Rio de Janeiro Social Change 2009-2016:
The Pre-Olympic Legacy
www.fgv.br/fgvsocial/rio2016/en

Objective

The prime objective of the present project is to measure the evolution of the *carioca* (Rio's dweller) population's social conditions after the announcement of the Rio 2016 Olympics. Another objective is to assess the role of municipal public policies in different areas such as education, health, labor, housing, public utilities, digital inclusion and social development. A conceptual framework was created to coordinate evidence of the performance of each sector with an integrated narrative of the main transformations occurring in the life of the Rio population.

Given the city's growing international vocation, we drew parallels of the main public programs with those elsewhere in the world and analyzed the performance in terms of global metrics, such as the UN Sustainable Development Goals (SDGs). We also undertook analyses of the institutional influences on the city of Rio de Janeiro in the recent period after other national and international experiences, as well as the influences emanating from the Rio model.

There also is the role of public-private partnerships, in which the group of Olympic constructions is perhaps the best example of interest. But there are others such as the extension of basic sanitation to the West Zone, acknowledged as the poorest in the city. The aim, therefore, is to measure the sum of efforts and the division of labor between public and private administration levels in order to measure the multiplication of their results and the difference they make in the life of *cariocas*.

Empirical Approach and Knowledge Dissemination

Despite the relative abundance of information regarding the municipality of Rio de Janeiro, including official institutions and civil society, there is a vast collection of relevant untouched local microdata for each of the aforementioned areas. These bases cover the municipality of Rio de Janeiro and the rest of the country in at least two instants in time. This helps, on one hand, to assess the relative performance of the municipality vis-à-vis other similar Brazilian cities, using statistical controls to isolate the impact of the adopted municipal public policies. We defined the other municipalities of *Greater Rio* (Rio metropolitan area) as a control group of the project, since they are neighboring territories under similar influences, in terms, for example, of the climate or state administration.

From the viewpoint of the local population performance, we built up a longer-term view since 1970, or as far as the quality data reached in each area, in order to situate historically the changes observed since 2008, a period that occupies the center of the present assessment. We portrayed the most recent aspects of the different social dimensions analyzed by combining different household surveys and, in some cases, administrative records. These data provide a sensitivity analysis regarding shocks and external structural changes, such as, for instance, changes in the oil price and adoption of a social security reform. All analyses addressed the comparison of Rio municipality with the others in *Greater Rio* and, when backed by census data, between different planning areas and Rio administrative regions.

We created a project website on the Internet with a series of interactive databases, videos, short texts and a report of the project, in addition to abstracts in English of the project's main products. In the future there will be a seminar organized by FGV. The route to be taken to increase the impact of the project is to translate the technical terms of the strict empirical analysis to a language that reaches the ordinary citizen. The creation of user-friendly interactive devices enables interested parties to navigate on the website intuitively and match information of their own interest, for example, open the years of schooling or access health care by gender, age and so on. They help answer questions of interest by merely analyzing attributes taken separately, and/or with more complex analyses that help separate the role of the interaction between attributes in the transformations experienced by different Rio social groups. Accordingly, the project looks to empower the Rio population by giving information about its reality, permitting each individual to act as a kind of ombudsman, providing more transparency and longevity to the results.

Detailing of the Pre-Olympic Social Legacy

Motivation

After 50 years of economic and political decline, beginning when it lost the status of the capital of Brazil, the municipality of Rio de Janeiro, announced in 2009 as host to the Olympic Games, ceased to look back with nostalgia and now looked to the future, with focus on preparing for the 2016 Olympic Games. Soon after the official announcement, a lively debate on the set of actions that would help redeem the city's brightness, at one time nicknamed wonderful. The renewed quest transcends the necessary conditions for the city to meet the requirements of the mega event, and the agenda now addresses what the city can achieve as host to the Games. The Olympics represent a privileged opportunity for the city to change permanently, by building stadiums, mobility projects, urban regeneration, investment in tourist infrastructure, housing, environment, and so on. More recently, after implementing the two strategic plans, the 500 Year Vision project was prepared, an initiative of City Hall with civil society through the City Council that looks to discuss and plan improvements after the Olympic Games. The desired benchmark is to deliver the best possible city in 2065, when we will celebrate 500 years of its existence. With this in mind, the Olympic Games would be the first great event of the first of the next 50 years.

