

THE PERMANENT POPULATION CENSUS AND NEW OPPORTUNITIES FOR ANNUAL DATA DISSEMINATION AT MUNICIPAL LEVEL: A FOCUS ON EMPLOYED PERSONS BY EDUCATIONAL ATTAINMENT IN ITALY'S LARGE CITIES¹

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1. The new data dissemination opportunities of the Permanent Population and Housing Census

The first cycle of the Permanent Population and Housing Census ended in 2021. The new Italian census strategy foresees the integration of information from administrative sources and data collected annually through sample surveys. The Permanent Census has been designed based on the Italian National Institute of Statistics (Istat) modernization program which places the integrated system of statistical registers at the core of statistical production. The role of field surveys in this system is to support registers, in the broad sense of assessing their quality and to add information that is missing, incomplete or of insufficient quality (Gallo and Zindato 2021). The new census methodology has required a difficult revisiting of the process of producing and validating estimates while offering the ability to disseminate multidimensional tables more frequently. In fact, the usual decennial dissemination, moreover, regulated by European Union Regulations (Regulation (EC) No 763/2008, Regulation (EU) 2017/712, Regulation (EU) 2017/543, Regulation (EU) 2018/1799), is complemented by an annual informative supply on topics varying from the main demographic characteristics of the usual resident population to socio-economic features. It is a dynamic dissemination programme that can be reshaped over time according to the increasing availability of data from administrative sources and adjustments made each year to the contents of the sample surveys. The census, as known, ensures the availability of statistics at a territorial detail that cannot be guaranteed by any other survey. Studies are underway to identify the methodology suitable for producing the sub-municipal level estimates that are one of the census outputs most expected by users, especially by local government officials. A first set of these estimates should be ready by the first half of 2023. It means that, from the point of view of

¹ The article is exclusively expressing the authors' opinions. Although the paper is the result of joint work, sections are attributed as follows: paragraphs 1, 2.1 and 5 to Simona Mastroluca, paragraphs 2.2 and 4 to Simone De Angelis and paragraph 3 to Valeria Quondamstefano.

dissemination, the Permanent Census guarantees the availability of census statistics at the same classificatory and territorial details but with greater timeliness and frequency than before. The first municipality-level data related to 2018 and 2019 editions of the Permanent Census were published on Istat's institutional website starting from December 2020 and covered population by sex, age and citizenship, by educational attainment, current activity status (employed, unemployed and outside of the labour force) and commuting for study or work. Referring to the same years, information on the number of households and on the number of members classified by citizenship, Italian or foreign, were made accessible. In 2020, due to the pandemic crisis, the surveys were not carried out, which meant that Istat could not proceed with the estimation of some aggregates. In the new Italian strategy, in fact, variables have been classified as totally, partially or not replaceable. Totally replaceable variables are already included in the administrative sources; these variables are considered complete since they are available for all units in the Registers and accurate, having a good level of coverage and quality. Partially replaceable variables are considered complete and accurate only for a subset of the target population; for the others, the data are unknown or cannot be considered accurate. Finally, not replaceable variables are those not yet available from administrative sources. For partially or not replaceable variables, field-collected data are a requirement for producing reliable estimates at a high level of territorial detail. These variables include both current activity status and commuting, which therefore could not be included in the annual dissemination programme reported for 2020, which replicated those of 2018 and 2019 for all other cross tabulations. Activities related to the production and validation of the Permanent Census statistics are highly complex and still being refined. The analysis of administrative sources in terms of coverage, completeness and quality and the planning of annual surveys require significant investments of time and resources as well as the definition of estimation methodologies and the check of the results. Between December 2022 and early 2023, data referred to 2021 on the usual resident population by sex, age, citizenship, educational attainment and current activity status will be disseminated. The first information on conventional dwellings is also scheduled to be published by the end of 2022. Then, by March 2024, 119 multidimensional cross tabulations at different levels of geographical detail covering all Census topics, from demographic to socioeconomic variables, from internal and international migration to commuting, households and housing must be made available to Eurostat. These are the 119 "hypercubes" included in Regulation 2017/712 to be transmitted to the Commission that ensure the comparability of census data collected by all member states.

