United Nations International Seminar
on Population and Housing Censuses:
Beyond the 2010 Round
27-29 November 2012
Seoul, Republic of Korea

SESSION 4: Emerging methodologies for the census

EMERGING METHODOLIGES FOR THE CENSUS IN THE UNECE REGION

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1. Introduction

This paper presents an overview of the methodology used by member countries of the United Nations Economic Commission for Europe (UNECE) for the population and housing census of the 2010 round, with focus on methodologies alternative to the traditional census.

The next section of the paper (section 2) presents a general description of the traditional census and of some problems associated with this approach, which lead many countries in the UNECE region to look at alternative ways to conduct the census.

In section 3, the main alternative approaches developed in the UNECE region to conduct the census are described, with a general discussion of their implications in terms of data quality, census organization and costs.

Then, section 4 presents which methods were adopted by UNECE countries for the 2010 census round. A comparison with the methods used in the 2000 census round is also presented, to assess how the census methodology changed in the region in the last ten years.

In section 5, information is presented on enumeration methods used in the 2010 round, and finally section 6 includes some preliminary information on the benefits and risks of the alternative census methods used by UNECE countries in the 2010 round.

The paper is based on information from various sources, including a worldwide survey conducted in 2009 by the United Nations Statistic Division (in cooperation with UNECE and Eurostat for the European region), a survey conducted in 2011 by the US Census Bureau in preparation for the review of the 2010 World Population and Housing Census Programme (at the February 2012 session of the United Nations Statistical Commission), and information collected by UNECE for its wiki page on censuses[1].

2 The traditional census approach and its shortcomings

For many centuries, the methodology used for the census has been basically the same in all countries, consisting of the direct count of all individuals and the collection of their characteristics through the completion of population lists or – more recently - census forms. The information is collected in the field across the whole country in a relatively short period of time, normally lasting a few weeks.

Under the traditional census approach, different enumeration methods can be used. For instance, census forms can be delivered by census enumerators to the households who fill them and the return them to the enumerators some days later. In some countries the postal system is used instead of the enumerators for the delivery and/or the collection of the forms. In other countries – particularly where a relatively high proportion of the population has minimal education or is illiterate - census enumerators collect the information from the households during an interview and complete the forms.

[1] http://www1.unece.org/stat/platform/display/censuses/UNECE+Census+Wiki

2.1 Problems associated with the traditional census

Although the concept of the traditional census is relatively simple, its implementation is a huge and very complex operation that requires significant financial resources, the participation of various administrations at the central and local levels, and the recruitment and training of a large work force to be employed on a temporary basis as census field staff (enumerators, supervisors, etc.).

From the point of view of the **census management**, there are a number of problems and issues to be faced when the traditional approach is adopted, including the following:

i) Very high cost: the census conducted in a traditional way is very expensive. The main cost item is for the temporary work force (enumerators, supervisors, etc.) that has to be recruited and trained, and has to work for a few weeks or longer periods. In addition, the cost of printing, distributing, collecting a huge number of census forms, entering the data (manually or using scanners) and processing them is also very high. An analysis of data from the 2000 round of censuses conducted by United Nations Economic Commission for Europe (UNECE, 2008) showed that a traditional census could cost as much as about 20 US dollars per capita in purchasing power parity (ppp) units.

ii) Not only the very high costs, but also the cost distribution over time and in particular the peak around the period of the fieldwork can create problems for the management of the traditional census.

iii) In many countries, it is difficult to recruit a large number of temporary census staff for the fieldwork operations, taking into account that they must have the necessary skills but can be employed only for a short period.

iv) In many National Statistical Institutes, once the census operations have been completed, it is not possible to retain the staff that worked for the census; they are often reallocated to other services or released. In this case, the knowledge accumulated while planning and conducting the census is lost unless the same staff can be re-employed for the next census.

