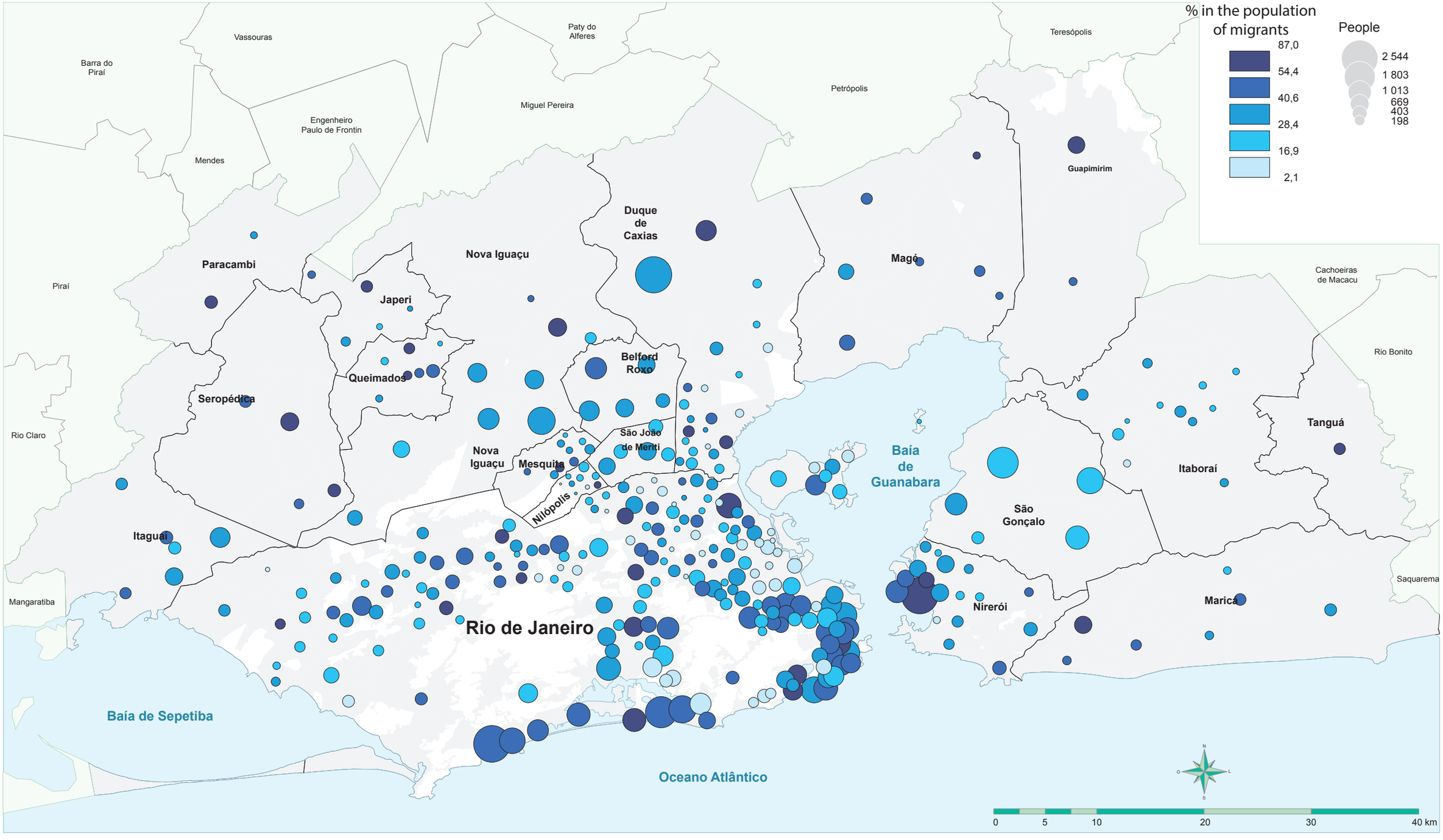
Fig. 20

Migrants from the Southeast Region

2000 - 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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Fig. 21

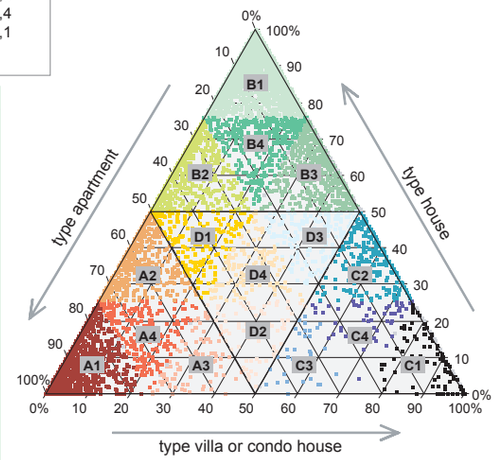
Types of living units

2010

Classes	Living units	% of Houses	% of villa or condo houses	% of Apartments
		Predominant type: apartments		
A1	687 903	4,0	1,5	94,5
A2	121 621	36,1	3,4	60,5
A3	19 277	9,0	31,0	60,0
A4	58 007	17,4	13,4	69,2
		Predominant type: houses		
B1	2 393 817	95,5	2,2	2,3
B2	148 656	61,3	3,1	35,6
B3	120 019	62,0	33,7	4,3
B4	90 193	69,8	16,1	14,1
RJ MA	3 852 925	69,2	6,2	24,6

Classes	Living units	% of houses	% villa or condo houses	% of apartments
		Predominant type: villa or condo houses		
C1	22 240	8,5	88,7	2,8
C2	48 926	36,6	59,2	4,2
C3	6 497	10,0	56,4	33,6
C4	11 953	21,2	66,6	12,2
		Mixed type		
D1	43 229	42,5	14,2	43,3
D2	15 994	17,3	40,7	42,0
D3	37 627	43,8	41,8	14,4
D4	26 966	34,5	31,4	34,1

Absence of information or uninhabited space



Source: IBGE - 2010 Demographic Census (Universe – census tracts)

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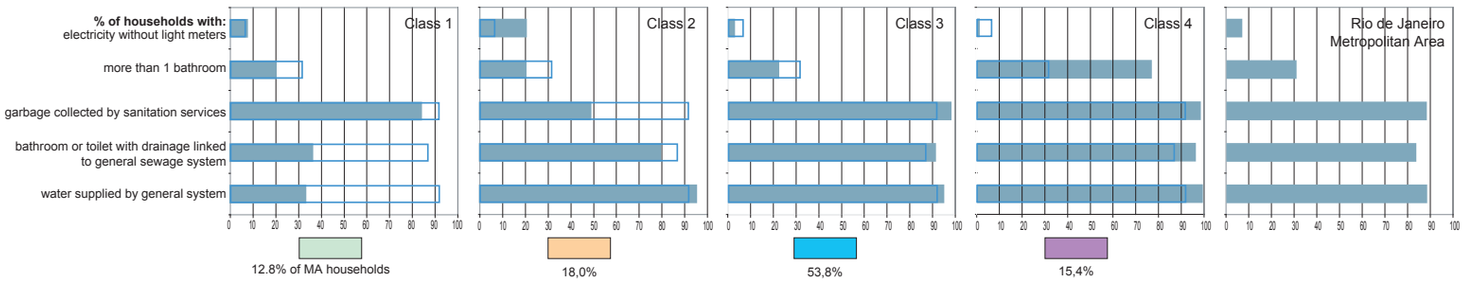
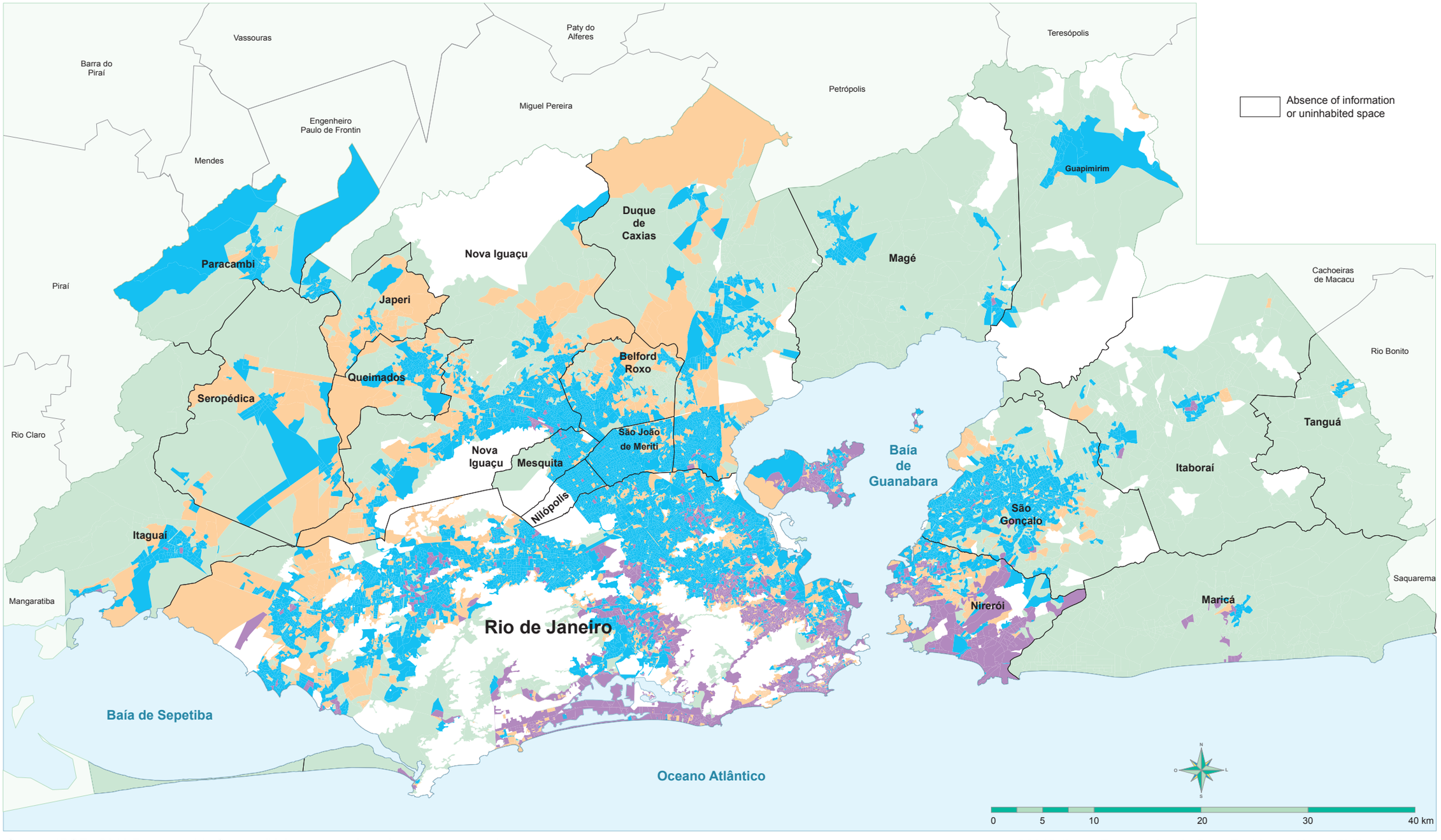
Fig. 22

Water supply
Bathrooms and sewage
Garbage destination
Electric Power distribution

2010





Source: IBGE - 2010 Demographic Census (Universe questionnaire – census tracts)

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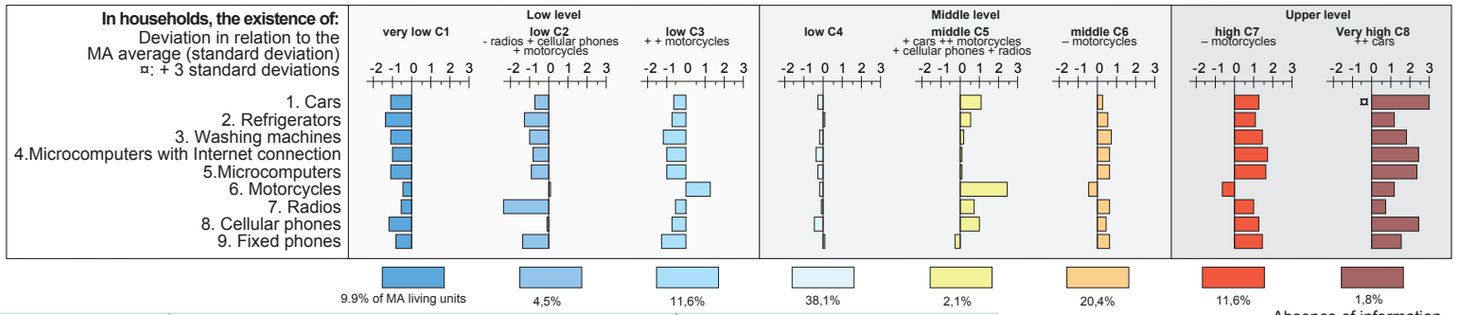
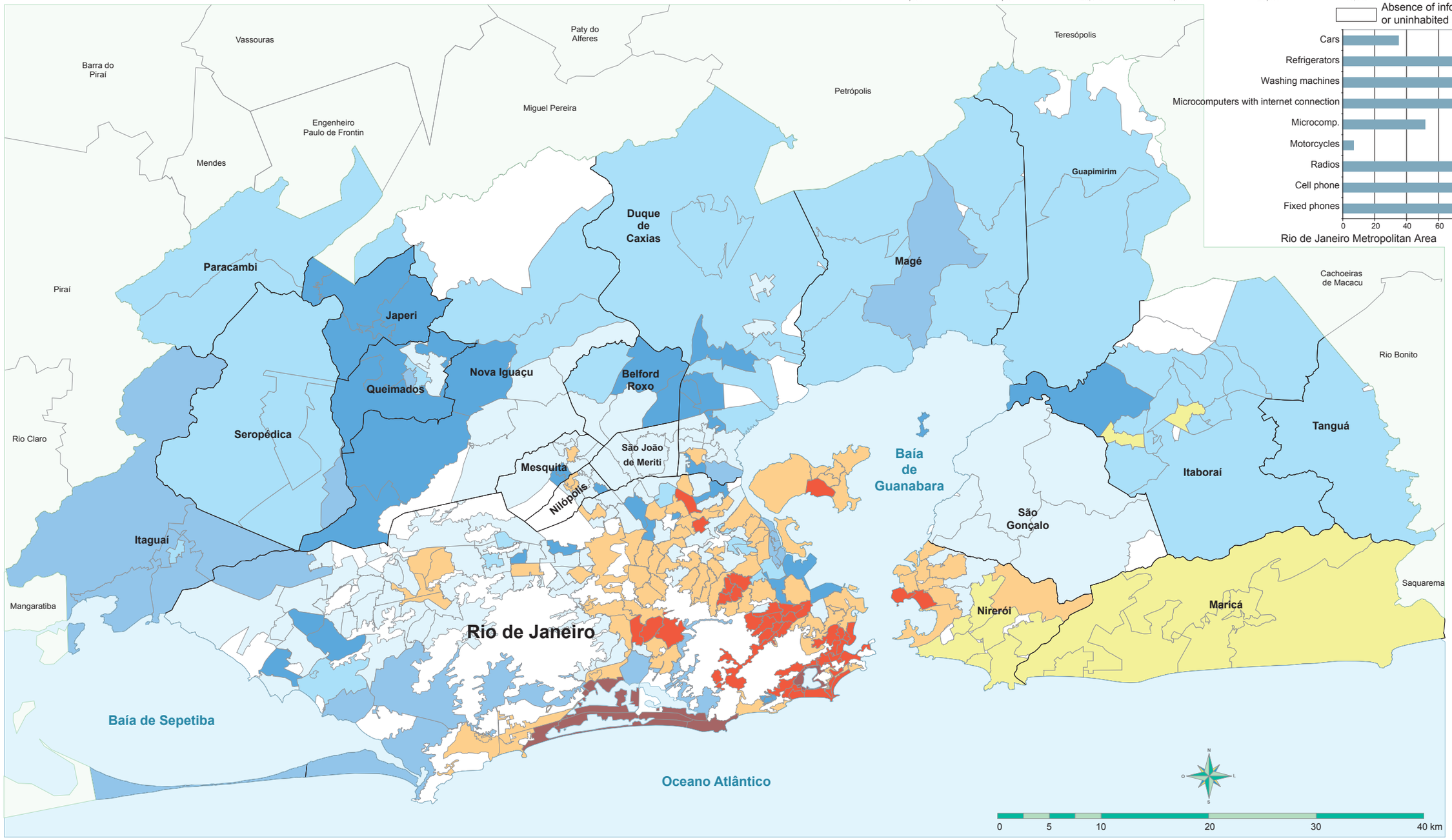
Fig. 23

Equipment in households

2010





Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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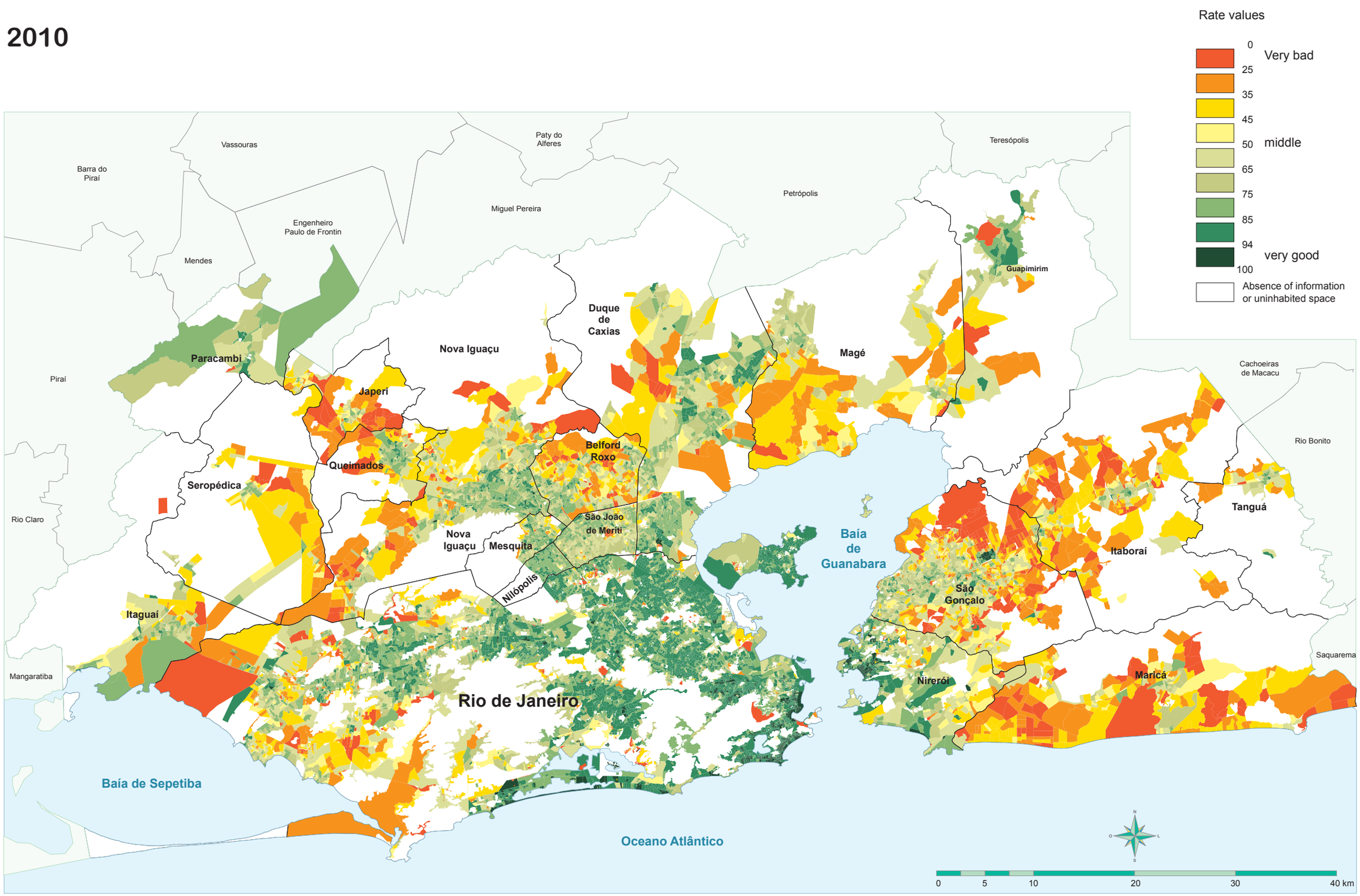
Fig. 24

Living units' urban environmental quality rates

2010



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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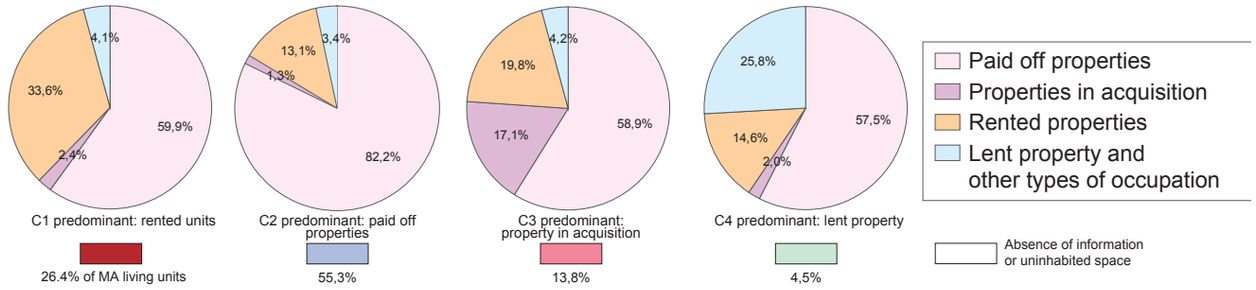
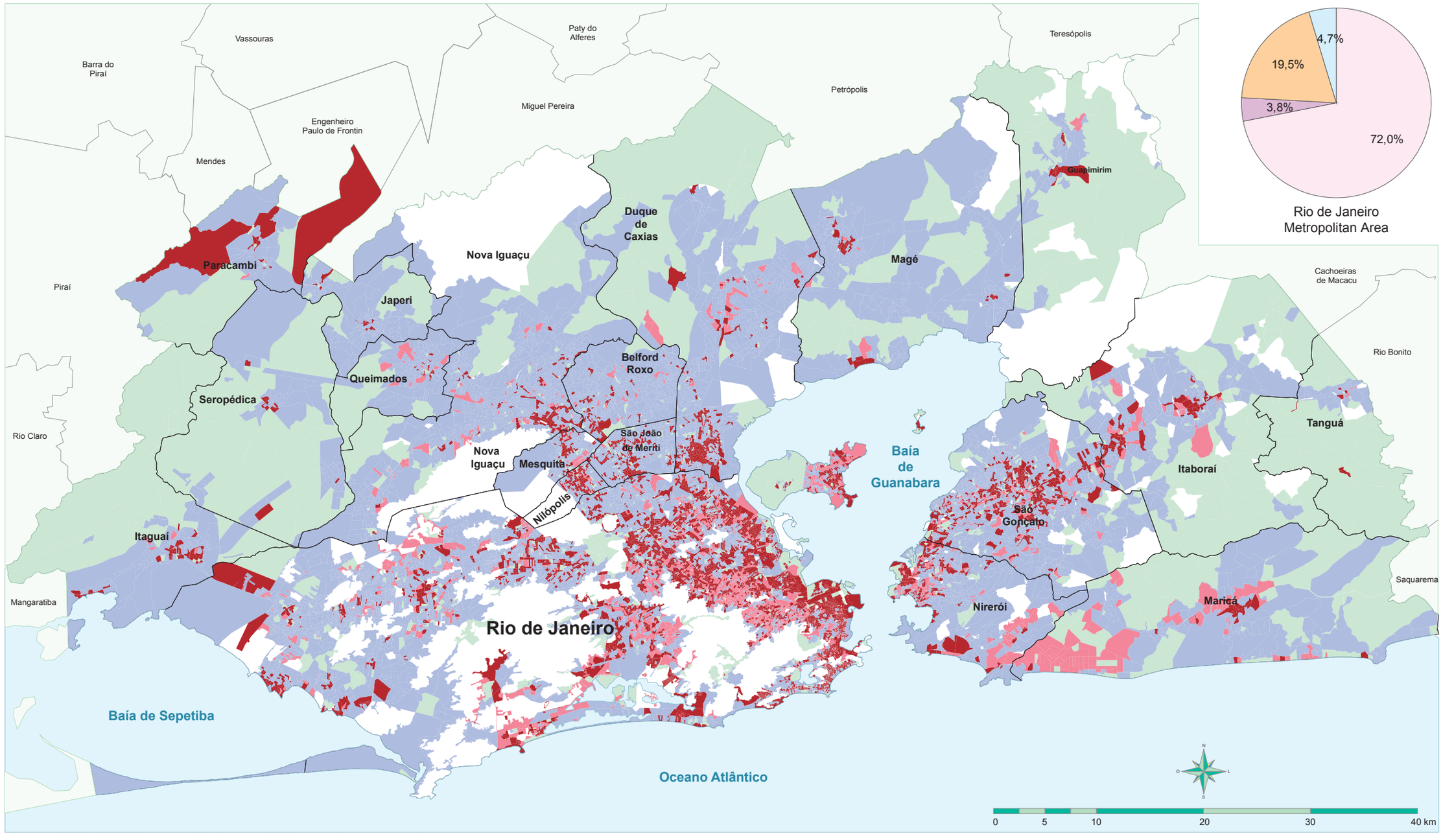
Fig. 25

Types of occupation of dwellings

2010





Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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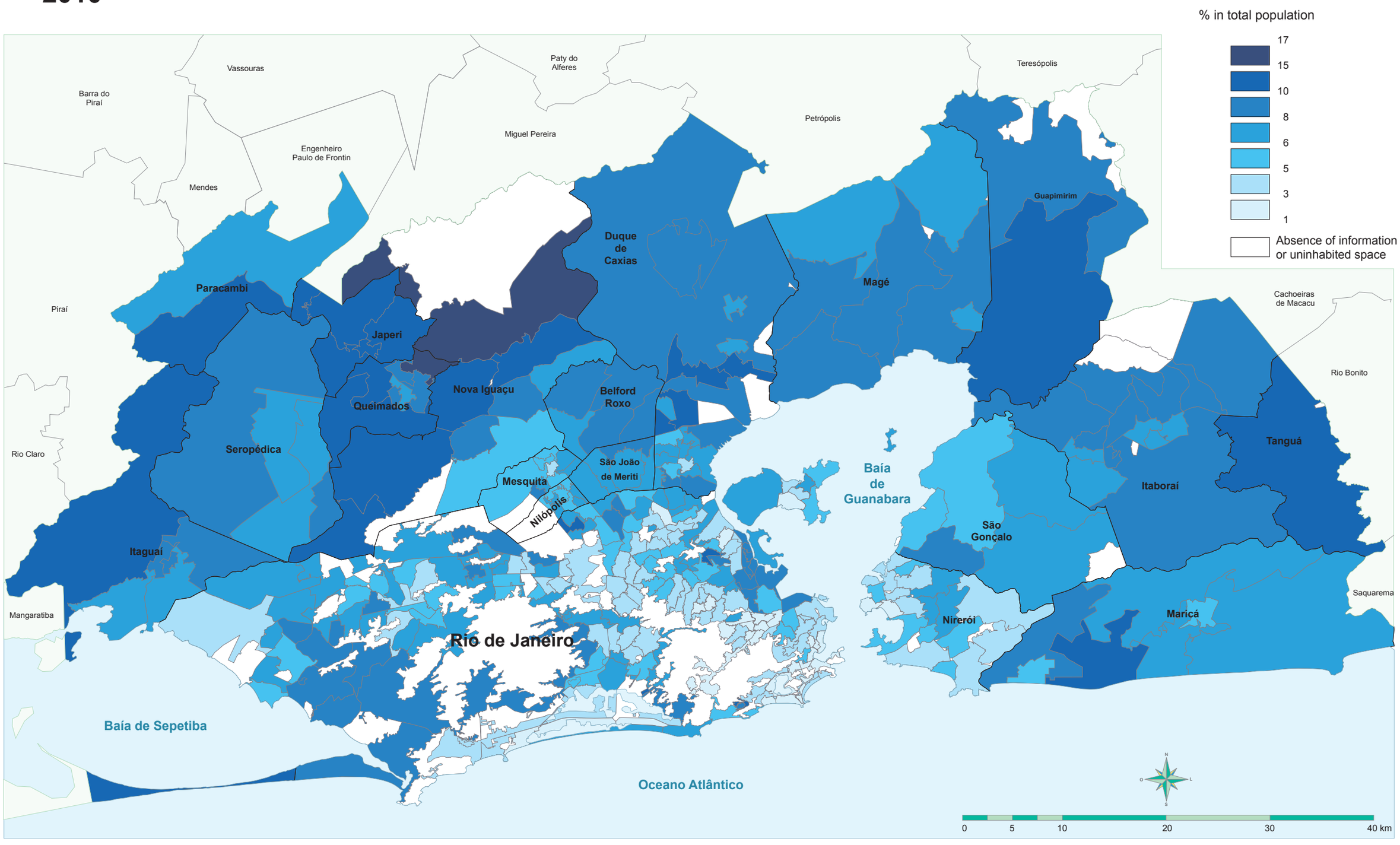
Fig. 26

People who have never been to school

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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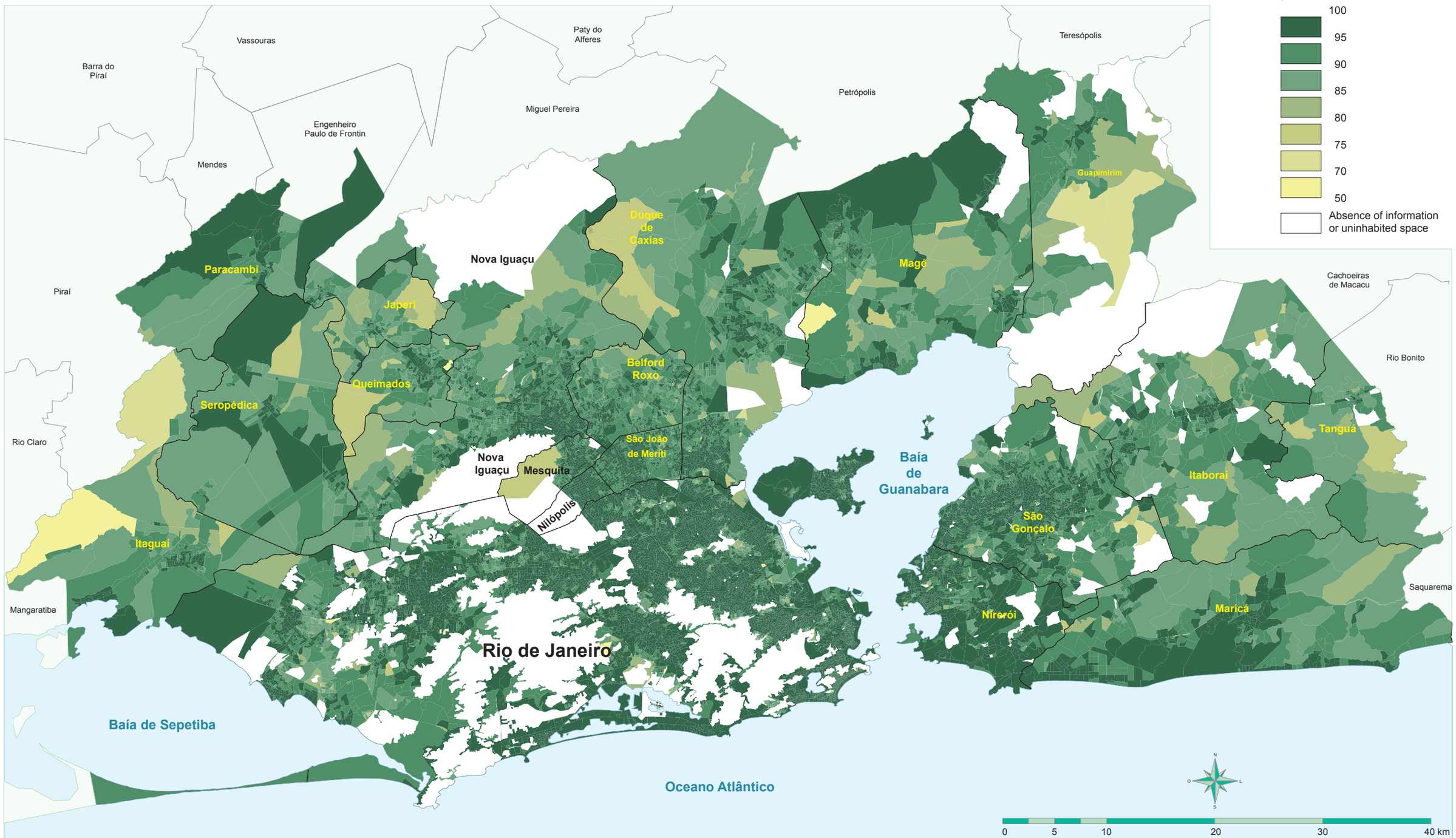
Fig. 27

Literate people

over 5 years of age - 2010



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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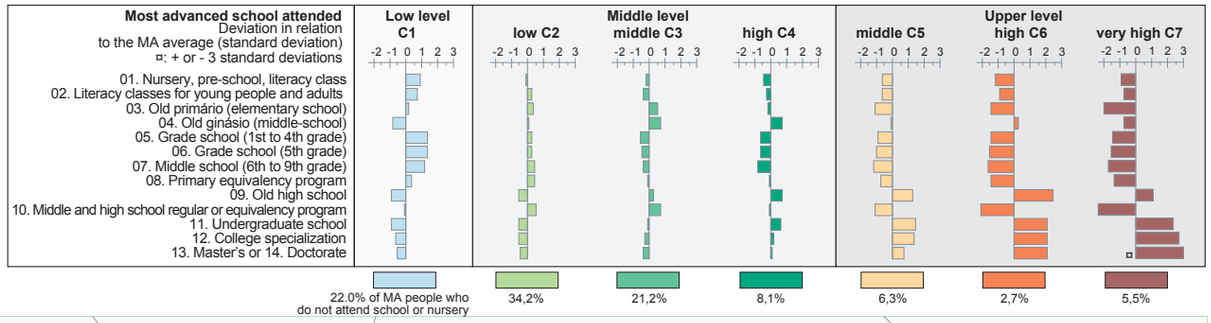
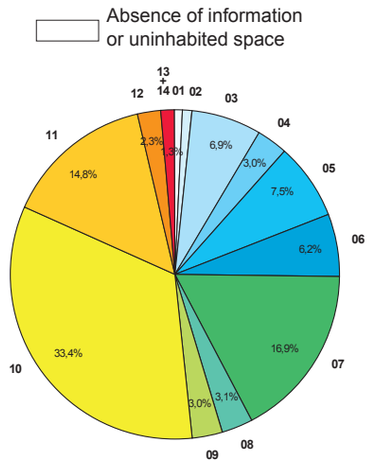
Fig. 28

School levels

2010





Rio de Janeiro
Metropolitan Area

Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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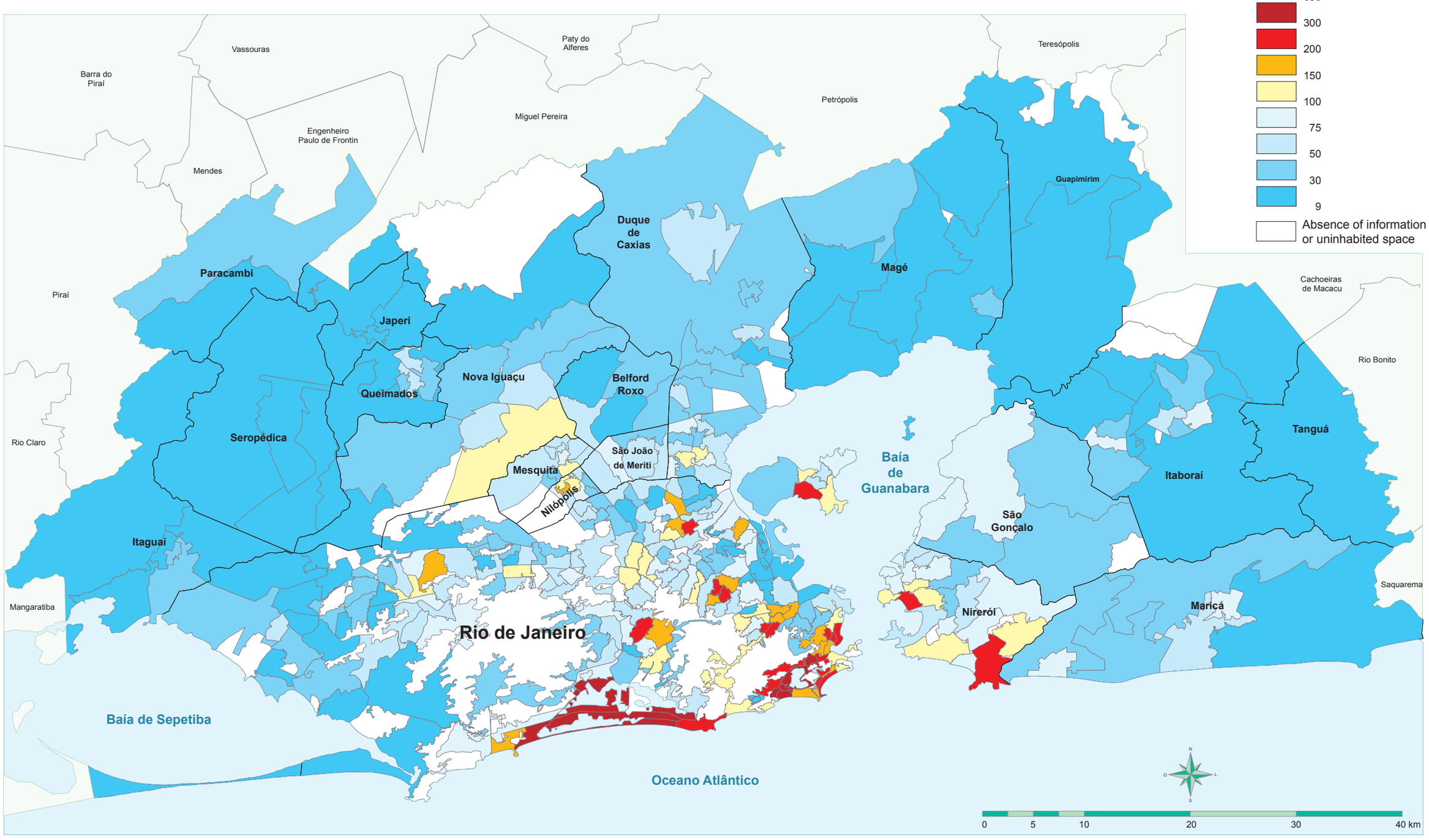
Fig. 29

Public or private schools students

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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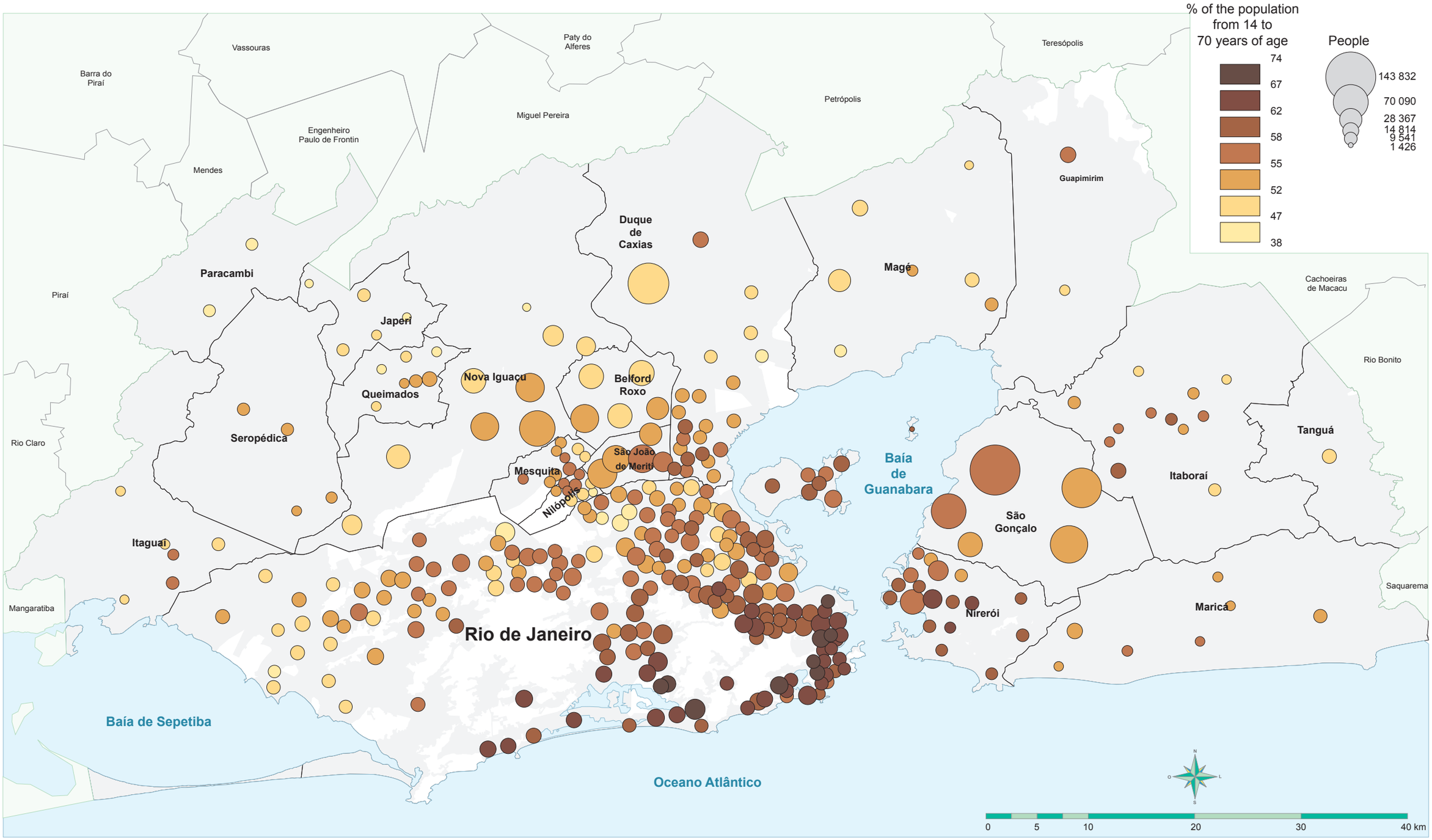
Fig. 30

Employment rates

from July 25 to 31, 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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Fig. 31

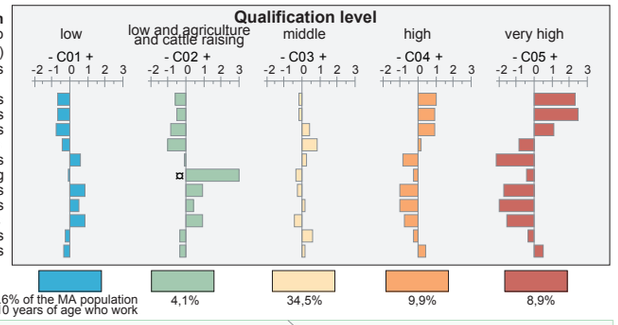
Occupations

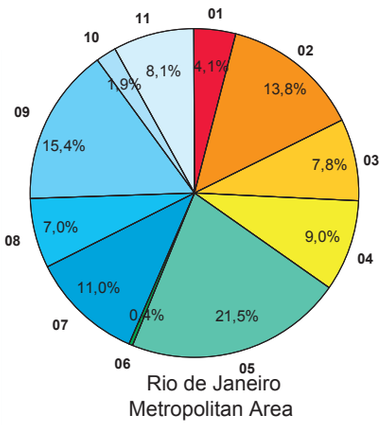
and levels of qualification of active population 2010