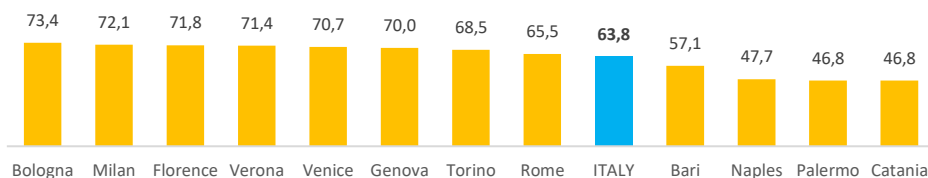
2. Education attainment and employment in Italy in 2019

2.1. Data sources

Educational attainment represents one of the Census population outputs most frequently requested by stakeholders. The data, broken down into eight categories ranging from illiteracy to PhDs at the municipal level, were estimated from the stock of individual information of the approximately 54 million persons surveyed at the 2011 Census and still residing in Italy in 2018 (Di Zio et al., 2019). These data were integrated, in the first instance, with information provided by the Ministry of Education and consolidated in the Education Data Base managed by Istat. Although the Ministry's data is the primary source for updating the 2011 Census, it shows an under coverage of some training courses and a delay ranging from 12 to 24 months. It was, therefore, necessary to use data collected through sample surveys in order to fill gaps related to courses administered by the regions, some tertiary degrees, postgraduate degrees (now available) and qualifications obtained abroad. Details on demographic characteristics (gender, age and citizenship) of the usual resident population classified by educational attainment were taken from the Population Base Register. The main reference source for estimating employment is the Employment Register which includes administrative signs of employment, retirement, study and variables related to income and monetary transfers (Istat, 2020). Specifically, the Employment Register integrates into a single data source information from the Annual Register on Wages and Labour Costs at the individual level, the Population Base Register and the information derived from the Labour Force and the Permanent Census Surveys.

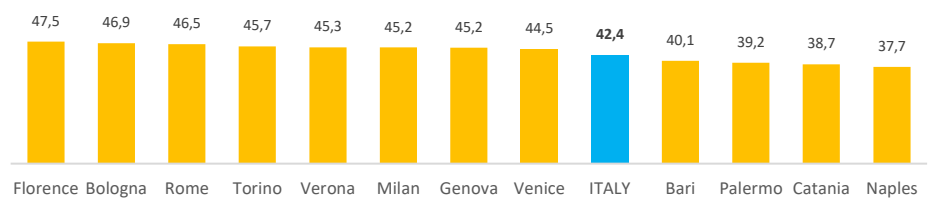
2.2. More employed persons and graduates in Italy's Large Cities

In Italy, according to the estimate reported as of December 2019, there are 23.662.475 employed persons. More than 15% (3.634.928) of them reside in Italy's 12 Large Cities with Rome and Milan where the percentage of employed persons stands at 4.9% and 2.7%, respectively. The specific employment rate 20-64 years old (Figure 1) at the national level is 63.8%; Bologna has the highest value (73.4%) followed by Milan (72.1%) and Florence (71.8%) while Rome, at 65.5%, is 1.7 percentage points above the Italian total. In general, a different trend is clear across the territory. The Large Cities in northern and central Italy show employment rates considerably above the national figure; the greater municipalities in the South, on the other hand, present much lower rates, as far as Catania, which, with 46.8 percent, is in last place of the ranking.

Figure 1 – Employment rate (20-64 years) in Large Cities.

