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**2010 round of censuses – innovations and lessons learned****Lessons learned from use of registers and geocoded databases  
in population and housing census****Note by the Italian National Institute of Statistics***Summary*

The paper describes the recent experience of the Italian National Institute of Statistics on census taking. It focuses on new methods and techniques applied in the Italian census. In Italy, the 2011 census was approached in a completely new way. Standardised solutions were adopted and there were significant changes in the survey methods and techniques. The last section of the paper presents the lessons learned, such as re-organizing the logistics of questionnaire handling, managing diversity in the way the census is organised according to the characteristics of municipalities, helping people to understand why the census is important and, finally, close monitoring of census performance during the process.

## **I. New methods and techniques for the Italian census**

1. Up to and including 2001, the Italian population and housing census was conducted using the traditional "door-to-door" survey method, with the same economic, human and organisational resources thus allocated to every household.
2. The 2011<sup>1</sup> census was approached in a completely different way. Standardised solutions were adopted in relation to municipality size, but above all, there were significant changes in the survey methods and techniques.
3. Data from existing records and supplementary information from administrative sources and statistical archives set up for this purpose were utilised to construct lists of citizens, which were then used as the basis to establish the recipients of the census. The census also involved a strong technological input, from the creation of local information technology (IT) infrastructures to the use of sampling techniques to survey a part of the information.
4. The new approach was based both on the evolution of European laws concerning population and housing censuses and on awareness of the growing difficulty of finding people in their normal place of residence, the growth in the population of immigrants, the need to reduce the statistical burden and the opportunity to lighten the burden of the census for the municipalities. For all these reasons, it was necessary to move beyond the methodologies adopted up to a decade ago.

### **A. Use of existing records to construct census lists**

5. Lists of households to whom the questionnaire should be sent were created on the basis of the municipality records, updated to 31 December 2010 following normalisation and geocoding of the addresses. The questionnaires were personalised with the name of the addressee and information on where they should be returned after completion.

### **B. New geographical instruments**

6. The 2011 census was organised by classification of municipalities in terms of enumeration areas and inhabited areas, on the basis of detailed, accurate maps. It also involved two innovative geographical tools:
  - (a) Archives of geocoded house numbers for each enumeration area, containing information about the structural characteristics for each house number;
  - (b) Census areas – sub-municipality geographical units sized between enumeration areas and inhabited areas – upon which the sample size for a number of variables was estimated.

### **C. Sample survey for certain variables**

7. One of the new features of the Fifteenth Italian General Population and Housing Census was the use of sampling techniques for the measurement of some of the variables of

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<sup>1</sup> Conducted with reference to 9 October 2011.

interest. This was carried out using two versions of the questionnaire, the full form and a short form.

8. Households received one questionnaire only; all questions in the reduced version were also contained in the full version. Random sampling was used only for municipalities forming the administrative seat of their province or with a population of at least 20,000 inhabitants as of 1 January 2008. Of these 486 municipalities, around one third of resident households received the full questionnaire and the remaining two thirds the short form. All households in all other municipalities received the full version of the questionnaire.

#### **D. Census management system**

9. All phases of the census were managed through a Census management system, accessible online to all workers involved, with access authorised on the basis of position and geographic area. The system was designed to automate back-office work and enabled the status of every individual questionnaire to be followed in almost real time. It also permitted the production of census progress reports, allocation of areas to the enumerators and monitoring of their work, targeted recovery of non-responders and unregistered individuals, comparison of the census and local records, and production of relative accounts.

#### **E. Postal delivery of questionnaires**

10. Unlike in the past, the questionnaire was sent to almost all households at the address entered in the municipality records. The municipality census offices were provided with a surplus of questionnaires, to be used for cases in which the address was incomplete and other particular situations.

#### **F. Mixed-mode return of questionnaires**

11. Households could choose the way in which they preferred to complete and return the questionnaire:

- (a) Online, using the password provided with the questionnaire;
- (b) At any post office in Italy;
- (c) At one of the municipality census collection centres, at which specialist assistance for the completion of questionnaires was also available;
- (d) Directly to a municipality enumerator, in service from 21 November for the completion of census operations.