Occupation
Deviation in relation to
the MA average (standard deviation)
¤: + or - 3 standard deviations

01. Directors and managers
02. Professionals of the sciences and intellectuals
03. Secondary-school level technicians and other professionals
04. Administrative support workers
05. Workers in services, trades and markets
06. Qualified workers in agriculture, cattle raising, foresting, hunting and fishing
07. Qualified workers and craftsmen in construction, mechanic and other crafts
08. Workers in installations and machines and assemblers
09. Elementary occupations
10. Members of the armed forces, policemen and military firefighters
11. Undefined occupations

Absence of information or uninhabited space





Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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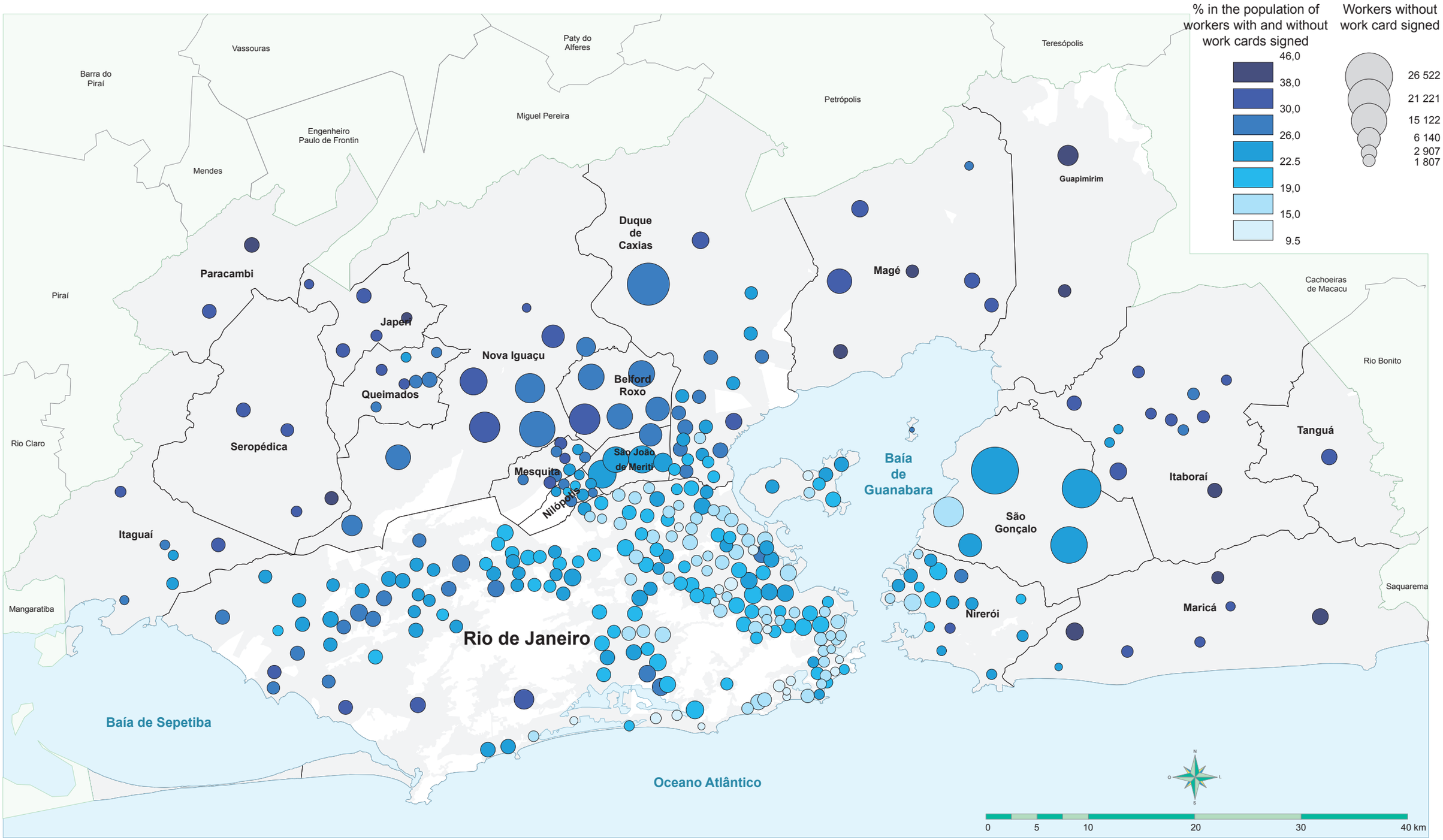
Fig. 32

Employees without work card signed by employers

2010



Source: IBGE - 2010 Demographic Census (Sample - Weighting Areas)

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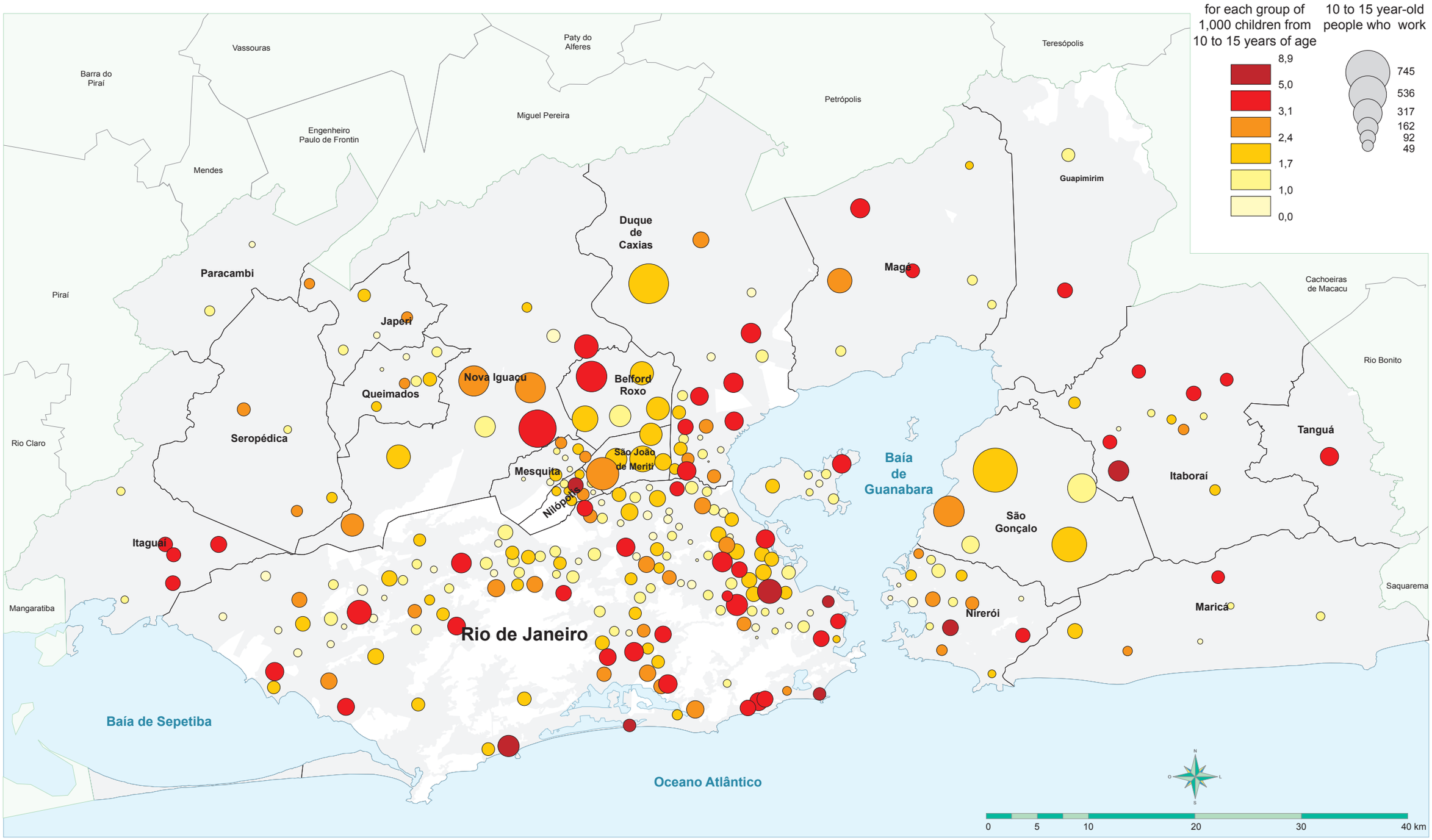
Fig. 33

Child Labor

from July 25 to 31, 2010



Source: IBGE – 2010 Demographic Census (Sample – Weighting Areas)

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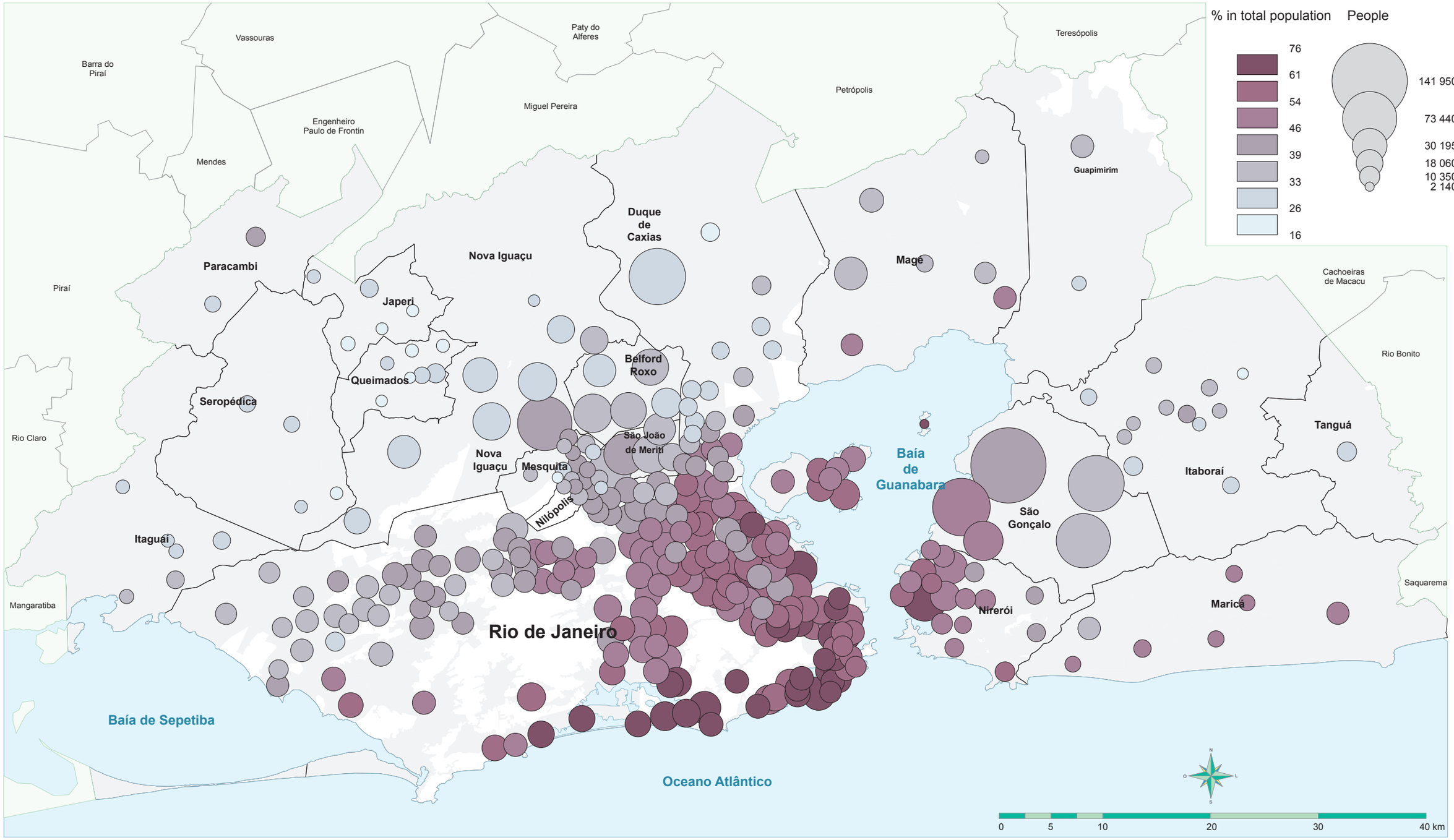
Fig. 34

Roman Catholic Church

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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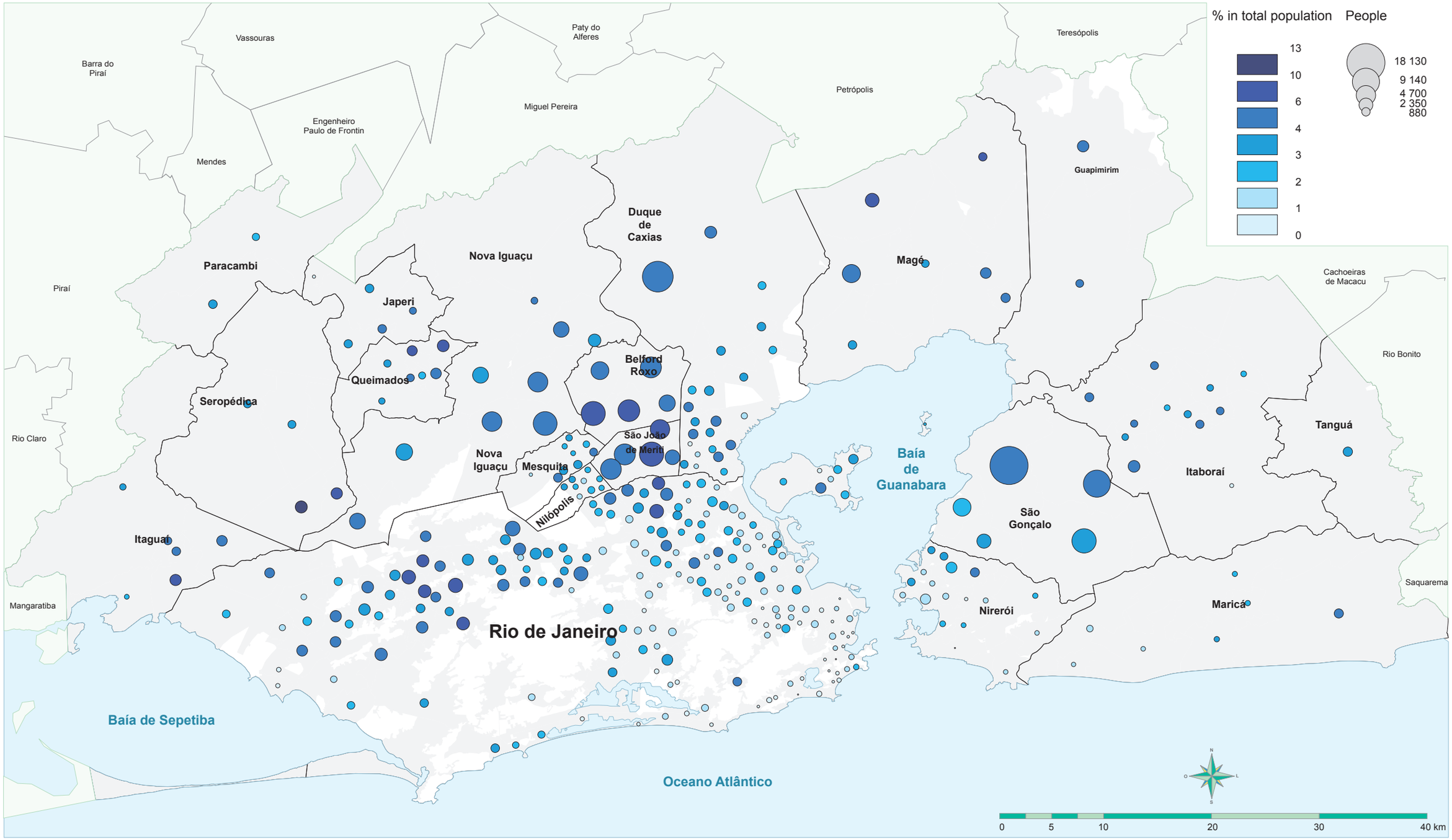
Fig. 35

Evangelical Baptist Church

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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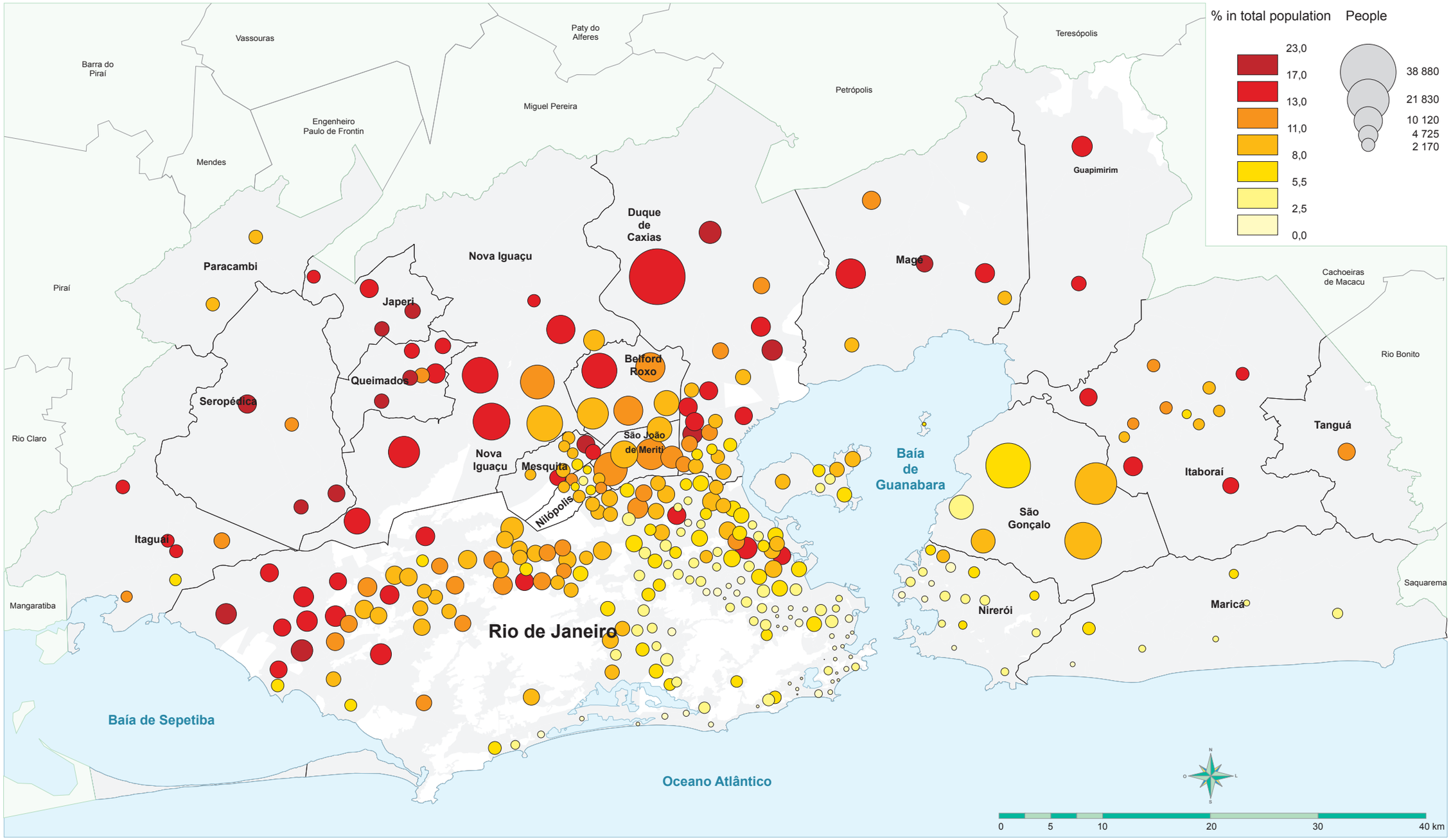
Fig. 36

Pentecostal Evangelist Church Assembly of God

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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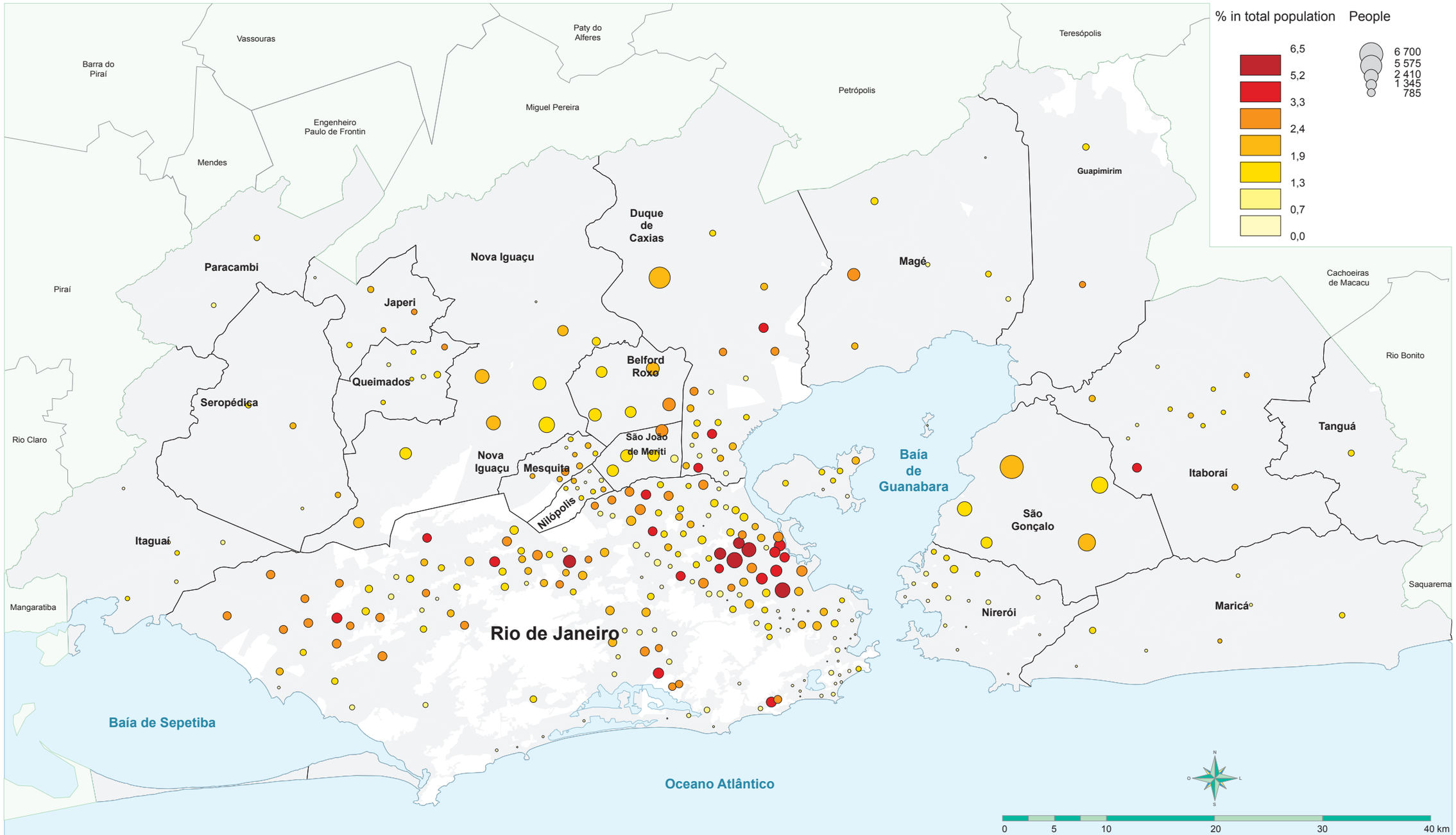
Fig. 37

Pentecostal Evangelist Church
Universal Church of the Kingdom of God

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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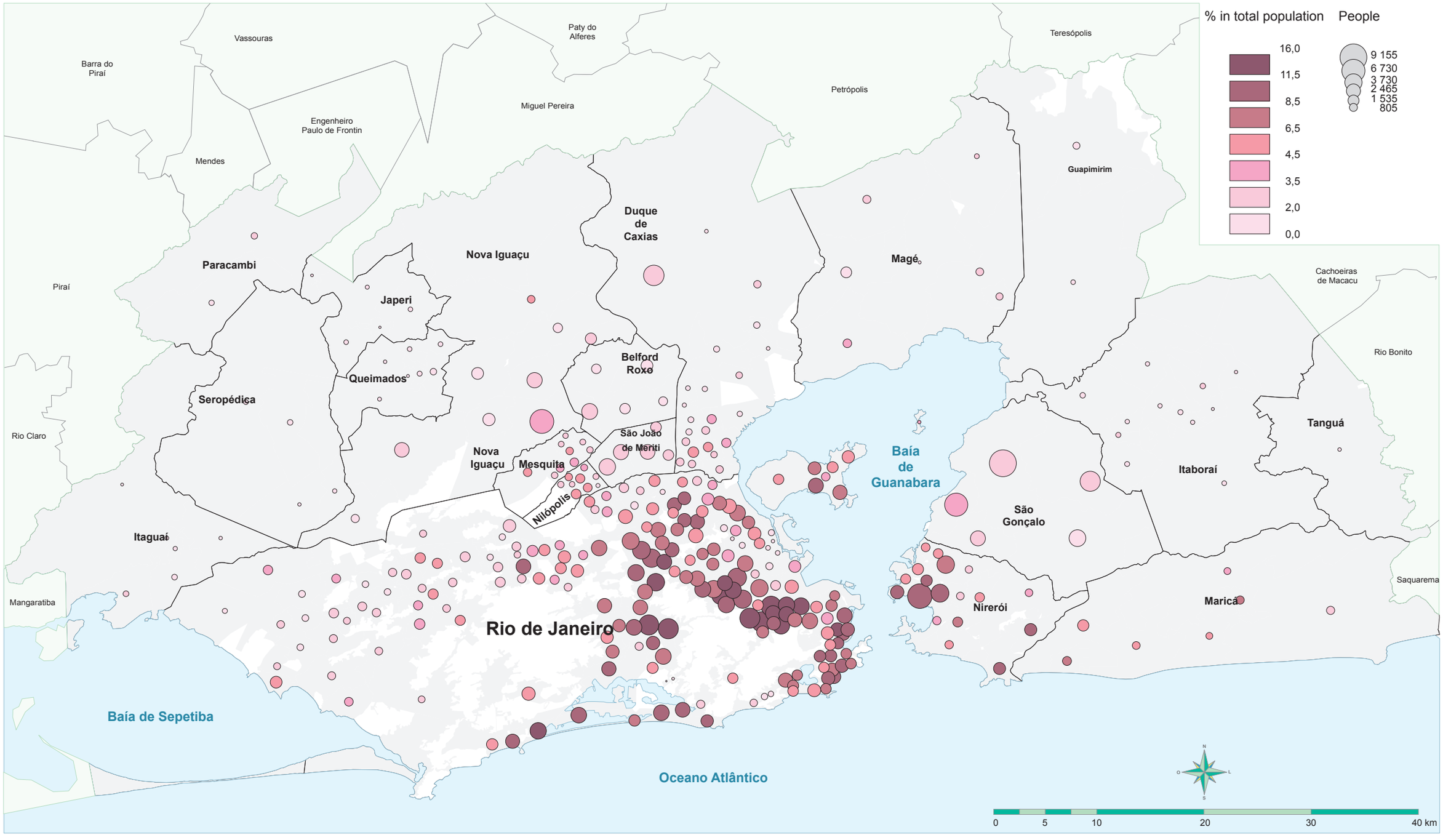
Fig. 38

Spiritualists

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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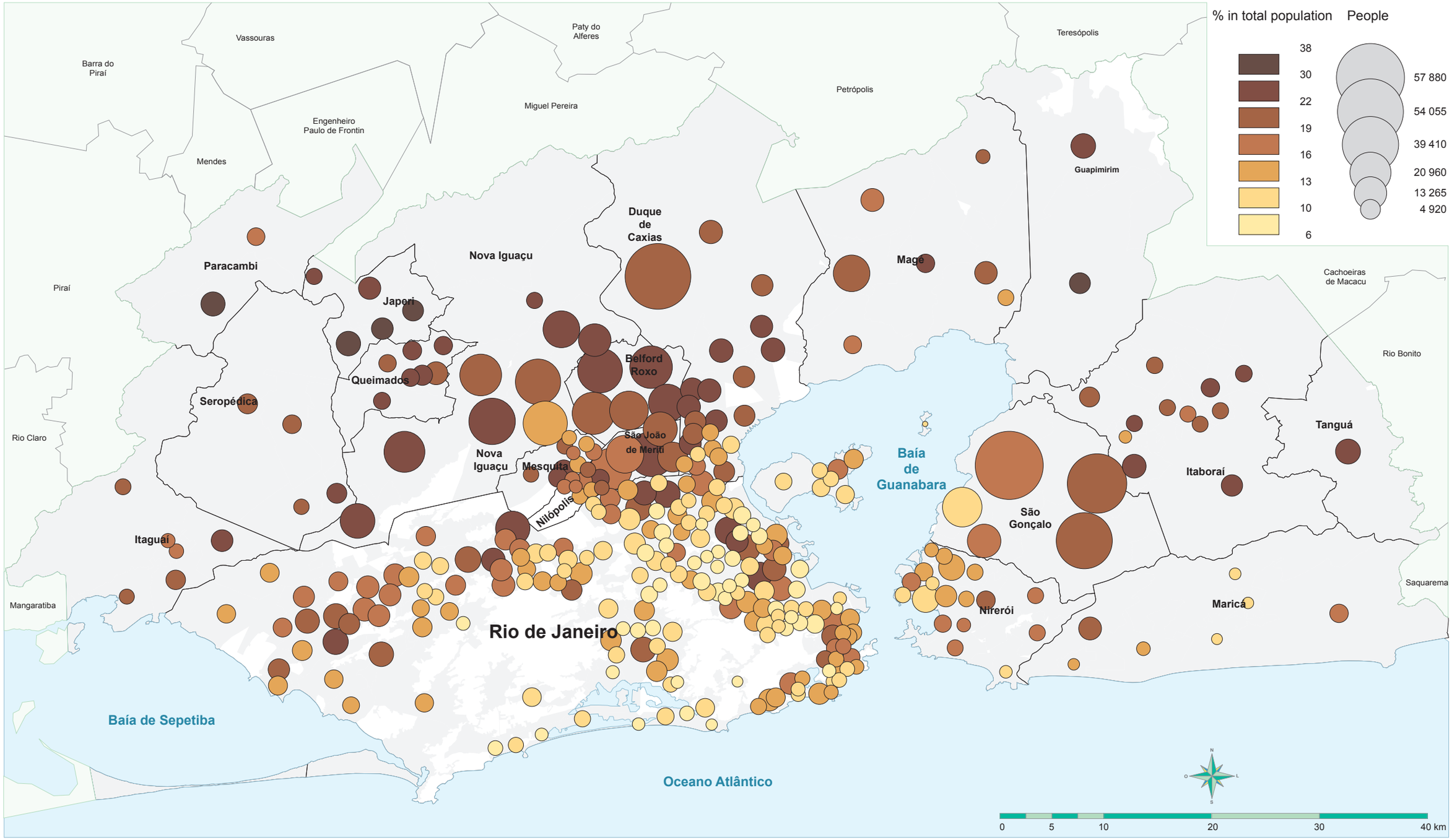
Fig. 39

People of no religion

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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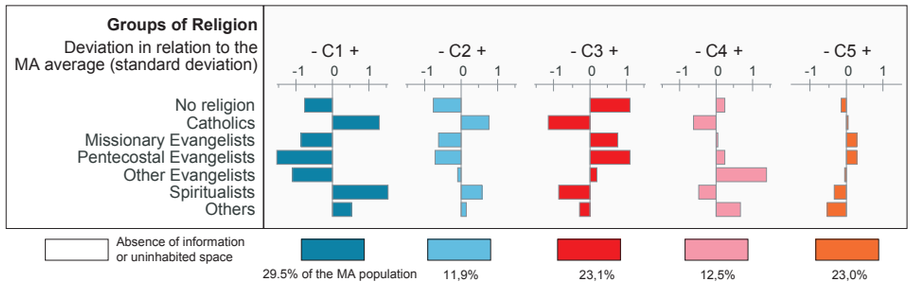
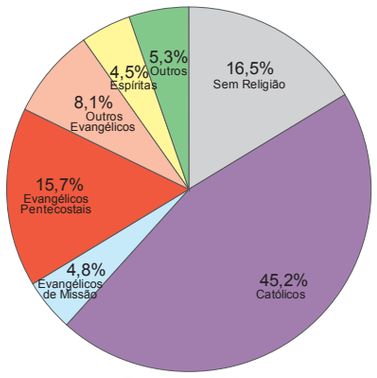
Fig. 40

Religious profiles

2010





Rio de Janeiro Metropolitan Area

Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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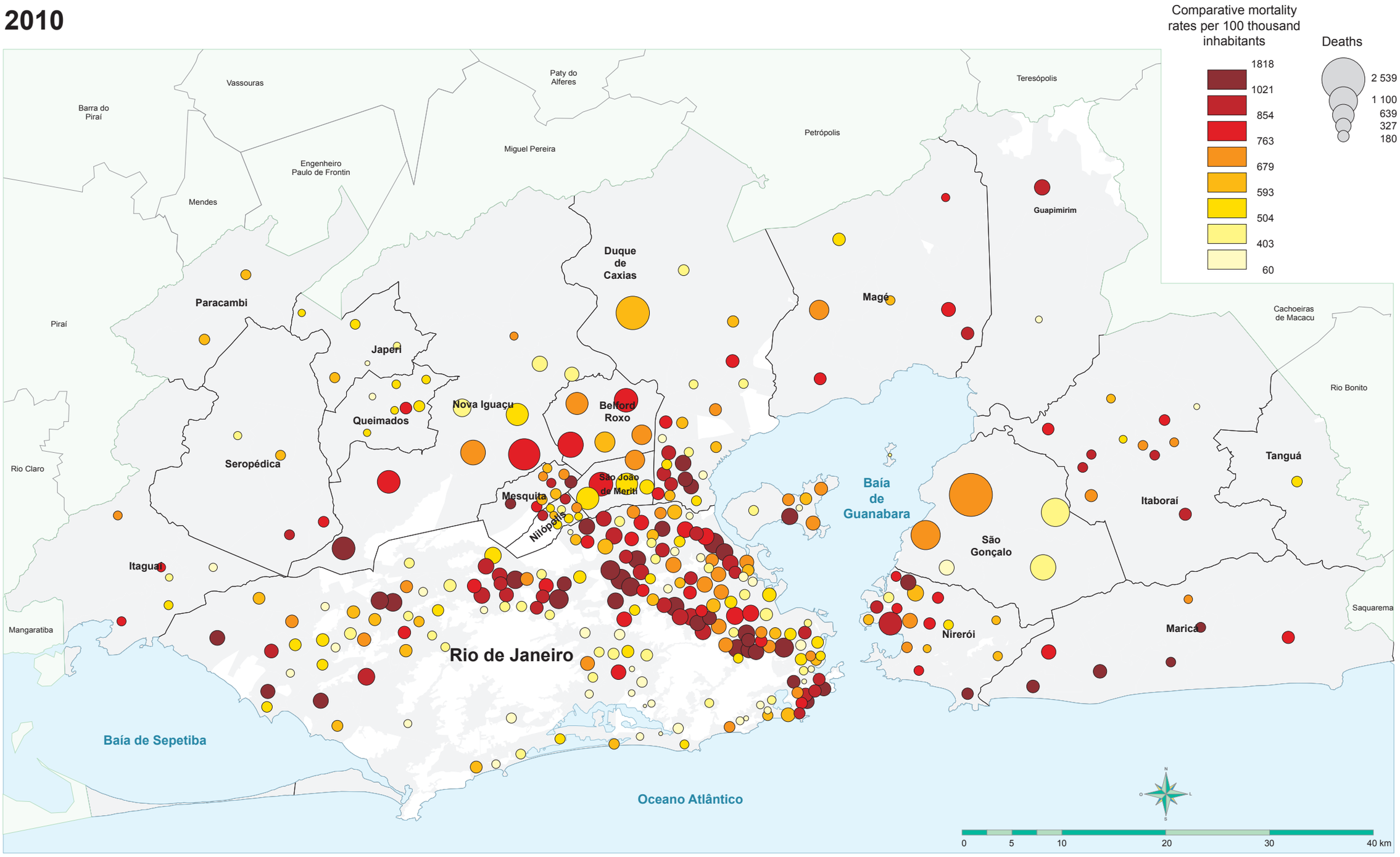
Fig. 41

Mortality
Gross rates

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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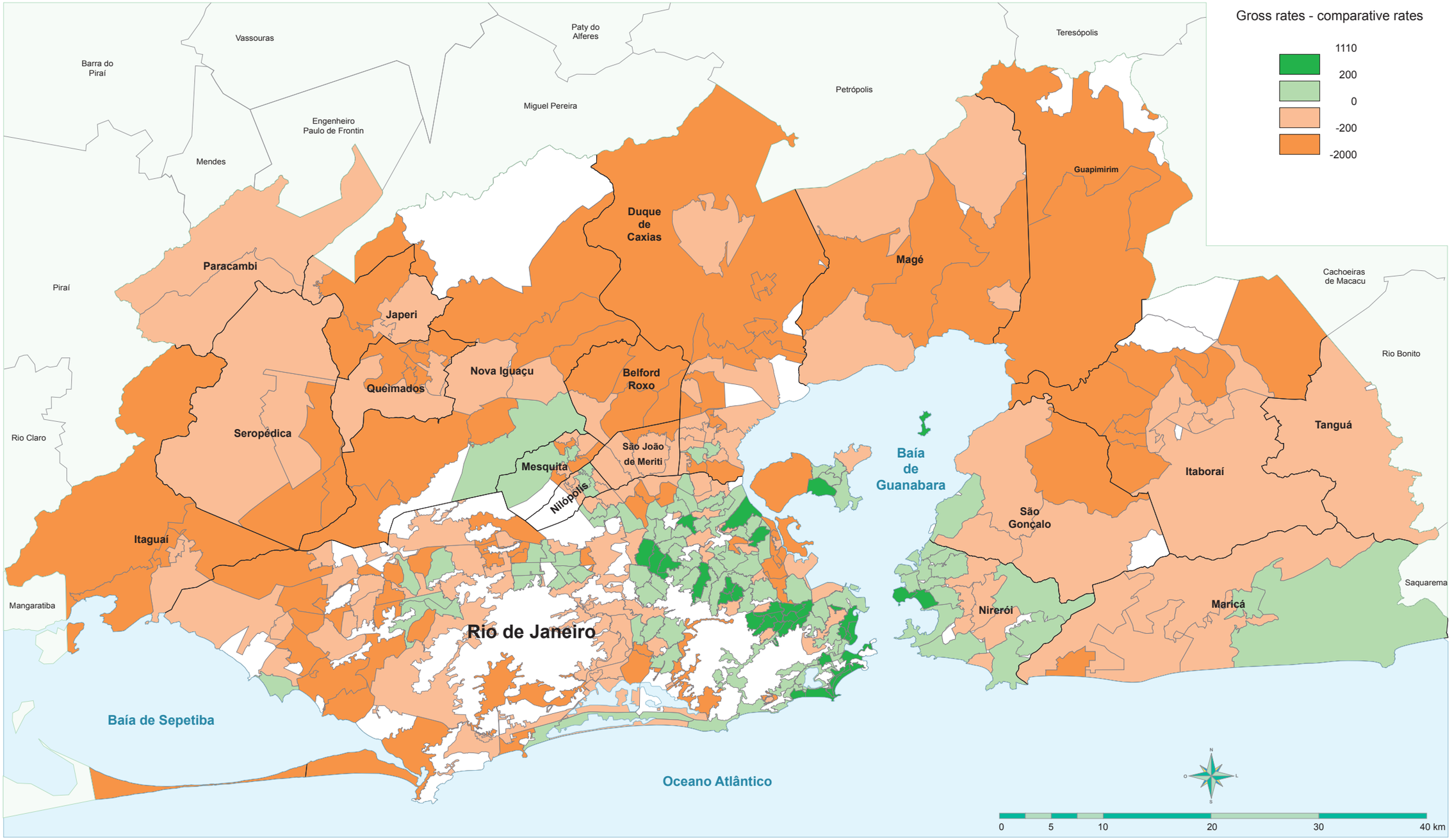
Fig. 42

Mortality
Gross rates - comparative rates

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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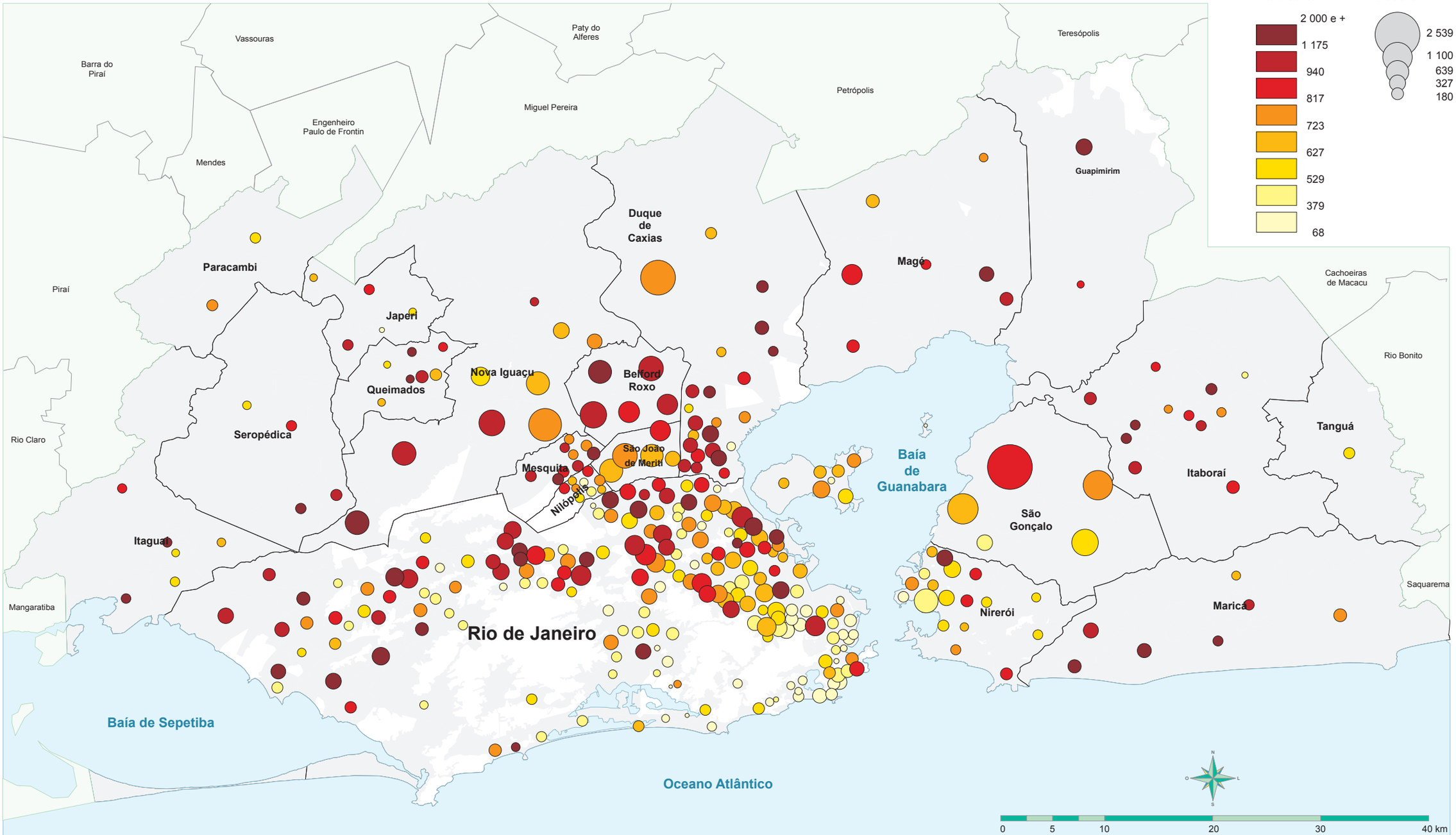
Fig. 43