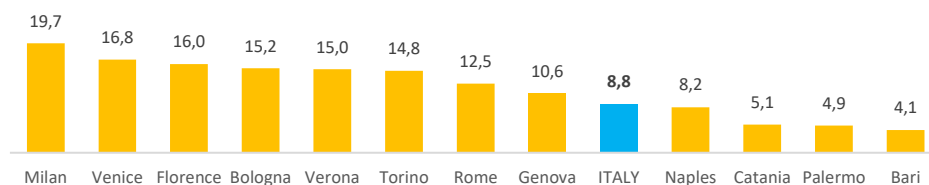
Source: Permanent Census 2019.

Analyzing employment by gender and citizenship, we can see that the north-south spatial characterization, which has already emerged for the employment rate, is also reflected in these two demographic topics. In Italy, out of every 100 employed persons aged 15 or over, 42 are women (Figure 2). In all Large Cities of the north and center, the percentage of employed women is, although slightly, above the national figure with the highest share recorded in Florence (47.5%) followed by Bologna (46.9%) and Rome (46.5%). The gender gap is very clear, on the contrary, in the south with Naples where, out of 100 employed, only about 38 are women.

Figure 2 – Percentage employed women in Large Cities.

Source: Permanent Census 2019.

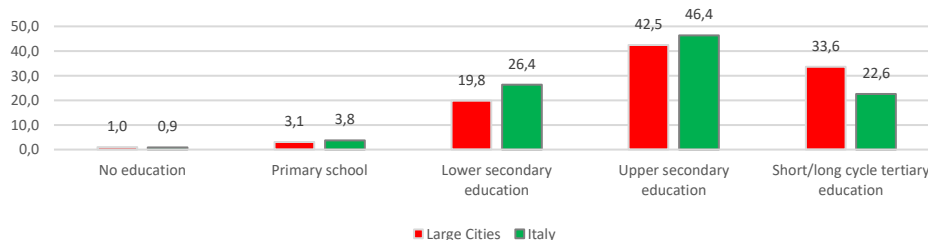
In 2019, 8.8 percent of employed persons have foreign citizenship (Figure 3). The north-south dualism appears even more evident in this case. Indeed, in all the Large Cities of the north and center, the percentage of foreign employment is above 10%, with Milan approaching the 20% threshold. In the south, employment opportunities for foreigners are significantly lower; in Bari the incidence of foreign employment is 4.1%, less than half the national average.

Figure 3 – Percentage employed foreigners in Large Cities.

Source: Permanent Census 2019.

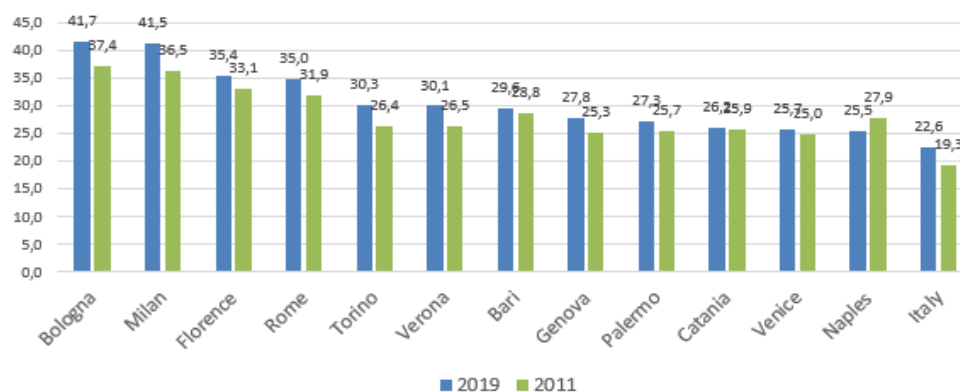
3. Employed persons by educational attainment in Italian Large Cities

In the twelve Italian Large Cities (Figure 4) the percentage of employed graduates (33,6%) is significantly higher than that recorded at the national level (22,6%). The employed persons with a upper secondary education or a lower secondary license living in big towns are, as a percentage, fewer than those recorded for the whole of Italy. Compared with 2011, the reference year of the last traditional Census, the percentage of employed graduates has increased both at national level (19.3 percent) and in Large Cities (30.7) while the gap between the two values remained almost the same (11 percentage points).