The work, as a kind of social ombudsman of the city, begins by looking at the period immediately after the announcement of the Olympics. Rio won the contest to host 2016 Olympic Games against global cities like Chicago, Madrid and Tokyo, not because of its economic strength or its logistics infrastructure already established, but by the capacity of the Olympics transform the city. The term Olympic legacy generally refers to the projection of the prospective benefits to be enjoyed by the city after hosting the sports event.

Yet, in the gap between the announcement and staging the event, are any relevant inflexions now perceived in the historic series of the City of Rio de Janeiro? Has there been any Olympic turnaround in the life of the Rio citizen? In other words, how was the local population impacted during the preparation period for the Games? For example, has there been any change in the home, school, work, transportation, health and so on? Staging a global event in a territory once also described as the "divided city" places huge challenges in terms of inequality. What changes have been made at the base of the Rio social pyramid? What has been the role of anti-poverty policies and their interactions with other public policies? These are empirical and factual questions that will be studied with a vast collection of public microdata as yet unexplored. Opening such social data permits us to scientifically investigate the existence or not of a pre-Olympic legacy.

Brief Background

The FGV Social aims to contribute toward Brazilian inclusive development by linking applied research, public debate and adoption of public policies. The design and assessment of social programs, combined with construction and monitoring of related indicators, form the core of the work. This involves processing large public collections of information and transforming them into knowledge of interest to society. Our team has been successful in revealing in first hand all the main inflexions in the data on Brazilian poverty and inequality occurring over the last twenty years.

In this interim the team detected a number of social inflexions in the municipality of Rio de Janeiro, such as the impact of the Real Plan[1]. In 2011, a book was launched organized by André Urani and Fabio Giambiagi, bringing together a series of prospective analyses on changes in progress, entitled "Rio: Comeback Time". Heuristically, the present project assesses *a posteriori* if in fact there was such an Olympic comeback or a v-shaped turn in the life of the Rio population.

Timeline

This project aims to quantify Rio's pre-Olympic legacy in social terms and understand the role played by the public policies in this process. The central period of analysis begins when Rio 2016 was announced in October 2009. There will be a brief retrospective analysis since 1970, ten years after Rio de Janeiro lost its status as the country's capital, and the ensuing trend of harmful effects for the population, exacerbated with the disappearance of the Guanabara "city-state" in 1975.

Focus

A characteristic of the approach used is to place the citizen at the center of the action, whether as final recipient of the adopted social policies, or as first ombudsman of the processed information. Emphasis has been given to the question of equality and, in particular, to the more vulnerable segments of the population that tend at first to stay on the edge of the dynamic center of changes made by the sports mega-events.

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[1] For 12 years we have participated in the City Council where these analyses have been submitted. The participation in the 1996 World Bank Report on the City and the Rio de Janeiro Ending Hunger Map were benchmarks in this trajectory. In the studies undertaken on different topics, Rio de Janeiro has always held a privileged position. Given the multidimensionality of the project in question, we attached here another document to give a view of the myriad of topics relating to this initiative that are studied by FGV Social.

Details of the Empirical Analyses

AREAS ANALYZED

EDUCATION	HEALTH	LABOR	HOUSING	PUB. SERVICES	TRANSPORT	DIGITAL INCLUSION	SOCIAL DEVELOP.

Some empirical innovations:

Municipality of Rio de Janeiro – The empirical analysis of the project centers on Rio de Janeiro municipality in the period 2009-2016, varying in accordance with available data for the eight areas of public policies (education, health, etc.), as shown in the diagram above.

