Ciência & Saúde Coletiva
cienciaesaudecoletiva.com.br
ISSN 1413-8123. v.29, n.11
DOI: 10.1590/1413-812320242911.04392024EN

Geospatial innovations and their contributions to the quality and investigations of the 2022 Demographic Census

Júlia Célia Mercedes Strauch (https://orcid.org/0000-0002-9225-0511) [1]
João Bosco Azevedo (https://orcid.org/0000-0003-2827-5164) [2]

Abstract *Geospatial innovations played a key role in the different stages of the 2022 Demographic Census, especially in the preparation of the Territorial Base, crucial for the planning of and follow-up on data collection; in the organization and integration of essential areas, a basic principle for the development of a geostatistical framework for a country; and in the implementation of spatial intelligence in questionnaires, thus providing better quality in the identification and investigation of Traditional Peoples and Communities. The present study sought to describe the role of geoinformation in the operational planning and data collection of, and follow-up on the coverage of the 2022 Demographic Census, thereby presenting a holistic view of all operations carried out in the preparation of the census operation and during enumeration, in turn highlighting the role of geoinformation in planning the territorial base, in the importance of the Geographic Framework, and in the georeferencing of the questionnaire.*
Keywords: Geoinformation, Demographic Census, Georeferencing

[1] Departamento de Análise Geoambiental do Instituto de Geociências da Universidade Federal Fluminense, Campus Praia Vermelha. Avenida Milton Tavares de Souza, s/nº, 4º andar, Boa Viagem. 24210-346 Niterói RJ Brasil. juliastrauch@id.uff.br
[2] Programa de Pós-Graduação Stricto Sensu em População Território e Estatísticas Públicas, Escola Nacional de Ciências Estatísticas, Instituto Brasileiro de Geografia e Estatística. Rio de Janeiro RJ Brasil.

Introduction

The Demographic Census, or population census, is a survey carried out with all the inhabitants of a given territory in order to obtain information about people's living conditions. This is a survey conducted each decade with all inhabitants of a given territory, in order to obtain information about people's living conditions. To achieve this, a set of operations is carried out to collect, group, and publish demographic, economic, and social data, referent to a specific moment or to certain periods, concerning all of the inhabitants of a given country or territory[1].

The word census stems from the Latin *census* and means "a set of statistical data on the inhabitants of a city, province, state, nation"[2] (p.17). In Brazil, the Demographic Census is carried out each decade and seeks to "count the inhabitants of the national territory, identify their characteristics, and reveal how Brazilians live, since having in-depth knowledge about what the population is like and how it lives is of extreme importance for both the government and society"[2] (p.17).

The data collected in the census operation is called primary, as it is obtained directly from the source (informant from the collection unit), revealing who they are, how the population lives, and what their living conditions are, thus providing a detailed portrait of various aspects. These data include: the total population, by sex and age group, and by how it is distributed in the country; its ethnic-racial distribution; the life expectancy of the population; conditions of housing and the surrounding area, such as the proportion of homes by type of access to basic sanitation, access to water, and garbage collection; working conditions; the average individual income; and the household income of the population. These data make it possible: (1) to assess the changes that occurred during the intercensal period, which is deemed relevant in order to guide the management planning and governmental budgets of a country, as well as to analyze investments at any level of government, be it federal, state, or local; (2) to subsidize and evaluate public policies; and (3) to compare data, as well as to understand the evolution of social indicators and measure them, in such a way as to allocate public resources to priority areas. Therefore, census data are essential instruments for the formation of educational, electoral, and management districts; as well as for the distribution of budget allocations to local governments. These data are also highly relevant to the provision of essential information for a wide variety of studies and scientific research in economic, educational, health, and social areas, among many others. These data are not only useful for government decision-making in various spheres, but they are also applicable to the private sector, serving as a key reference for decision-making concerning investments in the consumer market, purchasing power, location of the target audience, among others.