Figure 4 – Employed persons by educational attainment. Italy and Large Cities.

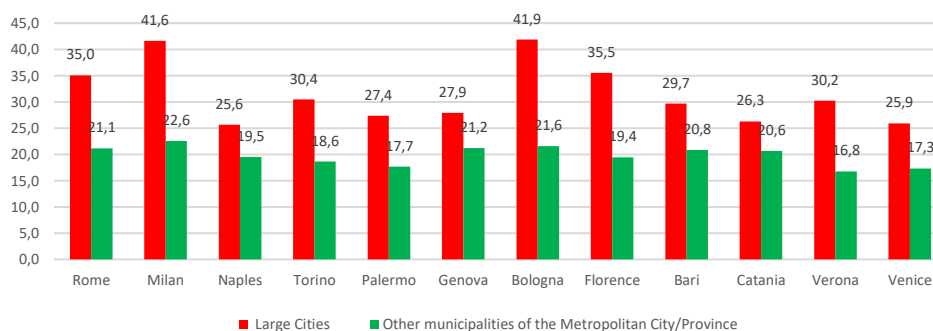
Source: Permanent Census 2019.

In Bologna and Milan in 2019, employed persons with a short or a long cycle tertiary education exceed 41.0%, 30.0% in Florence, Rome, Turin and Verona. Catania, Venice and Naples have the lowest percentages but still over the national value. In 2011, the percentage of employed people with a tertiary education never reaches the 40% threshold and ranges from 25% of Venice to 37.4% of Bologna. In the intercensal period, graduates increase in all Large Cities except Naples where it goes from 27.9% to 25.5%. (Figure 5).

Figure 5 – *Employed persons with Short/long cycle tertiary education in Large Cities.*

Source: Permanent Census 2019 and 2011

In 2019, the percentage of employed graduates out of total employed persons is significantly higher in the Large Cities than in the other Municipalities of the Metropolitan City/Province (Figure 6). In Bologna, employed graduates aged 20 or over represent 41.9% of the total employed in that age group, while in the other municipalities of the Emilian regional capital the share stops at 21.6 percent. The situation is quite the same in Milan where the difference between the figure of the Large Cities and that of the rest of the metropolitan city is 19 percentage points.

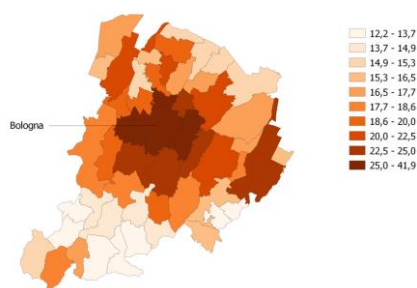
Figure 6 – *Employed graduates aged 20 years and over: Large Cities vs the remaining province. Permanent Census 2019.*

Source: Permanent Census 2019.

If we consider the deciles of the distribution, all the Large Cities are in the decile with the highest percentages of employed graduates, except for Catania (included in the second decile). Let us compare the two municipalities at the antipodes: Bologna with 41.9% of employed graduates and Catania, the only Large

City not in the decile of the most virtuous. Figure 7 shows the trends for Bologna and the other municipalities in the metropolitan city. The municipalities belonging to the percentile with the highest percentages of employed graduates are all bordering Bologna: San Lazzaro di Savena (33.6%), Casalecchio di Reno (31.1%), Castenaso (26.5%), Zola Predosa (26.0%) and Castel Maggiore (25.1%).

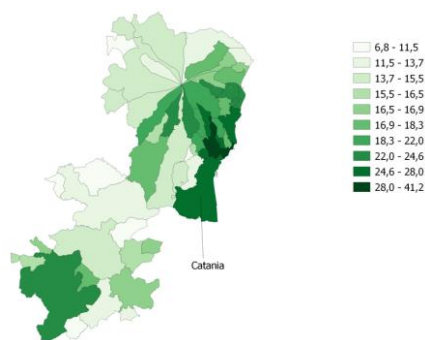
Figure 7 – Percentage of employed graduates out of total employed Bologna vs the remaining province.