From the point of view of the **organization of the fieldwork operation**, there are also problems associated with the traditional census, including:

i) The cooperation of various administrations at the national and local level is normally necessary to conduct an operation as complex as the traditional census; this may pose problems in some countries, especially if the budget does not fully cover the census expenses, or if the respective tasks and responsibilities of the various administrations involved are not clearly specified.

ii) There are increasing difficulties to enumerate certain population groups, particularly those characterized by high mobility and multiple residences (including young professionals, students, workers, retired people or other categories who commute regularly between two or more places). In general, it can be difficult to find these persons at home in order to fill in the census forms. Moreover, identifying the place of usual residence for these people is often complicate. A partial solution to this problem is the possibility for the respondents to complete the census forms on the Internet, which is offered as an option by an increasing number of countries.

iii) In many countries, an increasing reluctance of the population to participate in the census has been observed over the last years. This can be due to various reasons, including: reluctance to open the door for security reasons, in particular by old people or in areas with security problems; distrust towards the statistical institutes or more in general the public authorities; fear that the information collected could be used for purposes other than the

statistical use; reluctance to provide information that is already available in registers or other administrative sources.

Finally, there are also some problems with the **outputs** produced by the traditional census, including:

i) The timeliness of the census results is often an issue at least for certain categories of users of the traditional census, because the results are normally available a relatively long time after the data collection, due to the need to process a huge amount of material and information.

ii) The frequency of the results may also not be sufficient for certain categories of users who need "fresh" data regularly updated: for these users, updates only every ten years are not sufficient.

iii) The information content is limited by the characteristics of the enumeration, in particular when the forms are completed by the respondents. The number of questions and the time necessary to complete the forms must be limited, and questions that may be complex or potentially sensitive for the respondents have to be avoided.

2.2 A variation of the traditional census: the use of long and short forms

In order to address some of the shortcomings of the traditional census, a possible solution consists of using two different forms: a long form is used to collect detailed information from a sample of the population, while a short form is used for the majority of the population, to collect only very general information used for the population count. This approach has been used for instance in the United States and Canada since the 1970s.

This method has the advantage of providing extensive information on the characteristics of the population (from the long form), and at the same time reducing substantially the amount of information collected and processed, and limiting the complexity and costs of the census operations. On the other hand, the information present in the long form is available only for a sample of the population. Therefore, the information detail is limited both for small areas and for small population groups.

For the 2010 US census, the long form has been replaced by a large household sample survey (the American Community Survey, or ACS) that is conducted every year and provides detailed demographic, social and economic data about households. As a result, the US census model for 2010 is based on a decennial traditional enumeration – conducted in 2010 using only a short form – with yearly updates of the population characteristics on a sample basis provided by the ACS.

3 Alternative methods developed in the UNECE region

In addition to the use of long forms and short forms, which can be considered as a variant of the traditional census method, some countries have been looking at alternative ways to conduct the census, with the objective to avoid some of the problems described above. In many cases, countries try to use as much as possible data from administrative registers or other sources that are available.

This process started in some countries in the UNECE region already several decades ago, but there was acceleration in the last years, in correspondence with the 2010 census round. This section presents an overview of the main alternative census methods developed in the UNECE region in the last years.

3.1 The register-based census

Starting in the 1970s, some Nordic countries began working on a totally different approach to the census, where the traditional enumeration was replaced by the use of administrative data coming from various registers (population register, cadastre, social security, etc.) through a matching process, making use of a personal identification number. This approach, adopted for the first time in Denmark in 1981, permits the production of census data at a limited cost and with relatively limited work, once a good quality system of statistical registers has been set up. This approach has the advantage of placing no burden on individuals, and data are potentially available every year. Moreover, there is no cyclic distribution in the costs and census staff, as they are distributed relatively evenly across time. It should be noted, however, that setting up and maintaining a statistical system based on registers requires important initial investments and a very long development time. Moreover, this approach requires good cooperation between the statistical institute and the authorities responsible for the registers, legislation which allows using register data for statistical purposes and matching records across registers, and finally the acceptance by the public of such a system. All these conditions are met in all the Nordic countries, which adopted this approach in 2011.

A disadvantage of this approach is that the characteristics to be collected are limited to those available in the registers, and the quality of the data produced is dependent on the coverage and quality of the registers themselves. Statistical agencies, however, can combine data from different registers to assess and increase quality and derive new variables. Statistical agencies are also dependent on register authorities, but in the Nordic countries in general there is good cooperation. Establishing and maintaining a high quality register-based statistical system requires significant resources and societal will. However, once such a system is set up, it can be used to efficiently produce a wide range of statistics in addition to census data (see also UNECE, 2007).

