



Opening new frontiers in census taking in Europe: “To boldly go where no man has gone before”

Paolo Valente*

United Nations Economic Commission for Europe, Geneva, Switzerland – paolo.valente@unece.org

Abstract

Since ancient times, most countries across the world have been conducting regularly population censuses using basically the same traditional methodology, based on collecting information on paper questionnaires filled for the whole population over a relatively short period of time. This approach, however, has a number of disadvantages, including the huge costs and complexity of the operation, the difficulty to enumerate specific population groups, the relatively long time needed to produce the results, and the fact that in most cases these results are updated only every ten years. For these and other reasons, around the 1970s a number of countries, mainly in Europe, started developing alternative methods to carry out the population census, often taking advantage of information available in registers and administrative sources. Until the 2000¹ census round, however, only a relatively small number of pioneer countries adopted alternative census methods, and the traditional census was still the most common approach. Available data show that the 2010 census round, just completed, was a turning point: about half of the countries in Europe adopted an alternative census methodology, with a large number of variants developed and implemented for the first time. While in the past countries did not want to “risk” adopting innovative methods for such an important and expensive operation like the census, now they seem increasingly open to consider alternative methods. And by developing their own methodology, customized to their needs and requirements, countries are actually pushing further the frontiers of census taking. This paper describes the paths followed by European countries over the last decades in their quest for the best census methodology, looking in particular at the alternative methods adopted in the 2000 and 2010 census rounds. The analysis of these paths, together with information currently available about plans for the 2020 census round, seems to indicate that in Europe the trend of moving away from the traditional census is likely to continue in the future.

Keywords: population census; census methodology; traditional census; registers.

1. Introduction

Since ancient times, the population census has been conducted in virtually all countries using the same traditional methodology, based on collecting information on individuals and households using paper questionnaires filled for the whole population over a relatively short period of time. This approach, which may seem relatively simple, has a number of disadvantages, including the huge costs and complexity of the operation, the long time needed to produce the results, and the fact that they are updated only at the next census, which means for most countries every ten years. For these reasons, around the 1970s a number of countries, mainly in Northern Europe, started developing alternative methods to carry out the population census, taking advantage of information available in registers and administrative sources.

Until the 2000 census round, however, only a very small number of pioneer countries adopted alternative census methods, and the traditional census was still by far the most common approach.

¹ In line with the terminology used in the United Nations World Census Programmes, in this paper the term “2000 census round” refers to the ten year period from 1995 to 2004. Similarly, “1990 round” refers to the period from 1985 to 1994, and “2010 round” to the period from 2005 to 2014.

Available data show that the 2010 census round, completed in 2014, was a turning point in Europe, where about half of the countries adopted an alternative census methodology. Moreover, a large number of different methods were developed and implemented for the first time in the 2010 round.

This paper describes briefly the census methods used by countries in Europe, North America and Central Asia² between the 1990 and the 2010 census rounds. Attention is paid in particular to the various alternative methods³ adopted in these census rounds (sections 3-5), and to the paths followed by countries over the last decades in their quest for the census methodology that best fits their needs (section 6). In the conclusions (section 7) some considerations are presented on whether the trend of moving away from the traditional census, observed in Europe, is likely to continue in the future.

2. The traditional census and its limitations

In the traditional census, data on all individuals and households of a country, referred to a specific census date, are collected in a limited period of time and recorded on paper questionnaires that can be filled by census enumerators during an interview, or directly by the respondents. In the latter case, the questionnaires can be delivered and collected by census enumerators, by mail or other methods. Whatever method is used, the traditional census is a hugely complex and costly operation. A very large workforce with specific education and skills has to be recruited and trained to work as census enumerators, supervisors and other support staff. A huge number of paper questionnaires – with specific requirements if optical reading is used - have to be printed, distributed, collected and processed. All these operations imply huge costs and require a very long and heavy preparatory work. Moreover, since the census is normally conducted every ten years the results are updated with the same frequency, and when a new census is taken the users have to rely on data referring to about 10 years before. In the last 10-15 years, some additional limitations of the traditional census method have emerged. In many countries there are increasing difficulties to enumerate specific population groups, like students, young professionals or other people with high mobility and multiple residences. Moreover, there is an increasing reluctance by some respondents to participate in the census, for security reasons (particularly old people living in cities, who do not like to open their door), distrust toward the public authorities, fear that the information collected could be used for taxation or other purposes, or for other reasons.