Source: Permanent Census 2019.

Figure 8 reports the performance of Catania (with 25.6% of employed graduates out of the total employed) and the other municipalities in the metropolitan city.

Figure 8 – Percentage of employed graduates out of total employed Catania vs the remaining province.



Source: Permanent Census 2019.

All the municipalities with the highest incidence of employed persons with a short or a long cycle tertiary education are neighbouring each other and are located on the northern border of Catania. The most virtuous municipality is Sant'Agata li Battiati (41.2%) while the greatest distance between contiguous municipalities in the ranking (5.2%) occurred between San Gregorio di Catania (39.8%) and Aci Castello (34.7%).

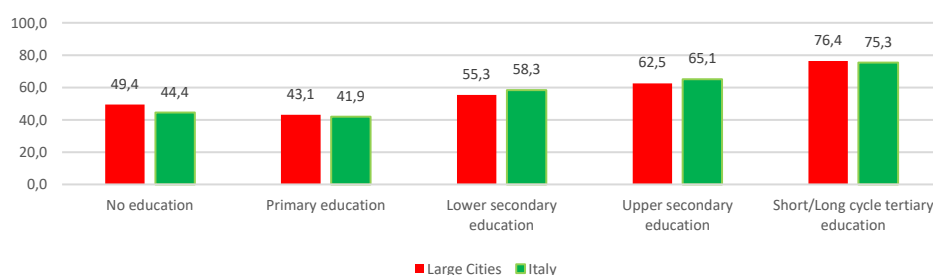
As for Rome and Milan, the gap from their most virtuous metropolitan city municipalities (Grottaferrata and Basiglio) is very low: 0.3 and 0.6. Turin differs from the most virtuous municipality (Pino Torinese) by 12.7 percentage points, Genoa by 8.4 (from Pieve Ligure) and Naples by 5.7 (from Portici).

4. Specific employment rates: more job opportunities for graduates

Specific employment rates related to the 20–64-year-old population (Figure 9) show that high educational attainments correspond to greater employment opportunities (Istat, 2021). Given an employment rate that in Italy stands at 63.8%, the rate for graduates is more than 11 percentage points higher and equal to 75.3%.

Among persons with an upper secondary education, the employment rate falls to 65.1% up to 58.3% pertaining to those with a lower secondary license. For people who attended only the primary school or who have not successfully completed a regular course of study, the rate ranges from 41.9% to 44.4%. The 12 Large Cities as a whole present greater employment attractiveness with regard to the graduates. Compared to the national figure (75.3%), in fact, the employment rate in this case is more than one percentage point higher and amounts to 76.4%. On the other hand, the rates for persons with a secondary education are lower in the most populated towns. In the Large Cities 49.4% of people without an educational qualification find work compared with 44.4% recorded in Italy and 43.1% of people with a primary school license (41.9% at national level). Italy's large urban realities, therefore, while attractive for high-skilled labour on the one hand, also seem to be no less attractive in the case of lower-skilled employment.

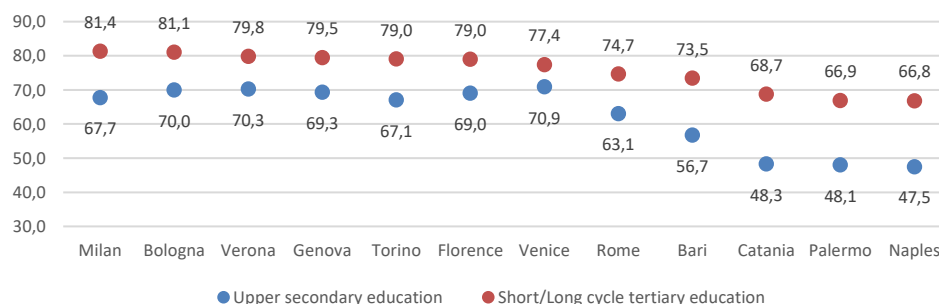
Figure 9 – *Employment rate (20-64 years) by educational attainment in 2019: Italy and Large Cities.*



Source: Permanent Census 2019.