PNAD - In the principal base, PNAD (national household sample survey), we use the comparison of available data between 2008 and 2014, in which the reference period is October of the relevant year. In the other bases we aim to reconcile as far as possible those moments of observation. When it was possible, the PNAD analysis was updated by the variation observed in the Continuous PNAD to compare the same variables in the two surveys.

Panoramas – In the case of household surveys, microdata processing helps provide interactive databases called panoramas, which permit matching the items of interest by sociodemographic attributes (gender, age, policy dimensions, etc.).

DiD – The differences in differences analysis (DiD) took the comparison between the capital's municipality (nucleus) and the set of municipalities on the metropolitan periphery, which acted as a control group in the aggregate analysis.

Simulators – The estimated multivariate models acted as a base for setting up user-friendly simulators so that the user can draw scenarios according to the combination of individual attributes.

Census RAs 1970 – The long-term retrospective analysis was based on the spatially disaggregated microdata of the 1970 and 2010 Censuses. The geographic units used in the comparison are the 23 administrative regions existing in 1970 as spatially comparable minimum units (see diagram below). In some cases we used the current Planning Areas (PAs) – Center, South Zone, North Zone, Barra and West Zone.

Census 2065 – The long-term prospective analysis using microdata took as base the Census 2010 microdata, the demographic projections headed by professor Kaizô Beltrão from the FGV EBAPE for City Hall, and the socioeconomic scenarios generated by the FGV Social for the project. The geographic units used in the comparison are the 33 administrative regions existing in 2000.

Sequence

First, we built a detailed empirical diagnosis of the day-to-day living conditions of the population in the Rio municipality vis-à-vis the outskirts of *Greater Rio* in order to check whether there has been a shift in trend after the Rio 2016 announcement, and if this shift is positive or negative. We looked at each modality of empirical analysis undertaken to clarify through the data colors if there was improvement (blue), deterioration (red) or continuity (no color) of the addressed indicators. We made use of a vast array of microdata and specific indicators on covering different elements associated with public policies, namely including education, labor, housing, public utilities, transportation, use of information and communication technologies (ICTs) and social development. After drawing the most recent Rio portrait in the different dimensions, we implemented bivariate analyses of the time series. Firstly, we made a controlled analyses of the indicators, comparing people with the same sociodemographic attributes at two moments in time for, in a second moment, undertook difference-in-difference analyses controlled by the same observable attributes for statistically test the progress of the Rio population's living conditions compared to other relevant benchmark populations in the pre-Olympic period. We adopted the years 2008 to 2014 from the traditional PNAD as benchmarks for the pre-Olympic period and, in the case of income, poverty and inequality data, we arrived at 2016. The period before the Olympic announcement, in turn, is approximated in the PNAD for the 1992-2008 series and, in the case of the demographic census, for the period between 1970--2010, checking a longer-term view to ascertain if there had been an Olympic comeback of the different indicators or not. The Censuses allowed us to open these trends by Planning Areas (PAs) and Administrative Regions (ARs) of the municipality.

At a second stage, we will create multidimensional indicators to synthesize the performance of the group main aspects that determine the local population's quality of life. There will also be a prospective analysis on growth, inequality, population and related indicators, such as poverty and extension of the economic strata for the overall city and the administrative regions. We will also undertake in these spatial and thematic dimensions a prospective sensitivity analysis of these same geographic areas regarding different external changes. In this way we intend to draw up a conceptual plan for measuring the population's wellbeing and test the impact channels of the social policies adopted and their interactions.