Mortality
Comparative rates

2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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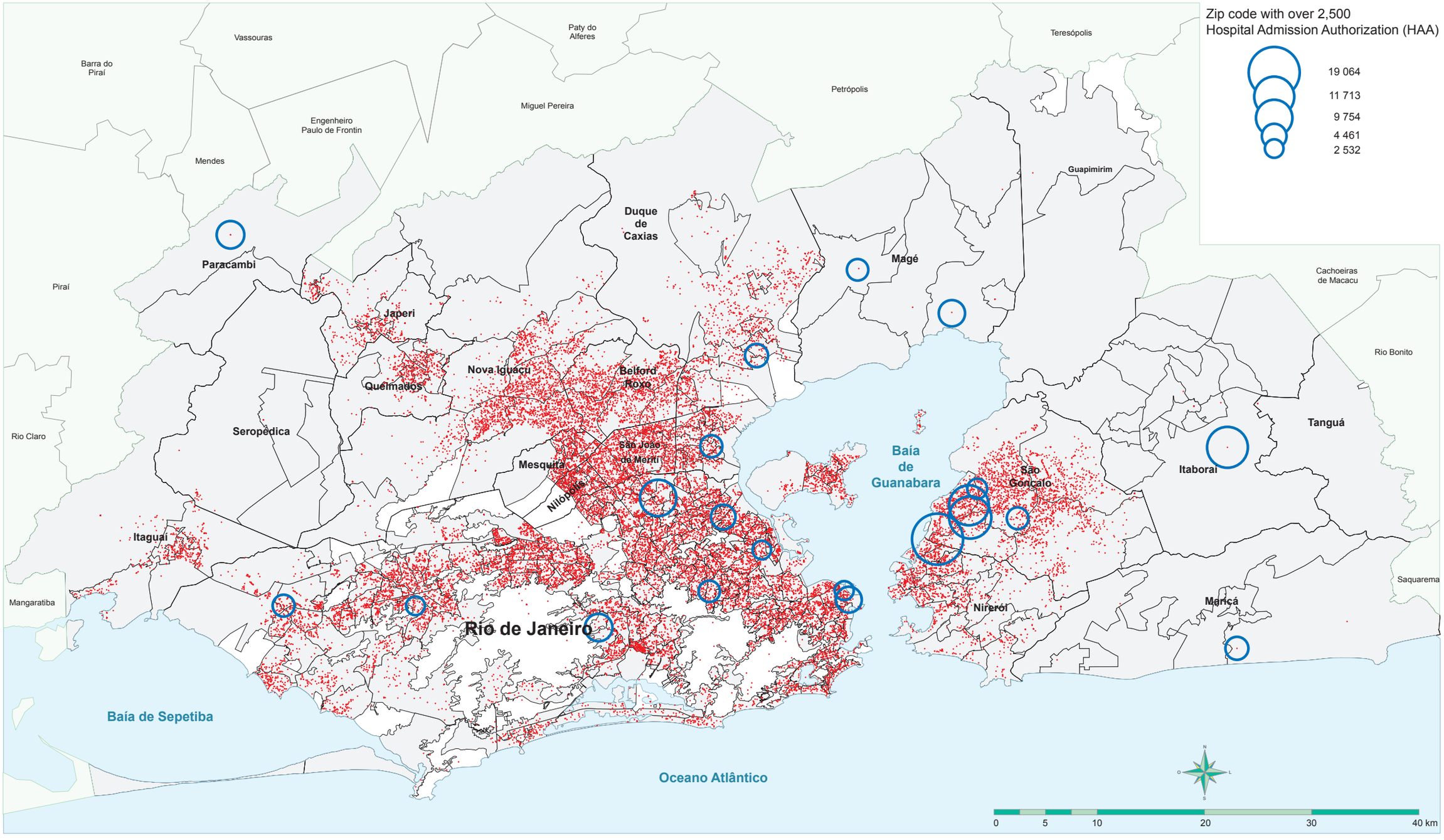
Fig. 44

Zip codes
from SUS Hospital Information System

2010



Source: SUS – POST OFFICE – IBGE

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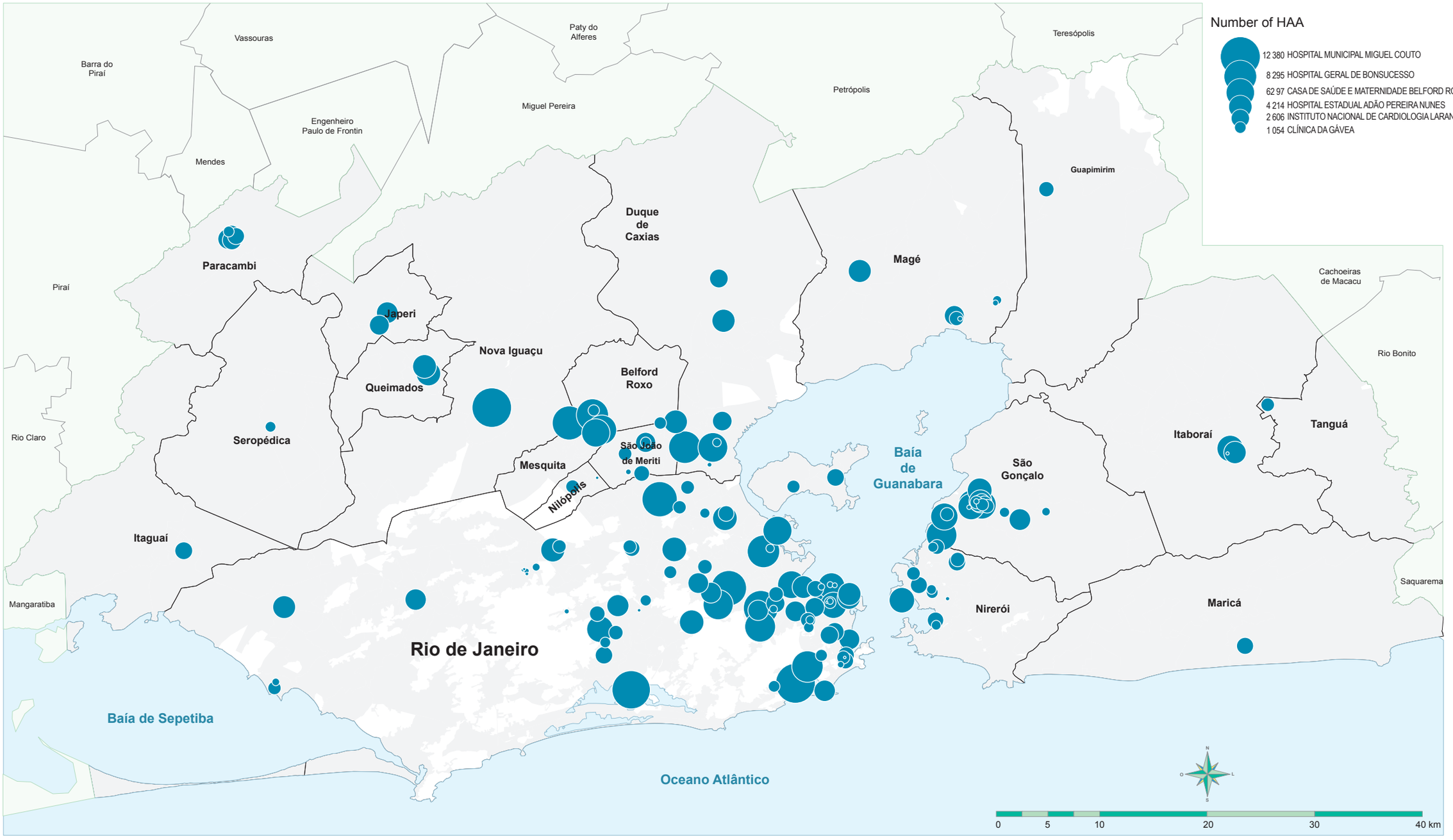
Fig. 45

Health facilities
Total number of SUS Hospital Admissions

2010



Source: DATASUS SIH/SUS

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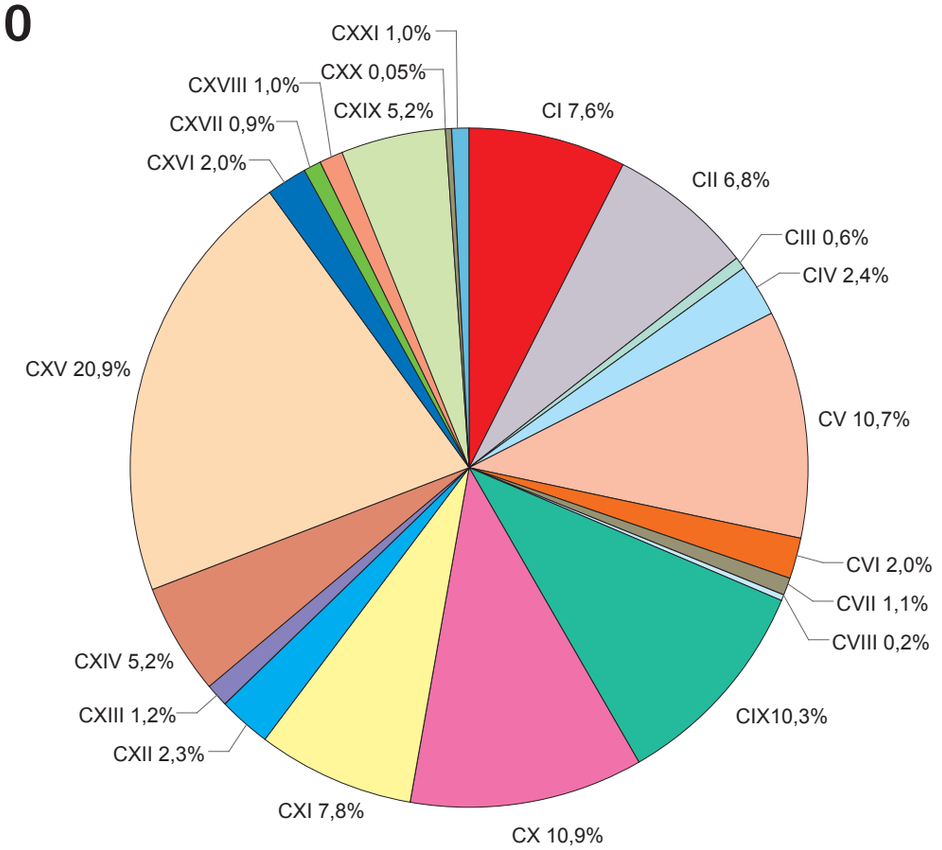
Fig. 46

SUS Hospital Admissions per International Disease Classification chapters (IDC)
Rio de Janeiro Metropolitan Area
2010



IDC Chapters	HAA	% HAA	Causes
Chapter I	35 924	7,6	Some infectious and parasitic diseases
Chapter II	32 305	6,8	Neoplasias [tumors]
Chapter III	3 020	0,6	Blood and hematopoietic organs diseases and some immune disorders
Chapter IV	11 446	2,4	Endocrine, nutritional and metabolic diseases
Chapter V	50 779	10,7	Mental and behavioral disorders
Chapter VI	9 321	2,0	Nervous system diseases
Chapter VII	5 054	1,1	Eye and other vision diseases
Chapter VIII	835	0,2	Ear and mastoid apophysis
Chapter IX	48 974	10,3	Circulatory system diseases
Chapter X	51 501	10,9	Respiratory system diseases
Chapter XI	36 738	7,8	Digestive System diseases
Chapter XII	10 758	2,3	Skin and subcutaneous tissue diseases
Chapter XIII	5 851	1,2	Osteomuscular system and conjunctive tissue diseases
Chapter XIV	24 474	5,2	Genitourinary system diseases
Chapter XV	98 814	20,9	Pregnancy, labor and puerperium
Chapter XVI	9 339	2,0	Some conditions originated in perinatal period
Chapter XVII	4 152	0,9	Congenic malformations, chromossomic deformities and anomalies
Chapter XVIII	4 699	1,0	Symptoms, signs and abnormal findings from clinical and laboratory tests, not classified in other chapters
Chapter XIX	24 485	5,2	Injury and poisoning and some other consequences by external causes
Chapter XX	228	0,05	Morbidity and mortality external causes
Chapter XXI	4 572	1,0	Factors that influence health and contact with health services
All Chapters	473 269	100	All causes

Source: DATASUS SIH/SUS

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Fig. 47

SUS Hospital admissions
IDC Chapter XV: "pregnancy, labor and puerperium"

2010

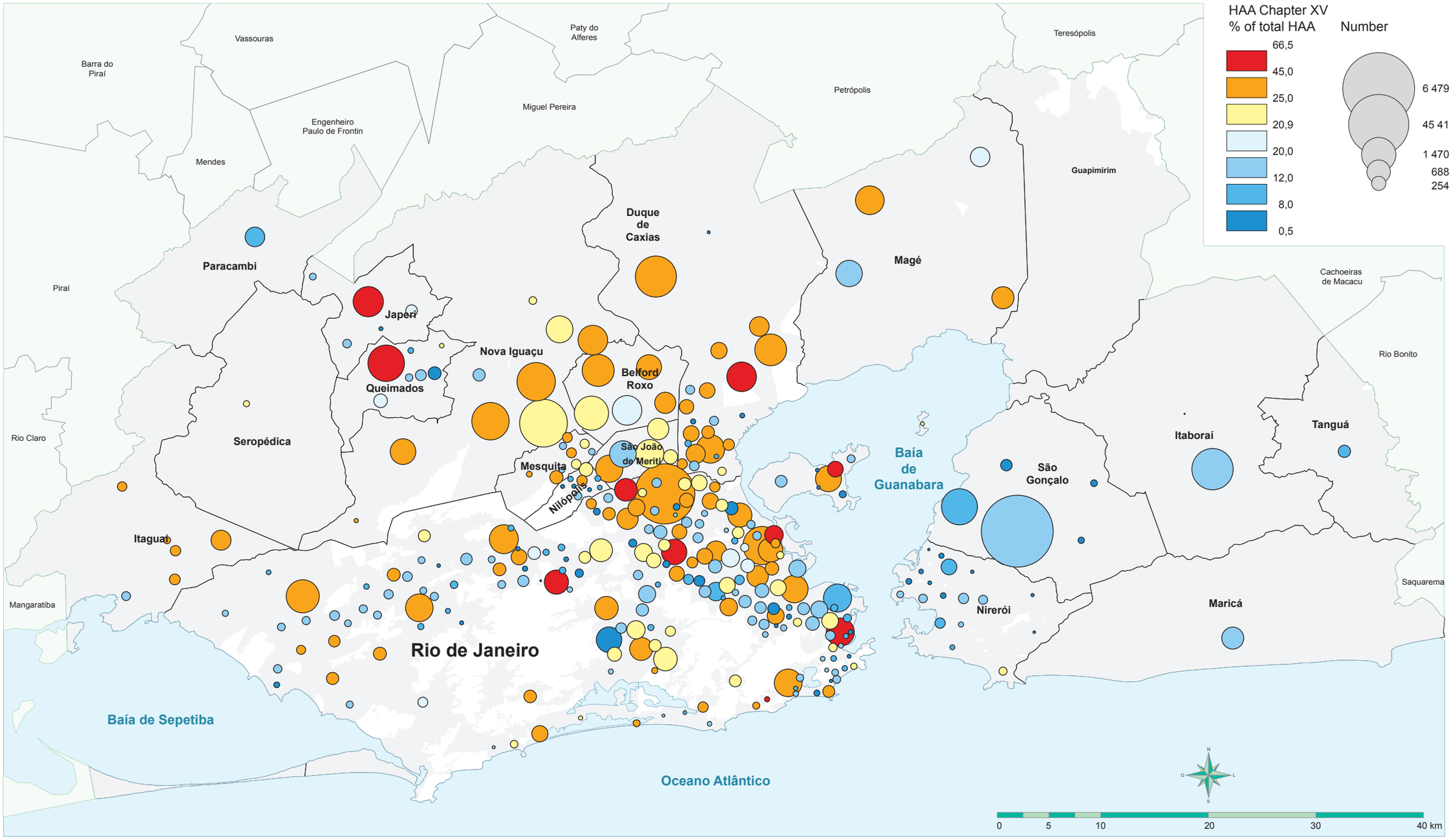

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Fig. 48

SUS Hospital admissions
IDC Chapter X: "respiratory system diseases"

2010

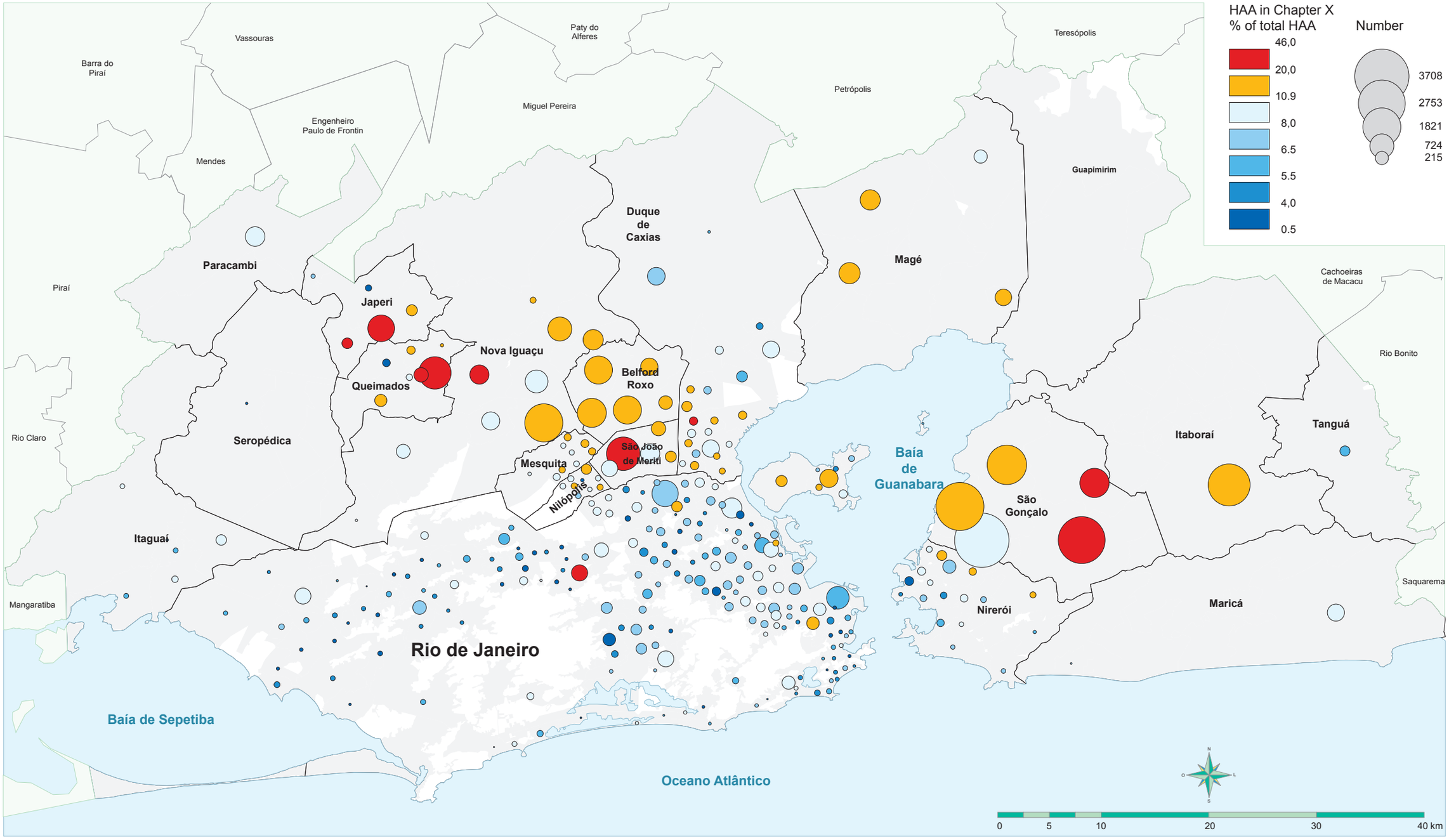

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Fig. 49

SUS Hospital admissions
IDC Chapter V: "Mental and behavioral disorders"

2010

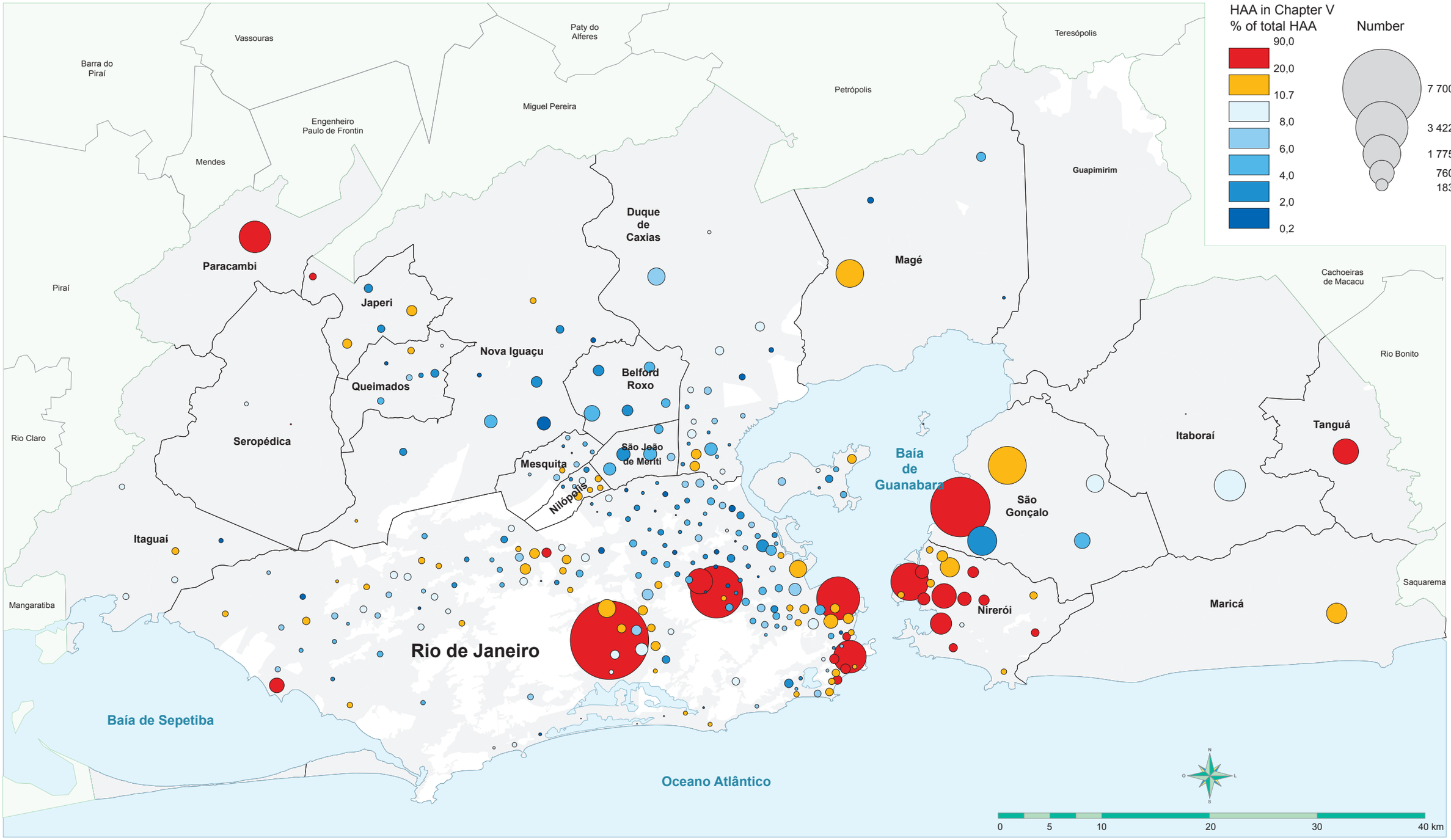

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Fig. 50

SUS Hospital admissions
IDC Chapter I: "Some infectious and parasitic diseases"

2010

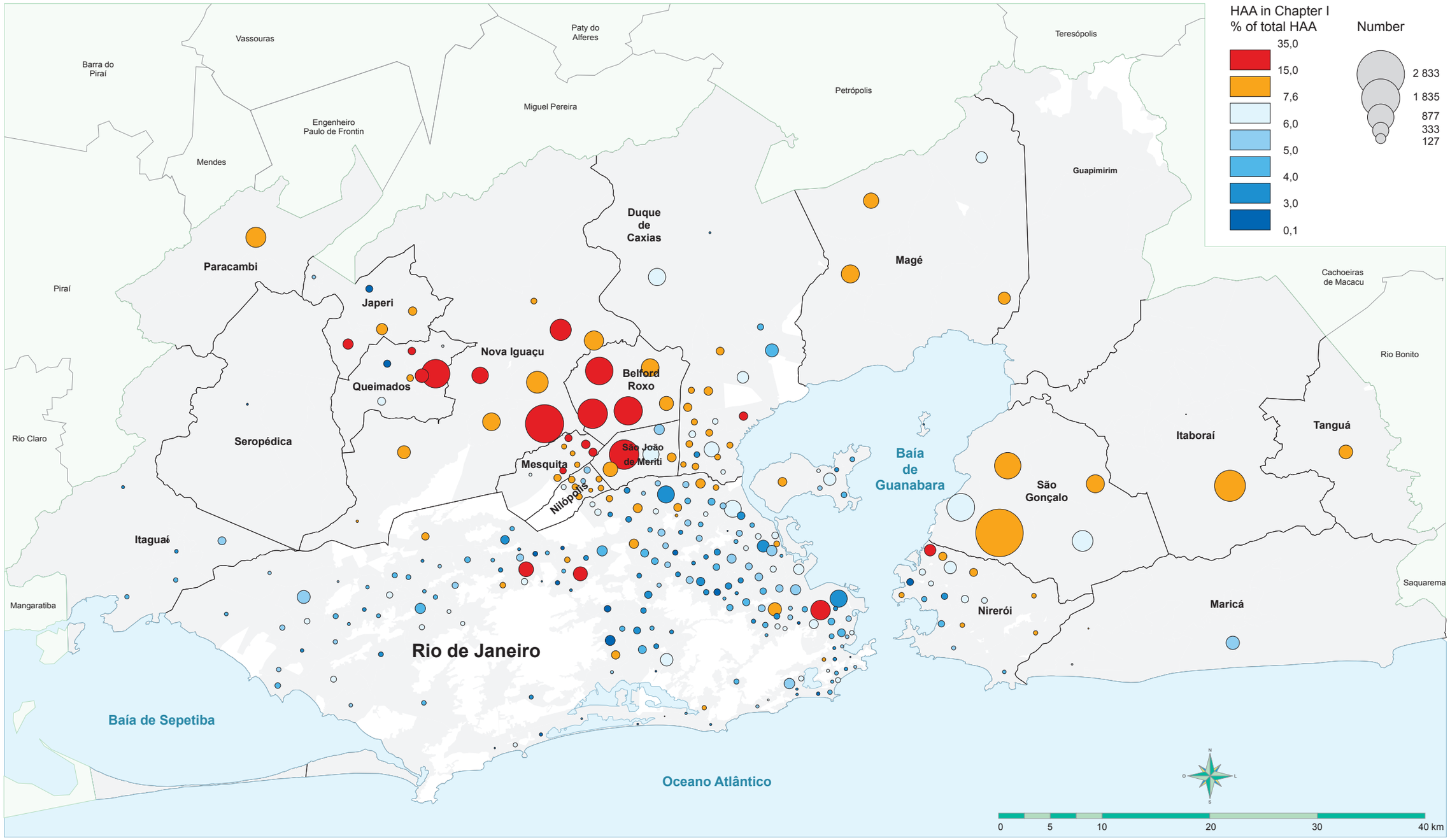

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Fig. 51

SUS Hospital Admissions
IDC Chapter II: "neoplasias [tumors]"

2010

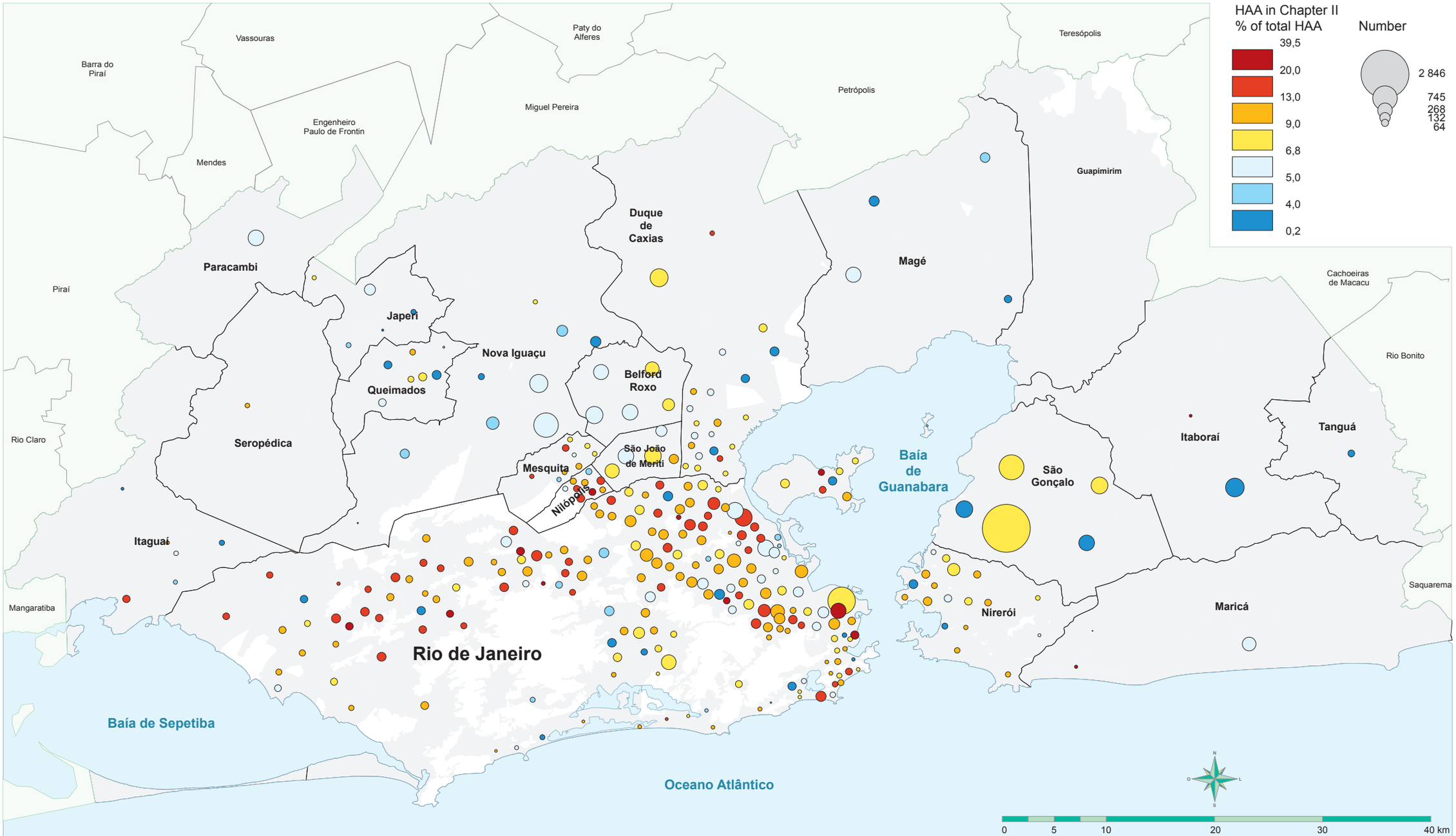

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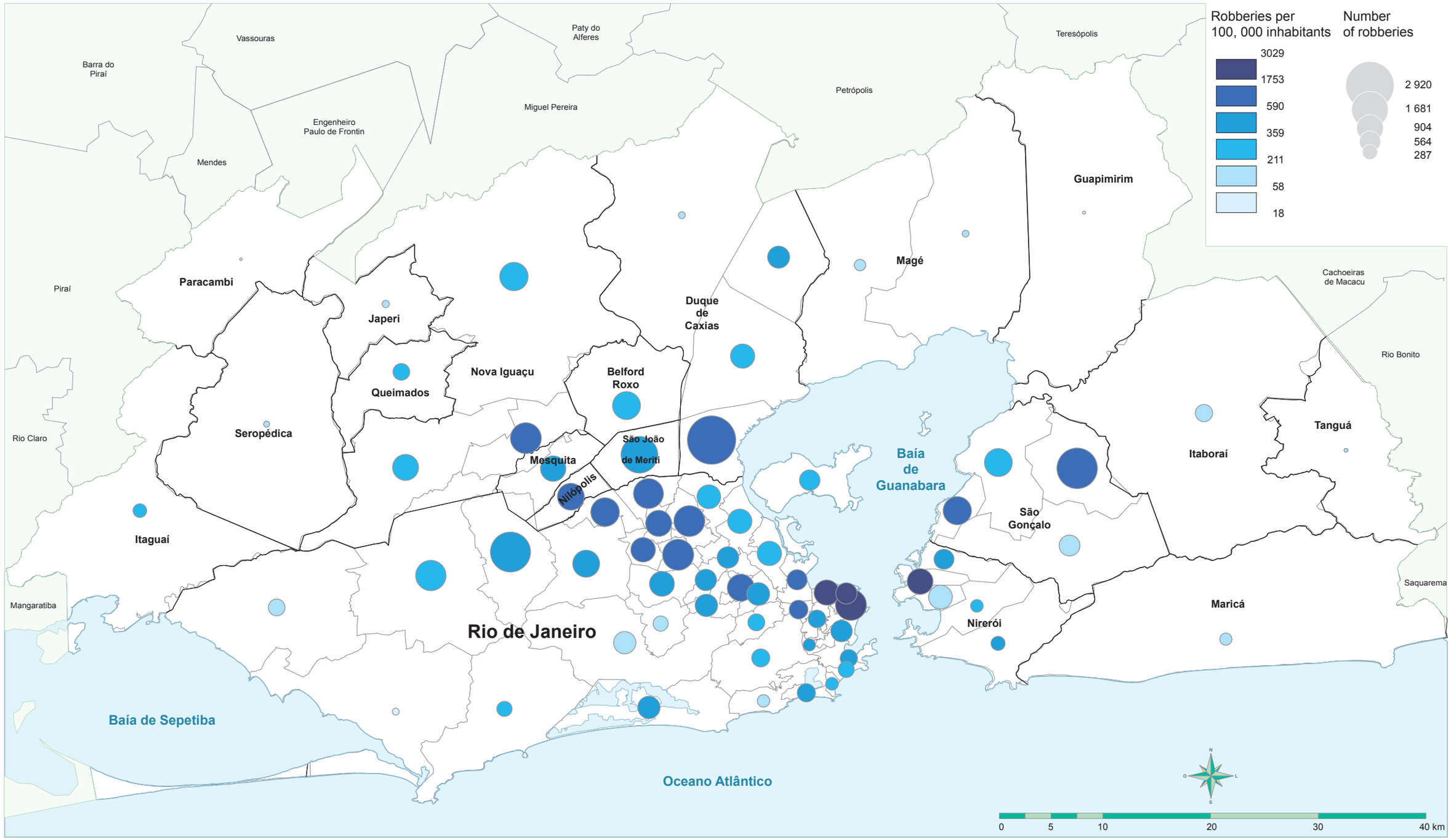
Fig. 52

Crimes against property: mugging

2012



Source: State of Rio de Janeiro Instituto de Segurança Pública (ISP)