#### **G. Systematic recovery of non-responders**

12. The availability of constantly updated information on the status of each questionnaire enabled enumerators to be directed only to households to which the questionnaire had been sent but not yet returned.

## **H. Systematic recovery of unregistered individuals**

13. The use of the auxiliary lists from central and local administrative sources containing information on the presence of individuals not registered in the municipal records enabled their targeted and systematic recovery. The lists used were as follows:

(a) Supplementary source list of individuals not already registered in the municipality records, identified through record linkage of the numerous archives in possession of central government;

(b) Supplementary municipality list, containing data on new residents and changes of address between 1 January and 8 October 2011;

(c) Additional list based on the house number survey, containing information on potentially inhabited housing units for which there was no corresponding entry in the municipality records.

## **I. Crosscheck of census and municipality records**

14. The availability in the census management system of municipality records updated to 8 October 2011 enabled real-time cross-checking between people responding to the census and those registered in the municipality records on the date of reference, enabling the earlier conclusion of the census and, it is expected, the earlier release of the results.

## **II. Running the census**

15. The Fifteenth Italian Population and Housing Census began in October 2011. Twenty-five million private households and more than 50,000 residential institutions, accounting for a total of approximately 60 million people, were to be enumerated by about 70,000 enumerators and 10,000 co-ordinators, organised in a network of 8,094 Municipal Census Offices (MCOs) and 110 Provincial Census Offices (PCOs). The Italian National Institute on Statistics (ISTAT) is responsible for the census and carries out design and coordination tasks directly, whereas the actual fieldwork is the responsibility of the municipalities.

16. The mailing out of questionnaires to the 25 million households registered in the Municipal Population Registers was performed by the national postal service. This took place over 6 weeks spanning the census reference date (8 October), beginning on 12 September and ending on 22 October (it being impossible to deliver such a huge amount of questionnaires in a shorter time). In addition to the questionnaire itself, the mail-out included an information letter, instructions for filling in the questionnaire and the return envelope. Three million questionnaires had been delivered by the end of the first week and 5 million more in the following 10 days, with a total of 8 million households reached (about one in three) by 27 September. A total of 23.3 million questionnaires were delivered. The remaining 2 million households were not reached by mail, due either to the failure of the address standardization process (almost 800 thousand cases) or because the addressee was unknown or had moved (about 1.2 million cases).

17. The questionnaire could be completed on the Internet or handed in either at any one of 14,000 post offices around the country or at one of the Municipal Collection Centres (MCCs) run directly by the MOCs. The online participation was highly successful and better than predicted. The online questionnaire was activated in the morning of Sunday 9 October, with a very high peak of access reached during the first hours. This great influx caused slow-downs and access difficulties during this time, but the problem was quickly

solved by doubling the power of the infrastructure. By 1.00 p.m. the next day, more than 340,000 people had already responded online, with an average 50 thousand contacts per hour, and more than 70 thousand questionnaires had been handed in through the post offices.

18. Participation during the first week continued to be high, with more than 7.5 million individuals enumerated during the first 10 days after the reference date, of whom 3.5 million online. By 21 November, the date after which enumerators would be sent out to collect questionnaires from non-responders, 7 out of 10 households had returned their questionnaire.

19. By 6 March<sup>2</sup>, 95.9% of households had been enumerated, for a total of about 24.6 million questionnaires returned. Of these, 27.9% were short versions. 34.2% of respondents chose the Internet, 31.5% the MCCs and 22.6% the post offices. The remaining 11.7% were collected directly by the enumerators. This breakdown is significantly different from the Pilot Survey, when there was a much lower response rate online and for the MCCs (9% and 40.8% of respondents respectively) and a much higher rate for return by post and collection by the enumerators (40.8% and 37.5% respectively; however, at the time of the Pilot Survey questionnaires could actually be returned by post rather than having to queue at the post office). The percentage of questionnaires collected by enumerators is bound to rise, as the biggest municipalities are still completing the enumeration (there are in fact currently just 87.1% of households enumerated in the 35 municipalities with at least 100,000 inhabitants).