3.2 The "combined census", based on data from registers and other sources

Many countries in the UNECE region have population and other registers that potentially could be used for the census, but the coverage and data quality are not sufficient for complete reliance on these registers to produce census data, or some key census variables are not available. Some of these countries in the last years decided that they can still use register data and integrate them with data from other sources in order to produce the census results. Different approaches to this "combined census" exist, depending on what other data sources are used, and how they are used in combination with the register data. Some of these approaches are presented in this section.

3.2.1 Combining data from registers and existing surveys

A first approach to the combined census consists in using the results from existing household surveys in combination with register data. An example is the so-called "Virtual census" conducted in the Netherlands in 2001 and 2011, where register data are integrated with results from the labour force survey (LFS) in order to produce census data. The Netherlands decided to develop this method because they could not obtain from the registers all the necessary information for some of the economic characteristics. Therefore, information on these characteristics is derived based on results from the LFS.

A necessary prerequisite for implementation of this approach, as for the register-based census, is the capacity to link information from different sources at the unit record level. As this method does not require a field data collection, there is no respondent burden on

households, and the costs are relatively limited. Moreover, census results are consistent with survey results for common variables. However, the processes to successfully link information on individuals from registers and surveys, and to produce information on households are quite complex. Finally, the data for variables taken from LFS have limited territorial and information detail due to the sampling.

3.2.2 Combining data from registers and an ad-hoc survey

A variation of the previous approach is to combine data from the registers with data from a sample survey conducted ad-hoc for the census. The survey is conducted to evaluate the accuracy of the population or address registers and to collect information on topics that may not be covered in registers, or for which the coverage and quality of registers is not sufficient. The method has the advantage of testing the accuracy of the population register and consequently being able to adjust population counts derived from it. This method was adopted in 2008 by Israel, and in 2011 by other countries including Poland, Spain, Switzerland and Turkey.

3.2.3 Combining data from registers and full enumeration

Some UNECE countries decided to conduct a census in which the enumeration is based on data from registers, but there is still a full field collection of characteristics on all individuals. This enables variables not available in registers to be obtained in the field as well as providing information about the accuracy of the population count based on registers. This approach is more expensive than the previous ones because of the full field enumeration. But it is in general less expensive than a traditional census, because of efficiencies in field operations made possible by the use of register data. Compared to a register-based census, this method is clearly much more expensive and poses response burden on the public, but on the other hand it provides improved precision of the results and may help improve the coverage and quality of the registers. For this reason, this approach is often selected for the transition period from a traditional to a register-based census. A significant number of countries in the European Union used this approach for the 2011 census (see the next section).

3.3 The rolling census

Some countries do not have population registers, and therefore cannot adopt the methods presented above. Some of these countries, however, developed alternative approaches to the traditional census without making use of registers. An original and very innovative approach was developed in France and it is known as the “rolling census”. As the name suggests, under this approach the census is conducted as a cumulative continuous (or “rolling”) survey over a long period of time rather than on a relatively short time period. In France a five-year cycle was adopted for the rolling census, and two different strategies are used for small municipalities (population under 10,000) and large municipalities. Small municipalities are divided into five groups, and a full census is conducted each year in one of the groups. In large municipalities, a sample survey covering 8% of dwellings is conducted each year. At the end of the five-year cycle, all the population in small municipalities (amounting in France to about half the total population) is enumerated, and about 40% of the population in the large municipalities. In total, about 70% of the country’s population is enumerated. This is enough to guarantee robust information at the level of municipality and neighborhoods, according to the French statistical institute INSEE that developed this method.

The census results are based on rolling averages calculated over the five-year cycle, and are updated yearly. Since the data collection for the French rolling census started in 2004, the

first results for the population at the national level were based on data collected in the five-year period 2004-2008 and were referred to 2006, which was the central year of the period. This method provides for improved frequency of the data, and spreads out across time the financial and human burden associated with the census. On the negative side, the method can be complex to implement. Complications may arise from the movements of persons across municipalities over the various years. These movements could potentially lead to double counting or to missing certain individuals, although specific mechanisms have been put in place to deal with these cases.