According to Senra[3] (p. 37), in 1808, with the arrival of D. João VI, Brazil, especially the city of Rio de Janeiro, gained recognition as a financial center, and a localized, fragile and erratic population survey was carried out, predominantly geared toward military recruitment. Hence, this achievement is not considered the first census due to supposed flaws in the population counting process. In 1853[3] (p.142), the International Statistical Congress was held in Brussels, which marks the birth of the Modern Census due to the establishment of an international standard for a population census. These standards included the recommendation to conduct a census each ten years, during the years ending in zero. In 1872, the first Census, called the Census of the Population of the Empire of Brazil was conducted, after which time censuses took place in 1890, 1900, and 1920[3], each with a mandatory and confidential character, that is, everyone had to participate and individual information could not be disclosed.

In 1934, the National Statistics Institute (*Instituto Nacional de Estatística* – INE) was created due to the need to have a governmental body capable of coordinating and processing statistical information[3]. In 1938, INE joined the Brazilian Geography Council (*Conselho Brasileiro de Geografia* – CBG), creating the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* – IBGE), along the lines known today. With the creation of the IBGE, the census became its main responsibility. Currently, the IBGE has 27 State Superintendencies to cover the entire national territory (26 in the state capitals and one in the Federal District), together with 566 Data Collection Agencies in the main municipalities, which carry out a wide range of studies essential to the country's development[4].

Among the studies carried out by IBGE, , in addition to the Demographic Census, it is important to highlight the Agricultural Census, the Systematic Survey of Agricultural Production (*Levantamento Sistemático da Produção Agrícola* – LSPA), the Municipal Agricultural Production (*Produção Agrícola Municipal* – PAM), the Mu-

nicipal Livestock Survey (*Pesquisa Pecuária Municipal* – PPM), Annual Industry Survey (*Pesquisa Anual da Indústria* – PIA), National Survey by Continuous Household Sample (*Pesquisa Nacional por Amostra de Domicílio Contínua* – PNAD-C), Household Budget Survey (*Pesquisa de Orçamentos Familiares* – POF), National Basic Sanitation Survey (*Pesquisa Nacional de Saneamento Básico* – PNSB), Quarterly Civil Registry Survey, Semiannual Stock Survey, and the Basic Municipal Information Survey (*Pesquisa de Informações Básicas Municipais* – MUNIC). Regarding the field of Geography, the following stand out: the implementation and maintenance of the Geodetic Reference System, Official Topographic Mapping, Macrocharacterization of Natural Resources, Environmental Statistics Research of Natural Coverage, Research of the Region of Influence of Cities, among others. All information collected by the institute, covering various aspects of society, is essential for both the private and public sectors.

The operationalization of the Demographic Census is a Herculean task, with Brazil representing a country of continental dimensions, with 8,510,417.771 km²[5], along with different biomes and survey conditions. However, the evolution of Information and Communication Technologies (ICT), as well as geotechnologies, have promoted the follow-up on the country's coverage and efficiency in obtaining and overseeing data collection. To understand this massive activity, in the 2022 Demographic Census, Brazil was divided into more than 452,246 census sectors[6], each passing through a sequencing of status until the work was considered completed[7]. Thus, nearly 89 million households were visited, and 203,080,756 people were registered in the census[8].

Thus, the present study aims to describe the role of geoinformation in operational planning, data collection, follow-up on coverage, and the dissemination of the results from the 2022 Demographic Census, along with the new ICT used for this purpose, as well as predict the trends for the next census. This work, to provide a better understanding, initially presents a holistic view of all operations conducted in the intercensal period and during the census. It then describes the role of geoinformation in census operations involving the planning of the territorial base, the formation of the geographic frame of reference, and the georeferencing of the questionnaire. The work also addresses the support technologies used in the 2022 Demographic Census and, finally, presents its final considerations.

Operations to conduct the census

The operationalization of a demographic census "requires a long and detailed planning process, covering technical, technological, administrative-managerial, and logistic aspects"[2] (p. 59) and begins, in the year following the end of the previous census, with its evaluation of the census operation.