20. In any case, the spontaneous return of questionnaires went very well, and the higher than expected (spontaneous) participation is probably due to the communication campaign and the clear message that the Census was mandatory and that a legal sanction would be applied to contraveners. In fact, the proactive attitude of respondents was one of the major “problems” of the 2011 Census, as the entire enumeration strategy was based on the assumption that MOCs would have to solicit respondents to make them respond! Instead, from the very beginning it was the respondents who were urging the municipalities, and ISTAT in its turn needed to find fast solutions in order to bring forward various operations originally scheduled for a later phase. For example, it was intended to enumerate individuals who had moved within the municipality since the beginning of 2011 after 21 November by the enumerators who, going out into the field for follow-up on respondents, would at the same time deliver the questionnaire to households who had not received it. Instead, in most cases, those concerned were going to the MCCs immediately after the Census reference date to ask for their questionnaire, thus creating various problems (e.g. a shortage of questionnaires which were scheduled for delivery to the municipalities in a second phase; and the creation of duplicates in the management system, as, again according to the schedule, it was due to be integrated on the basis of the updated Population Register).

21. Independently of the return mode chosen by the respondents, all paper questionnaires converged to the MCOs, who had to register them as received in the computerized Management Enumeration System (SGR), review them and, if necessary (incomplete/inconsistent questionnaires), re-contact the household. For each revised and completed questionnaire, summary data then had to be entered in the SGR. Finally, MCOs perform a comparison with Population Register data and revise population registers on the basis of the census results once the census has ended. In Italy, in addition to the obvious

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<sup>2</sup> Date on which this paper was issued. On this date, the enumeration was still ongoing in the biggest municipalities. According to the schedule, the smallest municipalities (below 20,000 inhabitants) were to finish on 10 February, those between 20,000 and 150,000 inhabitants on 10 March, and the biggest (at least 150,000 inhabitants) on 10 April.

main goals of determining the legal population and collecting information on the main demographic and socio-economic characteristics of the population usually resident, there is a third main goal to be achieved through census enumeration: the update of Municipal Population Registers (*Anagrafi*) on the basis of the comparison between census data and population register data, as required by the law on population registers (*Regolamento Anagrafico*).

22. In addition to the review of returned questionnaires, MCOs had to enumerate households actually residing in the municipality who were not included in the population register. To correct under-coverage list errors in order to guide enumerator fieldwork, information from auxiliary sources was used, and integrated in the SGR along with addresses from the Population Register. All this information was condensed in the Enumeration Area Diary, which included one row for each enumeration unit (whether from the Population Register or an auxiliary source), designed for infield guidance of enumerators.

23. Enumerators were responsible for collecting completed questionnaires from late-comers, delivering questionnaires to new households and assisting households in filling in the questionnaires whenever required. They were required to categorise each of the addresses corresponding to non-enumerated households according to a detailed classification (wrong address, uninhabited dwelling, residents temporarily absent, and so on). The aim of this operation was to classify uninhabited dwellings and to update Municipal Addresses' Registers.

24. By 6 March, 99% of the Enumeration Area Diary rows had been closed (i.e. classified as a returned questionnaire or as a non-questionnaire – uninhabited dwelling, transferred household and so on), of a total of more than 29,000,000 rows.

### III. Lessons learned

25. Questionnaires have been moved between those involved in the census process by a contractor who was in charge of delivering personal questionnaires to the households listed in the municipal registers, accepting questionnaires completed by citizens at collection centres all around the country, transporting questionnaires from collection centres to the municipal census offices, collecting questionnaires from the municipal offices and transporting them to the data capturing centres.

26. The logistics of this process proved to be very complex, with some potential points of failure. Not all addresses in the municipal registers could be processed by the contractor system. Many questionnaires could not be delivered because the addressee was not found at the reported address, for various reasons. In fact, about 2,000,000 questionnaires had to be delivered directly by the enumerators. Information about questionnaires returned to collection points was not always reported promptly, making it impossible for municipal offices to keep track of which households had to be contacted to prompt completion of the questionnaires.