Already by the 1940s some countries had developed a methodology - based on sampling - to deal with one of the main problems of the traditional census, which is the huge amount of information to be processed. The method consisted of using two forms: a “short form” with fewer questions that is completed by the majority of the population, and a “long form” with more questions that is completed only by a sample of the population. This method has been used in the United States since the 1940 census, and in Canada since the 1941 census for housing data (since the 1971 census also for population data). Another solution that has been adopted in some countries (including the United States since 1960 and Canada since 1971) to reduce the cost and complexity of the data collection is to use the national mail service instead of census enumerators for the delivery and/or collection of the forms. However, census enumerators are generally still used to identify addresses missing in the mailing lists, and for non-response follow-up.

More recently (starting in the 2000 round), an increasing number of countries offered to the respondents the option to complete the census questionnaire on the Internet. If a sufficiently large proportion of the population can do this, then significant savings can be obtained. Moreover, the processing time is substantially reduced and the quality of the data collected is generally better

² These are the countries that are member of the United Nations Economic Commission for Europe (UNECE), to which this paper refers. See also: <http://www.unece.org/oes/nutshell/region.html>

³ On alternative census methods see also: UNECE, 2006 (Ch. I and Appendix II) and Valente, 2010.



compared to paper questionnaire responses. However, providing the Internet response option requires significant initial investments, which may not be paid off if the take-up rate is not sufficiently high. And since it is often difficult to estimate in advance the take-up rate at the census, statistical agencies have to prepare contingency plans for both very low and very high take-up rates.

In the 2010 round, several countries with traditional census adopted multi-channel response models, where questionnaires were collected using different channels, including enumerators, the postal service, and the Internet. This approach may help increasing the response rate, reaching hard-to-count population groups, and possibly reducing costs, but requires a well-designed form-tracking system to make sure that all households fill their census forms once and only once.

3. The register-based census

Even using a short form and long form approach, the traditional census still remains a very costly and complex operation, with the limitations described above. For this reason, around the 1970s a number of countries in Northern Europe started developing an alternative method to carry out the population census, using the information contained in a number of administrative registers (normally including a population register and a dwelling register) without collecting data directly from the population. Under this method – adopted for the first time in Denmark for the 1980 census - individual records across the various registers are matched and new variables are derived, when necessary, to produce a complete set of census variables for the whole population (UNECE, 2007). Data processing and editing are required also to deal with the cases of missing data, or when different registers include conflicting information. In some countries, for variables not covered in registers, data from existing sample surveys (such as the Labor Force Surveys for economic variables) are used to supplement register data.

This approach has the obvious advantage that once the register-based statistical system is in place the cost and processing time of the census are many times lower compared to a traditional census (UNECE, 2013, ch. 7). The complexity of the census operation is also limited, so that at least in theory census data could be produced more frequently - even annually if necessary. However, developing a wholly register-based population system requires significant initial investments and a very long development work that takes many years or even decades before the registers reach the necessary quality level.

In addition to the availability of population, dwelling and other registers containing information on the census topics, there are a number of additional requirements that are necessary for adopting this method. National legislation must allow access to, and use of, administrative data for statistical purposes, linking data across registers, and the use of personal identification numbers to perform such linkages. The general acceptance of this approach by the public is also necessary, and this can be an issue in countries where there is high sensitivity concerning the use of personal data. Even when these requirements are met, and a register-based statistical system is set up, statisticians have to deal with the fact that most of the information in the system was originally collected for *administrative* purposes. Therefore some procedures may be needed so that the census data produced meet as much as possible the *statistical* definitions and classifications required for the purpose of the census.

4. The combined census, using data from registers and field data collection

Although population, dwelling and other registers that could be potentially used for a register-based census are available in many countries, until the 1990 census round very few countries conducted a register-based census. In many countries where such registers exist, their quality was not considered sufficiently good to replace the traditional census, therefore these countries continued to do a traditional census. This situation has changed since the 1990s, when an increasing number of countries

in Europe decided that their register data could be used for the census in combination with data collected in the field, used to assess the quality of register data and possibly correct them, or to provide data on topics not covered in the registers. Under this approach, called “combined census” (UNECE, 2006, Appendix II), register data can be combined with data collected from the whole population or just from a sample, depending on the variables that are missing and the desired level of detail (data collected on a sample have lower level of detail and cannot be used to produce small area estimates).

5. The rolling census: an alternative method not using registers

As described above, most countries that decided to adopt an alternative census method used data from registers. However, some countries do not have the requisite registers needed for a register-based or combined census, or if such registers do exist they cannot be used for the census, either for lack of legislation or public acceptability, or for other reasons. For these countries, an alternative approach that does not make use of registers is the “rolling census”, adopted for the first time in France in 2004. Under this method, census data is collected in the field continuously (rather than at a single point in time) through a “rolling” survey that takes place every year covering part of the population.