The stages of this massive operation can be divided into seven stages: i) Territorial Base Planning; ii) Preparation of the Universe and Sample questionnaire; iii) Execution of the Experimental Census; iv) Recruitment and training of personnel for data collection and supervision; v) Data collection; vi) Follow-up and control of data collection coverage; vii) Tabulation, and viii) Dissemination and publication of results. These steps are set out in Figure 1.

The activity of updating the Cartographic Base involves two stages carried out in parallel throughout the decade. The first consists of updating civil and administrative records and secondary sources, such as housing lists and national registries to evaluate an estimate of the resources needed for the survey. The second consists of updating the cartographic base with other institutions, such as city halls and duly registered companies, such as sanitation, water, and electric companies. In the 2022 Demographic Census, remote sensing techniques were used to update the cartographic base using high-resolution orbital images with recent acquisition dates. This enabled the identification of new areas of household occupation, whether in urban or rural areas, in subnormal agglomerations, or in areas occupied by populations with known spatial mobility, significantly improving data collection coverage and minimizing the need for field verification. Surveys from Social Cartography and Community Cartography projects for *quilombola* areas were also considered. At this stage, it is also important to mention the updating of some areas using Volunteer Geographic Information (VGI) data from the OpenStreetMap database for Brazil.

In the middle of the decade, IBGE commonly promotes public consultations and broad debates with society and technical government agencies to select the questions for the Universe and Sample questionnaire.

In the last quarter of the decade, IBGE chooses the information and communication technologies to be used when carrying out the Census, as well as the follow-up activities to be carried

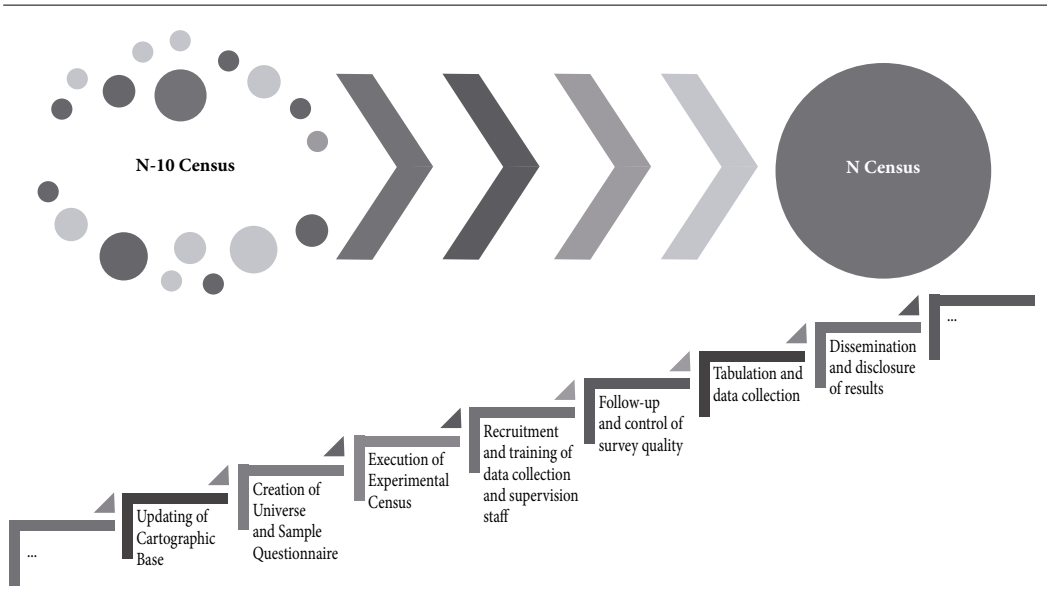

Figure 1. Operationalization of a demographic census.

Source: Authors.

out. Therefore, in this context, an experimental census is carried out, choosing municipalities that present characteristics common to the rest of the country so as to assess the effectiveness of the questionnaire and identify flaws in the process. This procedure aims to promote improvements in the structure and performance of data collection. For the 2022 Demographic Census, the experimental Census was carried out in the municipalities of Poços de Caldas, Minas Gerais, Brazil, from October 1 to December 2, 2019.