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Fig. 53

Crimes against property: larceny

2012

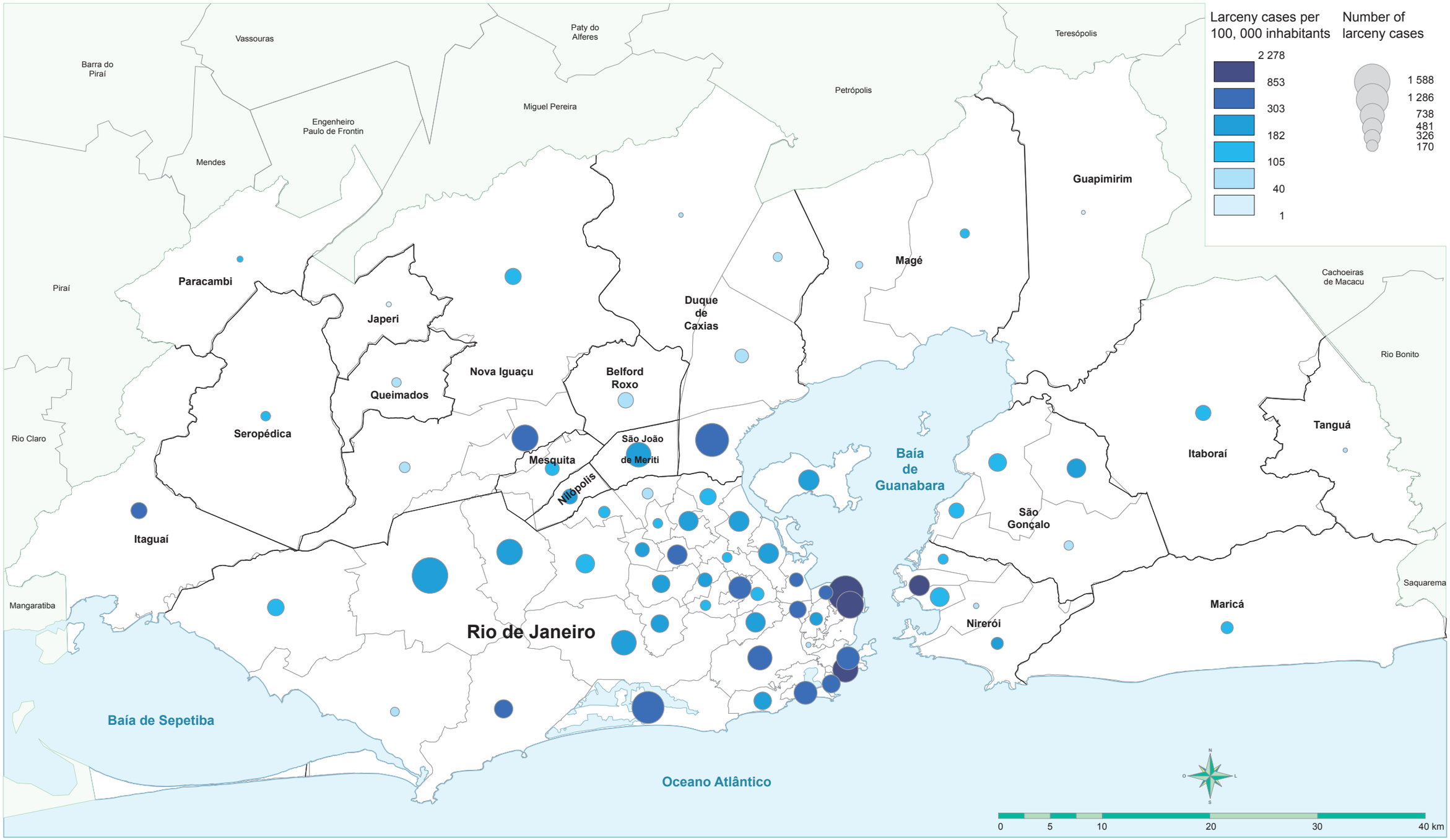

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Fig. 54

Crimes against property: robbery and theft of vehicles

2012

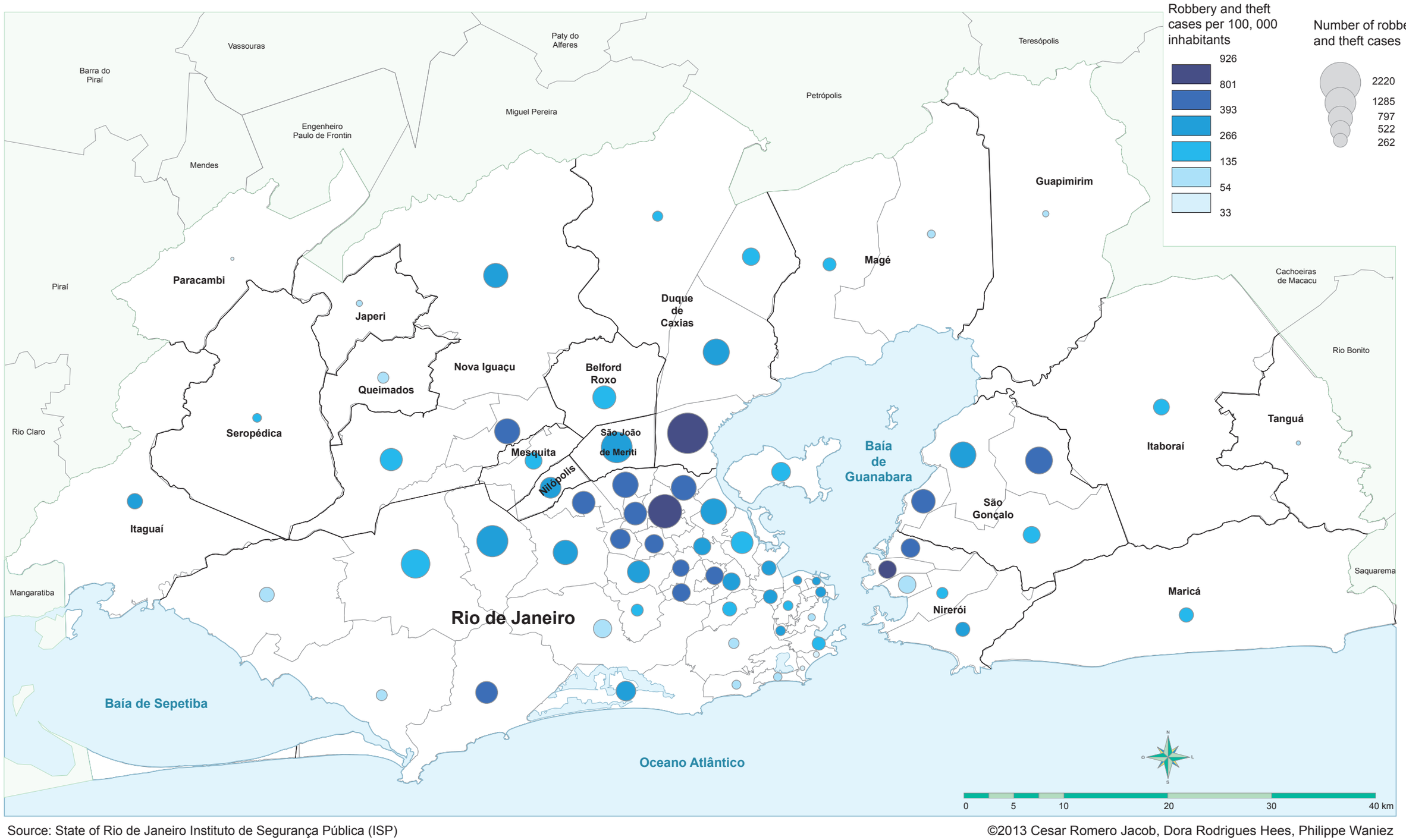

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Fig. 55

Violent crimes: intentional physical injury

2012

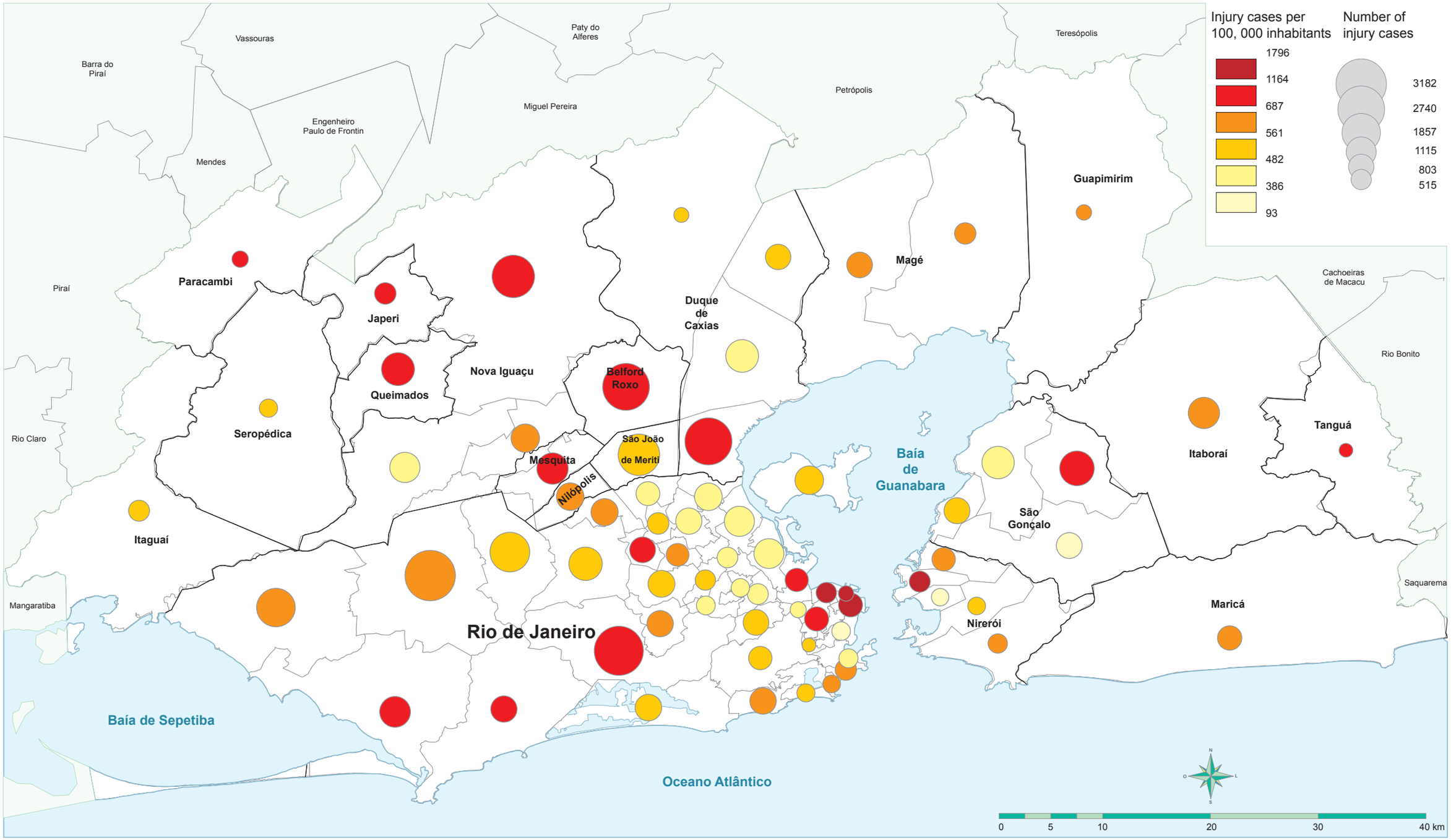

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Fig. 56

Violent crimes: intentional homicides and attempted murder cases

2012

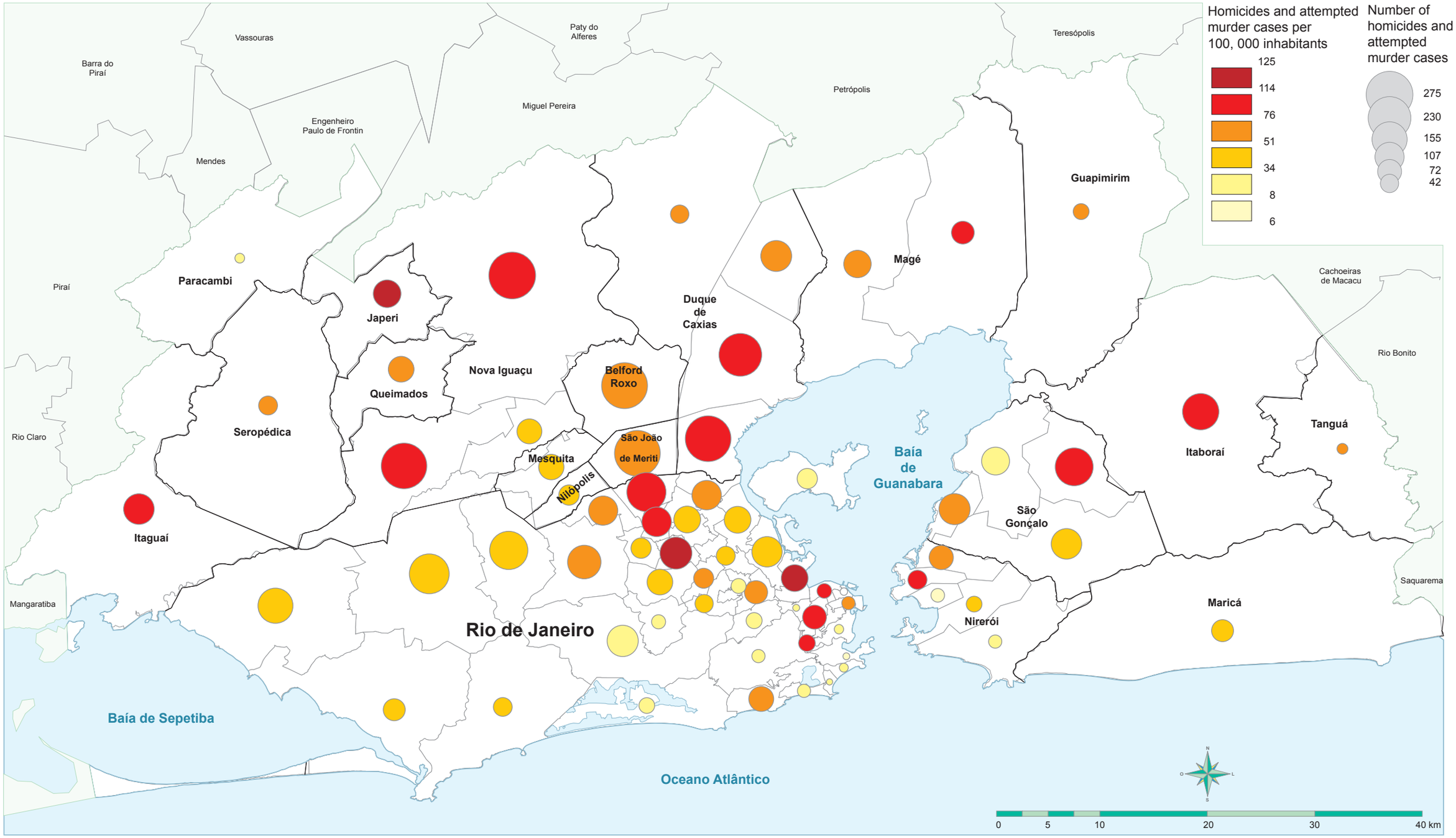

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Fig. 57

Threats

2012

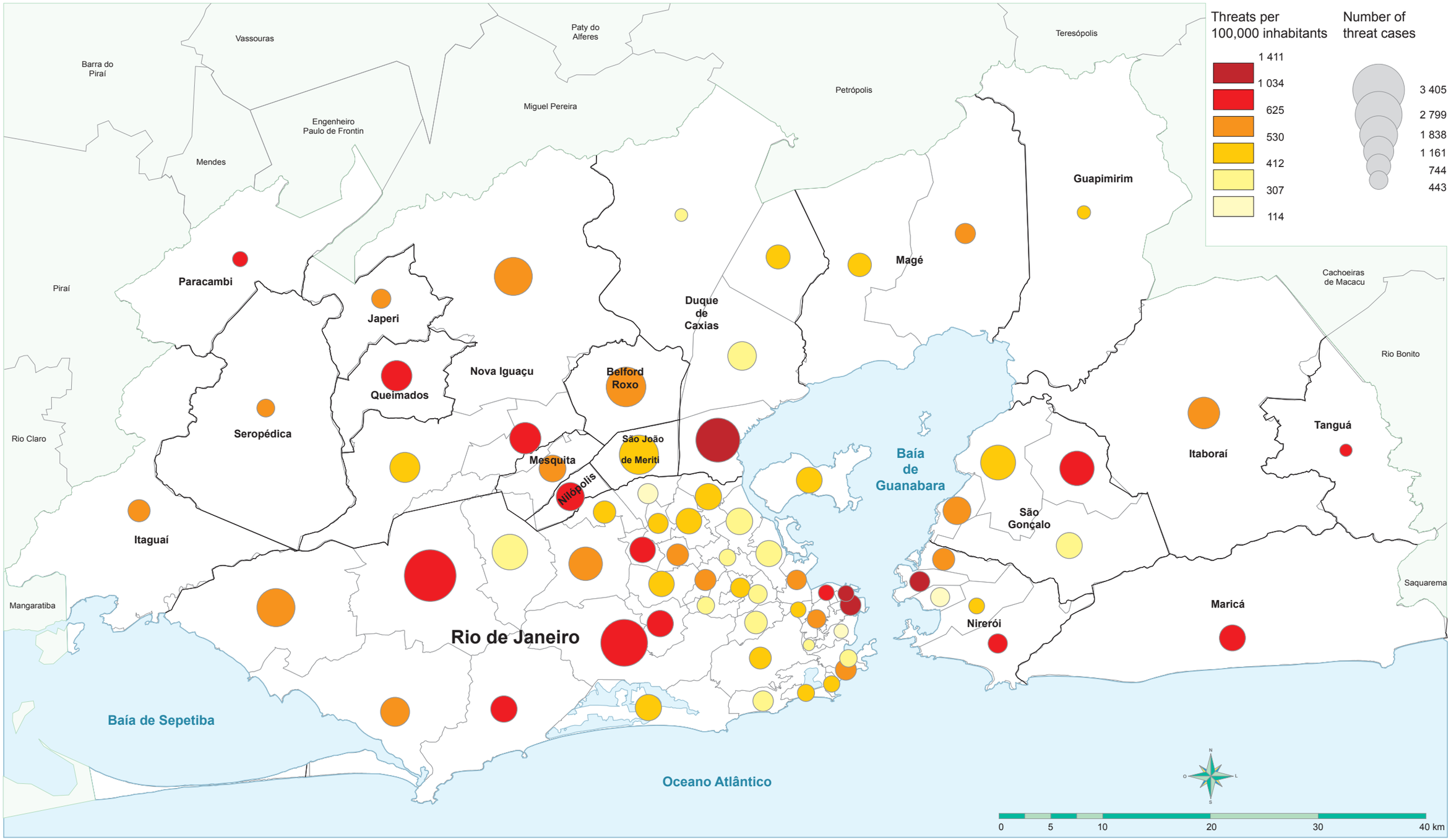

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Fig. 58

Violent crimes: rapes

2012

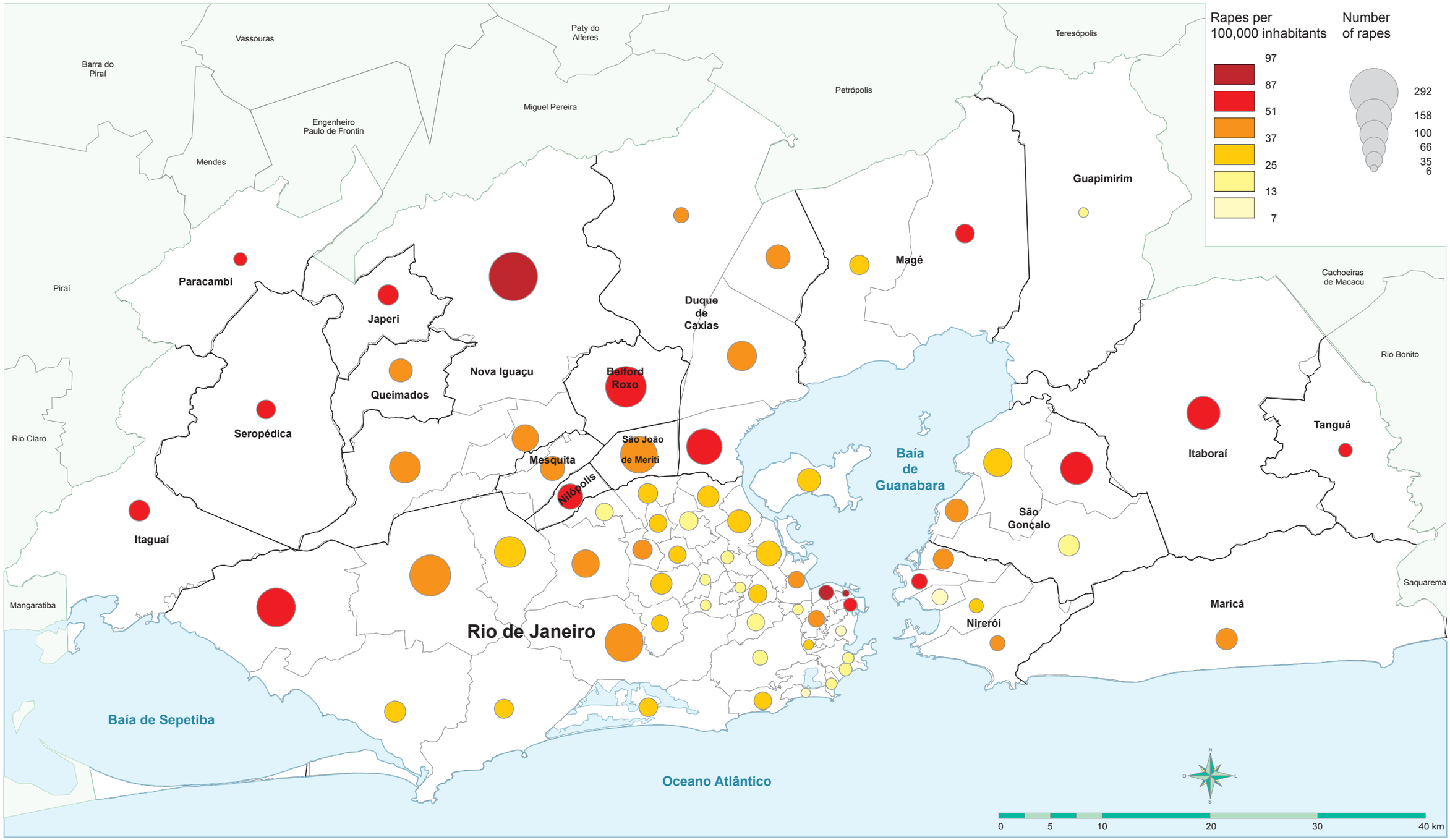

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Fig. 59

Traffic crimes

2012

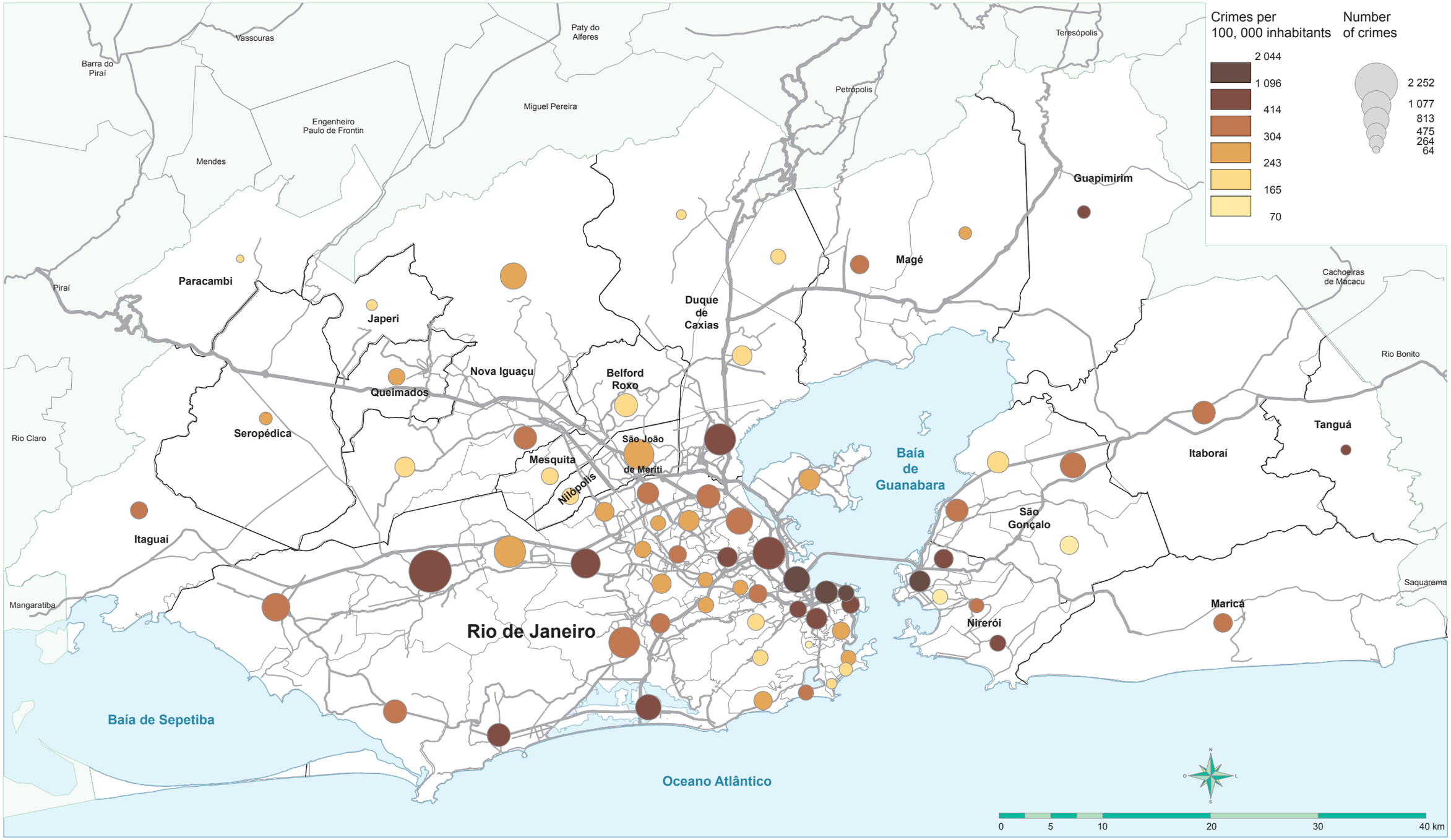

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Fig. 60

Arrest of children or adolescents

2012

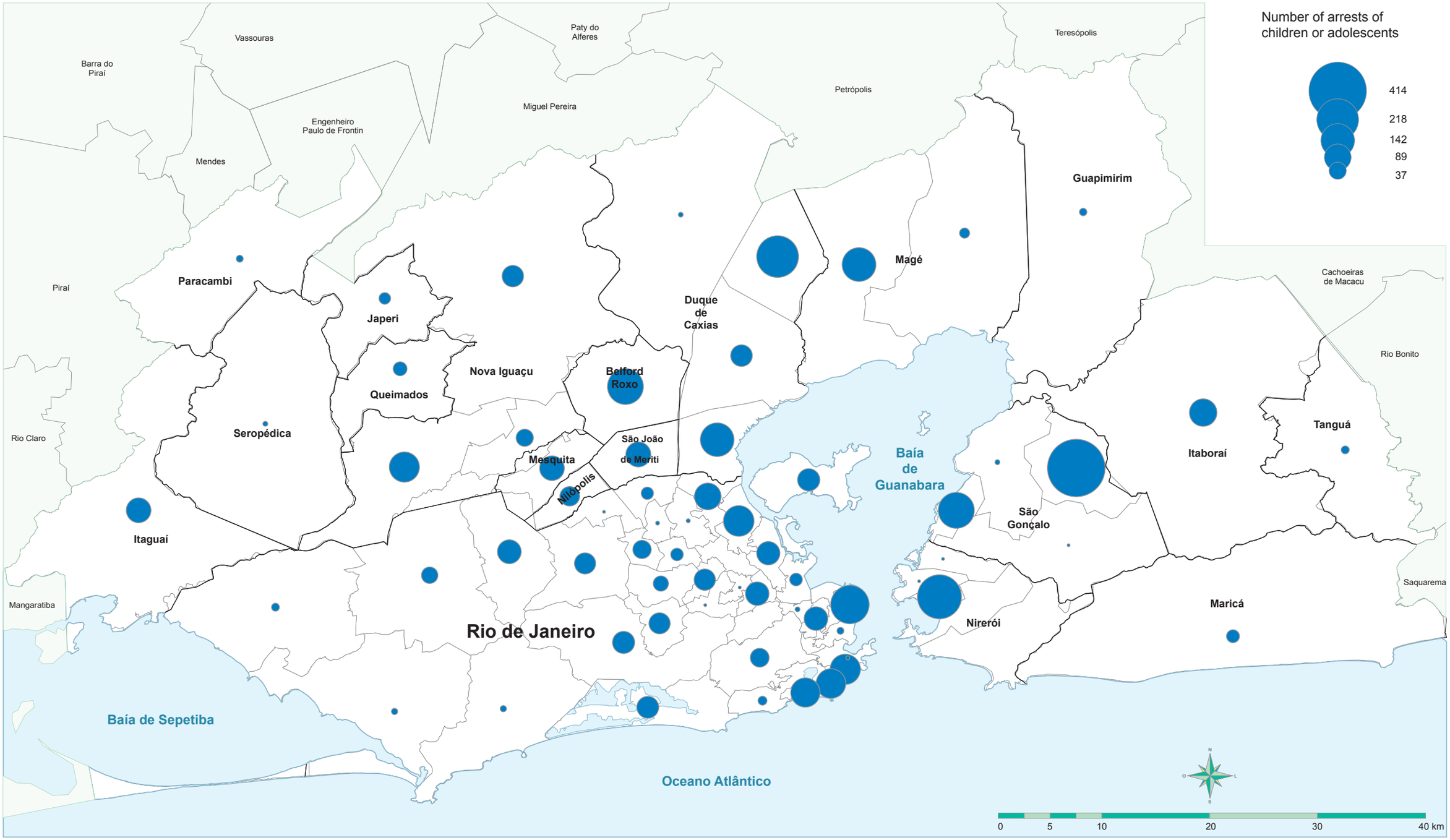

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Fig. 61

Drug seizure

2012

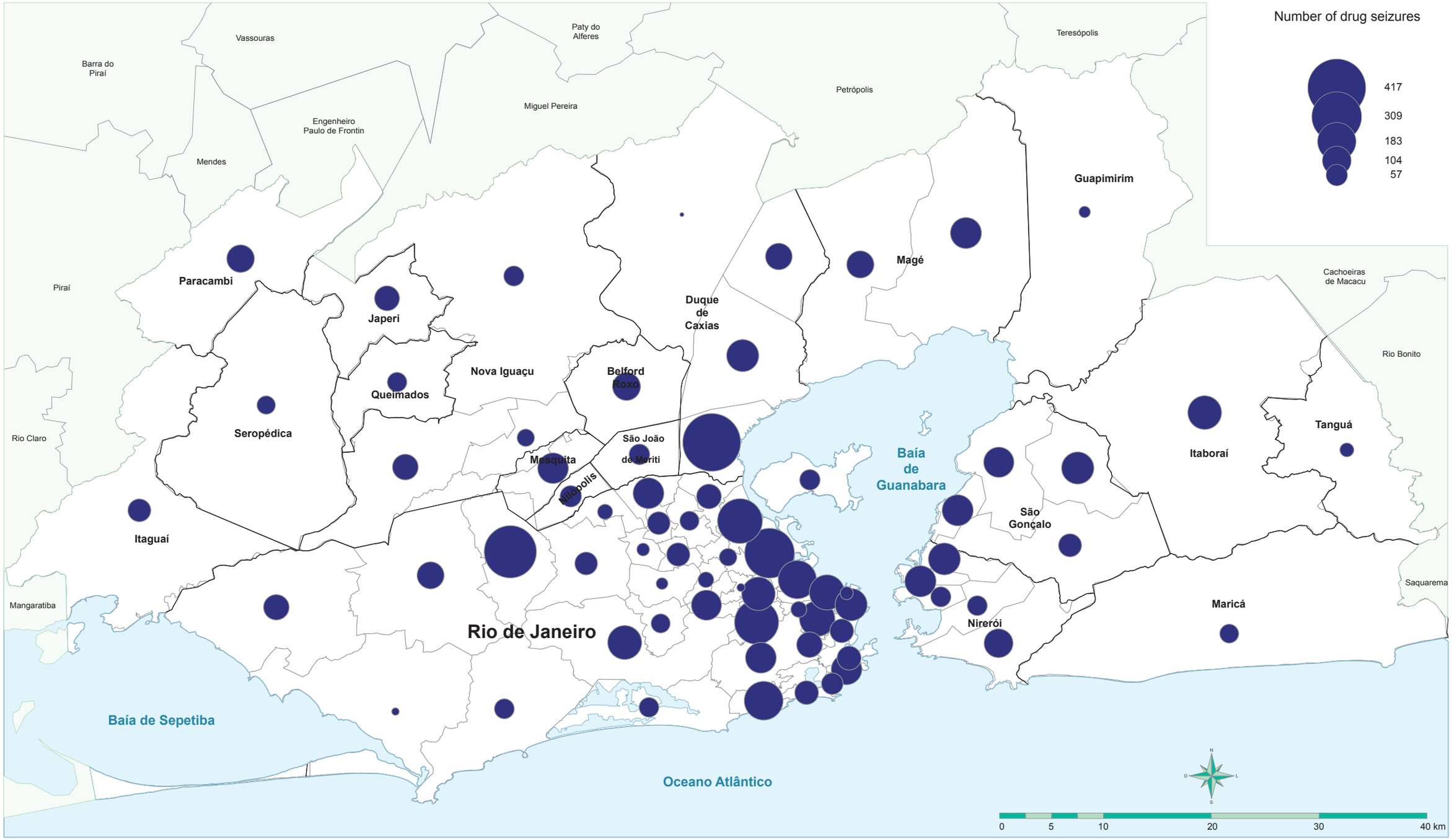

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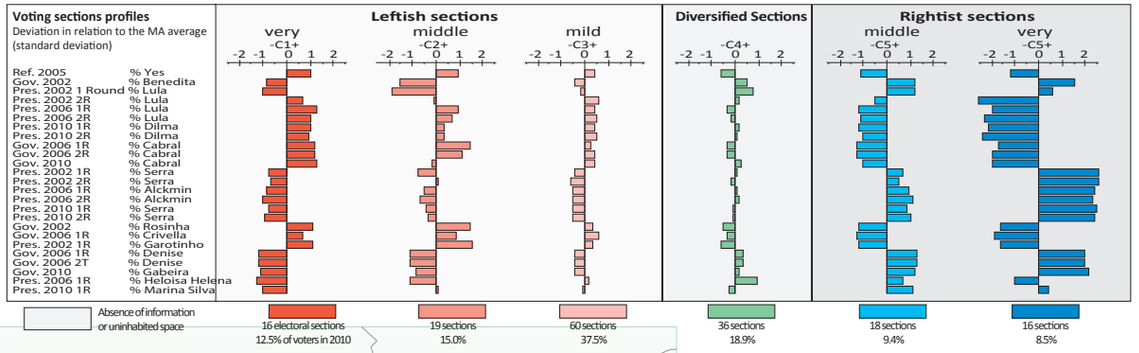
Fig. 62

2002-2010 Electoral Synthesis

2002, 2006, 2010 Elections for Governor and President
2005 Referendum



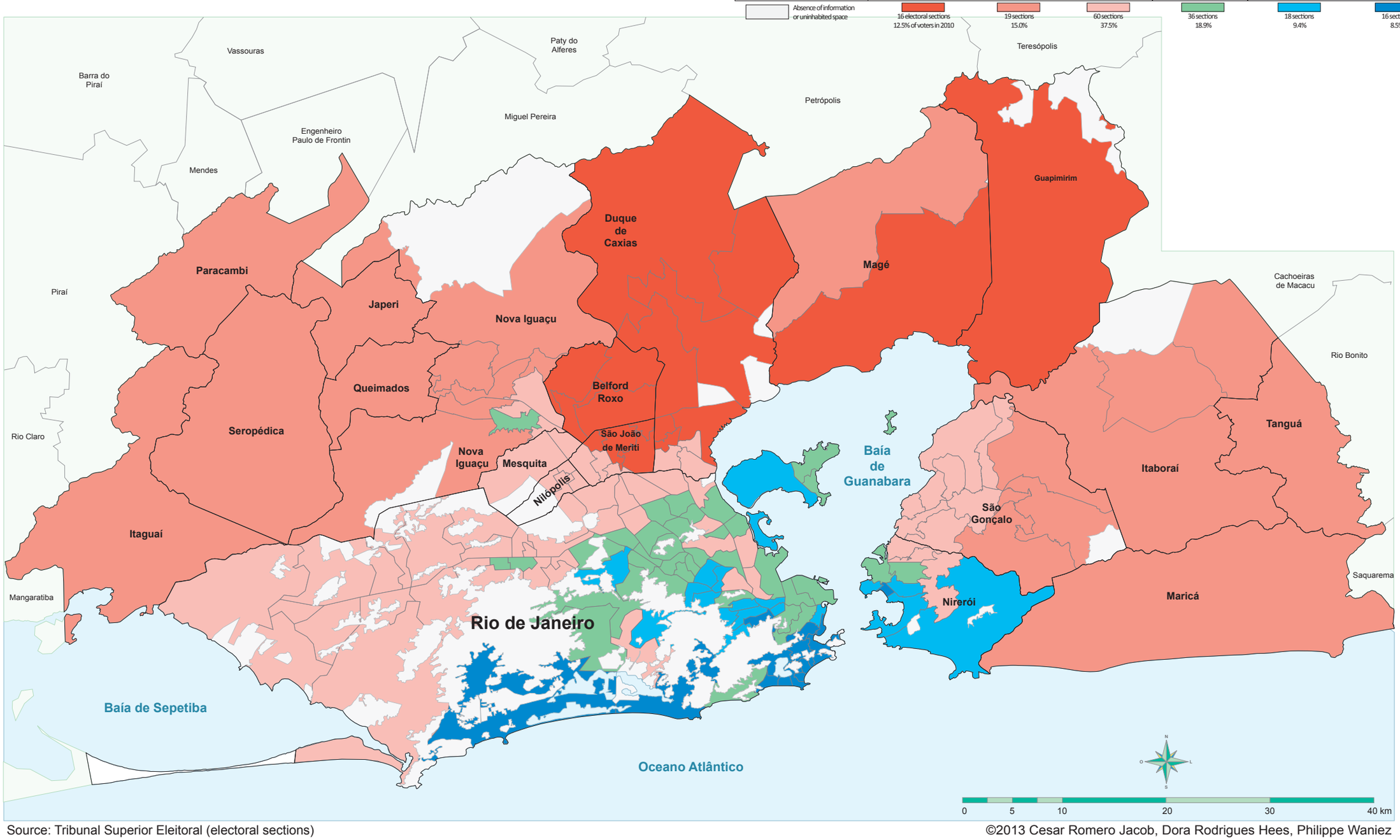


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Fig. 63

Luiz Inácio Lula da Silva
2002 Presidential elections (first round)