In Milan and Bologna, the employment rate of graduates exceeds 80.0% (Figure 10). Rome, with 74.7%, is slightly below the national figure (75.3 percent) while the lowest values are recorded in all southern municipalities with the minimums in Naples (66.8%) and Palermo (66.9%). Interesting, at the same time, are the differences that appear when comparing the employment rates of graduates versus persons with upper secondary education. The greater employment opportunities for the first ones are more evident in southern municipalities. In Catania, the employment rate of graduates aged 20-64 is more than 20 percentage points higher than those with a high school diploma, while in Naples and Palermo the gap is about 19 points. In Milan, the difference is just over 13 percentage points.

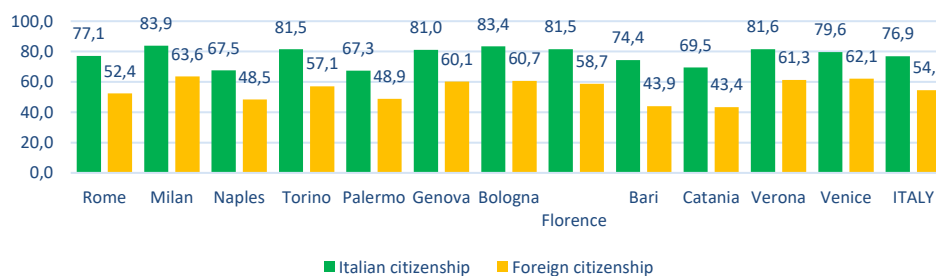
Figure 10 – *Employment rate (20-64 years) among graduates and upper secondary education in Large Cities.*



Source: Permanent Census 2019.

Breaking down the specific employment rate for graduates by citizenship, it shows that, compared to the national value (75.3%), for Italians the rate is 76.9% while for foreigners it is more than 20 percentage points lower settling at 54.6% (Figure 11). This means that the advantage gained, in terms of higher probability of employment, as the educational qualification increases, applies only to the Italian component and not to the foreign one. In any case, for foreign graduates, greater employment opportunities are in all the Large Cities of the north and particularly in Milan where the rate is 63.6%, followed by Venice (62.1%) and Verona (61.3%); the remaining southern municipalities highlight employment rates well below the national level with Catania and Bari where values are just above 43 percent.

Figure 11 – *Employment rate (20-64 years) by short/long cycle tertiary education and citizenship in Large Cities.*



Source: Permanent Census 2019.

5. Conclusions

The work is a preliminary attempt that shows the informational potential of the Population Permanent Census. It allows not only the traditional 10-year data supply required by the International Regulations, but also the annual dissemination of a municipal-level dataset. During 2023 it is also planned to disseminate sub-municipal level data particularly expected by stakeholders. The complexity of the new data production and validation process has so far caused the dissemination of a reduced number of cross tabulations. When fully operational, the goal is to offer an increasing set of hypercubes each year, thanks first of all to the enrichment of administrative sources in terms of coverage and quality. In this context, the relationship between employment status and educational attainment explored in the paper can be completed when more information will be available on job characteristics, such as occupation based on the ISCO, the International Standard Classification of Occupation, a topic necessary to explore, for example, the issue of overqualification.