In the last quarter of the decade, staff is still being recruited to train supervisors and census agents/workers so that fieldwork can be carried out during the established data collection time.

During the census period, data is transmitted, and follow-up and quality control of the survey are performed. In this process, areas that present logistical difficulties in access, poor coverage and completeness of the questionnaire, among other issues, are verified, due to such issues as climatic adversities, mining areas, and drug trafficking. Due attention is given to these areas in order to resolve these issues and complete the survey.

Once this data has been collected, it is then tabulated, that is, organized, transformed, and systematized so that it can be analyzed while preserving the confidentiality of citizens. This systematized data is then made available on IBGE platforms to be disseminated and disclosed in a way that can provide support for the definition of public policies and other societal issues, including both the public and the private sectors.

The role of geoinformation

Knowledge about the reality of a country is extremely important when proposing public policies. This knowledge cannot be one specific piece of data in a given moment in time, but rather information developed over time and logged permanently in the historical chronology of the country, thus guaranteeing the follow-up of its results by society as a whole.

Census operations are the main examples when formulating a set of data that characterizes the population and households. But how can we guarantee data collection coverage throughout the country, disseminate the results throughout the different Brazilian states, or even characterize Traditional Peoples and Communities?

To answer this question, we must turn our eyes to Geography, especially territorial analyses and typologies and the use of geoinformation. In Brazil, the IBGE has been carrying out census operations since 1940, when a great effort was made to determine geodetic coordinates for all municipal headquarters[9] and their respective maps.

Over the past 80 years, the development of geotechnologies has made it possible for any element that can be described on the Earth's surface by coordinates, be it a feature, a phenomenon, or a fact, to have a computational representation in the context of digital geographic space. This geographic information, also called *geospatial information*, or the more commonly used, *geoinformation*, gains relevance today, as it allows us to understand and analyze geographic space in a more precise and efficient manner.

In the 2022 Demographic Census, IBGE expanded the use of geoinformation, as interim president Cimar Azeredo states: "I am quite proud of this, because when saying that the Census is more geographic than statistical, what I want to highlight is that statistics, at the same time that it makes use of operation and analysis tools from the geosciences area, it also enhances and offers more to society"[10].

The use of geoinformation in census operations for the 2022 Demographic Census was organized into three blocks: i) Territorial Base Planning; ii) Geographic Reference Framework; and iii) Georeferencing of Questionnaires.

Planning of the Territorial Base

The census operation is carried out in the field, where each census taker travels throughout the country and applies the questionnaire to each household. To do so, it is necessary to characterize the territorial area of competence of each census taker. These areas, called the Census Sector, "correspond to the smallest portion of the area in which the National Territory is fragmented for statistical collection purposes"[11] (p. 82). The census sector is defined as a "territorial collection unit, that is, a continuous area whose size is related to its extension and the number of households or agricultural establishments therein"[11] (p. 82).

The Territorial Base Planning activity "reflects changes in the political-administrative division in the Brazilian territory and other socioeconomic arrangements"[2], and involves three stages carried out during the intercensal period and continuously. The first consists of updating the cartographic bases, which will be used as a spatial reference to represent the Political-Administrative Division and, together with data from administrative records, the planning of the census sector network.

The second stage consists of incorporating changes into the Political-Administrative Division, arising from new legislation that creates or changes municipal limits; judicial decisions arising from warrants or injunctions resulting from civil action; or changes in mapping when replacing or updating the cartographic base. Table 1 presents the numbers of the Political-Administrative Division in the 2022 Demographic Census.

These changes result in new knowledge of the territory or improvements in the quality of cartographic representation[2]. They are organized in a geospatial database that provides an overview of the levels that structure the territorial hierarchy organized into seven levels: i. Large Region; ii. State; iii. Federal District; iv. County; v. District; vi. Subdistrict; and vii. Neighborhood[11] (p. 19).