Database

The project is based on uni-, bi- and multivariate empirical analyses of a series of microdatabases from household surveys, administrative records and available secondary information. A valuable contribution of this project is to open unexplored microdata bases at the municipal level of the Brazilian state capitals. The main idea of the project is to develop information systems of social indicators for monitoring, diagnosing and assessing public policies. We aim to assess the strategies of Rio de Janeiro City Hall, taking into account other public or private initiatives. To do so, during the project we closely examined the topics described in tune with the investigative instruments developed by the FGV Social and the vast set of available data, breaking down the impacts of each public policy by attributes, such as income bracket, education, age and so on. The map that summarizes the main databases to be explored in the project can be found below:

Map of Microdata Bases with Municipal Opening

Basic Household Surveys Microdata

PNAD (100,000 housedholds per year)
Annual Cross-section
Incomes, Labor, Education, Housing, Public
Services, Digital Inclusion, Transport, etc

Monitoring

Continuous PNAD (200.000 households per
quarter) National, Longidutinal Aspect, Labor,
Education, etc

Mapping

CENSUS (18 million individuals)
*Decennial, Long Run Income and Detailed
Maps, Municipal and States Opening*

Administrative Records

Unified Register for Social Programs – MDS
CadÚnico (60 million individuals) Bottom
Incomes & Household Characteristics

Empirical Strategy

Here we attempt to give a more concrete idea with sectoral examples. In the case of a detailed assessment at the level and changes in education (complete years of schooling of the population, public and private school attendance by age group, level of education, grade repetition, etc.), we used the National Household Sample Survey (PNAD) and the Continuous National Household Sample Survey (PNADC). In turn, the labor topic is also based on the pair of national household surveys PNAD and PNADC, in order to understand individual income, based on the employment status and earned remuneration, in addition to hours worked, labor participation and level of education and their relevant labor premium. The entire analysis was opened by sociodemographic attributes, namely gender, age, race, and so on, and by economic attributes, such as job sectors, job position, social security contribution and so on. Labor earnings was include with other sources of income, such as social security benefits (above and up to a minimum wage), the government social aid programs, such as the *Bolsa Família* (Brazilian main CCT program) and local programs, besides received rents and private income. Our goal is to capture the impacts on individual income and household per capita income and calculate social welfare measures, inequality and poverty based on them.

Rental measurements imputed for homeowners will be calculated, in order to include in the income-based well-being measurements effects on the level and inequality of income. Measurements based on current income and on permanent income associated with assets will be calculated to check the sustainability and resilience of the changes made. This strategy depends on the microdata provided in the project. This empirical strategy will also help capture the residential capital of the city dwellers and the impacts from public policies such as public utilities, transportation and obviously housing. In the case of the mobility question, in addition to the time taken in travel to and from work, its pecuniary cost will be estimated for the wage-hour of each worker in the city. In both cases it is possible to estimate the distributive and spatial impacts of the performance of different dimensions associated with public policies.

In order to comply with the project's social monitoring character, mainly with regard to public policies against poverty, we build in a yet unexplored manner the aforementioned databases with other groups of supplementary data, such as the administrative regions of social security and *Bolsa Família*. The idea is that, when we combine the data in a completely new way, they act as a base with more up-to-date data to monitor local public policies, streamlining public spending, stronger immediate impacts on the pyramid base and providing in the long term more equal opportunities.

Techniques adopted

Univariate and bivariate analyses: The purpose of the univariate and the bivariate analysis is to draw a descriptive profile of the variables indicative of the main personal attributes, namely gender, race, age, education, etc. The univariate analysis only describes the extent or importance of each variable, informing, for example, that a fraction of the population takes up to 30 minutes a day traveling between home and work. The bivariate analysis, in turn, involves matching two variables, showing how a variable is distributed in each segment. It informs, for example, that a fraction of people without schooling take more than two hours to reach their work. It portrays the role of each attribute addressed separately; that is, ignoring possible and probable interrelations between the explicative variables.

Multivariate analyses: The multivariate analysis aims to handle the aforementioned interrelations by analyzing the regressions of various explicative variables considered together, in order to separate the effect

of each of them. The multivariate analysis helps distinguish whether what determines the travel time is income (or education) by comparing the same individuals in everything that is observable (gender, color, home address, etc.), except with regard to travel time. It played a key role in this study, since it helps isolate the different instances of policy performance. It consists of drawing regressions that inform us if there is some correlation between different explicative variables and the explained variable.