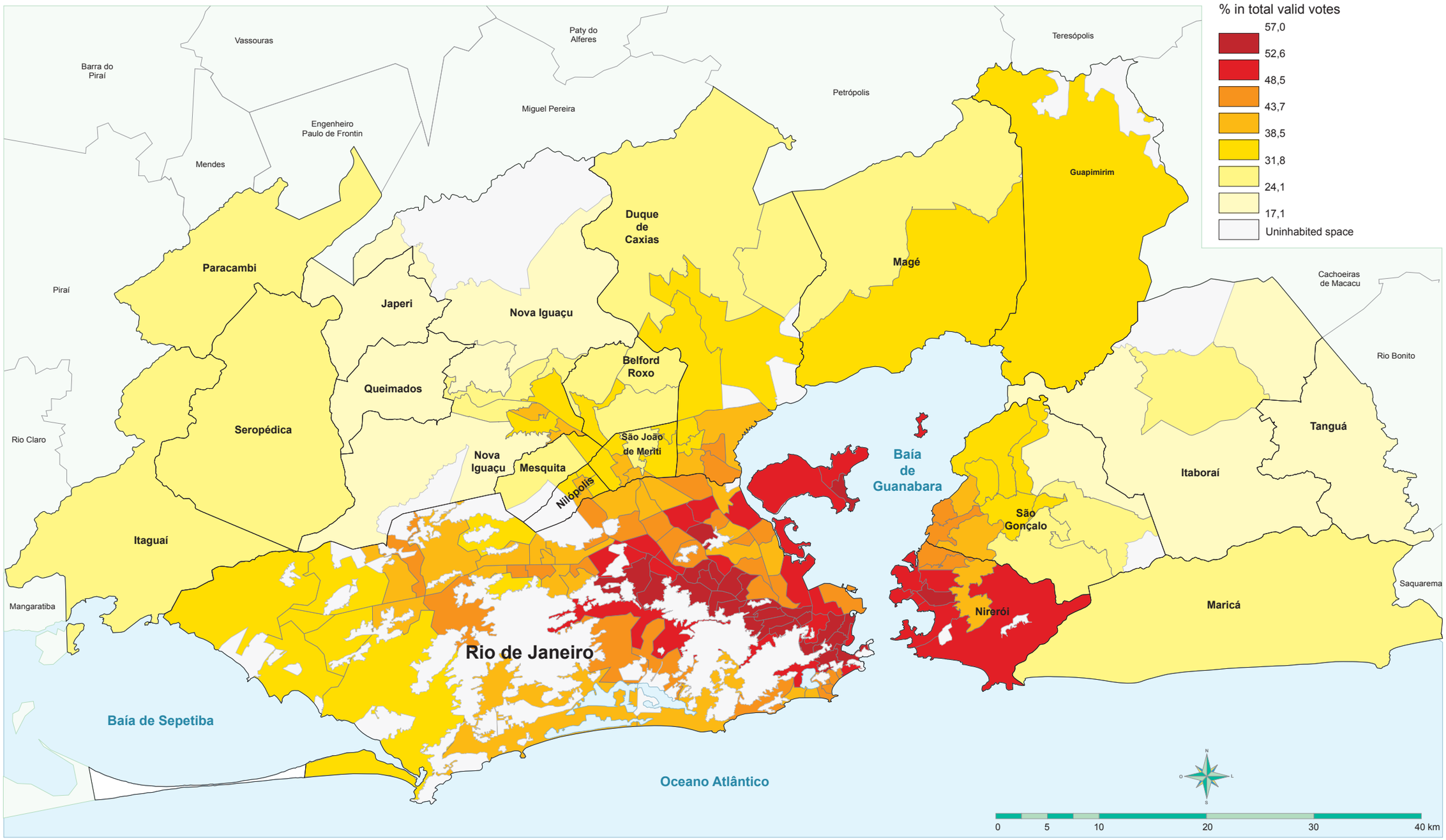

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Fig. 64

Benedita da Silva
2002 Elections for governor

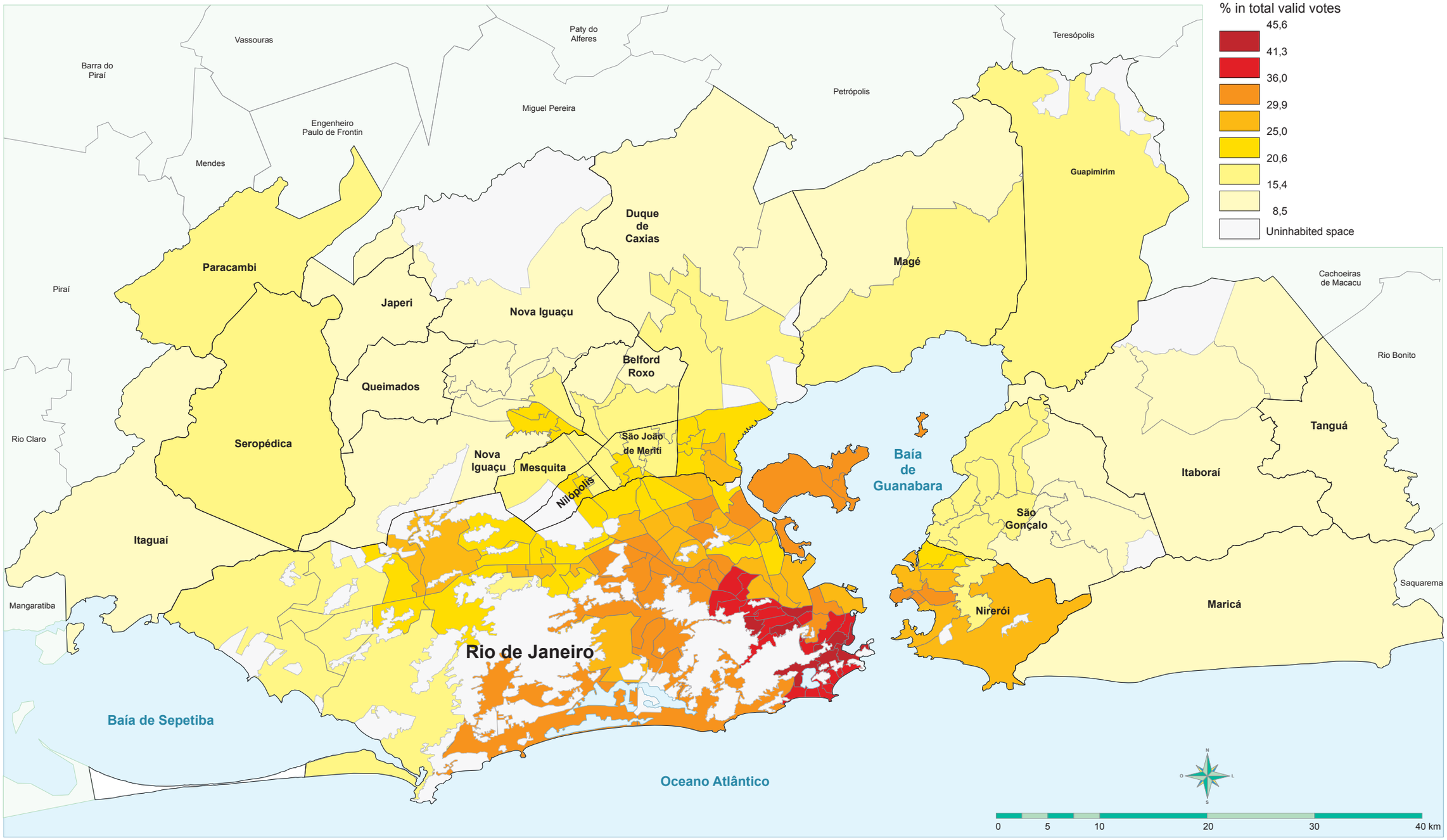

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Fig. 65

Rosinha Garotinho

2002 Elections for governor

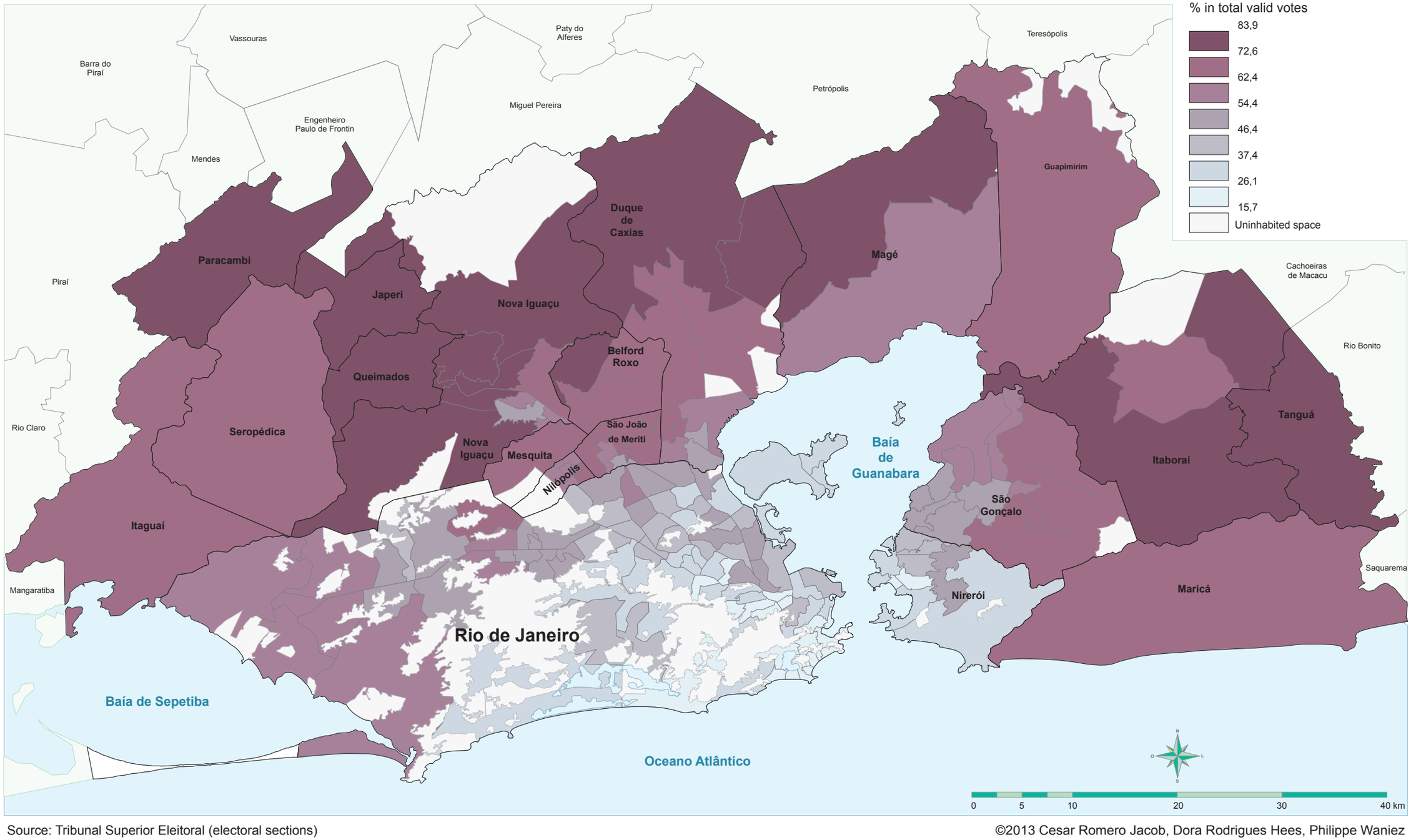

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Fig. 66

Anthony Garotinho

2002 Presidential elections (first round)

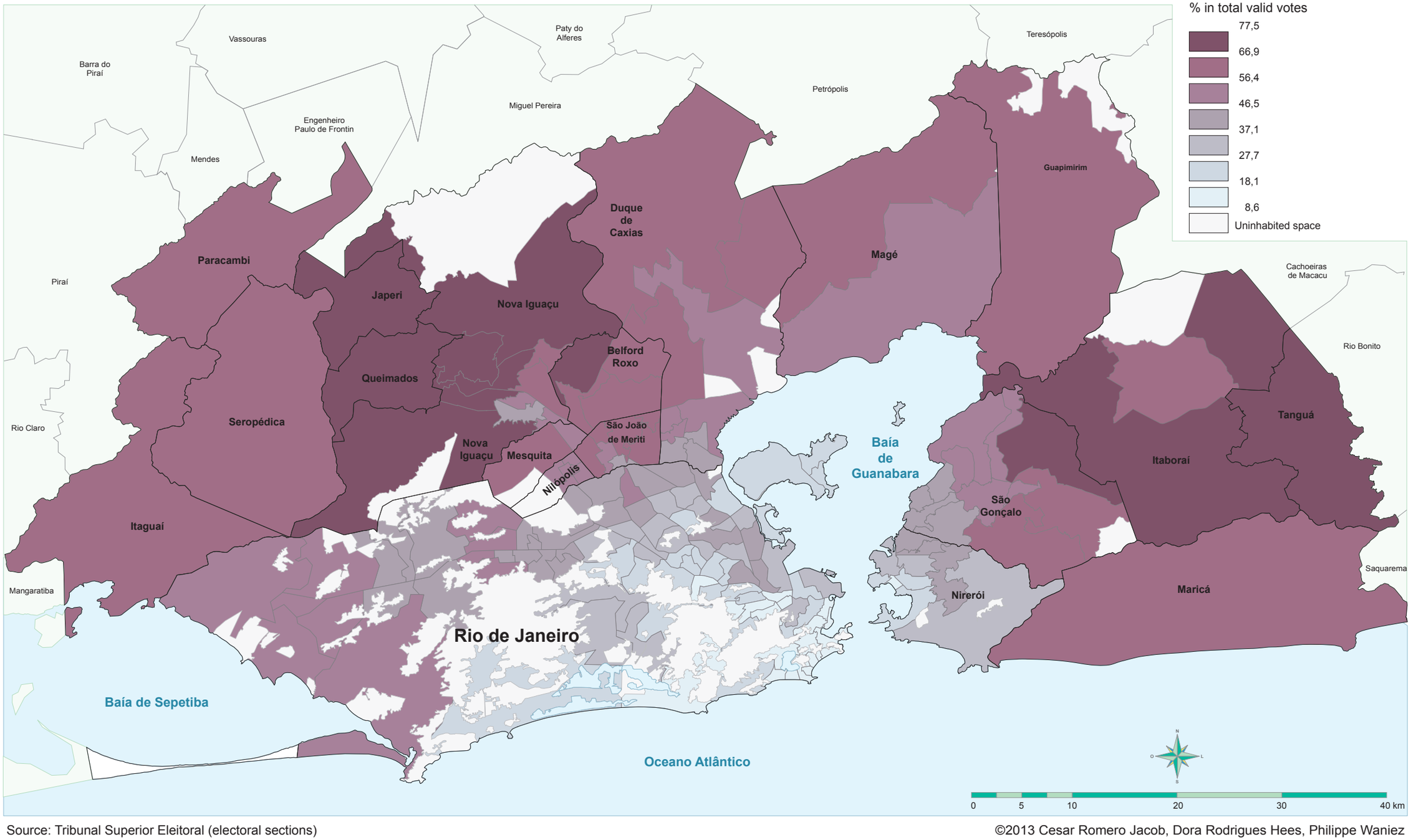

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Fig. 67

Marcelo Crivella

2006 Elections for governor (first round)

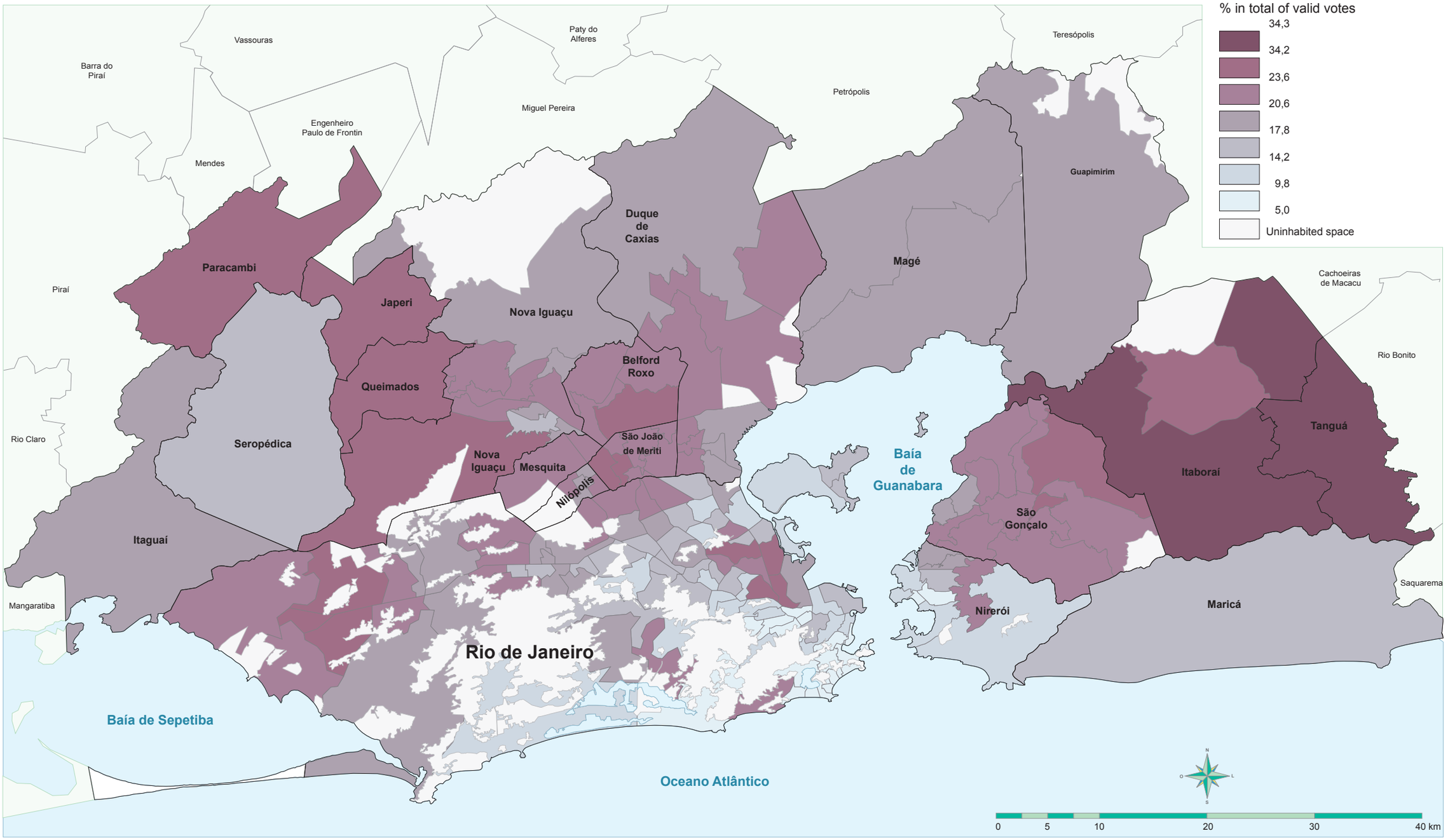

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Fig. 68

Luiz Inácio Lula da Silva

2002 Presidential elections (second round)

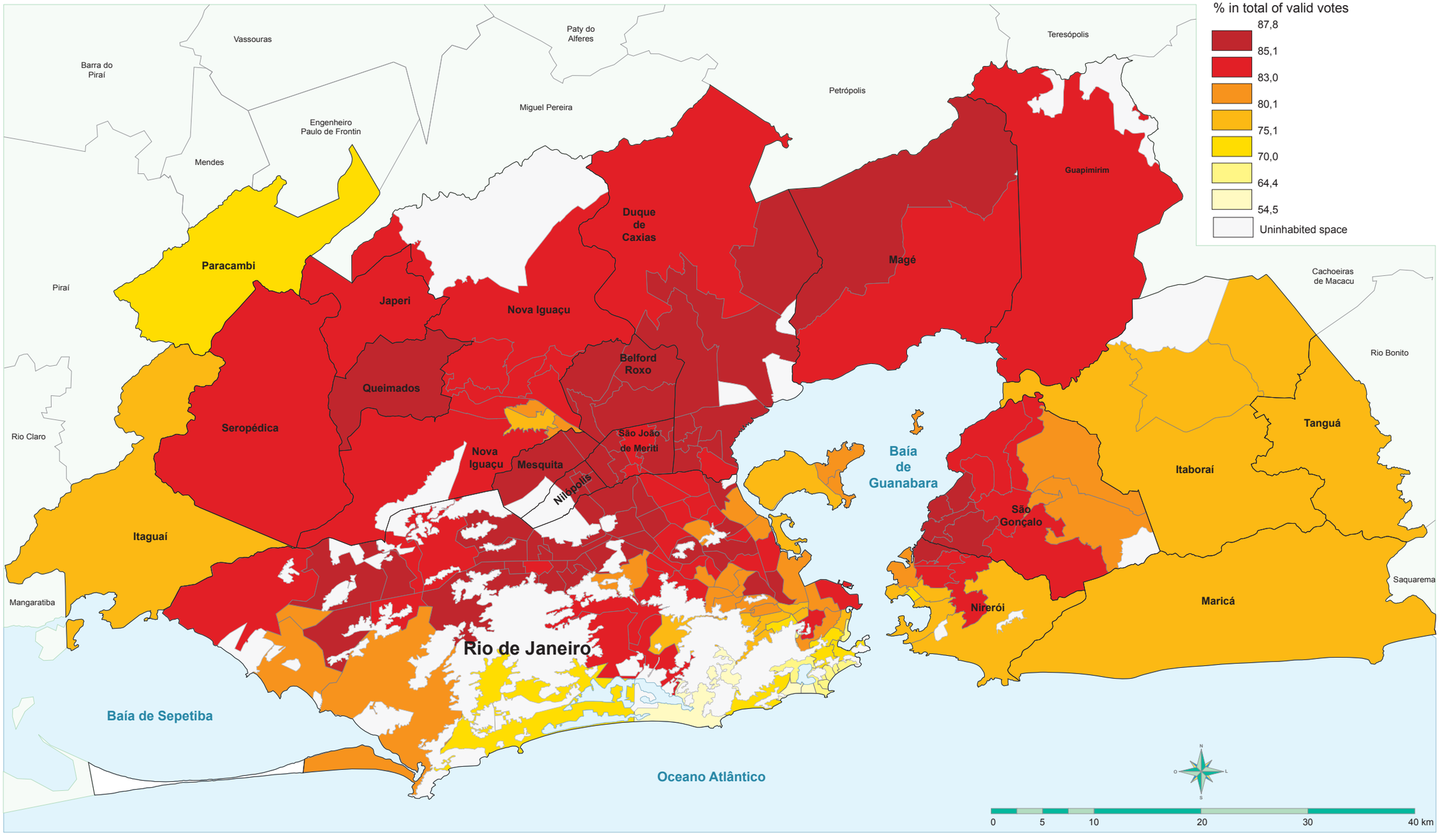

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Fig. 69

Luiz Inácio Lula da Silva

2006 Presidential elections (first round)

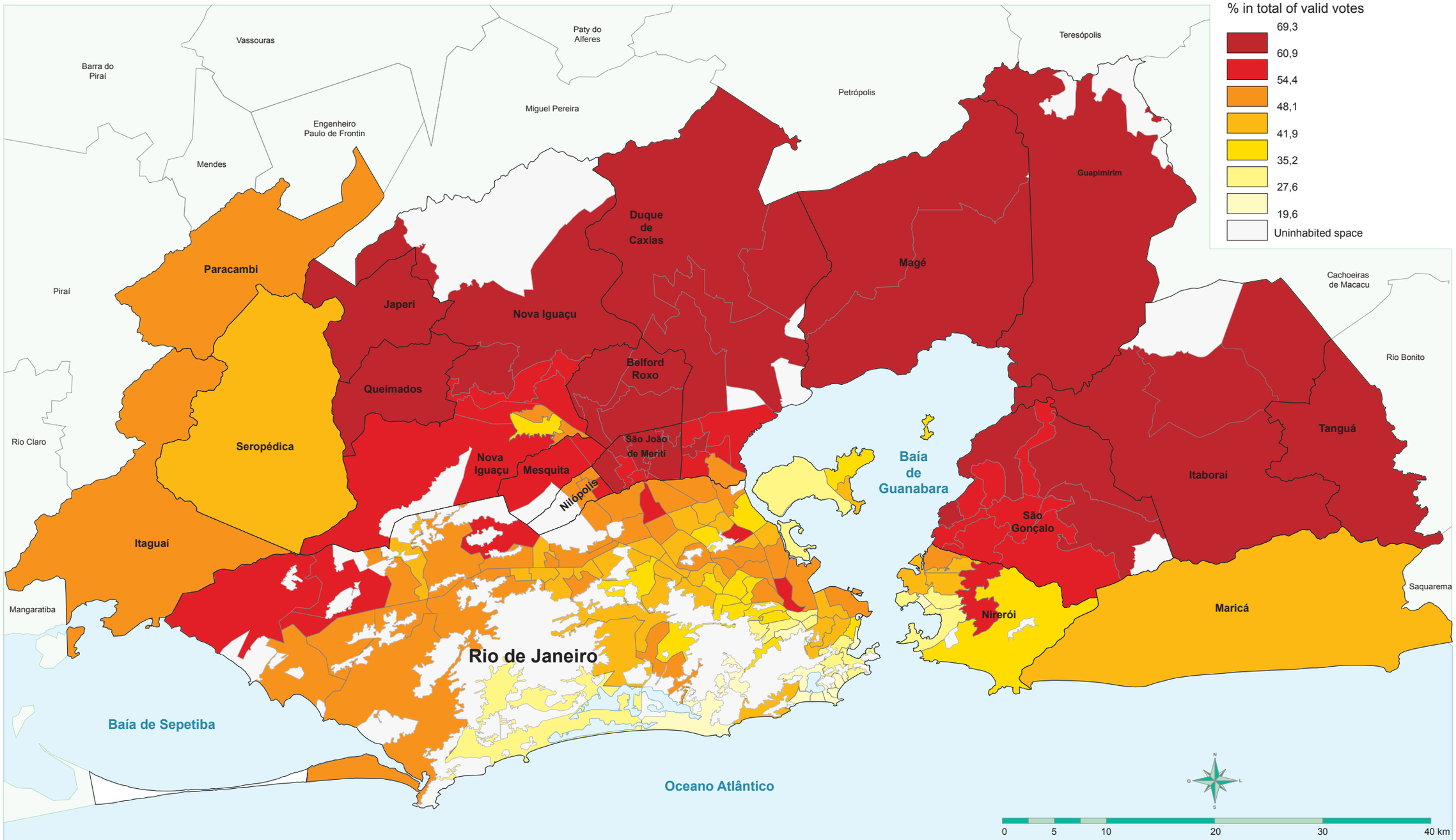

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Fig. 70

Luiz Inácio Lula da Silva

2006 Presidential elections (second round)

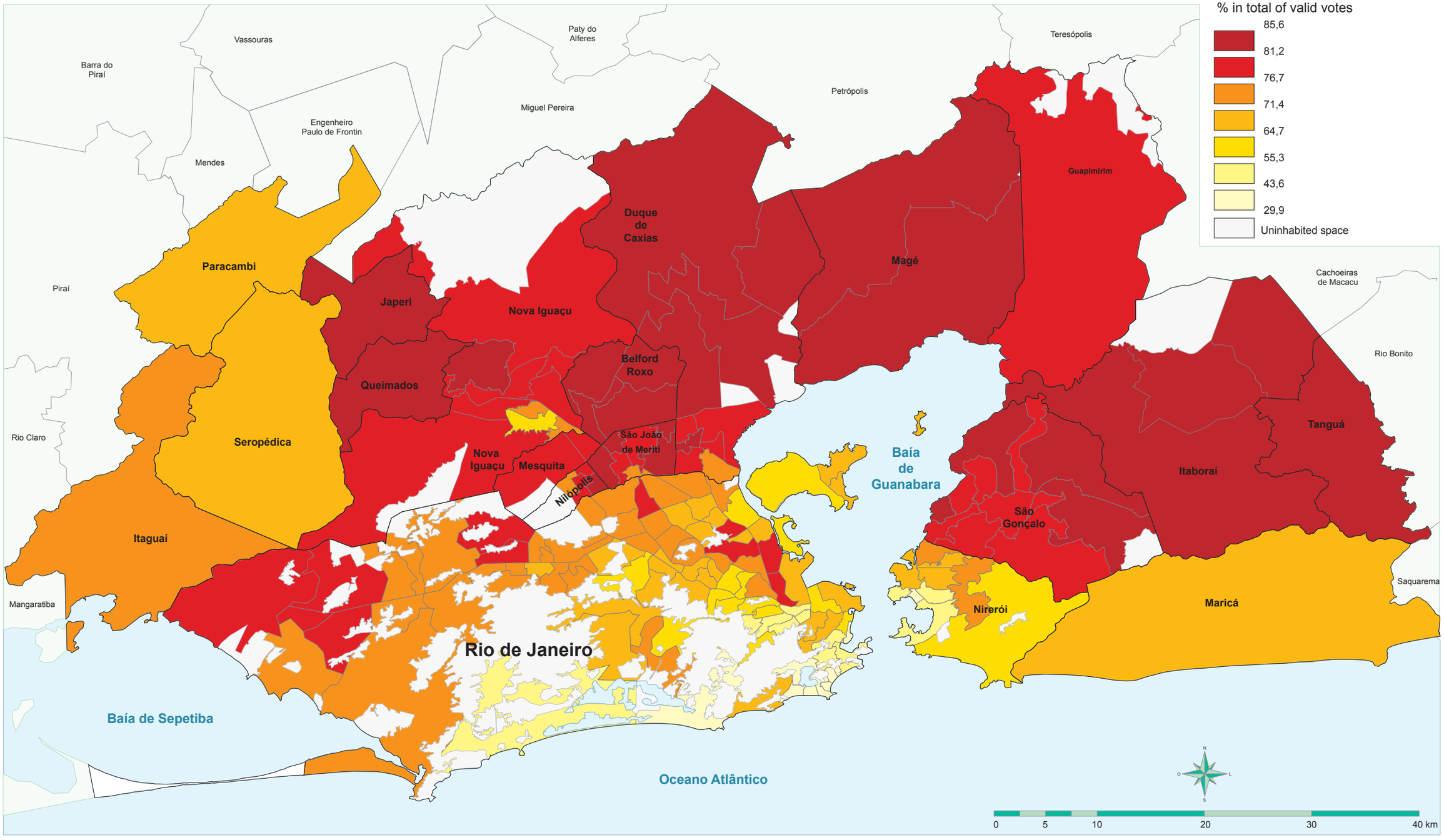

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Fig. 71

Dilma Rousseff

2010 Presidential elections (first round)

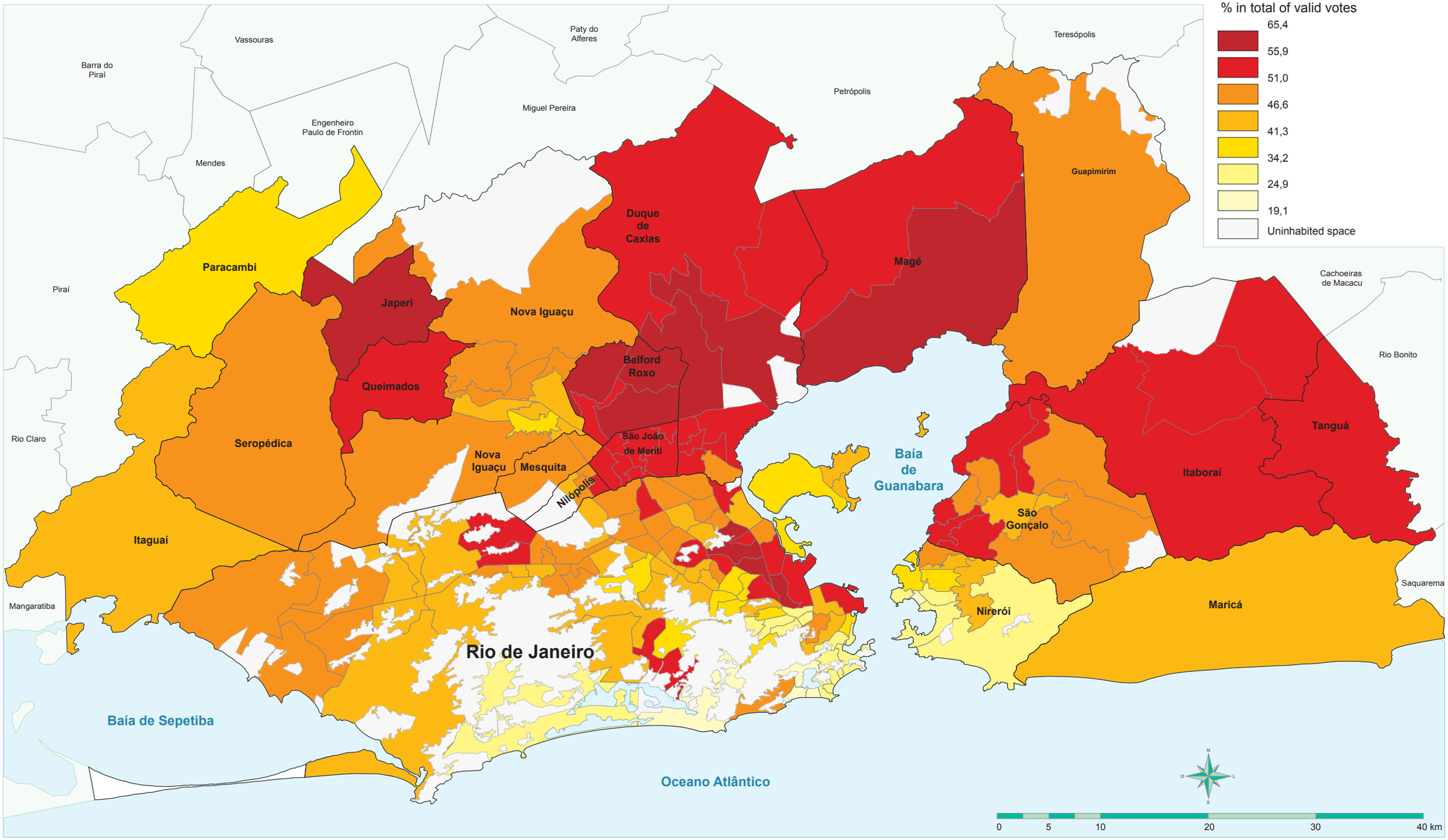

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Fig. 72

Dilma Rousseff

2010 Presidential elections (second round)

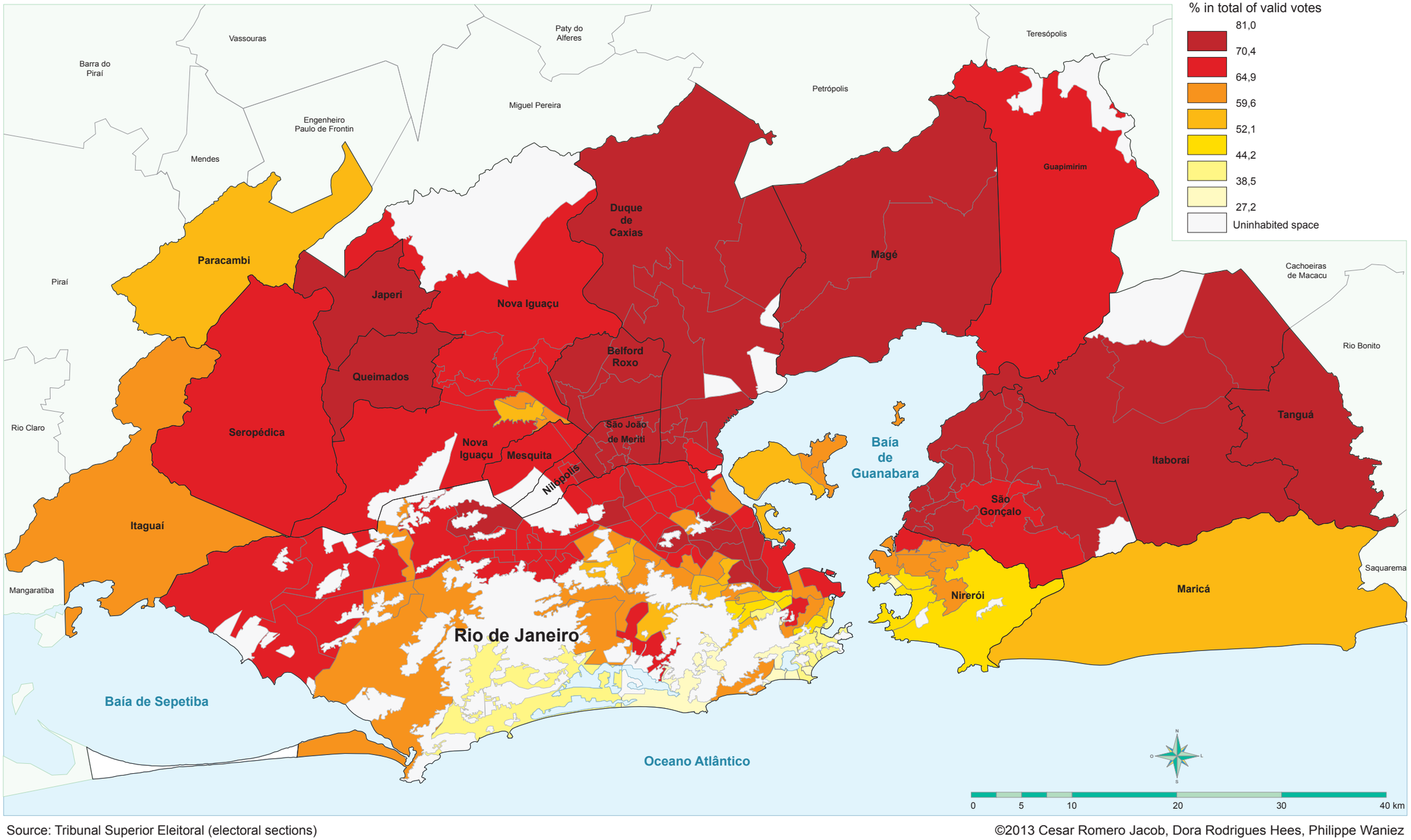

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Fig. 73

Sérgio Cabral
2006 Elections for governor (first round)

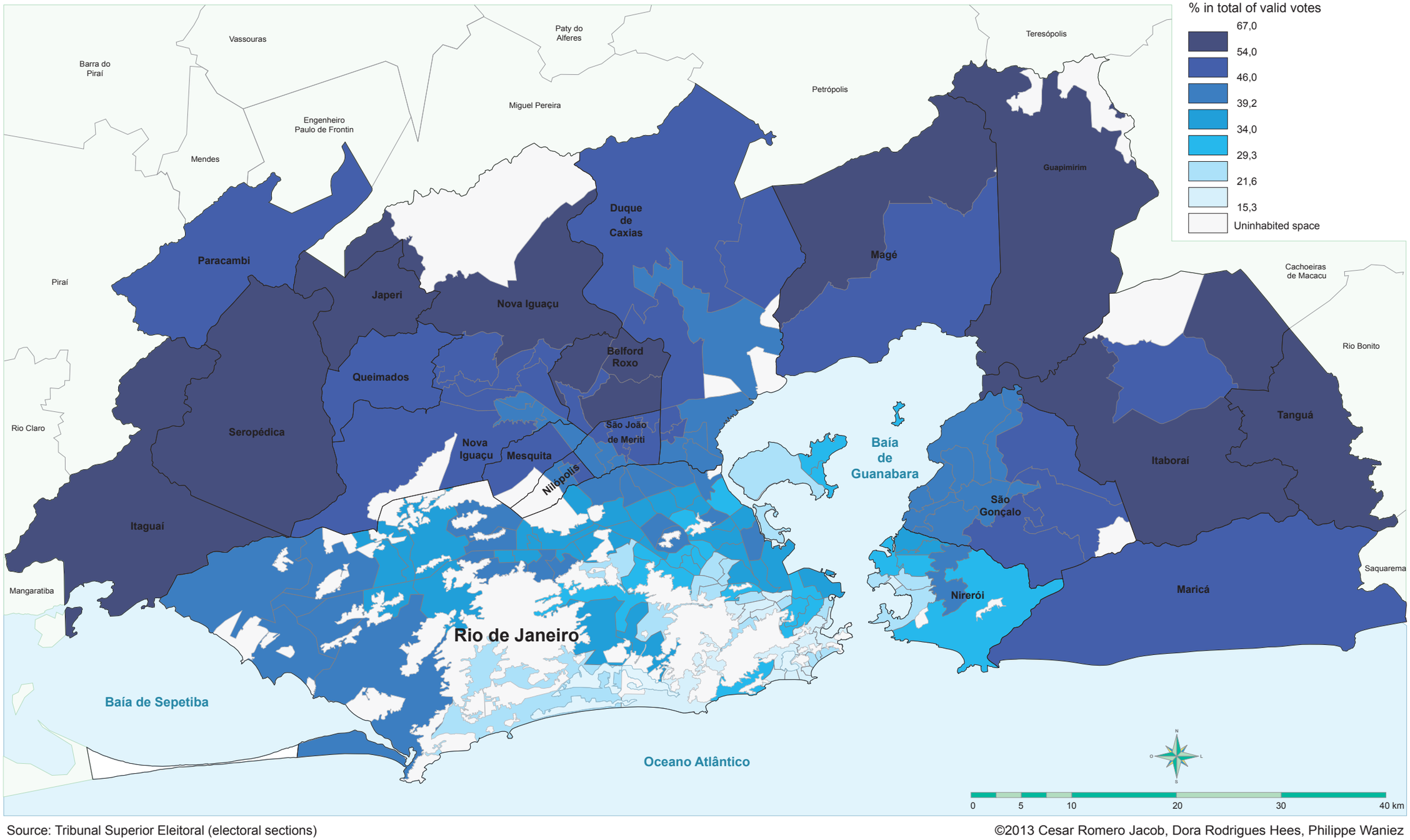

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Fig. 74

Sérgio Cabral

2006 Elections for governor (second round)

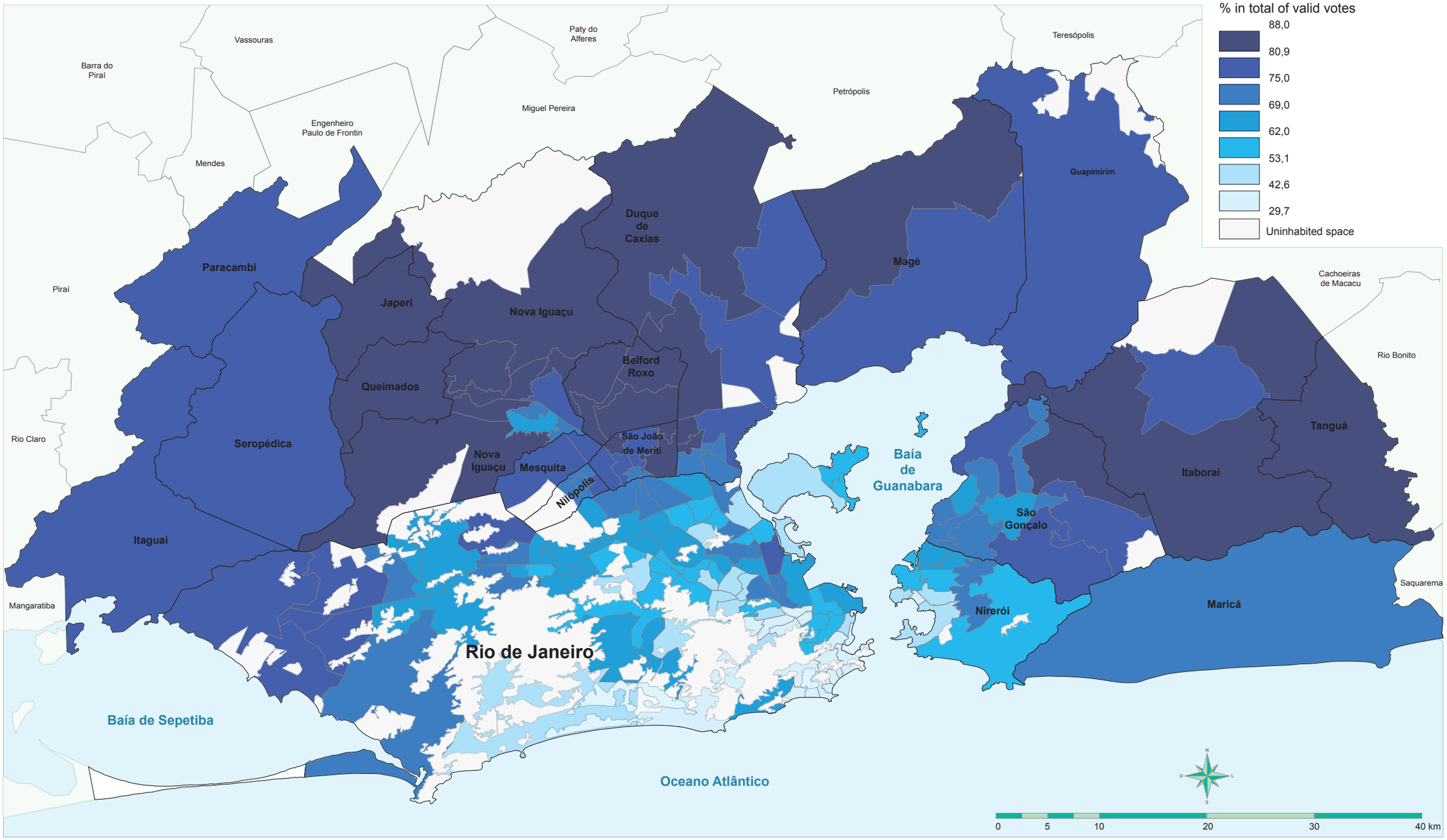

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Fig. 75

Sérgio Cabral
2010 Elections for governor

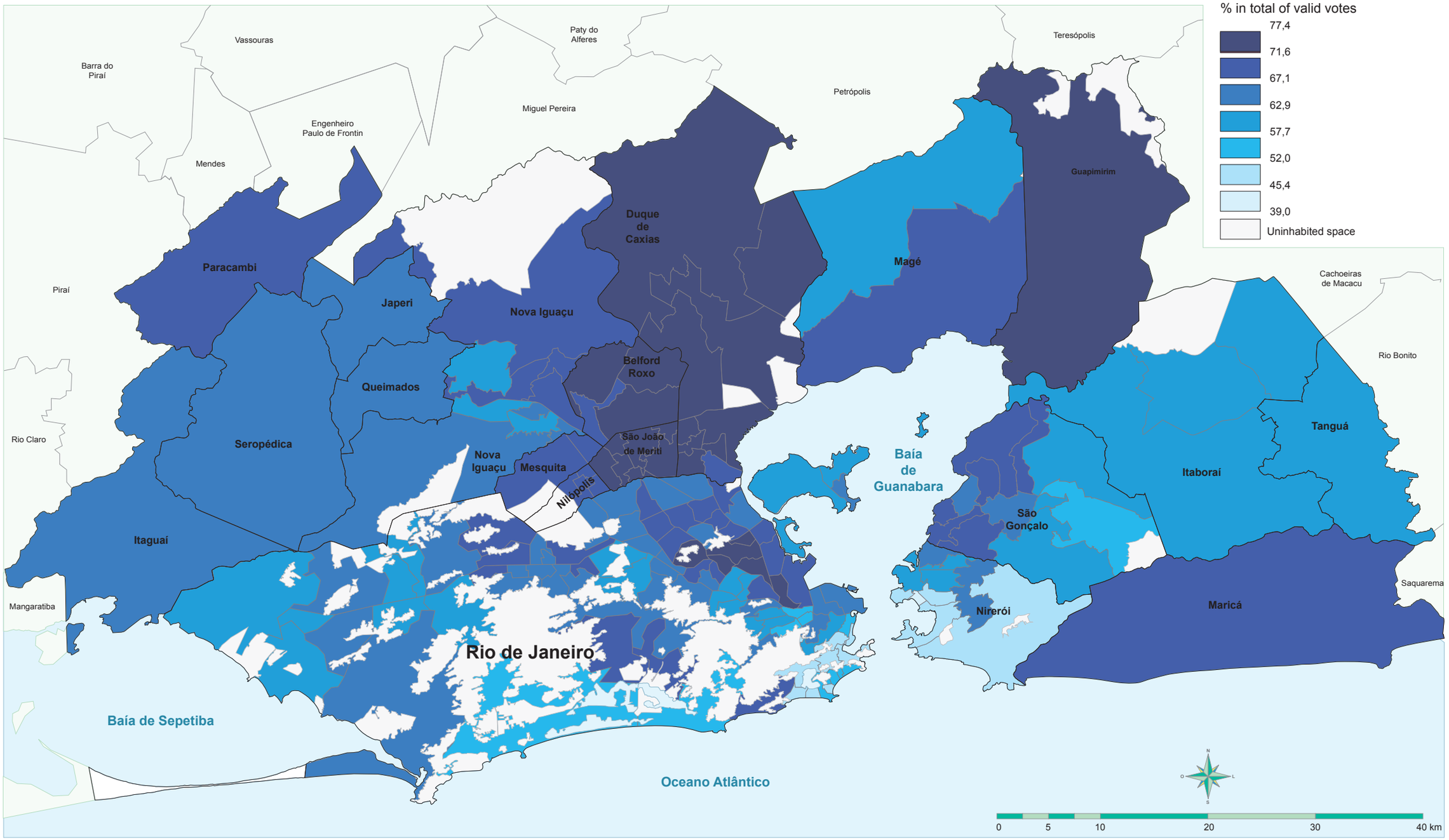

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Fig. 76

2005 Referendum

Should firearms and ammunition trade be prohibited in Brazil?

