

<b>Título do capítulo</b>	SECTION 5 <b>DATA FROM THE ACCESS TO OPPORTUNITY PROJECT</b>
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## SECTION 5

### DATA FROM THE ACCESS TO OPPORTUNITY PROJECT

The purpose of this section is: i) to present the accessibility, land use and socioeconomic data made available by AOP; and ii) to teach how to download and use this data with the `{aopdata}` R package.

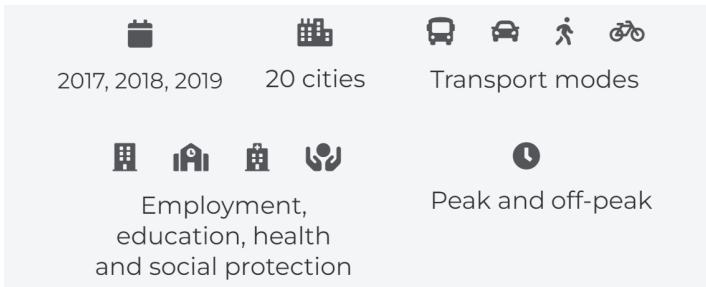
In the previous chapters, we learned about the concept of accessibility, how this concept is usually translated into quantitative measures and how to estimate accessibility levels using R. However, we often come across situations in which we do not want to calculate accessibility levels ourselves, either because we do not have the resources or data required for this or simply because they have already been calculated by other people. Throughout the next chapters, we will present the accessibility database created and made available by [AOP](#).

AOP is a research initiative led by Ipea with the objective of investigating the urban accessibility conditions and the inequalities in access to opportunities in Brazilian cities. All data produced by the project is made publicly available, including not only accessibility estimates, but also information on the spatial distribution of population, economic activities and public services.<sup>22</sup> The data is spatially aggregated into a hexagonal grid indexed by the [H3](#) geospatial indexing system, originally developed by Uber (Brodsky, 2018). Each hexagonal cell covers around 0.11 km<sup>2</sup>, an area similar to that covered by a city block, resulting in high spatial resolution analyses and outputs. As shown in figure 21, accessibility estimates have been produced for the years 2017, 2018 and 2019 and for the 20 largest Brazilian cities, considering different transport modes (walking, cycling, public transport and automobile), times of day (peak and off-peak), population groups (aggregated by income, race, sex and age) and types of activity (jobs, schools, health services and social assistance centers).

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22. The methods used to generate these datasets are presented in detail in two separate publications, one for population and land use data (Pereira et al., 2022a) and another for accessibility data (Pereira et al., 2022b).

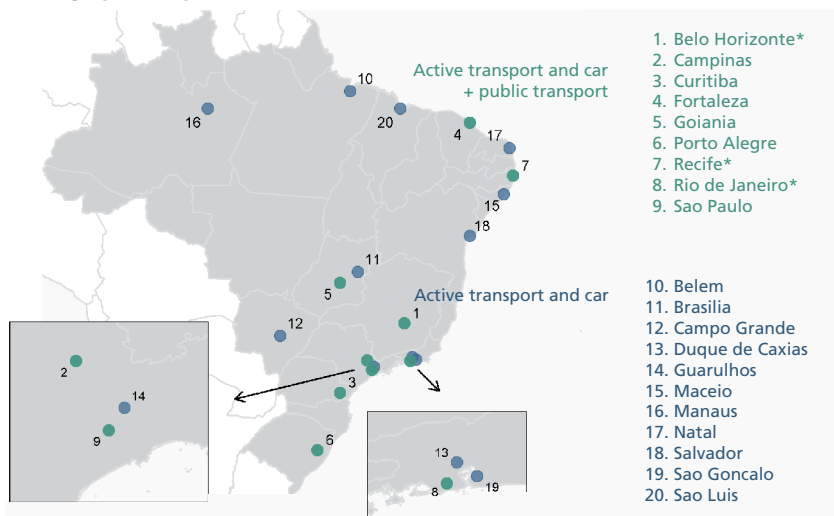
FIGURE 21  
Scope of AOP data



Authors' elaboration.

Accessibility estimates by public transport were calculated only for cities with good quality GTFS data, which include Belo Horizonte, Campinas, Curitiba, Fortaleza, Goiânia,<sup>23</sup> Porto Alegre, Recife, Rio de Janeiro and São Paulo. Still, in some cases the feeds of some of these cities were either only available for a few years or had quality issues, not being representative of the public transport operations they should be describing. In such cases, accessibility estimates by public transport were not calculated. Figure 22 shows the cities included in the project and the transport modes considered in their accessibility estimates.

FIGURE 22  
Geographic scope of AOP data



Authors' elaboration.

Obs.: Cities highlighted by an asterisk do not include accessibility estimates by public transport for all years.

23. Goiânia's GTFS covers not only the municipality, but its entire metropolitan region.

The following tables summarize the data made available by the project. Table 10 describes the urban accessibility dataset.

**TABLE 10**  
**Accessibility indicators calculated in AOP**

Indicator (code)	Description	Type of opportunities	Travel time thresholds
Minimum travel time (TMI)	Time to the nearest opportunity	Health, education and social assistance reference centers (CRAS)	Walk (60 minutes); bicycle, public transport and car (120 minutes)
Active cumulative accessibility measure (CMA)	Number of accessible opportunities within a given travel time threshold	Jobs, health, education and CRAS	Walk and bicycle (15, 30, 45 and 60 minutes); public transport and car (15, 30, 60, 90 and 120 minutes)
Passive cumulative accessibility measure (CMP)	Number of people that can access the grid cell within a given travel time threshold	-	Walk and bicycle (15, 30, 45 and 60 minutes); public transport and car (15, 30, 60, 90 and 120 minutes)

Authors' elaboration.

Table 11 describes the dataset containing the sociodemographic characteristics of the population and the spatial distribution of opportunities.

**TABLE 11**  
**Data on the sociodemographic characteristics of the population and the spatial distribution of activities aggregated by AOP, by year of reference and data source**

Data	Information	Years	Source
Sociodemographic characteristics of the population	Number of people by sex, age and race; average income per capita	2010	Demographic Census from the Brazilian Institute for Geography and Statistics (IBGE)
Education services	Number of public schools by education level (early childhood, primary and secondary education)	2017 2018 2019	School Census from the Anísio Teixeira National Institute for Educational Studies and Research (Inep)
Health services	Number of health facilities that serve the Unified Health System (SUS) by complexity level (low, medium and high complexity)	2017 2018 2019	National Registry of Health Facilities (CNES) from the Ministry of Health

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(Continued)

Data	Information	Years	Source
Economic activity	Number of formal jobs by education level of workers (primary, secondary and tertiary education)	2017	Annual Relation of Social
		2018	Information (RAIS) from the
		2019	Ministry of Economy
Social welfare services	Number of CRAS	2017	Unified Social Assistance System
		2018	(SUAS) from the Ministry
		2019	of Citizenship

Authors' elaboration.

All datasets created by AOP are available for download in the project [website](#) and through the `{aopdata}` R package. The data dictionary can be accessed online<sup>24</sup> or with the command `aopdata::aopdata_dictionary(lang = "en")` in an R session. The chapters in this section provide several examples illustrating how to download the datasets and create visualizations with them in R.

24. Available at: [https://ipeagit.github.io/aopdata/articles/data\\_dic\\_en.html](https://ipeagit.github.io/aopdata/articles/data_dic_en.html).