Istat is currently processing data related to the 2021 wave of the Permanent Census in order to disseminate by December 2022 the population counts at municipal level and geocoded to the 1 km² reference grid (Regulation (EC) No 1799/2018) Some cross-tabulations on socio economic topics and on dwellings will be published as well. Istat is also planning the production of the 119 hypercubes included in the European Regulation 2017/712 establishing the reference year and the programme of the statistical data and metadata for population and housing censuses to be made available to Eurostat by 31st March 2024. Meanwhile in Europe the use of data from administrative sources is increasing and Eurostat is working to a dissemination program for post-2021 Censuses based on a more frequent data supply. The purpose is an annual and a multiannual data collection,

starting from the mid-2020s, while maintaining the traditional decennial data dissemination in 2031 (Mastroluca and Verrascina, 2019). In simple terms, Italy is realizing, a few years in advance, the strategy that will be applied in all Member States of the European Union for the post-2021 Population and Housing Censuses.

References

- DI ZIO M., FILIPPINI R., ROCCHETTI, G. 2019. An imputation procedure for the Italian attained level of education in the register of individuals based on administrative and survey data, *Rivista di Statistica Ufficiale*, No.2-3, pp. 143-173
- EUROPEAN COMMISSION, 2017. Regulation (EU) 2017/543 Commission Implementing regulation (EU) 2017/543 of 22 March 2017 as regards the technical specifications of the topics and of their breakdowns, *Official Journal of the European Union*, Vol. 78, pp. 13-58.
- EUROPEAN COMMISSION, 2017b, Regulation (EU) 2017/712 of 20 April 2017 establishing the reference year and the programme of the statistical data and metadata for population and housing censuses, *Official Journal of the European Union*, Vol. 105, pp. 1-11.
- EUROPEAN COMMISSION, 2018. Implementing regulation (EU) 2018/1799 of 21 November 2018 on the establishment of a temporary direct statistical action for the dissemination of selected topics of the 2021 population and housing census geocoded to a 1 km² grid, *Official Journal of the European Union*, Vol. 296, pp. 19-27.
- EUROPEAN PARLIAMENT AND COUNCIL OF THE EUROPEAN UNION, 2008, Regulation (EC) 763/2008 of the European Parliament and of the Council of 9 July 2008 on population and housing censuses, *Official Journal of the European Union*, Vol. 218, pp. 14-20.
- GALLO G., ZINDATO D., 2021. Italy: The combined use of survey and register data for the Italian Permanent Population Census count. In *UNECE, Guidelines for Assessing the Quality of Administrative Sources for Use in Censuses, 69th plenary session of the Conference of European Statisticians*, Vol. 1, Geneva: UNECE, pp.91-103
- ISTAT, 2021. Statistiche Report: Livelli di istruzione e partecipazione alla formazione. Anno 2020. *Report Livelli di Istruzione 2020*, Roma, Istat.
- ISTAT, 2020. Nota tecnica sulla produzione dei dati del Censimento Permanente: la stima della popolazione residente per sesso, età cittadinanza, grado di istruzione e condizione professionale per gli anni 2018 e 2019, *Nota Tecnica Censipop*, Roma Istat.

MASTROLUCA S., VERRASCINA M., 2019. The multiannual dissemination programme in the Italian Permanent Census of Population: towards more timely statistics. In *UNECE 2019. Conference of European Statisticians*, Geneva: UNECE, pp. 1-10

SUMMARY

The Permanent Census of Population and Housing, now in its fourth edition, enables the annual dissemination of municipal-level data on topics related to population by sex, age and citizenship, educational attainment, current activity status, commuting for study or work, and households. The new census strategy, based on the integration of data from administrative sources and from sample surveys, ensures not only the traditional ten-year information supply, but also the ability to produce and share with users multidimensional tables aimed at micro-level territorial knowledge with unprecedented frequency and timeliness. Moreover, the incremental availability of information included in the thematic Registers of the Italian National Institute of Statistics and the opportunity to change annually the informative contents of sample surveys, allows the dissemination programme to be modified every year. The paper aims to explore the cognitive advantages arising from the new census strategy while also providing an example of the use of the data produced annually at the municipal level. We will see, also through the construction of gender- and citizenship-specific indicators, how the territory influences the distribution of the employment rate in relation to the highest educational level obtained in a comparison between residents in the 12 Italian cities with more than 250,000 inhabitants and those living in the other municipalities of the province.

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