Finally, the third stage is aimed at planning the census sector network, which consists of resizing the sectors due to the expansion of urban areas and their classification based on their situation (urban or rural) and type (normal or special). Therefore, the continuous process of planning the census sector network is essential in order to size the census operation and disseminate the results of the basic questionnaire in an intramunicipal manner; therefore, the census sector:

[…] must be appropriately classified, according to geopolitical, administrative, geomorphological, socioeconomic, and cultural characteristics, so that its delimitation not only fulfills the purpose of dividing the Brazilian territory, according to the dimensioning of the volume and costs of the collection operation, but it also represents the current territorial structures appropriately[11] (p. 83).

Mapping census tracts requires the use of a geospatial database of households with their respective addresses and a set of high-resolution satellite images. These images play a key role in resizing sectors. The use of these images, from different time periods, seeks to identify changes that characterize this growth to later subdivide or change the typology (urban or rural) of the sectors.

For the 2022 census operation, there was a review of the classification of census sectors in relation to the classification adopted in the 2010 Demographic Census. The current classification of census sectors by their situation and type is described in the Publication of Geographic Table[11] (p. 19).

Geographic Reference Framework

One question present in the census is: *How to georeference statistical information?*, especially

Table 1. Quantitative political-administrative division by major regions.

Political-administrative division	Brazil	Major regions				
		North	Northeast	Southeast	South	Midwest
States	26	7	9	4	3	3
Counties	5,568	450	1,794	1,668	1,191	32,550
Federal District	1	0	0	0	0	1
State district	1	0	1	0	0	0
Districts	10,670	695	3,301	3,434	2,487	753
Subdistricts	643	14	71	221	223	114
Census Sectors	452,338	37,206	115,995	203,058	63,529	32,550

Source: IBGE.

since it is not possible to disclose the data collected in the Demographic Census for each household, as this would violate the law of statistical confidentiality. This law guarantees that: "The information provided will be confidential, will be used exclusively for statistical purposes, and cannot be the subject of a certificate, nor, under any circumstances, will it serve as evidence in administrative, fiscal, or judicial proceedings, unless it is the result of a violation of the provisions of this law"[12]. Thus, IBGE developed the Geographic Reference Framework for Production, Analysis and Dissemination of Statistics[11], hereinafter referred to as the *Geographic Framework*.

The Geographic Framework provides spatial references consistent with statistical data, guarantees the confidentiality of the informant, enables geospatial analysis, and is aligned with the United Nations initiative in the development of a Global Statistical Geospatial Framework (GSGF). The latter consists of the "method of geospatialization of statistics and administrative data, to ensure that data from different sources can be integrated based on their geographic location as well as integrated together with other geospatial information"[11] (p. 13).

The Geographic Table describes each spatial section in two groups: a) Spatial Sections defined by Law (Municipalities, Metropolitan Regions, among others) and b) Spatial Sections defined by IBGE (Census Sector, Subnormal Agglomerates, Biomes, among others) describing an essential geospatial infrastructure and geocoding, enabling its use in a geospatial data management environment.

Georeferencing of the questionnaire

Global Navigation Satellite Systems (GNSS) have revolutionized the production of geoinformation, at the same time access to smartphones and the internet guarantee mobility in the data acquisition process, which, when integrated with GNSS, add value to the position. Census operations are not exempt from these technologies.

Since the 2006 Agricultural Census, IBGE has used portable devices to carry out questionnaires[13], one of its functions being to determine the coordinates of the location where the questionnaire will be applied. For the collection of the 2022 Demographic Census, these technologies were expanded. Each census taker has a Mobile Collection Device (*Dispositivo Móvel de Coleta* – DMC) which, in addition to the questionnaires, has access to the geospatial database, the previous list of addresses of households in the sector, a set of images of satellite in Tiles of the municipality, and an application to determine its location in real time.