Panoramas: The panorama permits obtaining quite a comprehensive view of different indicators matched with characteristics of the population (demographic, socioeconomic and spatial). It is possible to simply and directly measure, for example, the probability of different population groups having access or not to a certain public service. This instrument optimized and facilitated the consultation, processing and analysis of the data.

Simulators: Developed from multivariate models applied to the continuous (e.g. income) or discrete (e.g. school attendance) variables of interest, controlled by individual attributes, the simulators more effectively translate the results of the regressions.

Difference-in-Difference: In the Social Sciences, many studies are undertaken by analyzing random samples of public interventions or analogous situations using so-called natural experiments. Both cases occur when some exogenous event – such as, for example, a change in government policy – changes the environment in which individuals, families, firms or cities operate. We used a similar approach to that of experiments for other comparative analyses with the other dimensions considered in the project. To analyze a natural experiment we have to have a control group; that is, a group that has not been affected by the change, and a treatment group that was affected by the event, both with similar characteristics. Contrary to an actual experiment in which the control and treatment groups are chosen at random to prevent bias in estimates, the groups in a natural experiment emerge from the way in which the change is made. For us to study the differences between the two groups, we need data from before and after the event for both groups. Therefore, we find the difference in the difference verified between the groups, between the two periods. Hence the reason for the term differences-in-differences. Simulators were developed to present the results.

Appendix
I - Database

The diagnosis is based on uni- and multivariate empirical analyses of household surveys and available secondary information. The diagnosis paid special attention consolidating information in synthetic indicators while, on the other hand, breaking down the impacts of components linked to policies. We propose to use various sources of information, detailing below the main sources in which we will identify the municipality of Rio de Janeiro:

i)   National Household Sample Survey (PNAD): A detailed assessment of the level and changes in: education (complete learning years, public and private school attendance by age group and educational level, grade repetition, etc.), individual and per capita household income (by type of work, social security above and until a minimum wage, social programs, rents, etc.), labor (employment, wages, hours, informality, etc., opened by attributes such as activity sectors, job position, etc.), transport (travel time between work and home, workplace, owning cars and motorcycle), urban infrastructure (basic sanitation, water, sewerage, electricity, garbage), housing access (physical configuration of the home (number of bedrooms, rooms and

bathrooms, materials of floor, wall and roof, type of financing, value of rentals that help create a synthetic indicator, etc.), and so on, can be carried out based on the PNAD. All information can be combined with other miscellaneous information relating to the other aforementioned elements, to personal attributes (gender, race, age, etc.), access to the ICTs (Internet, mobile, time use, etc.). PNAD supplements: They help supplement the PNAD data in the years when they went into the field, quantifying a myriad of variables linked to the different topics that can be matched with the group of variables comprising the PNAD questionnaire.

iii)   Continuous National Household Sample Survey (PNADC): It brings a detailed assessment of the level and changes in the complete years of schooling, school attendance, (in)activity, (un)employment, income from all work, among other variables of interest.

iv)   Demographic Census: It permits a long-term view, providing a historic retrospective and base for prospective analysis. The main asset of this base is the possibility of opening the information at municipal, infra-municipal and even "infra-district" levels, in addition to specific aspects only surveyed in the Census, such as commuting movements of intercity mobility.

vii)   Administrative Records: They permit accompanying the performance of distributed social benefits, proficiency ratings, morbidity data of the population, and so on.

II – Differences-in-Differences Analyses:

Mathematically we can represent the differences-in-differences method with the following equation: $g3 = (y2,b – y2,a) – (y1,b – y1,a)$ where each Y is the average of the variable studied for each year and group, with the subscript number representing the period of the sample (1 for before and 2 for after the change) and the letter representing the group to which the data belongs (A for the control group and B for the treatment group). And g3 will be our estimate based on the differences in differences. On obtaining g3 we determine the impact of the natural experiment on the variable that we would like to explain.