In the French rolling census, based on a 5-year cycle, in small municipalities a full enumeration is carried out every five years, while in large cities a sample survey is carried out every year. Each year, all the data collected over the five previous years are combined and processed to produce estimates at the national and local level (UNECE, 2006, Appendix II). Some adjustments are needed to take into account movements of people in the five year period and other factors. This approach has various advantages: updated estimates can be produced every year (calculated as moving averages), and the financial and human burden associated with the census data collection is spread over time. On the negative side, the system is relatively complex and not all the population is actually enumerated, which means that the geographic detail is limited, especially in large cities.

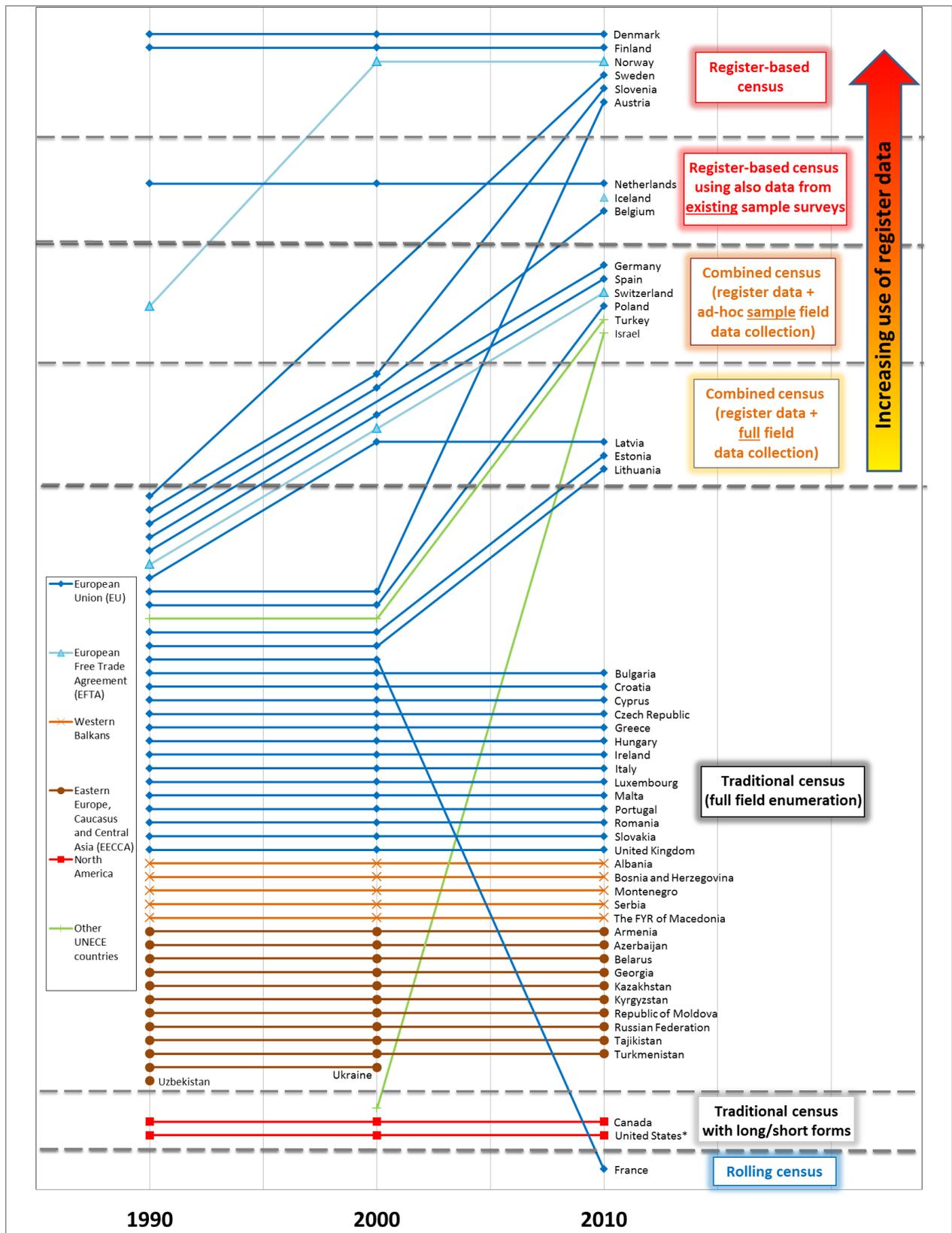
6. Evolution of census methods used in Europe, North America and Central Asia

The UNECE collected data on the census method used by its member countries in the 1990, 2000 and 2010 census round. Figure 1 presents this information graphically, showing the countries that changed census method, and in particular moved from the traditional census to the various types of alternative census methods described above.