In the 2022 Demographic Census, to ensure the incorporation of the *quilombola* ethnicity of residents in quilombola locations, the IBGE took steps to include them with a new questionnaire design; census cartography; differentiated training; approach methodology and census collection in quilombola locations; awareness; and dissemination[14] (p. 5), all forms of innovation in the inclusion of the spatial component for the application of the questionnaires.

The Territorial Base incorporates indigenous peoples through the typification and adaptation of census sectors to their limits that form the lands officially delimited by the National Foun-

dation of Indigenous Peoples (*Fundação Nacional dos Povos Indígenas* – FUNAI)[14] (p.74). The census sectors whose area is characterized "by the dispersion of occupied households or where it was not possible to confirm the presence of an indigenous population"[15] were called Areas of Operational Interest (AOI).

AOIs play a key role in the functioning of the coverage question "Do you consider yourself indigenous?", as this becomes mandatory, even for residents who, in these areas, do not declare themselves indigenous in terms of color/race[15].

The same occurred for the *quilombola* groupings identified by IBGE and not defined by the National Institute of Colonization and Agrarian Reform (*Instituto Nacional de Colonização e Reforma Agrária* – INCRA), these formed the AOIs for the geospatial verification and for the coverage question "Do you consider yourself a *quilombola*?".

Support technologies used in the census

As already mentioned, the use of Mobile Collection Devices (*Dispositivos Móveis de Coleta* – DMC) definitely incorporated the digital environment in the census collection stage, both for agriculture and demographics. This device discarded paper questionnaires, transforming the critical plan by enabling the validation of information collected in computer programs run in real time, in turn detecting and correcting inconsistent data during the interview, as well as directly transmitting the questionnaires to the IBGE database, with no need to scan or type the questionnaire[16].

Nearby, the DMC incorporated geodetic satellite positioning technology, originating from the GNSS, allowing coordinates to be obtained when filling out the questionnaire. This new (spatial) attribute of the questionnaire makes it possible to monitor the collection and coverage of the operation and, within the scope of the 2007 Agricultural Census, led to the creation of the National Register of Addresses for Statistical Purposes (*Cadastro Nacional de Endereços para fins Estatísticos* – CNEFE)[16].

With the georeferencing of the questionnaire and, consequently, of the household addresses, the 2022 Demographic Census once again innovated by making the geographic coordinates of 17 addresses available. The addresses made available were associated with eight types of species: i. Private home; ii. Collective household; iii. Agricultural establishment; iv. Educational establishment; v. Health establishment; vi. Establishment of other purposes; vii. Building under construction; and viii. Religious establishment[17].

The incorporation of contemporary technologies in census operations places the IBGE at the forefront among Statistical Institutes worldwide. It has been a reference institute since the 2007 census operation and confirms the concept created in the 1930s, of a federal institute that integrates reference areas in the production of data that can faithfully depict the physical, economic, and social reality of the country.

Final considerations

Today, geoinformation is of great relevance for census operations, not only in defining territorial sections, but also in providing each household interview with its geospatial position. This enhances the follow-up and monitoring of collection coverage through a Geographic Information System environment.

According to the interim president of IBGE, "follow-up of the Census operation, an activity traditionally conducted by the Research Directorate, is now also in the hands of the Geosciences Directorate. This is not only an innovation in the dissemination of results. It is a major innovation throughout the entire operation. It is the entry of a new actor into the process with a role as important as that of the other actors, who were already on the scene"[10].

Collaborations

JCM Strauch carried out the bibliographic review on census operations carried out in Brazil and the importance of geoinformation; JB Azevedo researched the innovations and procedures of the 2022 Demographic Census. Both worked on the conception of the article, its writing and final review.