27. These are just two examples of critical issues concerning the logistics of questionnaire handling. A different approach could have been to put the municipalities in charge of questionnaire delivery. They have a better knowledge of their area and might be better placed to resolve issues with wrong addresses or problematic households.

28. Municipalities want to work in different ways: some are enumerator area-oriented, others want to distribute work independently from enumerator areas. Small villages may need only a couple of people and one collection centre to run the whole census. Larger towns need a structured organisation and more than one collection centre, and sometimes

have large areas with only a few scattered communities, which are very hard for enumerators to reach. Running the census in big cities with millions of residents is a different task altogether. A very complex organisation is needed, with numerous collection centres spread evenly through the city and working almost as if they were independent census offices.

29. This great diversity in the way the census is organised according to the characteristics of municipalities entails a very flexible management system. This is reflected to a certain extent in the management system for the Italian 2011 Census, which allows the municipal managers to add new users to the system and assign them an organisational role and a system profile. Each census office can thus freely decide how to distribute work in terms of assignment of areas to enumerators and back office work to operators. A hierarchical organisation can also be defined by setting dependency relationships between staff with a coordinator role and other staff.

30. A more intelligent and flexible system could have three configurations, for villages, towns and cities. In this way, each municipal census office could be provided with the right degree of flexibility. Cities need more system roles than towns, and should be able to choose between an area-based organisation, where entire areas are assigned to enumerators, or a questionnaire-based one, where individual questionnaires are assigned to enumerators. Smaller towns do not need a wide range of organisational roles, but might still like to choose between the above two approaches. Villages probably need a very simple system where one or two people can access all system functions and only the questionnaire based approach is available.

31. Assisting citizens and municipalities is a fundamental aspect of the field work. Citizens need help in understanding why they have to fill in the census form, what their rights and duties are, privacy issues, the contents of the questionnaire, and the meaning of questions and definitions. They may have specific issues and problems in answering the questions and, in the era of web questionnaires, they need help to solve all sorts of technical issues like access credentials not working, web browser compatibility and questionnaire accessibility. In contrast, the municipalities need assistance to cope with cases not covered by the survey instructions and for technical issues in the use of the web management system.

32. Assistance to citizens in censuses is normally provided through a specialised company providing a first level help desk for standard enquiries, which can be answered by adequately trained non-specialist staff. For non-standard or very technical enquiries, ISTAT provided a second level help desk. Assistance to municipal census offices was also provided directly by ISTAT through its local offices.

33. When running a complex, mixed mode census, provision of a second level help desk should be considered, as the number of issues raised by citizens and municipal offices is much higher than in a conventional census and the complexity of many of them can be tackled only by specialist staff. Many citizens' requests could not be answered by the first level help desk, either because they required changes to the operational database, or because they touched on very sensitive issues, which could only be answered by ISTAT's technical or legal officers. Municipality issues mainly concerned the interpretation of the process rules and problems with the online management system.

34. In dealing with such a large volume of work, a second level help desk should be considered as one of the most important tasks of the census process and be implemented through dedicated, adequately trained staff. This applies to all sectors and levels of the census process: from IT-specific issues of the online management system to logistics issues, from interpretation of the census process rules to legal questions about privacy and the rights of citizens.

35. Close monitoring of census performance is a critical task for the coordinating organisation. All census phases must be monitored: questionnaire delivery, operator registration in the management system, return of completed questionnaires, questionnaire transportation between those involved in the process, systematic recovery of unregistered individuals, etc.

36. The online census management system met the above requirements through the production of reports. These were designed to minimise any impact on the system's performance while offering census operators some information on how the census was progressing. Unfortunately, this proved insufficient, as proper monitoring of such a complex operation requires a fully fledged dashboard with online analytical processing functions. As it is not possible to implement such a system on top of an operational database, the problem was resolved by making a copy of the database twice a week and performing ad hoc analyses on the offline copy. Future releases of the online census management system will have to cater for real time mirroring of the database, on top of which a data warehouse should be produced and maintained to provide the needed dashboard and online analytical functions.

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