Representing the method by a regression and creating the indicator variables (or dummies): dB, equal to one for the individuals in the treatment group and zero for the individuals in the control group; and d2, equal to one when the data refer to the second period, post-change, and zero should the data refer to the pre-change period, then:

$Y = g0 + g1*d2 + g2*dB + g3*d2*dB$ + other factors where Y is the studied variable, g1 the impact of being in the second period over the variable studied, g2 the impact of being in the treatment group over the studied variable, and g3 the post-event impact of the treatment group impact vis-à-vis the control group over the studied variable (which is precisely what we want to discover). Thus, g0 captures precisely the expected value when the control group is analyzed before the change, which basically gives us the parameter of comparison.

However, it is necessary to control by other relevant factors in the regression, which in econometric jargon means that, before we state that g3 will give us the impact of the exogenous policy, we have to discover and isolate the effect of all other variables that may be causing changes in the variable studied. This is done by inserting the relevant control variables in the regression, as shown in the second equation, thereby preventing effects from other variables to cause bias in our estimation. With this procedure we determined, therefore, the pure effect of the natural experiment on the variable that we would like to explain.

Extensions: New Products and Proposed Partnerships

We propose to extend activities and products by means of a partnership with other institutions in order to go deeper, create more impact and continuity for the results:

Book – Publication of a book that consolidates the experiences of Rio de Janeiro.

Upgrading devices – Development of new platforms for disseminating information generated by the project with new forms of data access and viewing.

Translation – Providing a more complete homepage on the Internet in English and Spanish with reports, data and videos.

International exchange – To organize workshops and/or seminars with the Pontifical Catholic University in Lima and Columbia University in New York.
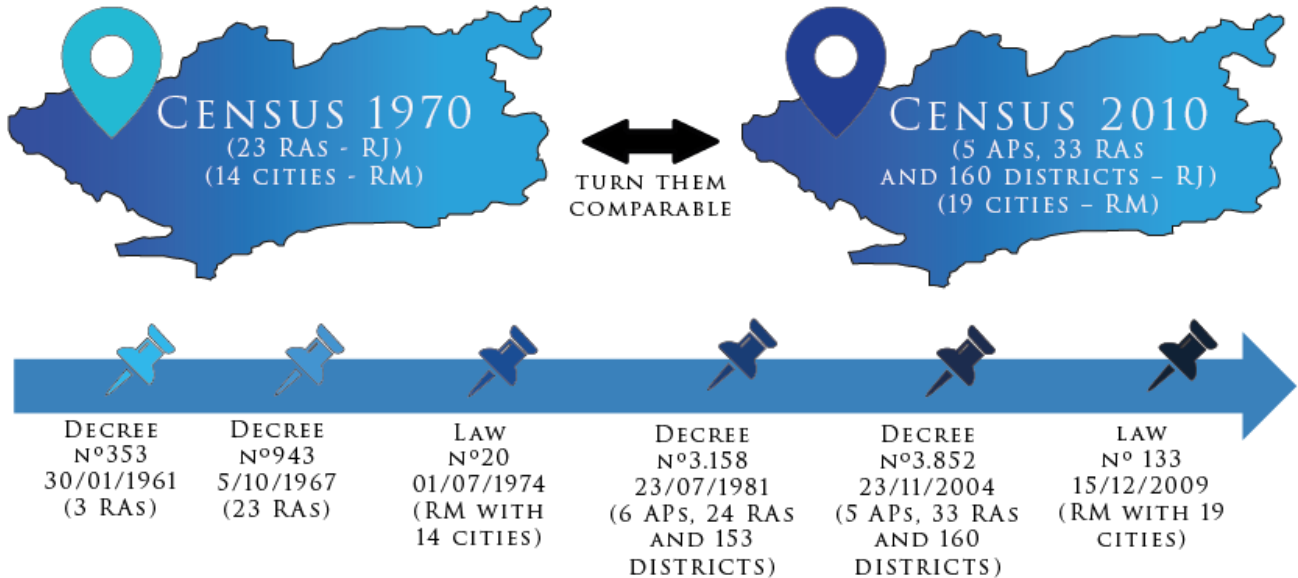
Exchange of experiences – To explore the fertile route, albeit little studied, to exchange social technologies between South American cities, national levels and the municipality of Rio de Janeiro, thereby including the Pacification Police Units (Unidades de Polícia Pacificadora - UPPs), "Rio, Como Vamos" indicators, conditioned income transfer programs and so on. Even the organization of the 2016 Olympic Games inspires exchange of experiences with other places such as Lima, host to the 2019 Pan American Games.