The higher part of the figure shows that the alternative methods based on registers have become more and more popular. The number of countries conducting a register-based census (including the two variants shown in red) grew from three in the 1990 round to nine in the 2010 round. And the number of countries conducting a combined census (two variants in yellow) increased in the same period from one to nine. Overall, the number of countries using register data for the census (in a register-based or combined census) more than quadrupled from four to eighteen. If only European Union (EU) and European Free Trade Association (EFTA) countries are considered, half of the thirty countries carried out a register-based or combined census in the 2010 round, compared to only 13% in the 1990 round.

With regard to the “paths” followed by the countries, among the countries that in the 2000 round moved from traditional to combined census with full data collection (intense field work), only Latvia adopted the same method again in the 2010 round, while Spain and Switzerland moved to a combined census with sample data collection (limited field work), and Slovenia and Belgium moved to a register-based census (no field work). So, the latter four countries changed census method twice in two census rounds, making increasingly use of data from registers, as long as their quality improved.

Fig. 1 – Census methods used by UNECE countries in 1990, 2000 and 2010 rounds



* In the 2010 United States Census the long form was replaced by the annual sample American Community Survey.

Sources: UNECE (2015) and additional information available at UNECE.



Five countries moved in the 2010 round from traditional census to combined census (Poland, Turkey, Estonia, Lithuania, and Israel). Austria passed directly from a traditional census in the 2000 round to a register-based census in the 2010 round, but the preparations for the 2011 register-based census had actually started well before the 2001 traditional census. Sweden had passed from a traditional census in the 1990 round to a register-based census in the 2010 round, but in that case there were some 20 years between the two censuses, since no census was carried out in the 2000 round.

All countries in the Western Balkans, Eastern Europe, Caucasus and Central Asia (orange and brown lines) continued using the traditional census in the 2010 round. As a result, this was still the most common approach in the UNECE region overall even though alternative methods have become increasingly popular. Canada and the United States are the only UNECE countries that in the 2010 round conducted a traditional census with long and short forms, although with some important changes compared to the previous rounds: in the 2010 United States census the long form was replaced by a large annual sample survey (the American Community Survey), which also allows producing annual updates; in Canada for the 2011 census the long-form (that was previously mandatory) was replaced by a new voluntary National Household Survey (NHS). Finally, France is shown at the bottom of the figure as the first, and so far the only, UNECE country conducting a rolling census.

Conclusions

The trend of moving away from the traditional census to adopt alternative methods based on register data emerged in Europe already in the 1990 census round, although it was limited to a small number of countries. In the 2010 round this trend has become stronger, and half of EU and EFTA countries adopted an alternative census method. Various types of alternative methods (using registers data only, or in combination with sample or full field data collection) have been developed and implemented for the first time, to fit national circumstances. While in the past many countries did not want to take risks adopting innovative methods for an important and expensive operation such as the census, now they seem more open to consider alternative methods or even develop new methods, like the original rolling census adopted in France. Many countries have adopted an alternative method because the traditional approach was no longer acceptable or practicable, for financial or other reasons. By developing their own method, customized to their specific needs, countries are pushing further the frontiers of census taking.

For the future, information available from selected countries about plans for the 2020 census round seems to indicate that in Europe the trend of moving away from the traditional census is likely to continue, and that only a minority of countries will carry out a wholly traditional census in the 2020 round. The diversification of census methodology poses new challenges for census takers at the national level and international organizations responsible for coordinating international activities in this field, as the use of different methods and multiple data sources for the census make even more difficult than in the past ensuring the comparability of census results across countries and over time.

References

UNECE (2006). Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing (United Nations). Available at:
http://www.unece.org/stats/publications/CES_2010_Census_Recommendations_English.pdf

UNECE (2007). Register-Based Statistics in the Nordic Countries - Review of Best Practices with Focus on Population and Social Statistics (United Nations). Available at:
http://www.unece.org/stats/publications/Register_based_statistics_in_Nordic_countries.pdf



UNECE (2013). Measuring population and housing – Practices of UNECE countries in the 2010 round of censuses. Available at: http://www.unece.org/publications/publication_on_2010_censuses.html

UNECE (2015). 2010 Population Census Round – Web page on censuses in UNECE countries. Available at: <http://www1.unece.org/stat/platform/display/censuses/2010+Population+Census+Round>

Valente (2010). Census taking in Europe – How are populations counted in 2010? In “Population & Sociétés” no. 467, may 2010 (published by INED). Available at: http://www.ined.fr/fichier/s_rubrique/19135/pesa467.en.pdf