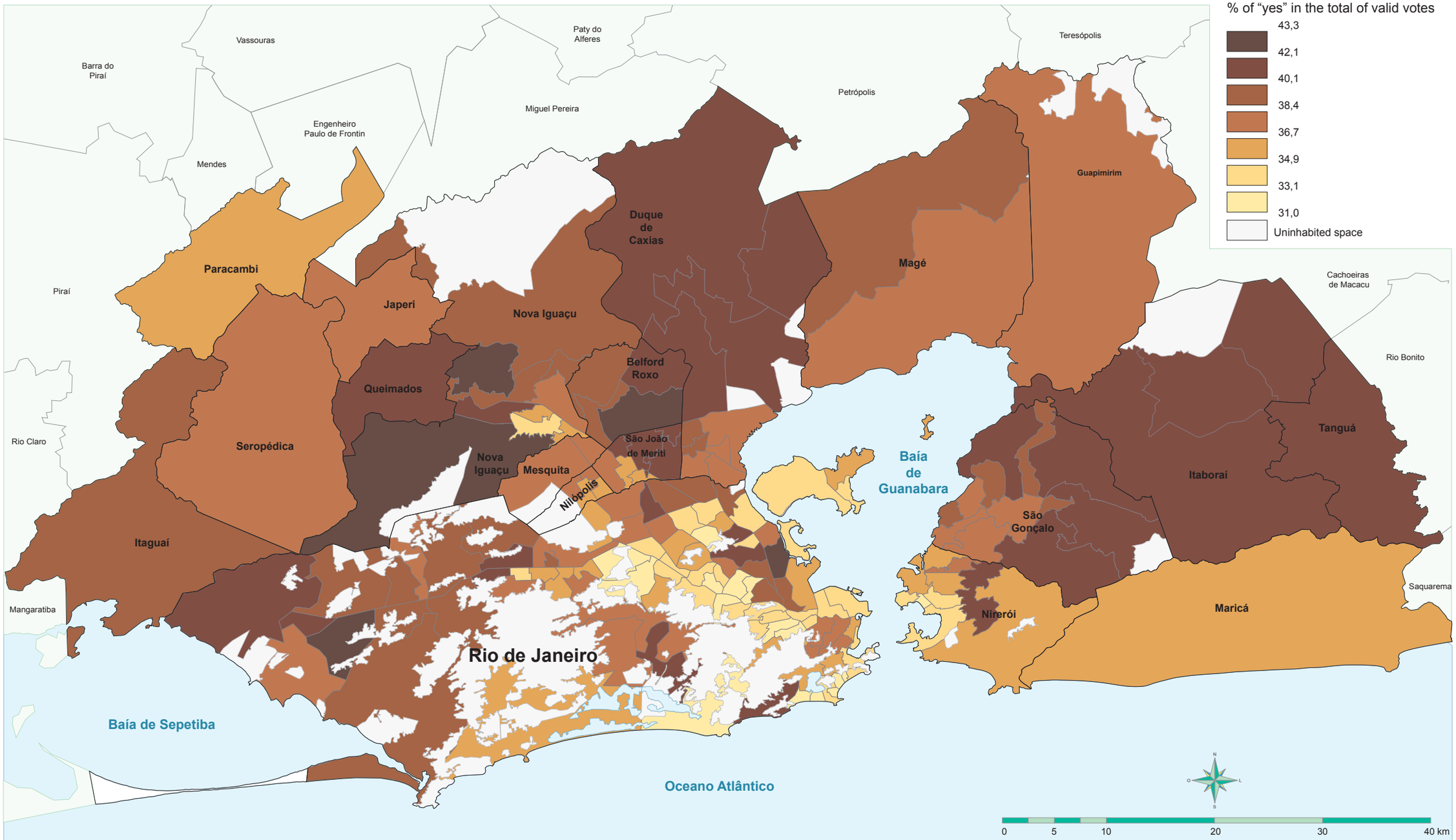

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Fig. 77

José Serra

2002 Presidential elections (first round)

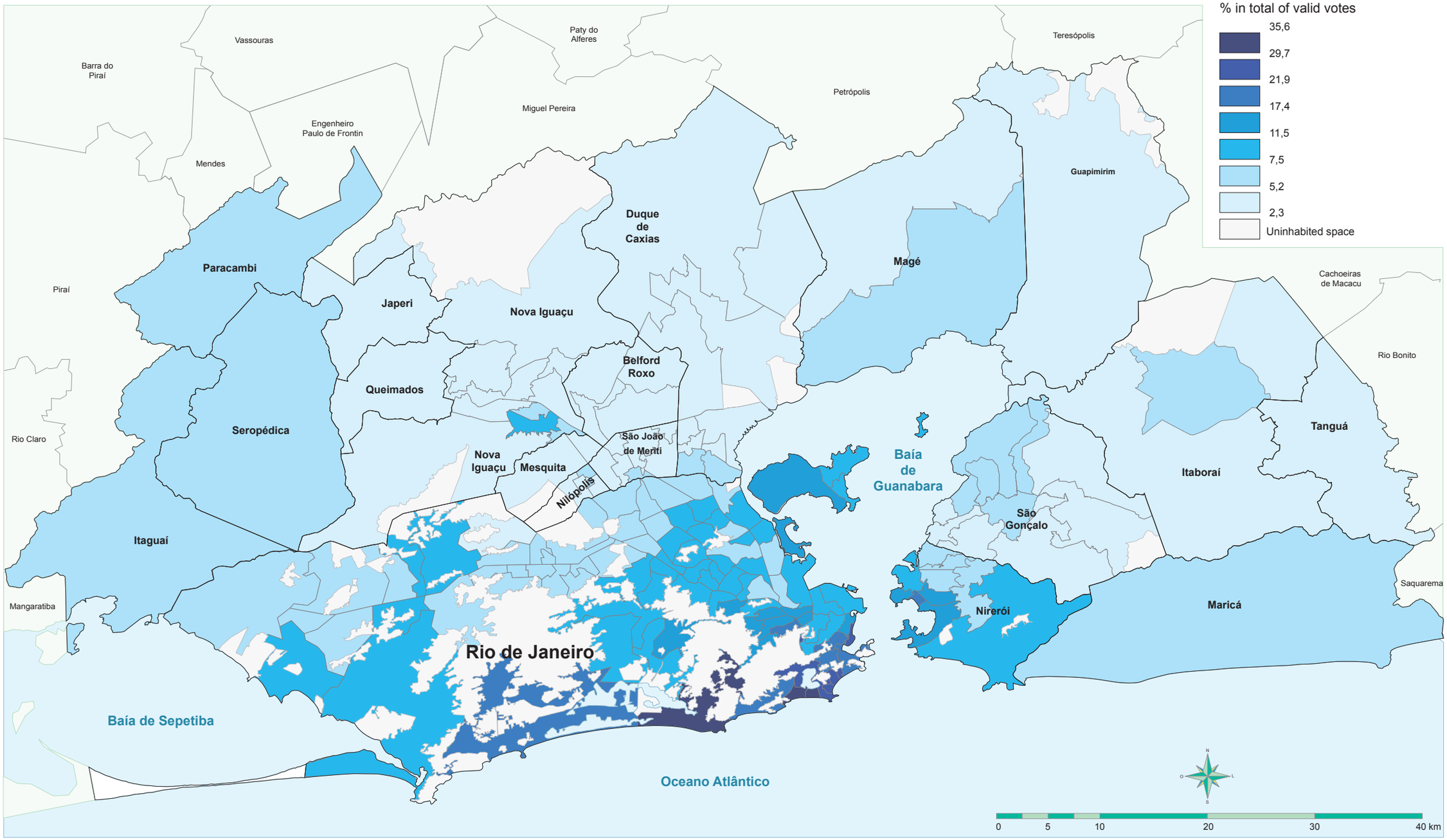

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Fig. 78

José Serra

2002 Presidential elections (second round)

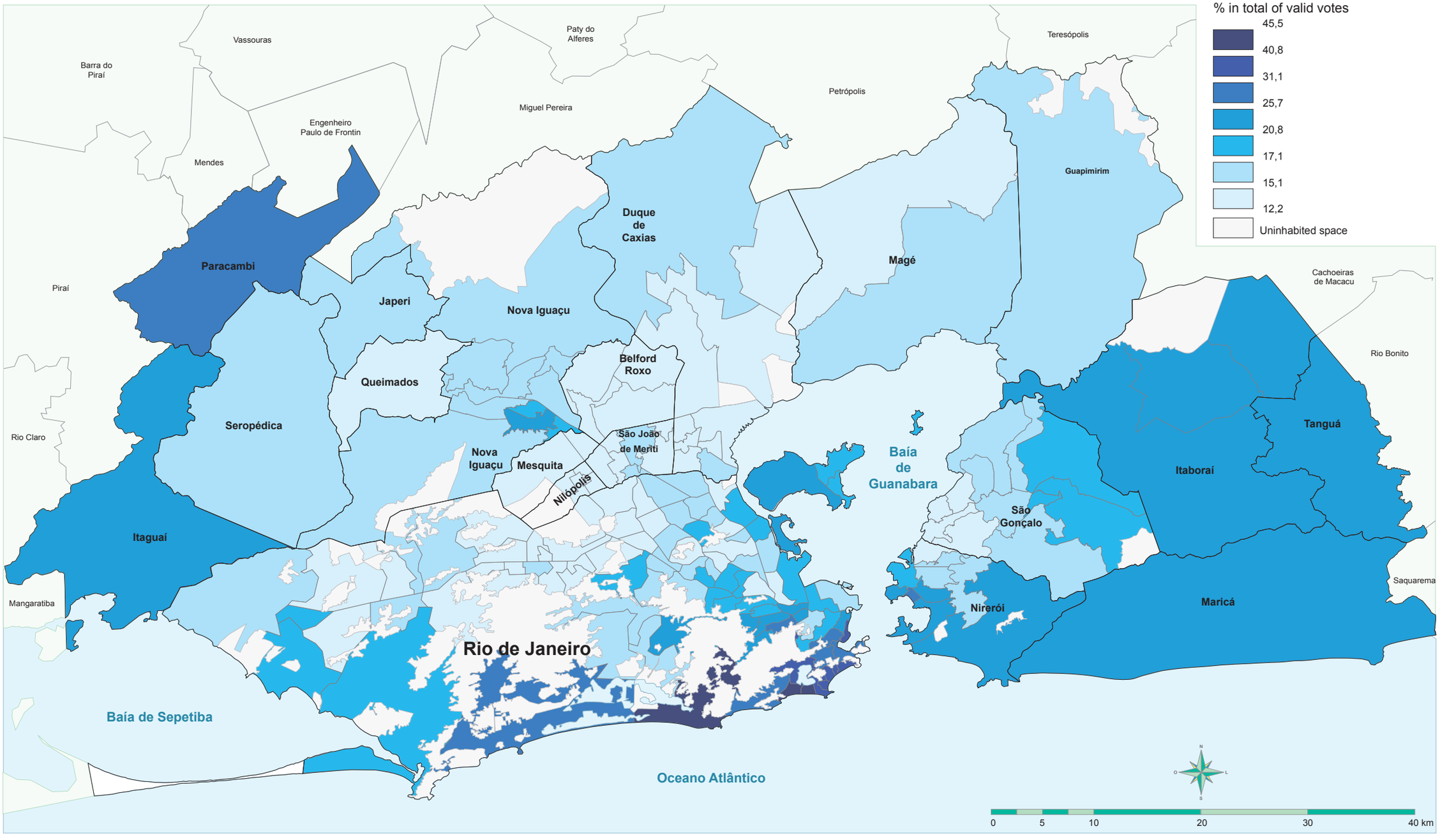

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Fig. 79

Geraldo Alckmin
2006 Presidential elections (first round)

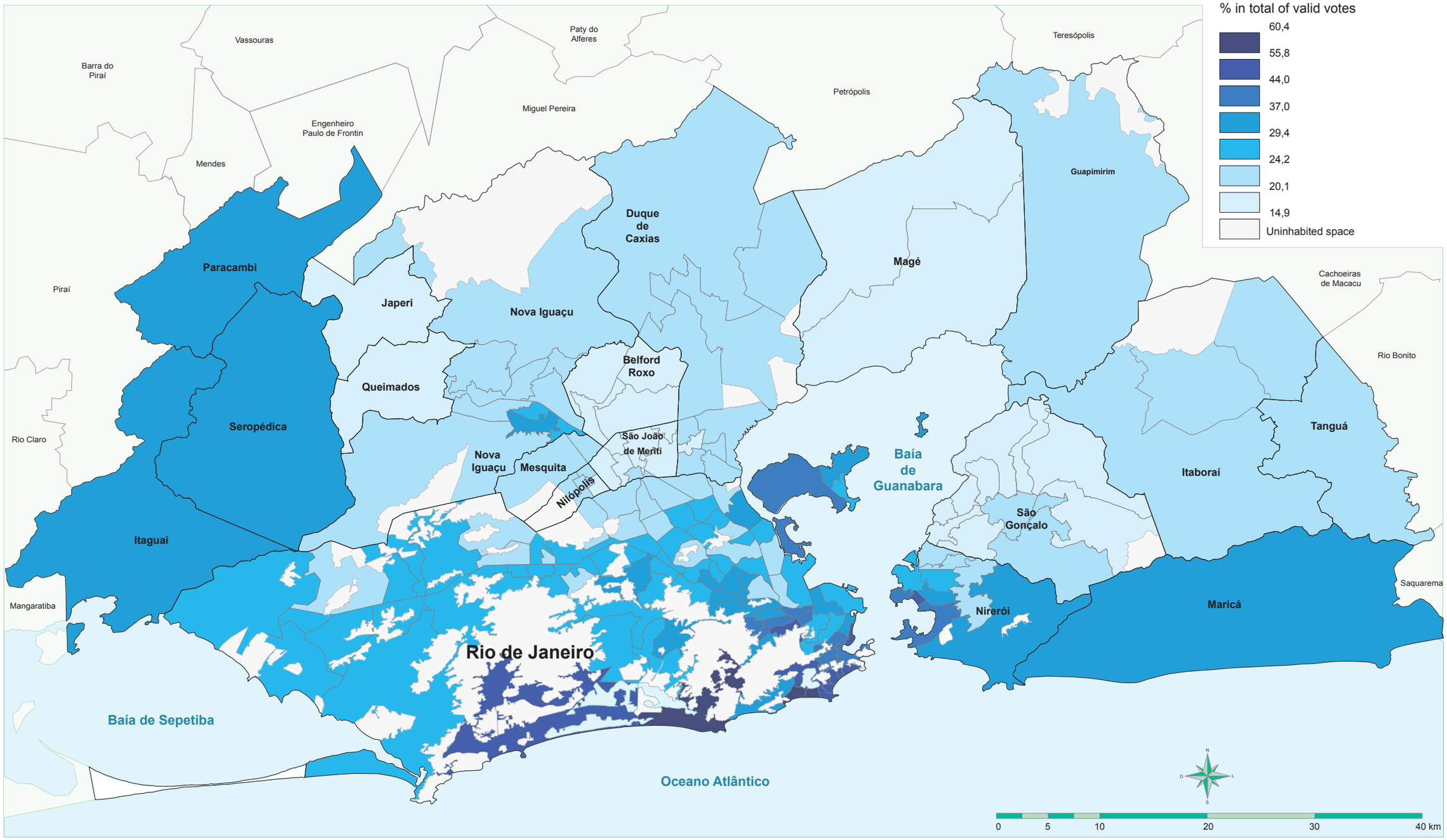

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Fig. 80

Geraldo Alckmin

2006 Presidential elections (second round)

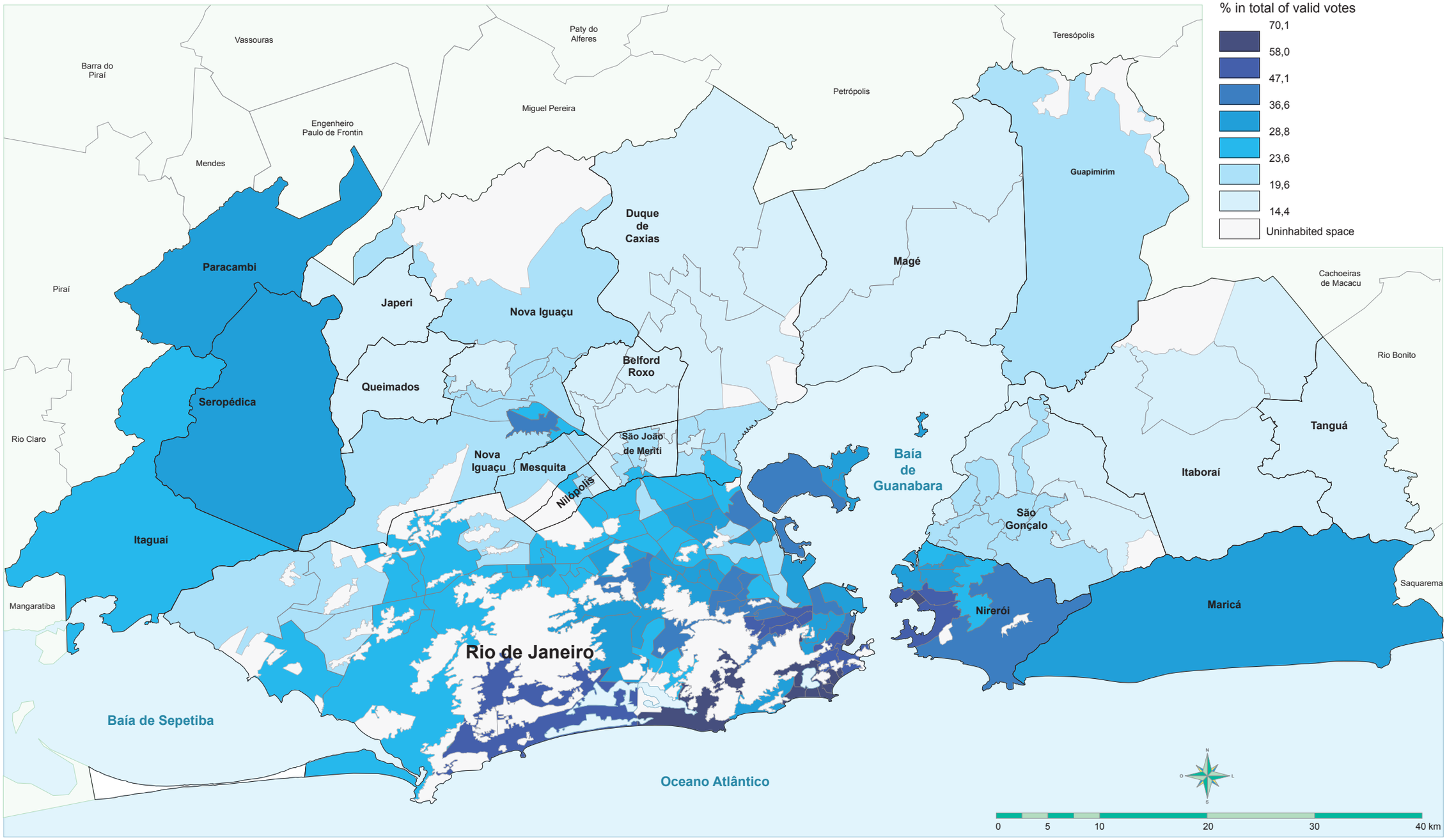

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Fig. 81

José Serra
2010 Presidential elections (first round)

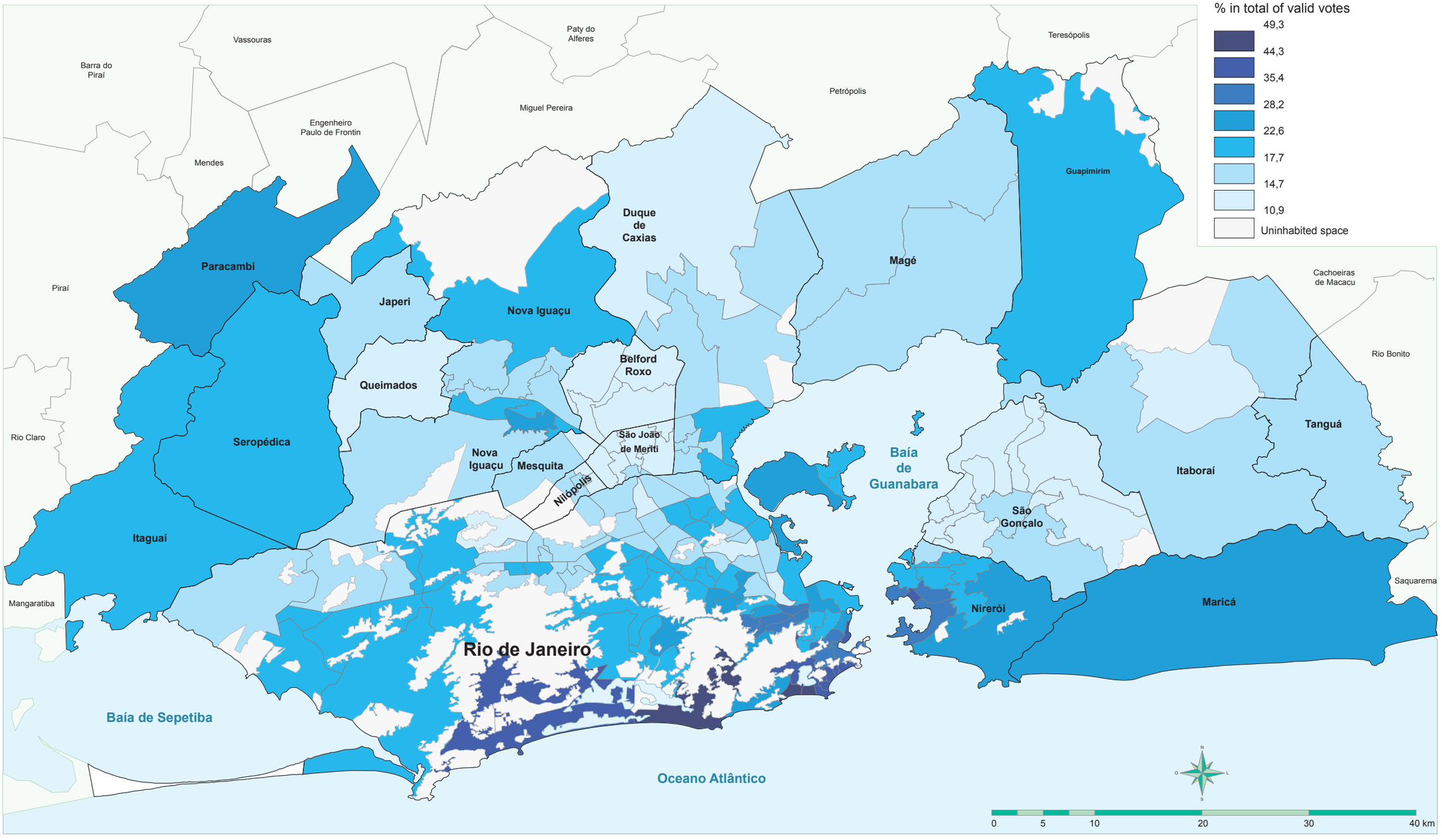

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Fig. 82

José Serra

2010 Presidential elections (second round)

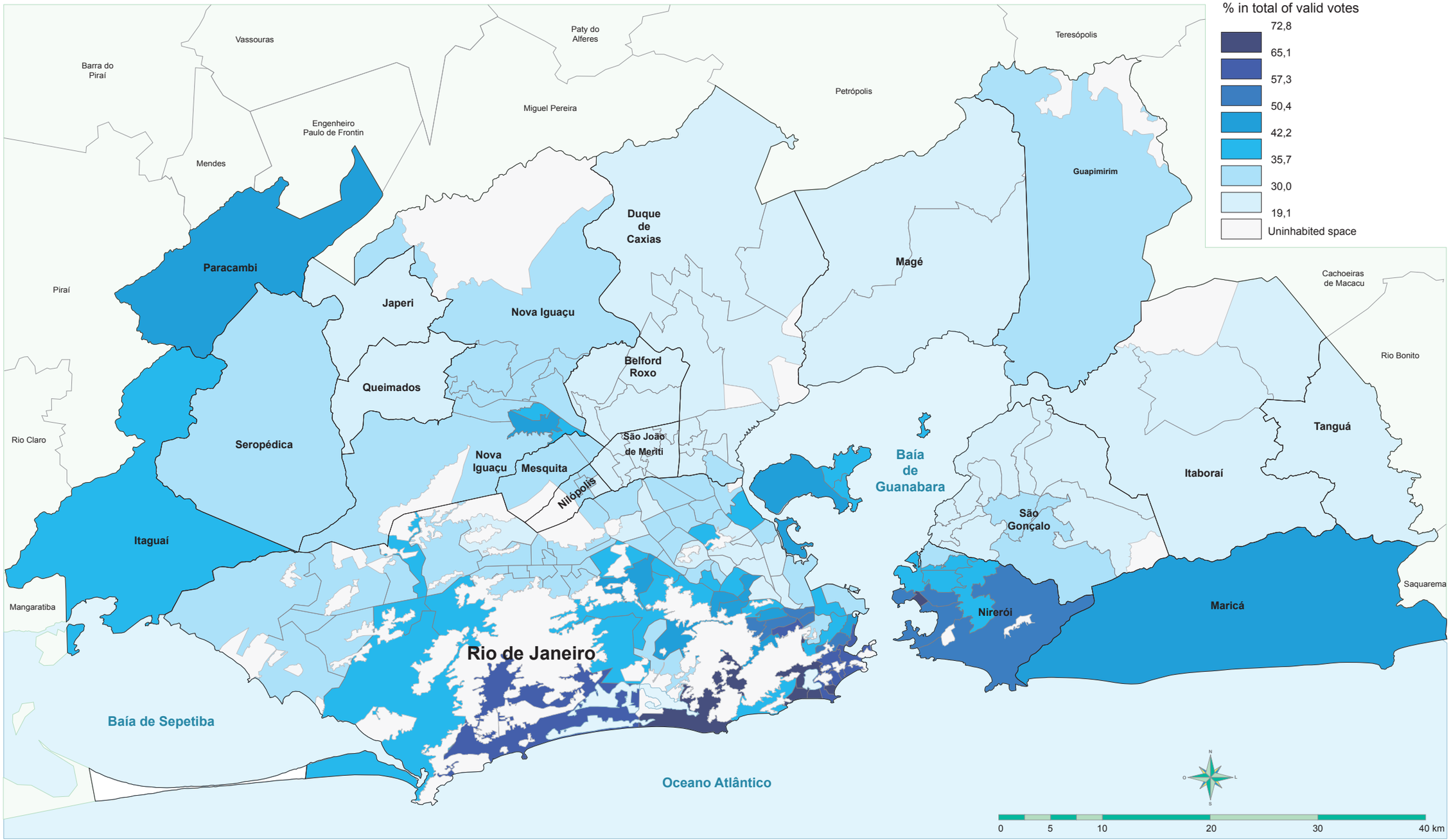

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Fig. 83

Denise Frossard

2006 Elections for governor (first round)

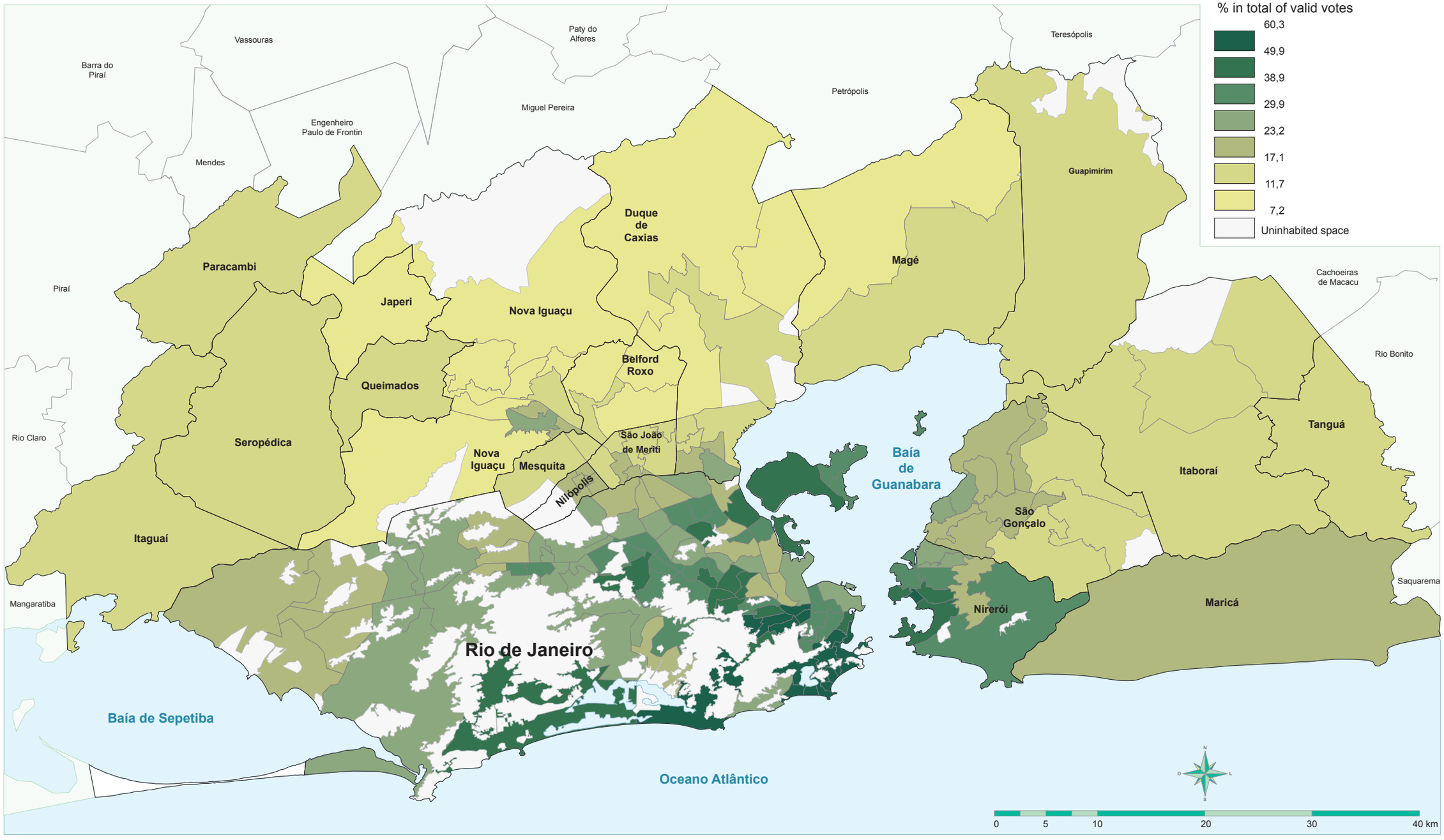

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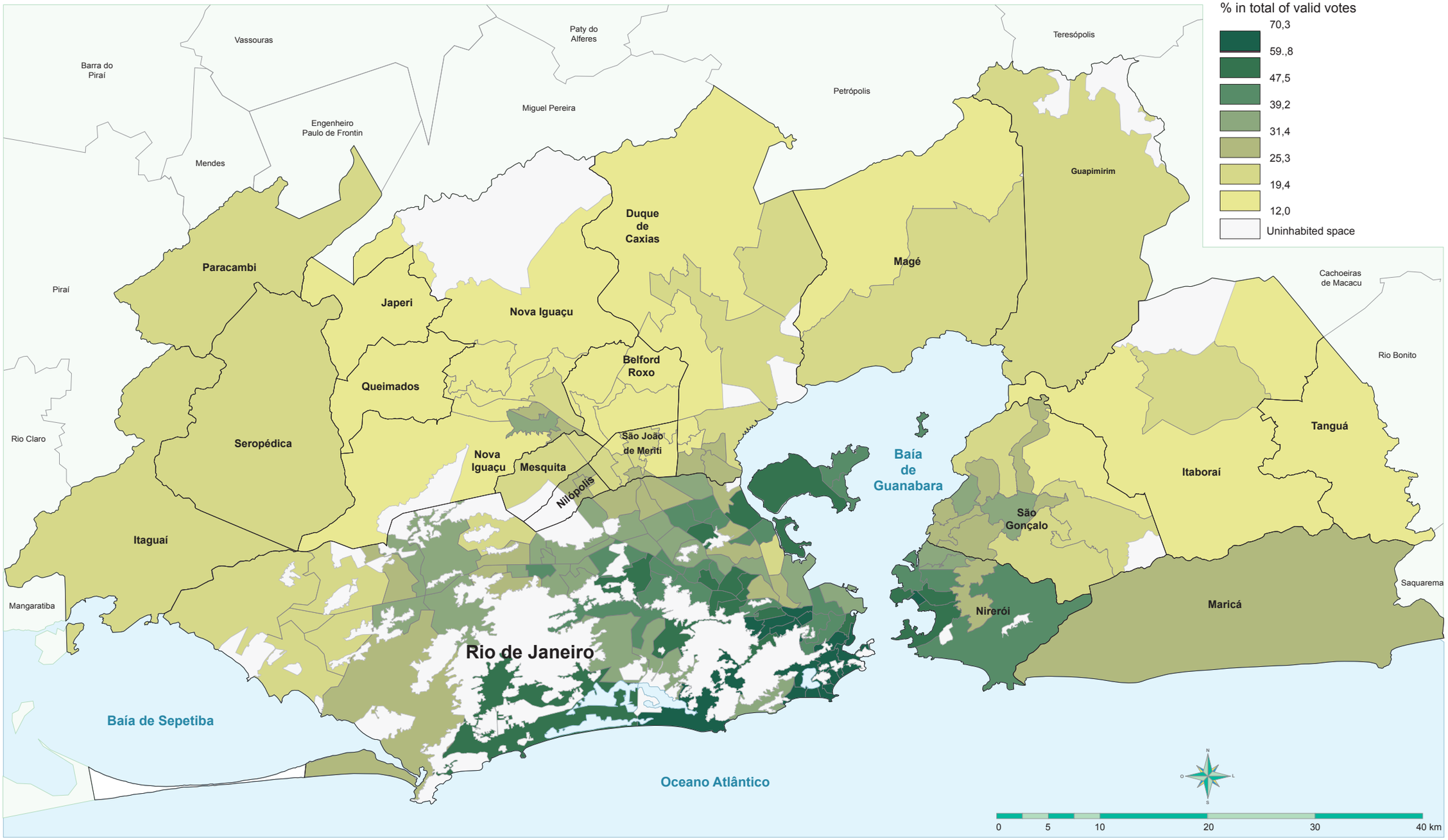
Fig. 84

Denise Frossard

2006 Elections for governor (second round)



Source: Tribunal Superior Eleitoral (electoral sections)

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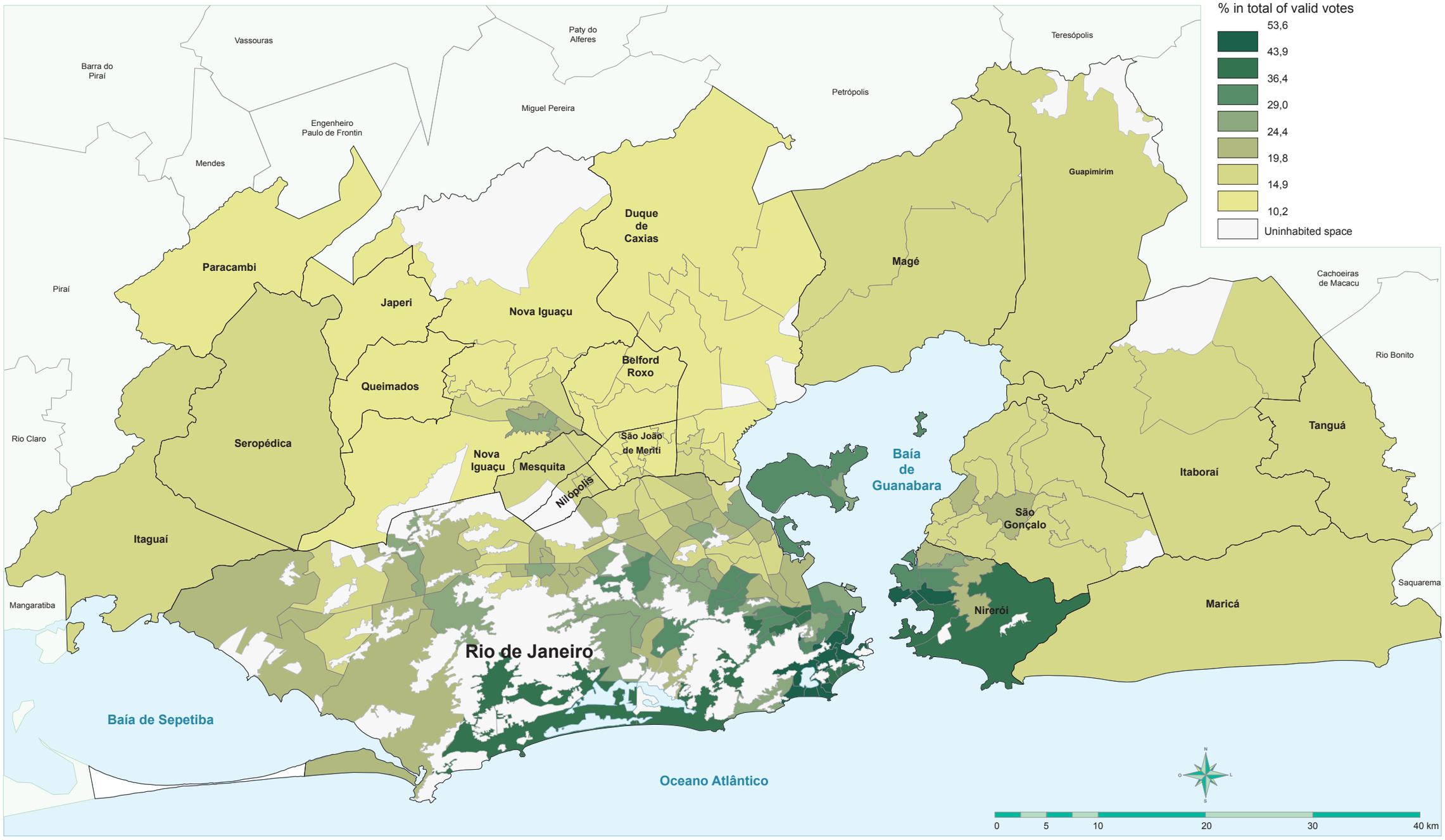
Fig. 85

Fernando Gabeira
2010 Elections for governor



Source: Tribunal Superior Eleitoral (electoral sections)

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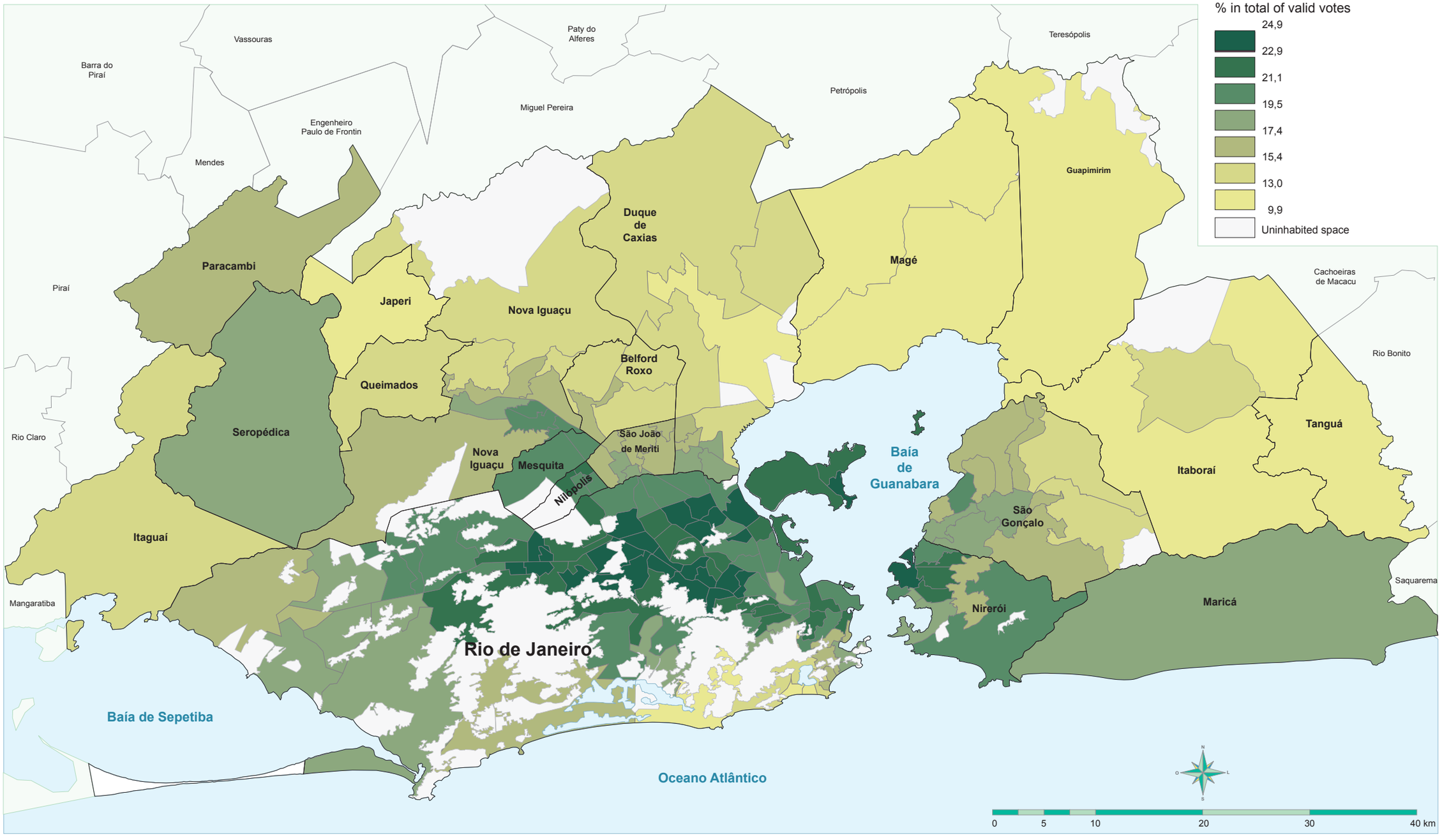
Fig. 86

Heloísa Helena

2006 Presidential elections (first round)



Source: Tribunal Superior Eleitoral (electoral sections)

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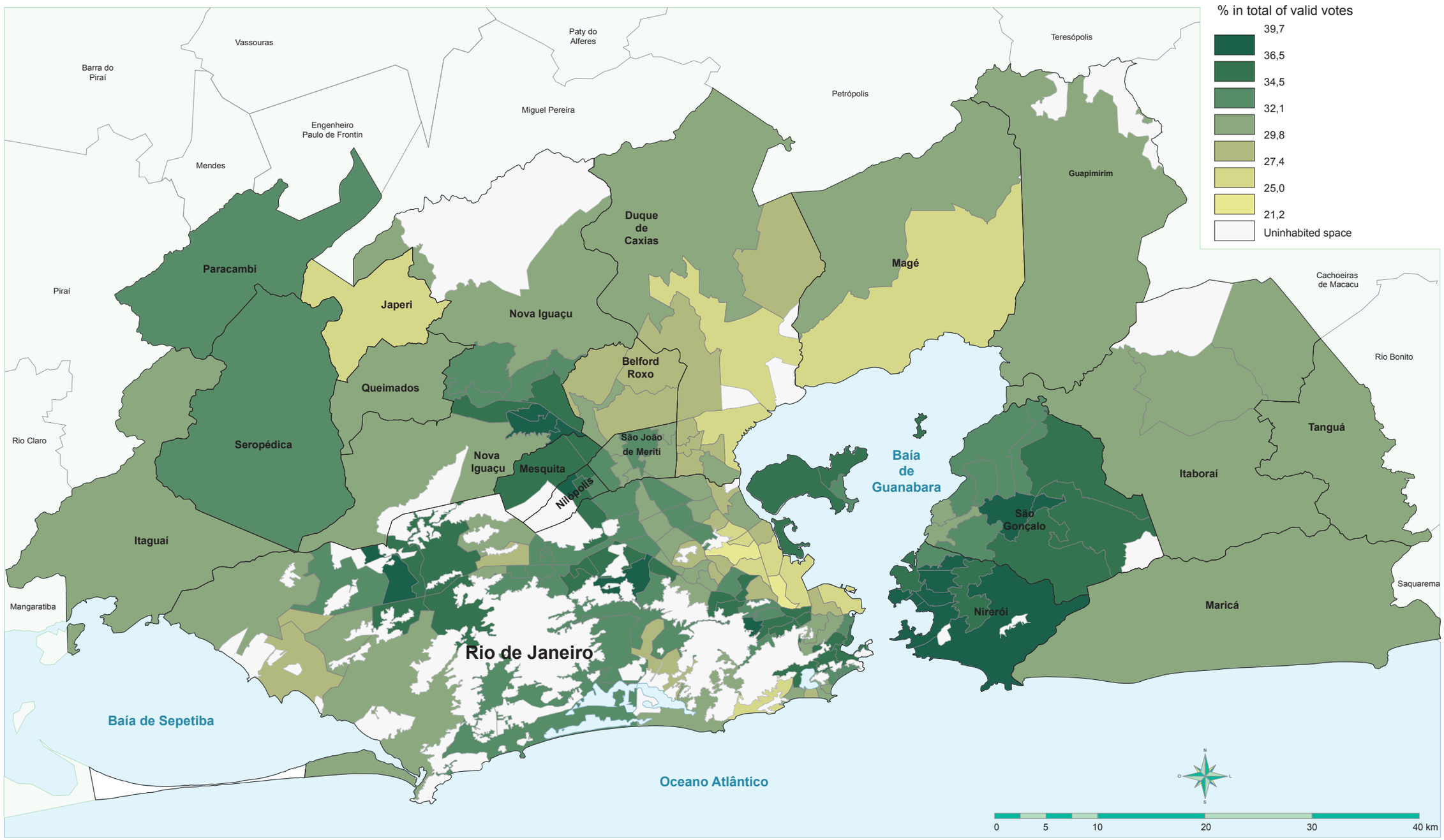
Fig. 87

Marina Silva

2010 Presidential elections (first round)



Source: Tribunal Superior Eleitoral (electoral sections)