Empirical scope – To extend the empirical analysis beyond the borders of *Greater Rio*, comparing impacts with the center and periphery of other Brazilian metropolitan areas. To adopt a methodology to select control areas. To extend the range of analysis and monitoring timeline.

Field – To increase the database by including field surveys on a symbolic meaning of changes and different aspects regarding public policies.

In short, we aim to extend time, space, topics, horizons of exchanging experiences, and in the diversity of the generated products.

In the 1970 Census, the area corresponding to the Rio Metropolitan Area (RM in Portuguese – the area was only officially established in 1974) included only 14 municipalities. In the 2010 Census RM included 19 municipalities, while in nowadays includes 21. On the other hand, the Rio de Janeiro municipality (at the time called Guanabara State) had 23 administrative regions (RAs in Portuguese) in the 1970 Census. Only in the 1980s was established a territorial division in three levels: Planning Areas (APs in Portuguese), administrative regions and districts ("Bairros" in Portuguese). The territorial division of the city observed in 2010 Census remains the same nowadays, with 5 APs , 33 RAs and 160 Districts. This division will be used for the projections of the 2065 Census.

CENSUS 1970
(23 RAs - RJ)
(14 cities - RM)

TURN THEM COMPARABLE

CENSUS 2010
(5 APs, 33 RAs AND 160 DISTRICTS – RJ)
(19 cities – RM)

DECREE Nº353 30/01/1961 (3 RAs)

DECREE Nº943 5/10/1967 (23 RAs)

LAW Nº20 01/07/1974 (RM WITH 14 CITIES)

DECREE Nº3.158 23/07/1981 (6 APs, 24 RAs AND 153 DISTRICTS)

DECREE Nº3.852 23/11/2004 (5 APs, 33 RAs AND 160 DISTRICTS)

LAW Nº 133 15/12/2009 (RM WITH 19 CITIES)

RM - Census 1970

Rio de Janeiro, Niterói, Duque de Caxias, Itaboraí, Itaguaí, Magé, Maricá, Nilópolis, Nova Iguaçu, Paracambi, Petrópolis, São Gonçalo, São João de Meriti e Mangaratiba (Total = 14)

RM - Census 2010

Rio de Janeiro, Niterói, Belford Roxo, Duque de Caxias, Guapimirim, Itaboraí, Itaguaí, Japeri, Magé, Maricá, Mesquita, Nilópolis, Nova Iguaçu, Paracambi, Queimados, São Gonçalo, São João de Meriti, Seropédica e Tanguá (Total = 19)

RAs - Census 1970

I – Zona Portuária
II- Centro
III – Rio Comprido
IV – Botafogo
V – Copacabana
VI – Lagoa
VII – São Cristóvão
VIII – Tijuca
IX – Vila Isabel
X – Ramos
XI – Penha
XII – Méier
XIII – Engenho Novo
XIV - Irajá
XV – Madureira
XVI – Jacarepaguá
XVII – Bangu
XVIII – Campo Grande
XIX – Santa Cruz
XX – Ilha do Governador
XXI – Paquetá
XXII – Anchieta
XXIII – Santa Teresa

New RAs - Census 2010

XII – Inhaúma
XXIV – Barra da Tijuca*
XXV – Pavuna
XXVI – Guaratiba
XXVII – Rocinha
XXVIII – Jacarezinho
XXIX – Complexo do Alemão**
XXX – Maré
XXXI – Vigário Geral
XXXII – Realengo
XXXIII – Cidade de Deus

Subtitle

Lagoa
Ramos
Penha
Méier
Jacarepaguá
Bangu
Campo Grande
Anchieta