References

1. United Nations (UN). Recommendations for the 2020 censuses of population and housing. In: *Proceedings of Conference of European Statisticians Recommendations for the 2020 Censuses of Population and Housing*. New York/Geneva: United Nations; 2015.
2. Instituto Brasileiro de Geografia e Estatística (IBGE). *Metodologia do censo demográfico 2010: relatórios metodológicos, v. 41*. Rio de Janeiro: IBGE; 2013.
3. Senra N. *História das estatísticas brasileiras*. Rio de Janeiro: IBGE; 2006.
4. Instituto Brasileiro de Geografia e Estatística (IBGE). O IBGE [Internet]. [acessado 2024 fev 26]. Disponível em: https://www.ibge.gov.br/acesso-informacao/institucional/o-ibge.html
5. Instituto Brasileiro de Geografia e Estatística (IBGE). Áreas Territoriais [Internet]. [acessado 2024 mar 12]. Disponível em: https://www.ibge.gov.br/geociencias/organizacao-do-territorio/estrutura-territorial/15761-areas-dos-municipios.html?t=acesso-ao-produto&c=1
6. Instituto Brasileiro de Geografia e Estatística (IBGE). Malha de Setores Censitários [Internet]. 2022. [acessado 2024 mar 12]. Disponível em: https://www.ibge.gov.br/geociencias/organizacao-do-territorio/malhas-territoriais/26565-malhas-de-setores-censitarios-divisoes-intramunicipais.html
7. Instituto Brasileiro de Geografia e Estatística (IBGE). Nota Metodológica: prévia da população dos municípios com base nos dados do Censo Demográfico de 2022 coletados até o dia 25/12/2022 [Internet]. [acessado 2024 fev 27]. Disponível em: https://ftp.ibge.gov.br/Censos/Censo_Demografico_2022/Previa_da_Populacao/Nota_Metodologica_Previa_Populacao_Municipios_CD2022.pdf.
8. Instituto Brasileiro de Geografia e Estatística (IBGE). Panorama do Censo Demográfico de 2022 [Internet]. [acessado 2024 mar 12]. Disponível em: https://censo2022.ibge.gov.br/panorama/
9. Instituto Brasileiro de Geografia e Estatística (IBGE). *Christovam Leite de Castro e a geografia no brasil: memória institucional 18*. Rio de Janeiro: IBGE; 2013.
10. Revista Brasileira de Geografia. Entrevista Censo 2022 – Cimar Azeredo Pereira. *Rev Bras Geogr*. 2022; 67(1):255-263.
11. Instituto Brasileiro de Geografia e Estatística (IBGE). *Quadro geográfico de referência para produção, análise e disseminação de estatísticas*. Rio de Janeiro: IBGE; 2022.
12. Brasil. Presidência da República. Lei nº 5.534, de 14 de novembro de 1968. Dispõe sobre a obrigatoriedade de prestação de informações estatísticas e dá outras providências. *Diário Oficial da União* 1968; 20 nov.
13. Instituto Brasileiro de Geografia e Estatística (IBGE). Censo Agropecuário [Internet]. [acessado 2024 fev 11]. Disponível em: https://censos2007.ibge.gov.br/historia-censo-2007/censo-agropecuario
14. Instituto Brasileiro de Geografia e Estatística (IBGE). *Censo Demográfico 2022: quilombolas – primeiros resultados do universo*. Rio de Janeiro: IBGE; 2023.
15. Instituto Brasileiro de Geografia e Estatística (IBGE). Povos e comunidades tradicionais [Internet]. [acessado 2024 mar 12]. Disponível em: https://anda.ibge.gov.br/sobre/povos-e-comunidades-tradicionais.html
16. Mariano LFPM. Coleta de dados por computadores de mão para censos de proporções continentais [Internet]. 2007. [acessado 2024 mar 13]. Disponível em: https://repositorio.enap.gov.br/bitstream/1/241/1/Coleta%20de%20dados.pdf
17. Instituto Brasileiro de Geografia e Estatística (IBGE). *Coordenadas geográficas dos endereços no Censo Demográfico 2022: nota metodológica n. 01*. Rio de Janeiro: IBGE; 2024.

Article submitted 14/03/2024
Approved 15/04/2024
Final version submitted 17/04/2024

Chief editors: Maria Cecília de Souza Minayo, Romeu Gomes, Antônio Augusto Moura da Silva