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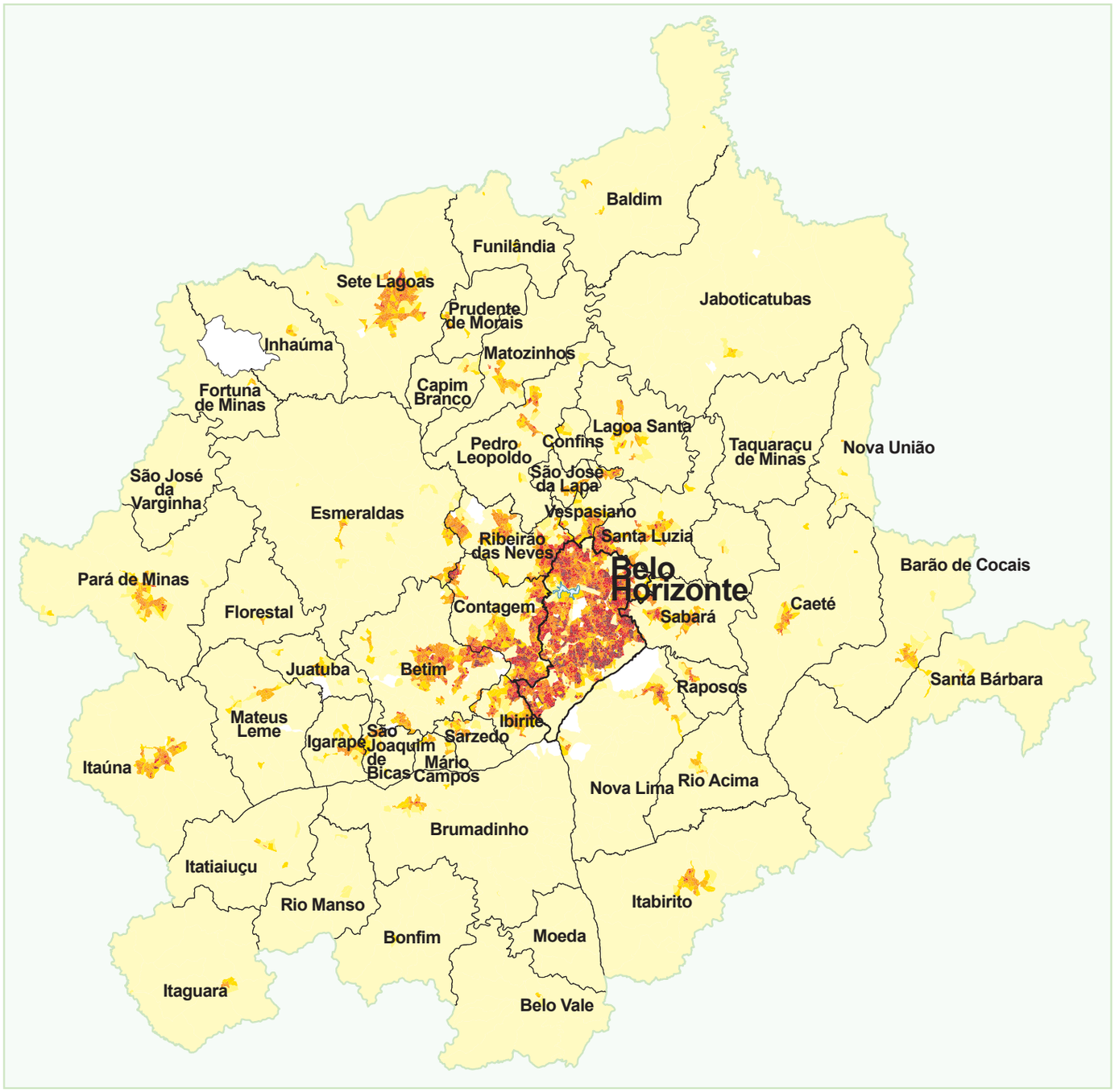
Fig. 88

Population Density

in Belo Horizonte Metropolitan Area, 2010



People/hectare

- 300
- 150
- 125
- 100
- 80
- 40
- 20
- 10
- 5
- Absence of information or uninhabited space

0 10 20 40 60 80 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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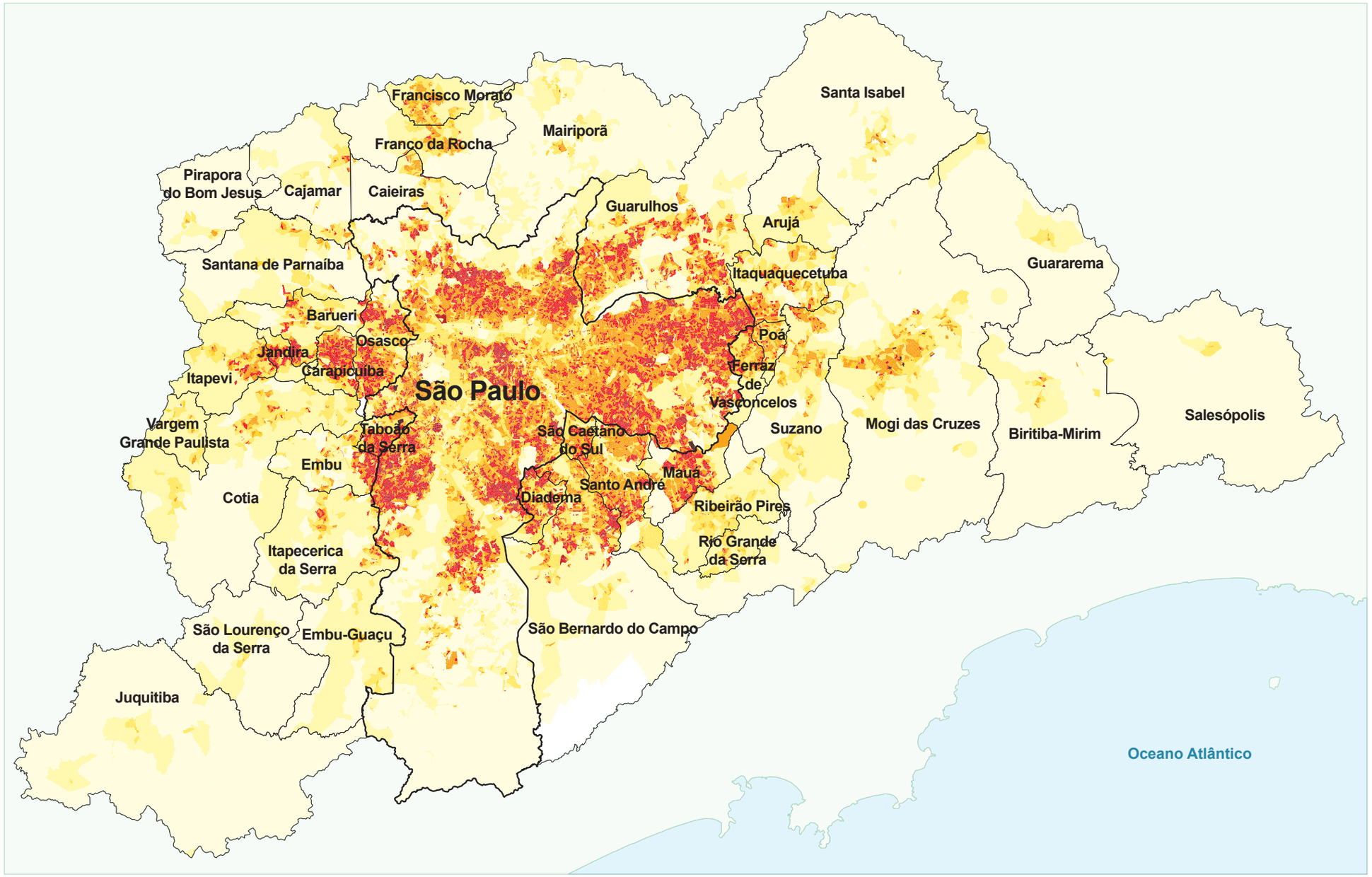
Fig. 89

Population Density

in São Paulo Metropolitan Area, 2010



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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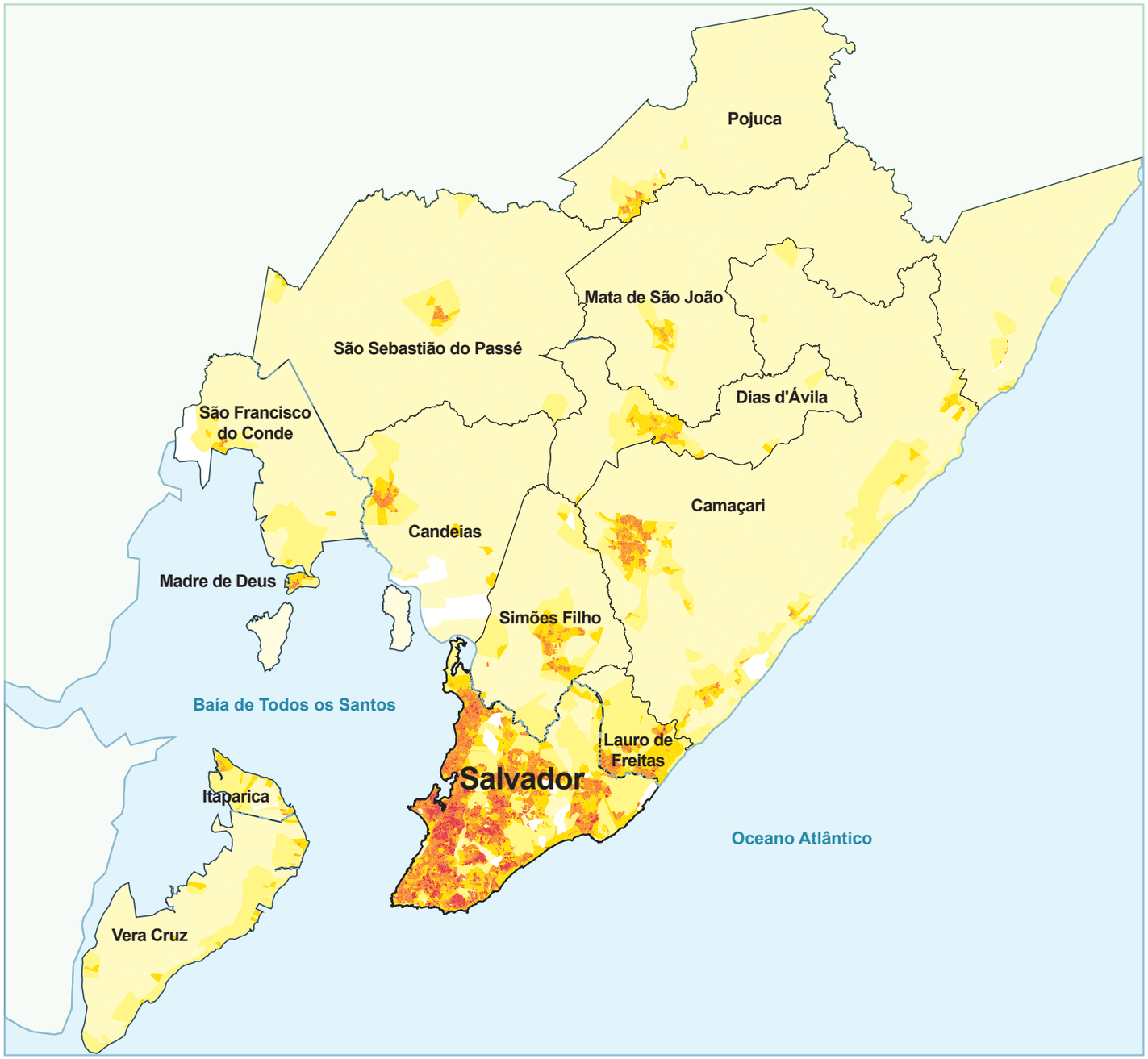
Fig. 90

Population Density

in Salvador Metropolitan Area, 2010



People /hectare

- 1775
- 925
- 290
- 150
- 73
- 55
- 12
- 1

Absence of information or uninhabited space

0 7,5 15 30 45 60 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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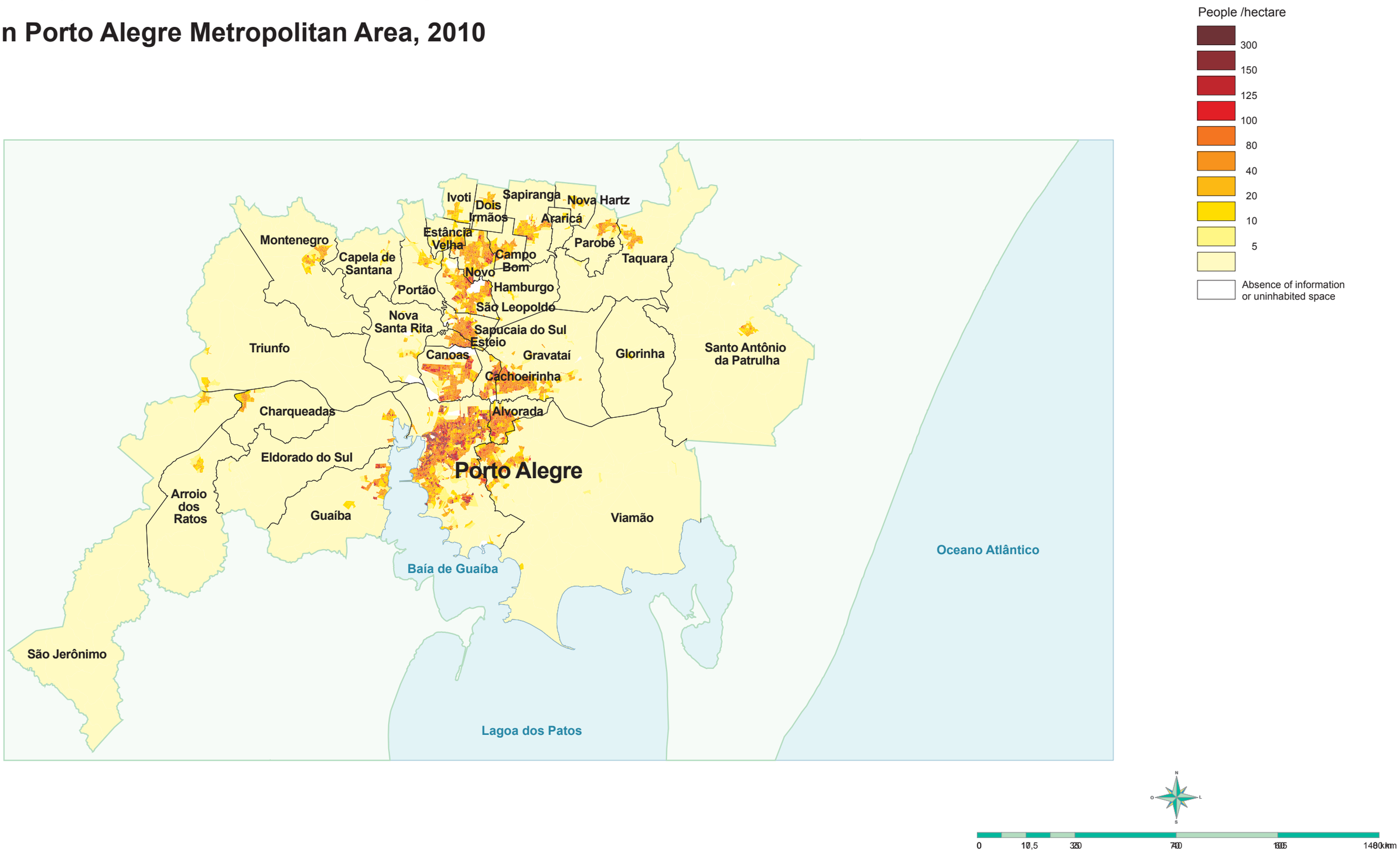
Fig. 91

Population Density

in Porto Alegre Metropolitan Area, 2010



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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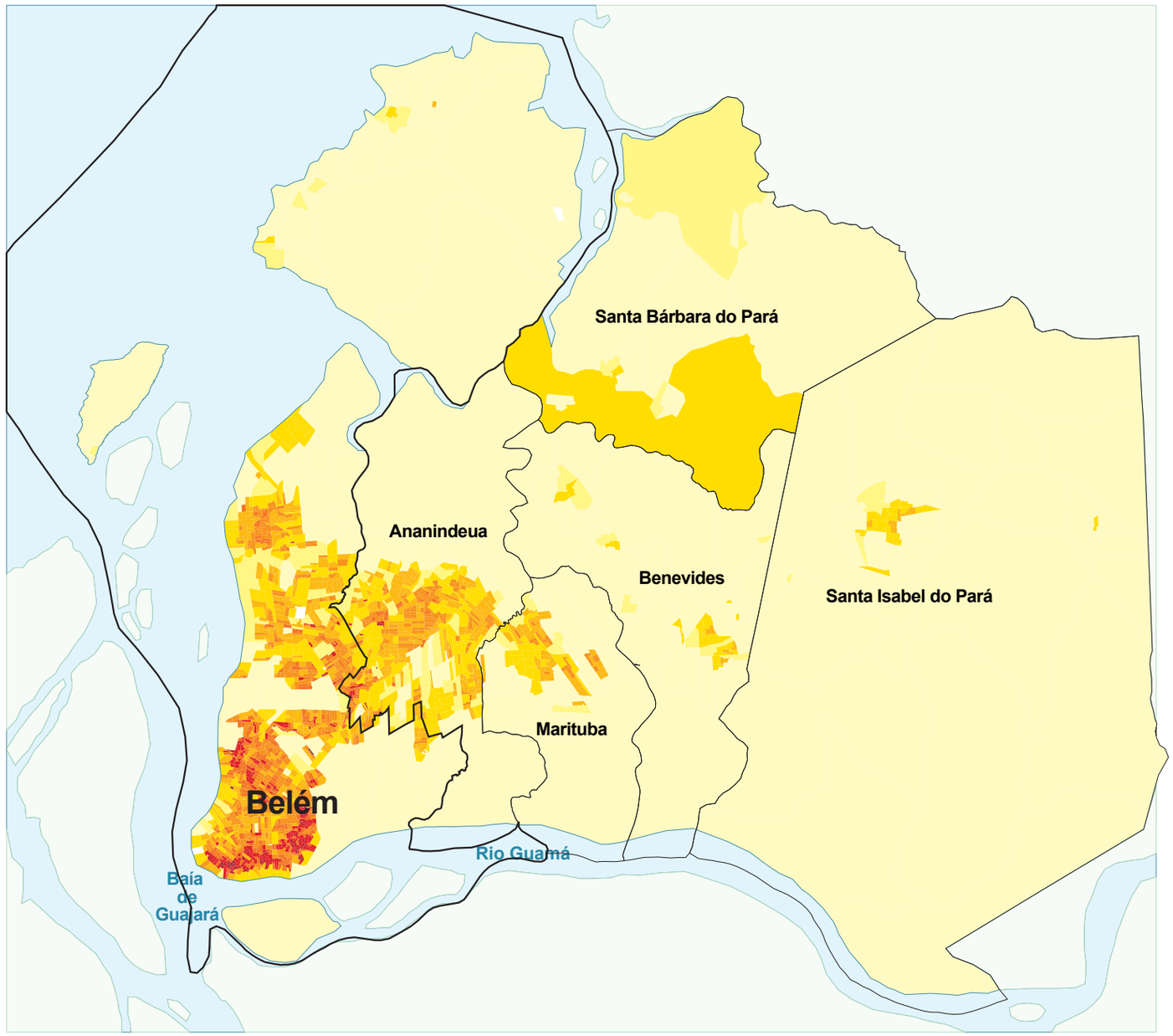
Fig. 92

Population Density

in Belém Metropolitan Area, 2010



People /hectare

- 500
- 400
- 300
- 200
- 150
- 100
- 50
- 20
- 10
- Absence of information or uninhabited space

0 3,75 7,5 15,00 22,5 30 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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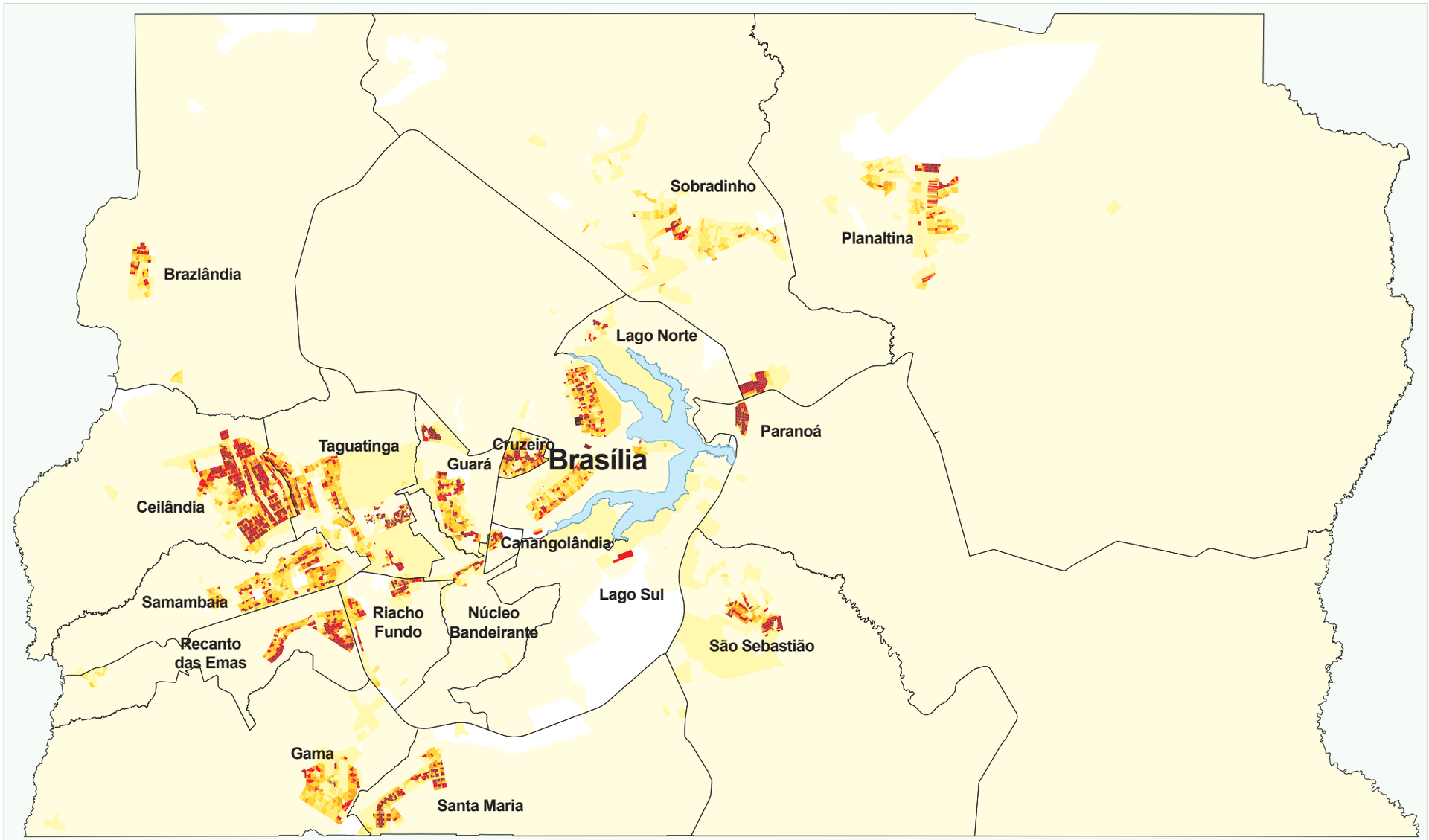
Fig. 93

Population Density

in Distrito Federal, 2010



People /hectare

- 500
- 200
- 150
- 125
- 100
- 75
- 50
- 6
- Absence of information or uninhabited space

0 5 10 20 30 40 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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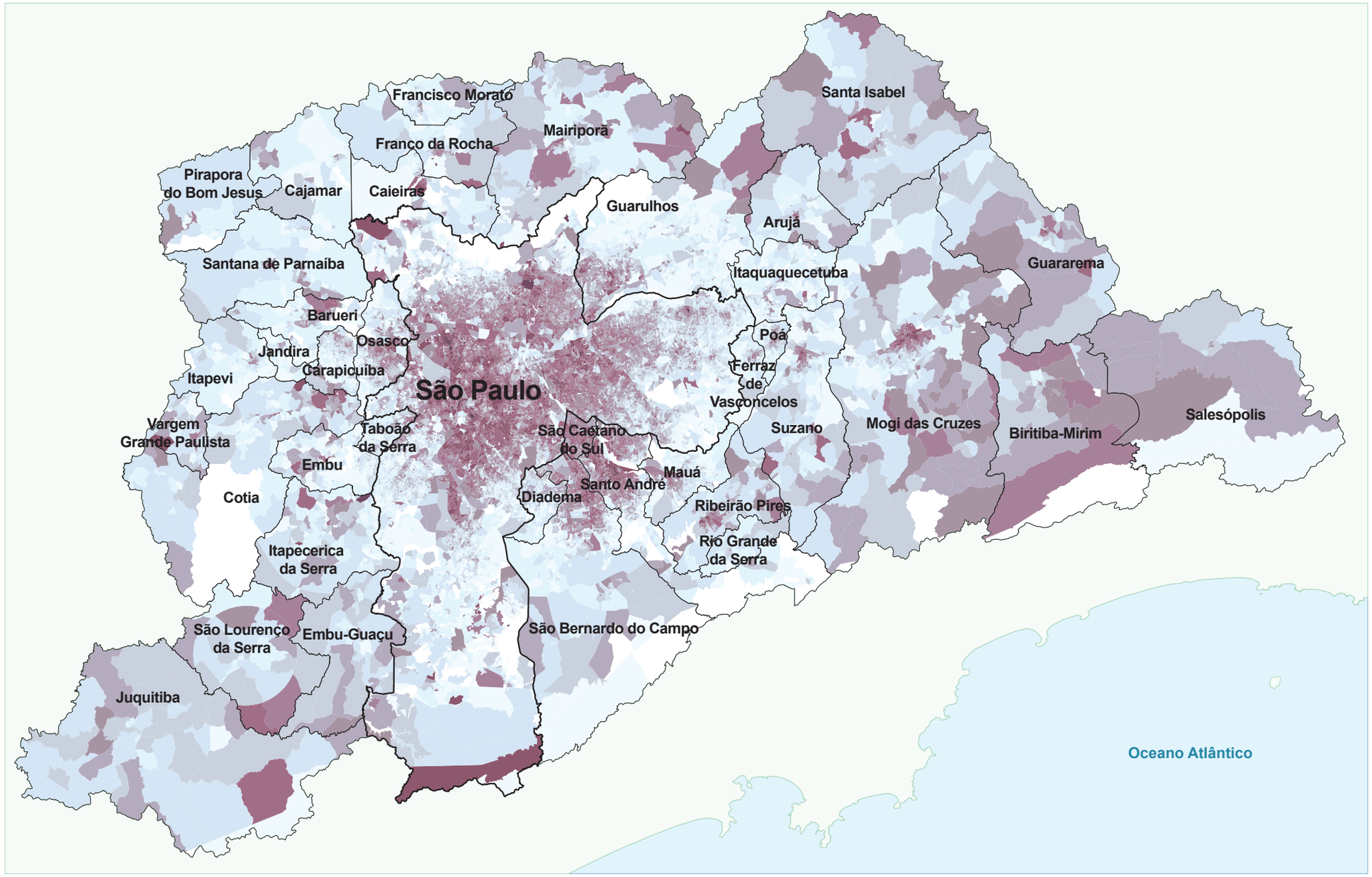
Fig. 94

People over 60 years of age

in São Paulo Metropolitan Area, 2010



Number of elderly people
for each group of 100 people

- 35,0
- 25,0
- 20,0
- 17.5
- 15,0
- 12.5
- 10,0
- 7.5
- 5,0

Absence of information or uninhabited space

0 7,5 15 30 45 60 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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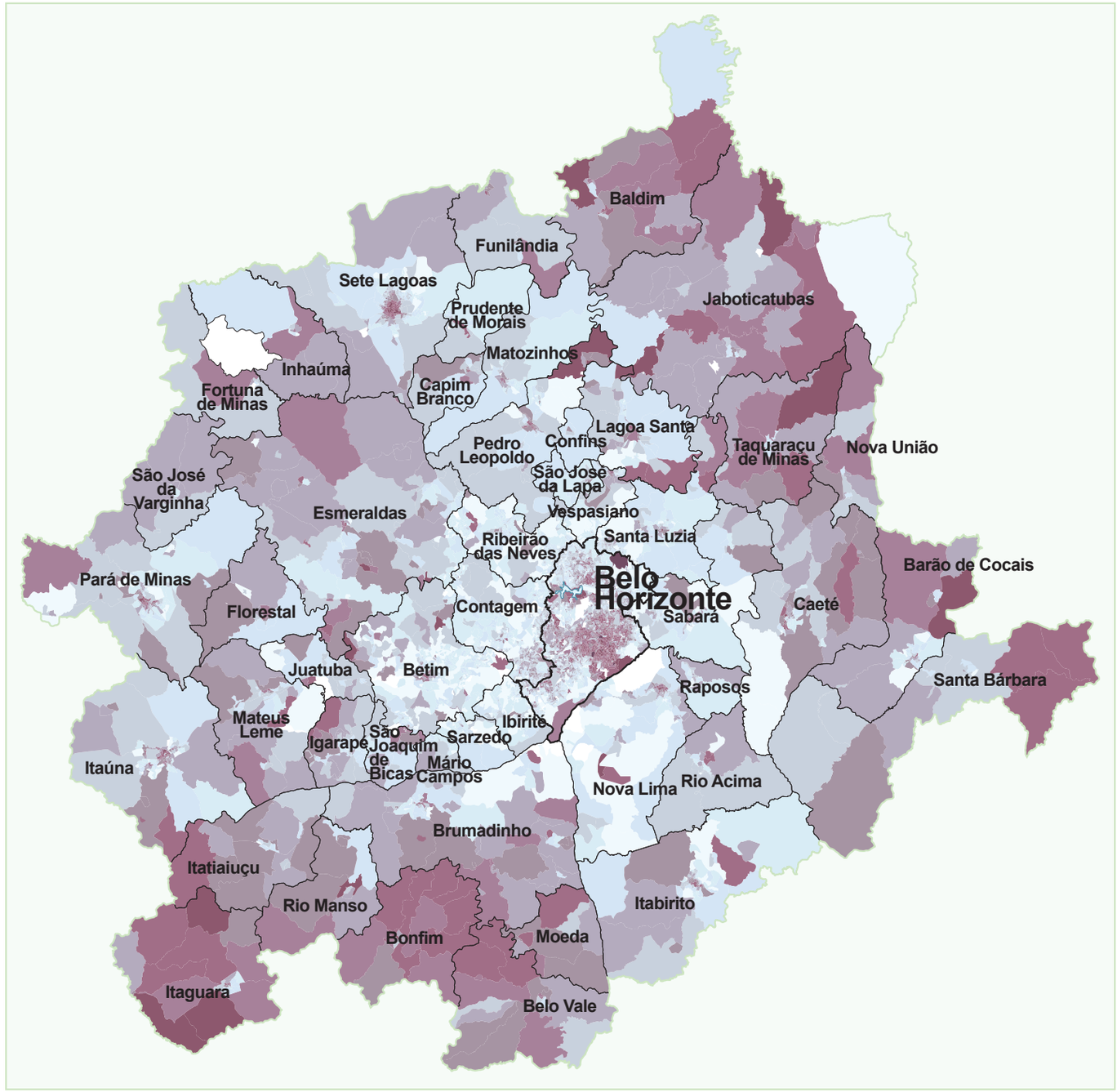
Fig. 95

People over 60 years of age

in Belo Horizonte Metropolitan Area, 2010



Number of elderly people
for each group of 100 people

- 35,0
- 25,0
- 20,0
- 17.5
- 15,0
- 12.5
- 10,0
- 7.5
- 5,0

Absence of information or uninhabited space

0 10 20 40 60 80 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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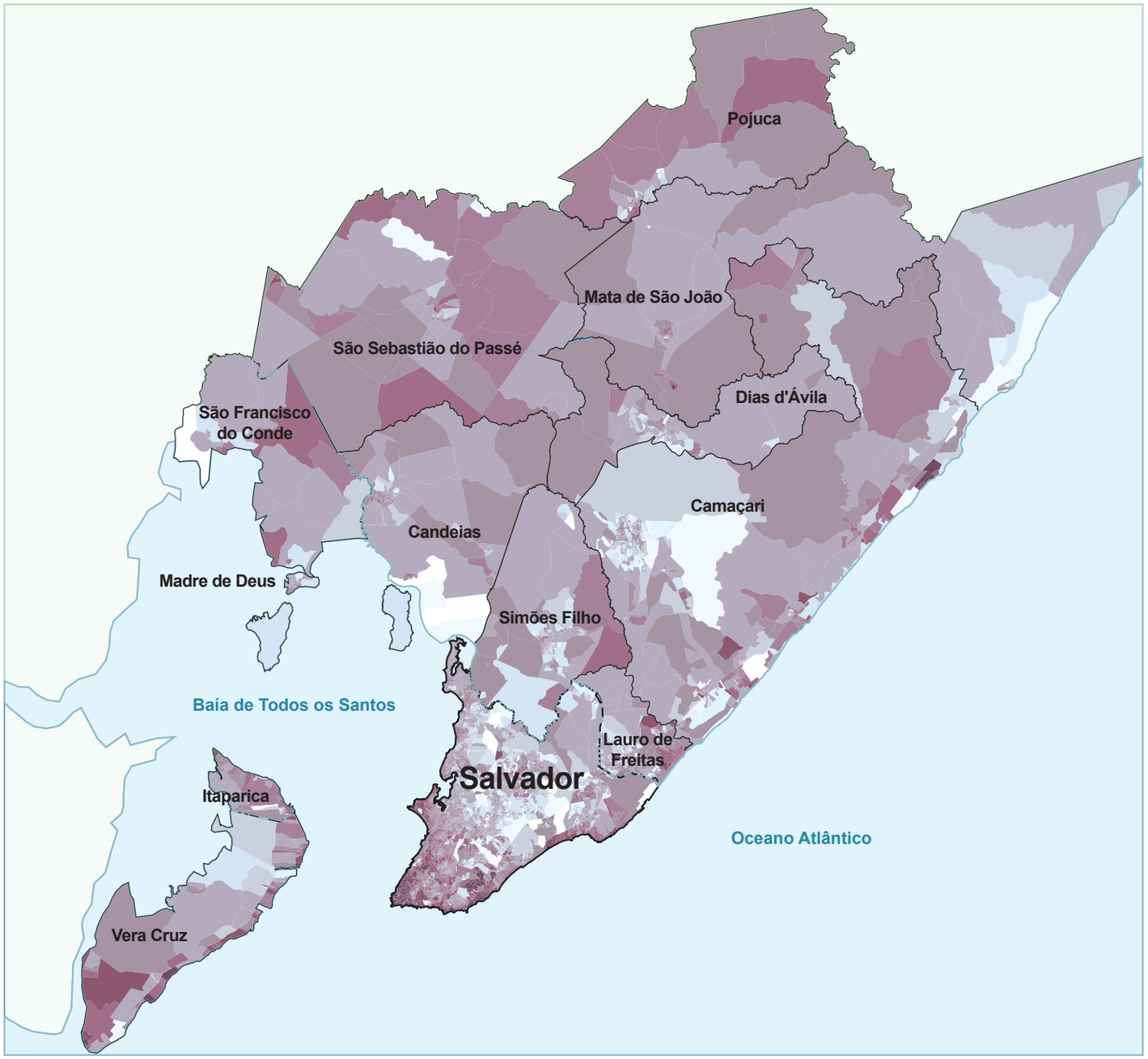
Fig. 96

People over 60 years of age

in Salvador Metropolitan Area, 2010



Number de of elderly people
for each group of 100 people

- 20,0
- 15,0
- 12,5
- 10,0
- 7,5
- 5,0
- 4,0
- 3,0
- 2,0

Absence of information
or uninhabited space

0 7,5 15 30 45 60 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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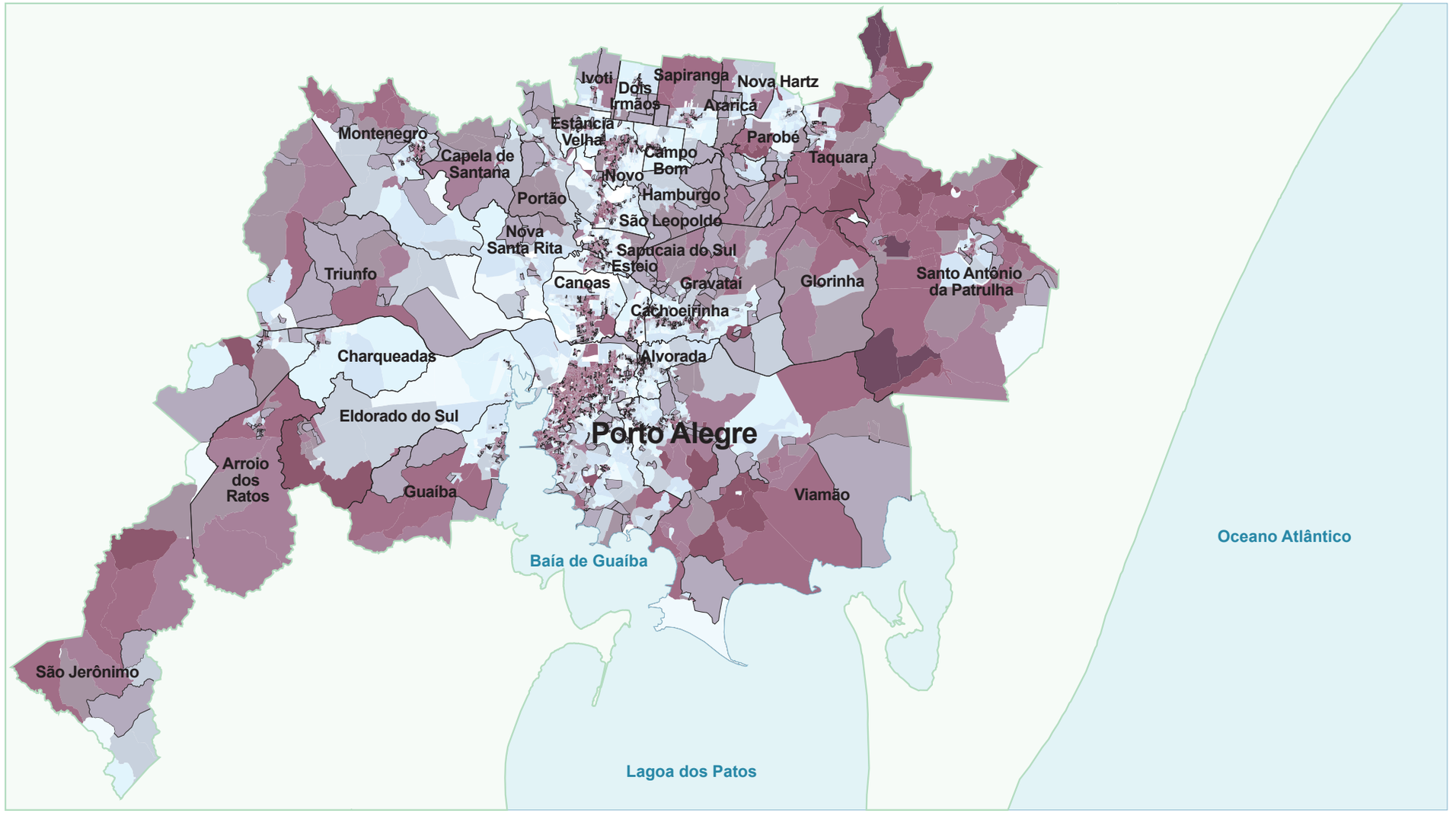
Fig. 97

People over 60 years of age

in Porto Alegre Metropolitan Area, 2010



Number of elderly people
for each group of 100 people

- 35,0
- 25,0
- 20,0
- 17.5
- 15,0
- 12.5
- 10,0
- 7.5
- 5,0

Absence of information or uninhabited space

0 17,5 35 70 105 140 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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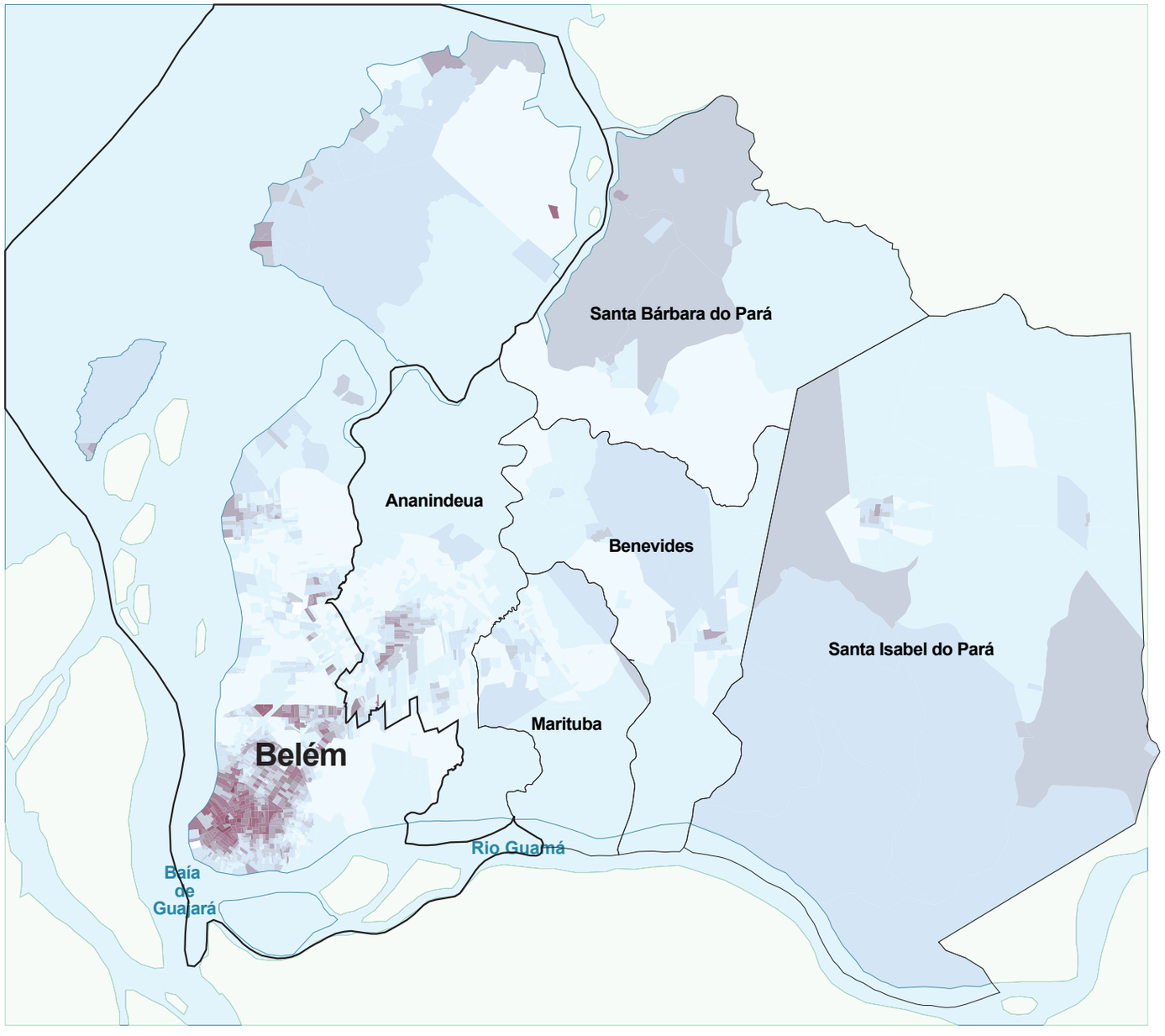
Fig. 98

People over 60 years of age

in Belém Metropolitan Area, 2010



Number of elderly people
for each group of 100 people

- 35,0
- 25,0
- 20,0
- 17.5
- 15,0
- 12.5
- 10,0
- 7.5
- 5,0

Absence of information or uninhabited space

0 3,75 7,5 15,00 22,5 30 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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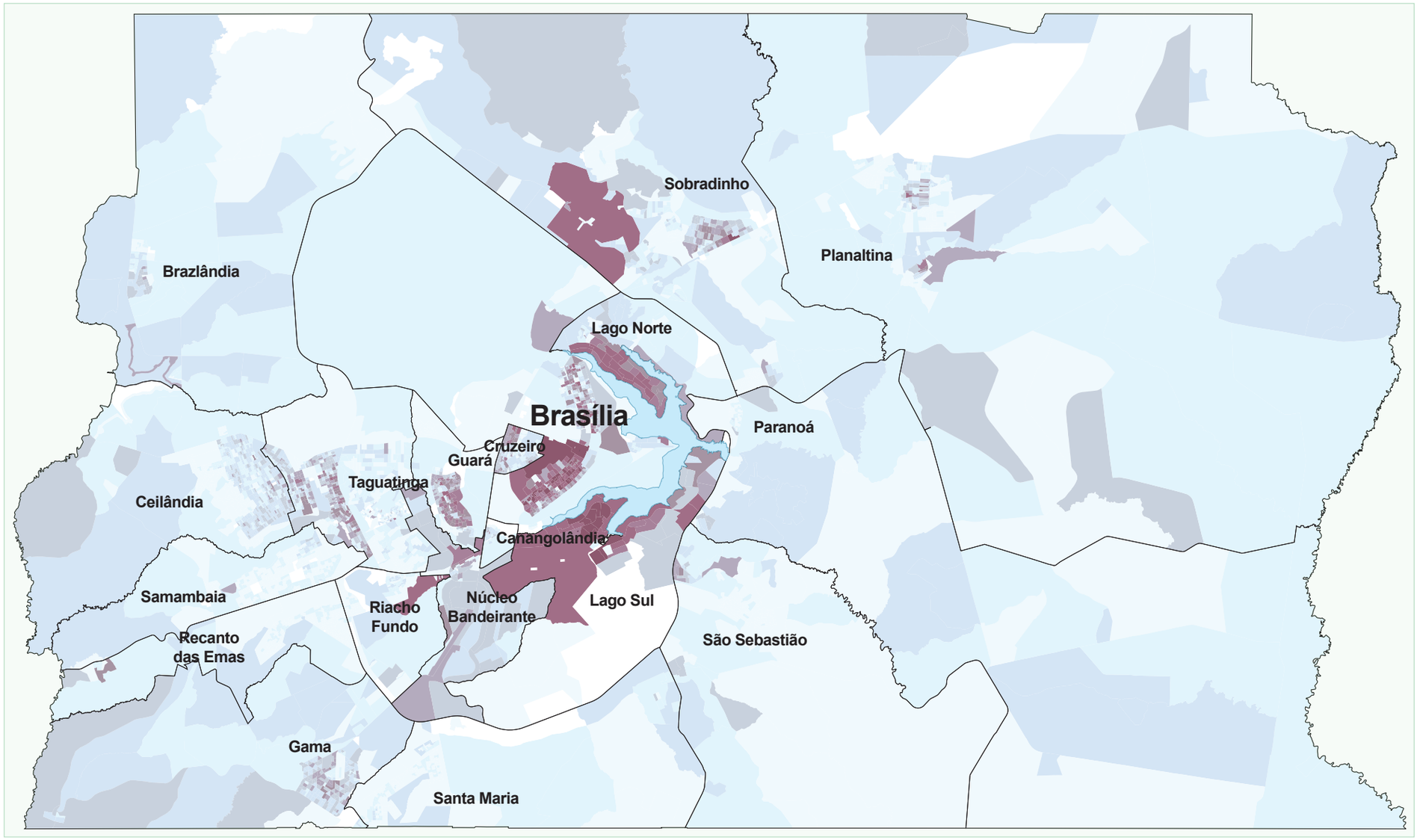
Fig. 99

People over 60 years of age

in Distrito Federal, 2010



Number of elderly people
for each group of 100 people

- 35,0
- 25,0
- 20,0
- 17.5
- 15,0
- 12.5
- 10,0
- 7.5
- 5,0

Absence of information or uninhabited space

0 5 10 20 30 40 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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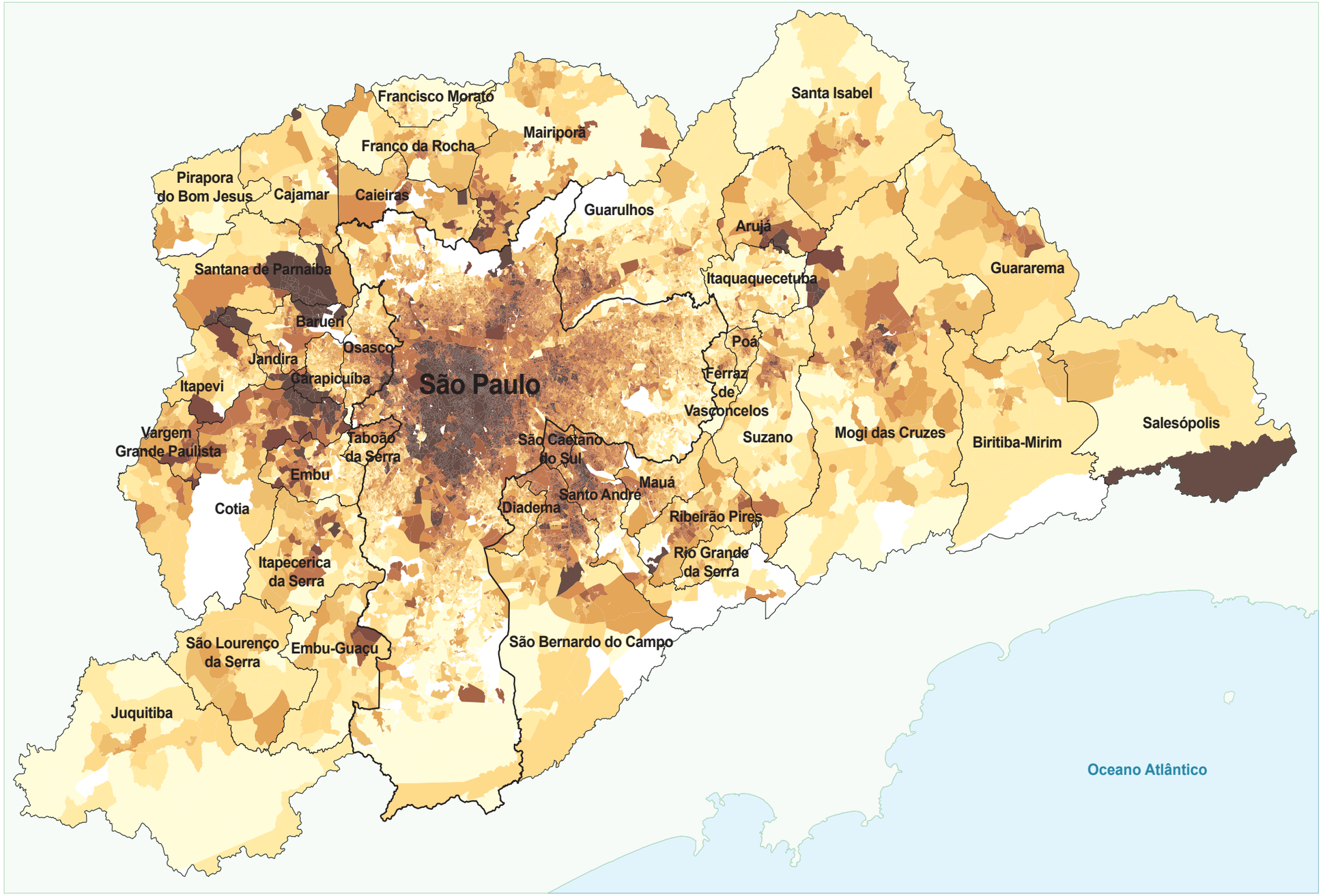
Fig. 100

Value of monthly nominal income per capita

in São Paulo Metropolitan Area

People over 10 years of age (with and without income)



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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Fig. 101

Value of monthly nominal income per capita

in Porto Alegre Metropolitan Area

People over 10 years of age (with and without income)



Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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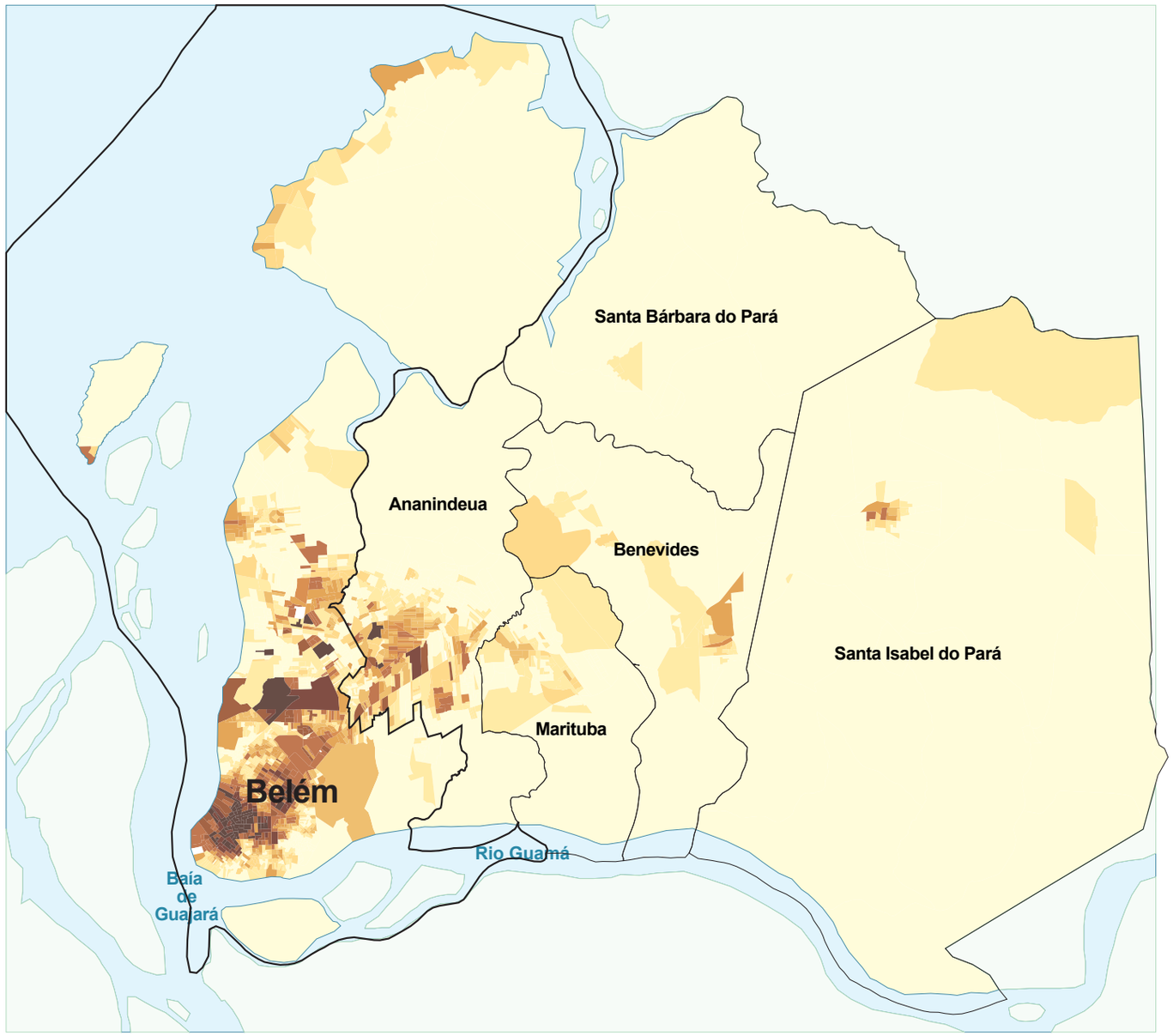
Fig. 102

Value of monthly nominal income per capita

in Belém Metropolitan Area

People over 10 years of age (with and without income)



Reais/month

- 2500
- 2000
- 1500
- 1000
- 900
- 700
- 600
- 500
- 400
- Absence of information or uninhabited space

0 3,75 7,5 15,00 22,5 30 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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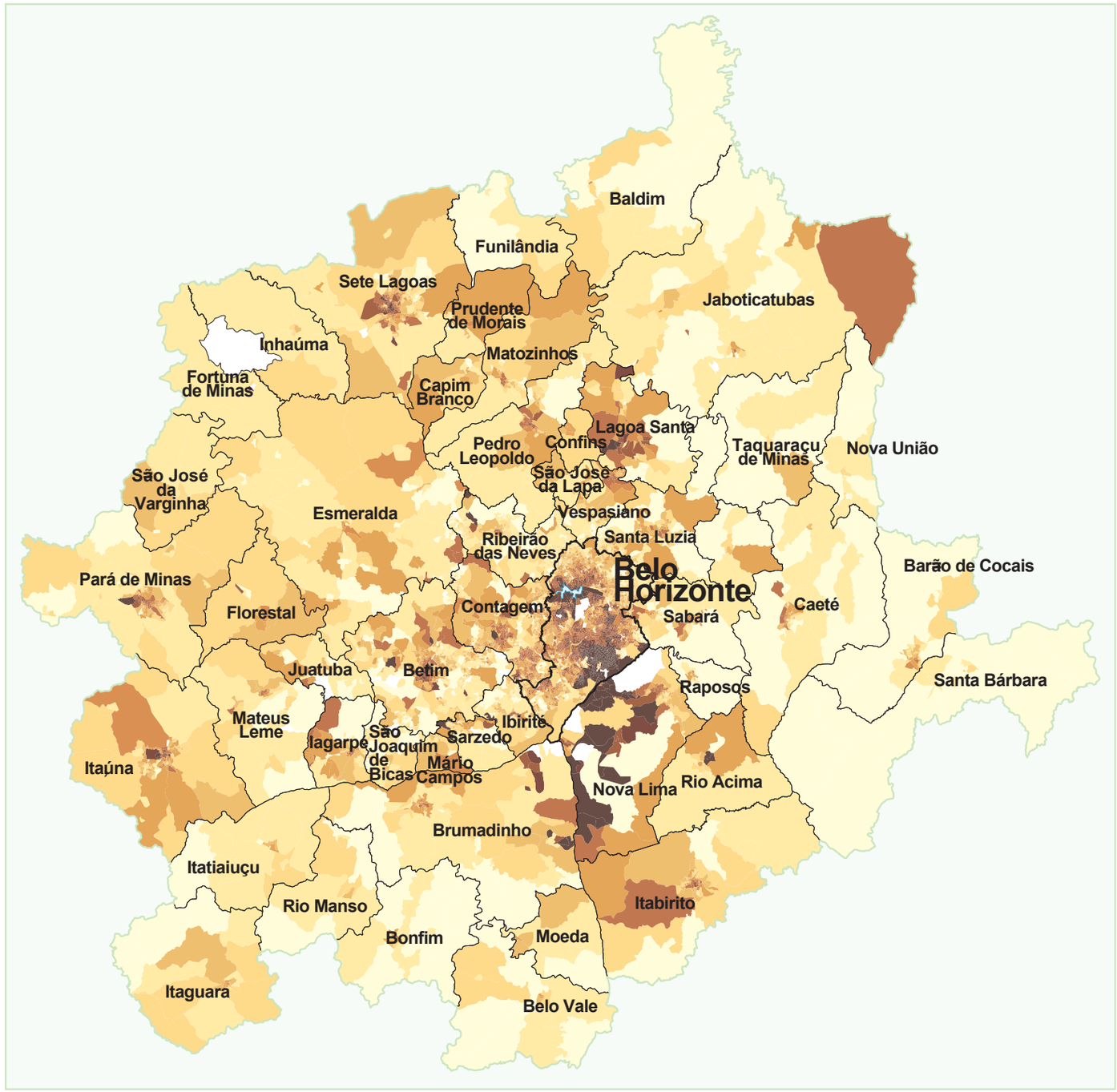
Fig. 103

Value of monthly nominal income per capita

in Belo Horizonte Metropolitan Area

People over 10 years of age (with and without income)



Reais/month

- 2500
- 2000
- 1500
- 1000
- 900
- 700
- 600
- 500
- 400
- Absence of information or uninhabited space

0 10 20 40 60 80 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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Fig. 104

Value of monthly nominal income per capita

in Salvador Metropolitan Area

People over 10 years of age (with and without income)



Reais/month

- 2500
- 2000
- 1500
- 1000
- 900
- 700
- 600
- 500
- 400
- Absence of information or uninhabited space

0 7,5 15 30 45 60 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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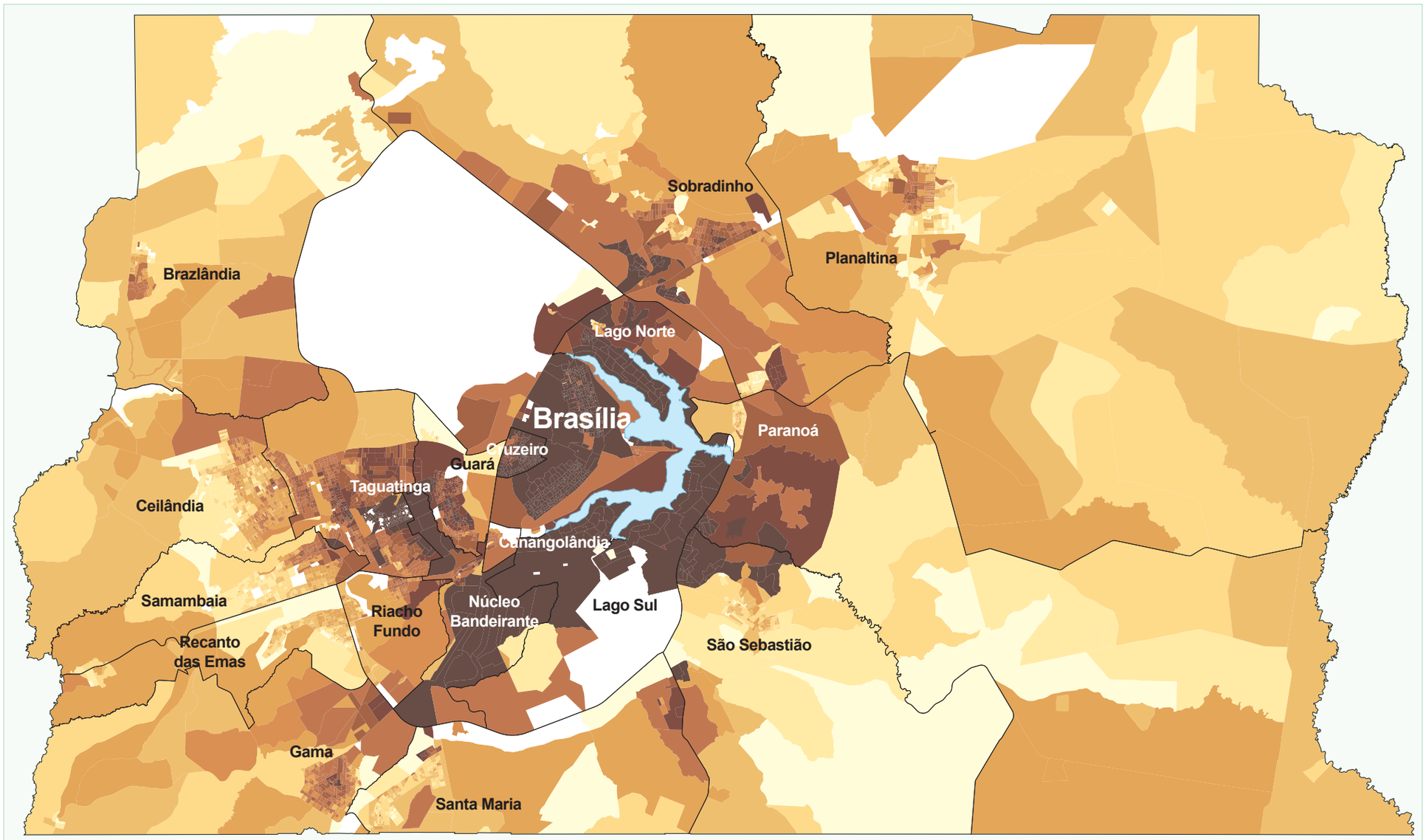
Fig. 105

Value of monthly nominal income per capita

in Distrito Federal

People over 10 years of age (with and without income)



Reais/month

- 2500
- 2000
- 1500
- 1000
- 900
- 700
- 600
- 500
- 400
- Absence of information or uninhabited space

0 5 10 20 30 40 km

Source: IBGE - 2010 Demographic Census (Universe – Census tracts)

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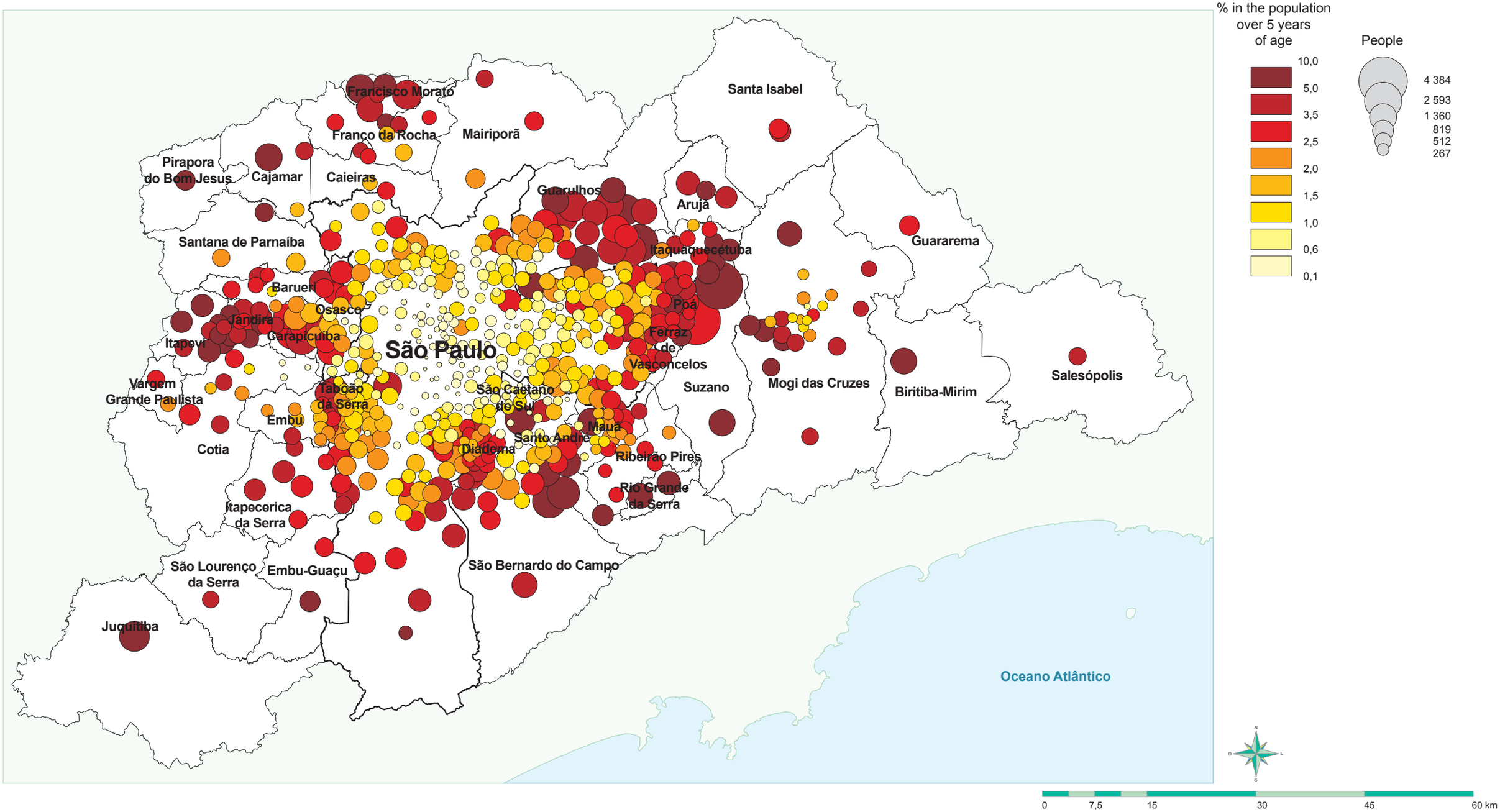
Fig. 106

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in São Paulo Metropolitan Area, in July 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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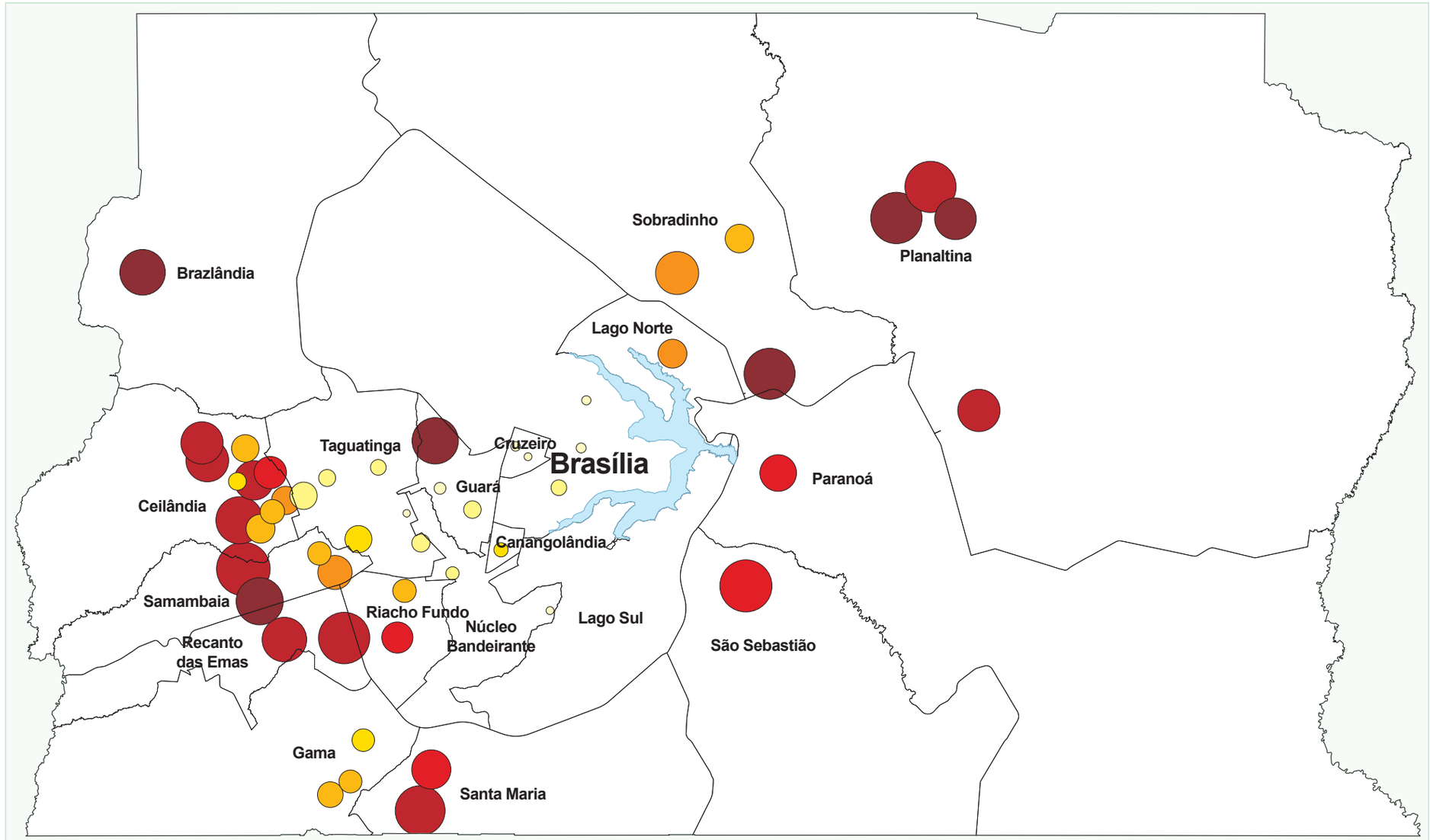
Fig. 107

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in Distrito Federal, in July 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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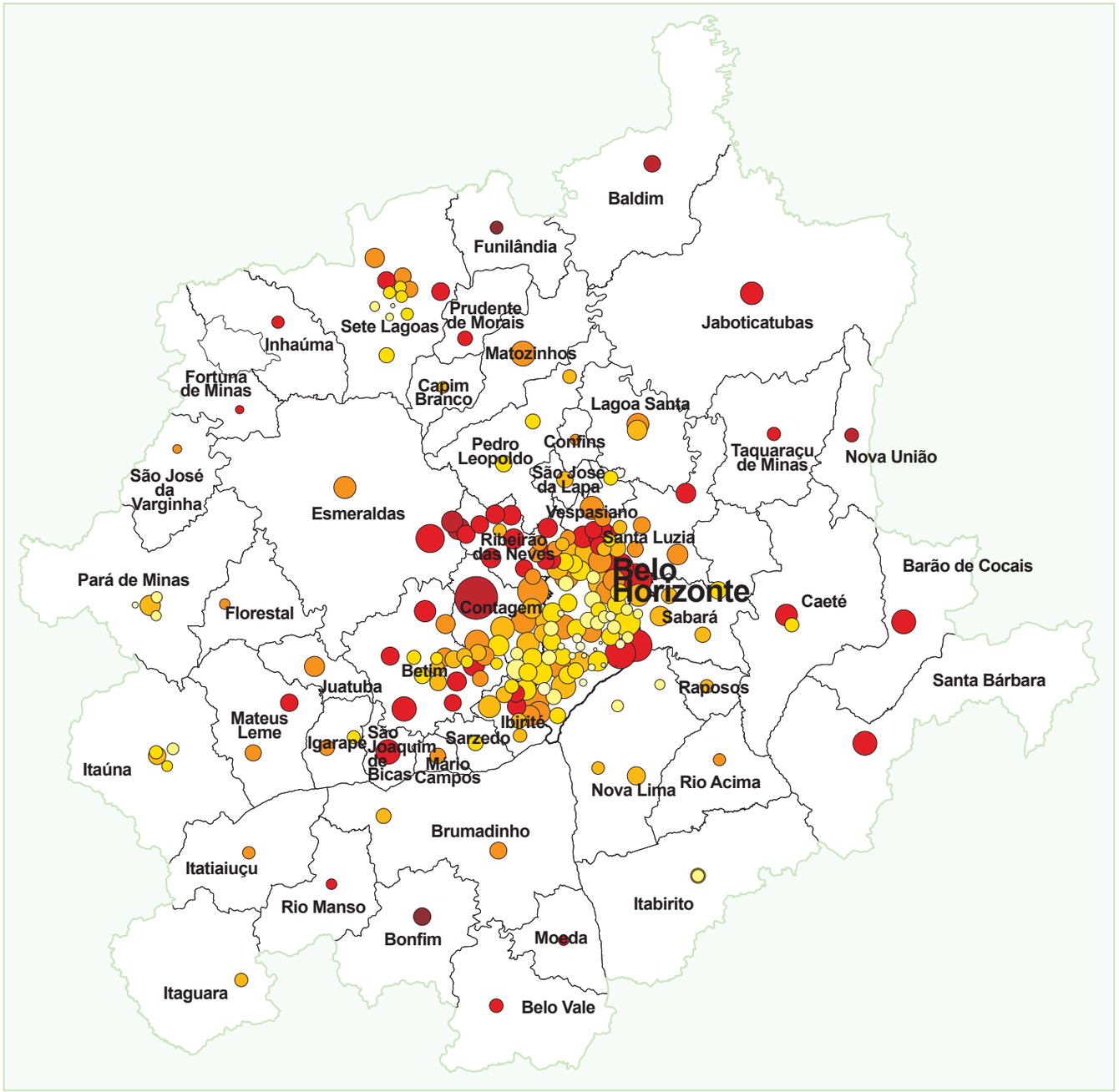
Fig. 108

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in Belo Horizonte Metropolitan Area, in July 2010



% in the population over 5 years of age

12
10
8
5
4
3
2
1
0

People

4 074
1 791
1 203
782
434

0 10 20 40 60 80 km

Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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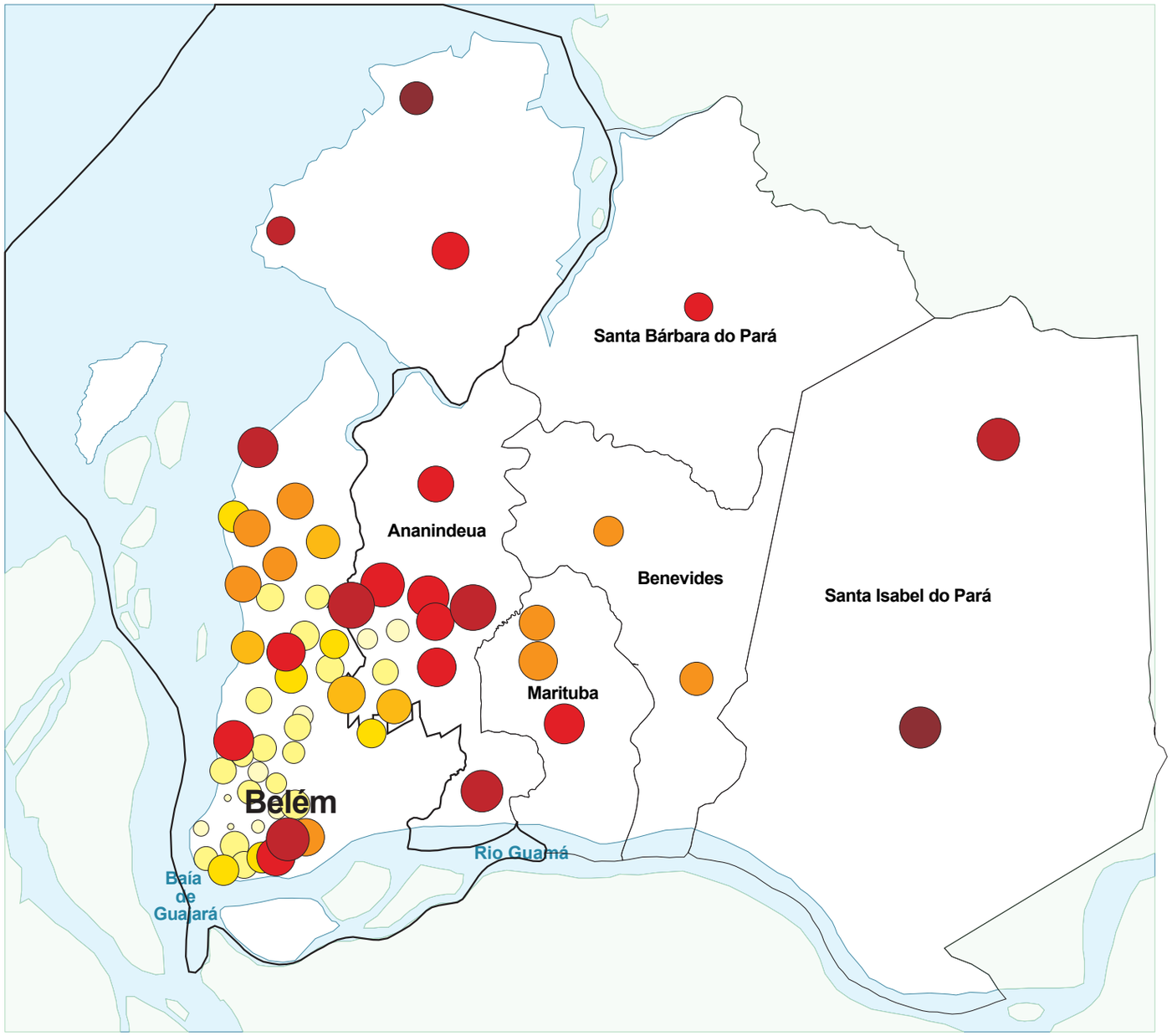
Fig. 109

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in Belém Metropolitan Area, in July 2010



% in the population over 5 years of age

13,2
12,0
10,0
8,0
7,0
6,0
5,0
2,5
0,0

People

3 393
2 711
2 057
1 497
1 041
507

N
O
L
S

0 3,75 7,5 15,00 22,5 30 km

Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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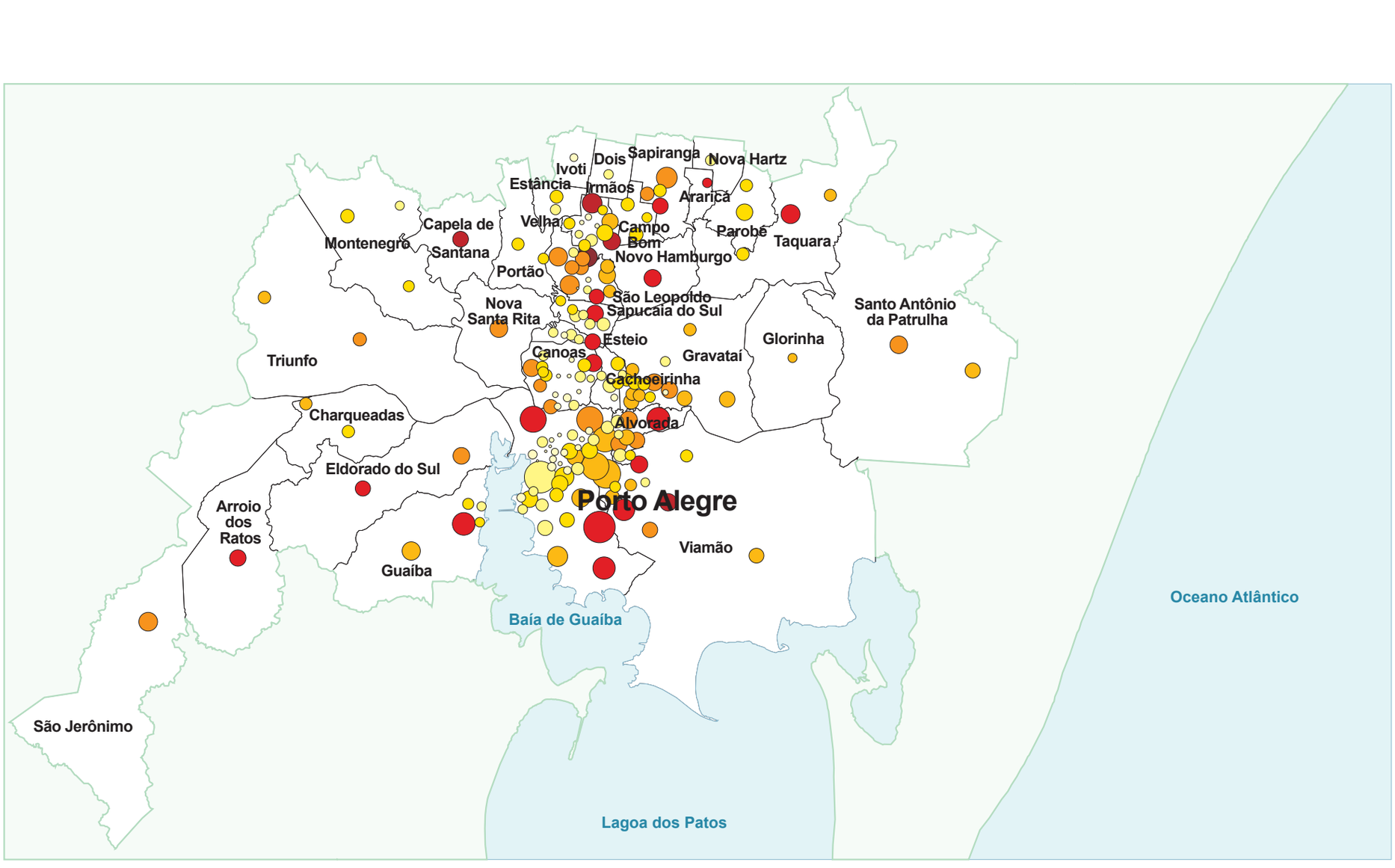
Fig. 110

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in Porto Alegre Metropolitan Area, in July 2010



Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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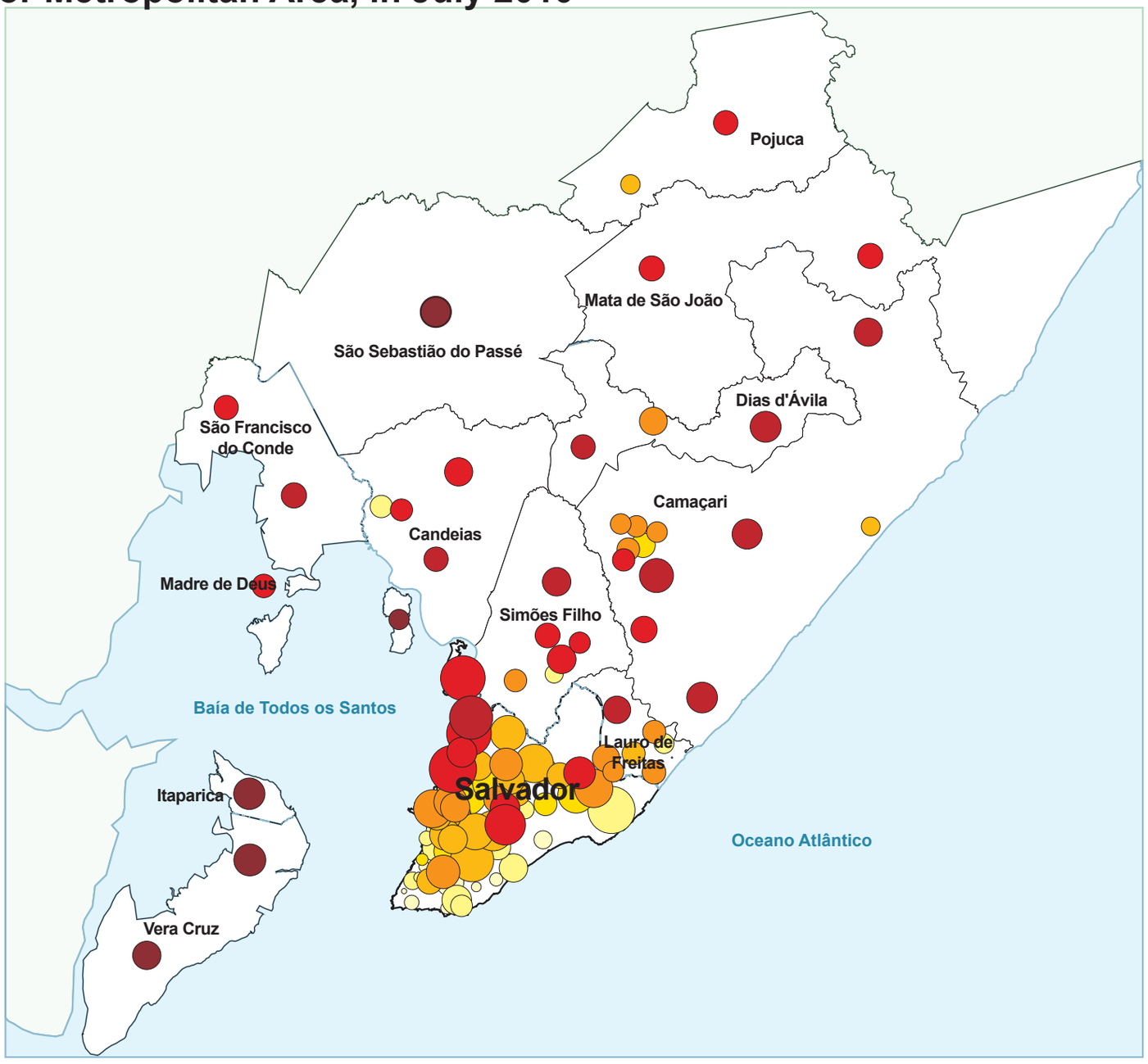
Fig. 111

Beneficiaries from Bolsa Família Social Program or from Child Labor Eradication Program – PETI

in Salvador Metropolitan Area, in July 2010



% in the population over 5 years of age

17,2
12,0
10,0
8,0
7,0
6,0
5,0
2,5
0,0

People

5 852
4 257
2 888
1 967
1346
676

0 7,5 15 30 45 60 km

Source: IBGE - 2010 Demographic Census (Sample – Weighting Areas)

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Fig. 112