4 Methods used in UNECE countries in the 2010 round

In the framework of the 2010 World Programme on Population and Housing Censuses, all countries are requested to conduct at least one population and housing census in the period from 2005 to 2014 (UN-ECOSOC 2005). Table 1 presents information about the census conducted or planned in the 56 member countries of the UNECE, including the reference date[2]. The table shows that 50 countries out of 56 conducted a census by the end of 2011. The large majority of these countries (including all 27 member countries of the European Union) carried out the census in 2011, which was the official census year for the EU census programme. In the Former Yugoslav Republic of Macedonia, the census operations were cancelled during the data collection in September 2011.

Among the six UNECE countries where a census was not carried out by the end of 2011, Turkmenistan is planning to conduct the census in December 2012, Bosnia-Herzegovina and Ukraine in 2013, Georgia in 2013 or 2014, and the Republic of Moldova in 2014. In Uzbekistan (where no census was taken in the 2000 round), a "mini-census" based on 10 per cent of the population was conducted in April 2011, but there are no plans for a full census.

Based on the information available, it is expected that by the end of 2014 (which will be the end of the 2010 census round), a census will have been successfully conducted in all UNECE countries, with the exceptions of the Former Yugoslav Republic of Macedonia and Uzbekistan.

Table 1.
Census date and method for 2010 census round – United Nations Economic Commission for Europe countries

Country	*Census date*	*Census method*
Albania	01-Oct-2011	Traditional
Andorra	31-Dec-2011	Register-based
Armenia	12-Oct-2011	Traditional
Austria	31-Oct-2011	Register-based
Azerbaijan	13-Apr-2009	Traditional
Belarus	14-Oct-2009	Traditional
Belgium	01-Jan-2011	Register-based
Bosnia-Herzegovina.	**01-Apr-2013**	Traditional
Bulgaria	10-Mar-2011	Traditional

[2] This table was extracted from a larger table available on the UNECE Census Wiki page (http://www1.unece.org/stat/platform/display/censuses/2010+Population+Census+Round) which is regularly updated and includes electronic copies of the census forms, technical papers, reports, and links to the national census websites.

Country	*Census date*	*Census method*
Canada	10-May-2011	Traditional
Croatia	31-Mar-2011	Traditional
Cyprus	01-Oct-2011	Traditional
Czech Republic	26-Mar-2011	Combined (reg. + enum.)
Denmark	01-Jan-2011	Register-based
Estonia	31-Dec-2011	Combined (reg. + enum.)
Finland	31-Dec-2010	Register-based
France	01-Jan-2011	Rolling census
Georgia	**(2013/14)**	Traditional
Germany	09-May-2011	Combined (reg. +enum.+surv.)
Greece	16-Mar-2011	Traditional
Hungary	01-Oct-2011	Traditional
Iceland	31-Dec-2011	Combined (reg. + survey data)
		No questionnaire
Ireland	10-Apr-2011	Traditional
Israel	27-Dec-2008	Combined (reg. + survey)
Italy	23-Oct-2011	Combined (reg. + enum.)
Kazakhstan	25-Feb-2009	Traditional
Kyrgyzstan	24-Mar-2009	Traditional
Latvia	01-Mar-2011	Combined (reg. + enum.)
Liechtenstein	31-Dec-2010	Combined (reg. + enum.)
Lithuania	01-Mar-2011	Combined (reg. + enum.)
Luxembourg	01-Feb-2011	Traditional
Malta	20-Nov-2011	Traditional
Monaco	09-Jun-2008	Traditional
Montenegro	31-Mar-2011	Traditional
Netherlands	01-Jan-2011	Combined (reg. + survey data)
		No questionnaire
Norway	19-Nov-2011	Register-based
Poland	31-Mar-2011	Combined (reg. + survey)
Portugal	21-Mar-2011	Traditional
Republic of Moldova	**1-Apr-2014**	Traditional
Romania	22-Oct-2011	Traditional
Russian Federation	14-Oct-2010	Traditional
San Marino	07-Nov-2010	Traditional
Serbia	31-Sep-2011	Traditional
Slovakia	21-May-2011	Traditional
Slovenia	01-Jan-2011	Register-based
Spain	01-Nov-2011	Combined (reg. +)
Sweden	31-Dec-2011	Register-based
Switzerland	31-Dec-2010	Combined (reg. + survey)
Tajikistan	01-Oct-2010	Traditional
The former Yugoslav Republic of Macedonia	**31-Sep-2011 (cancelled)**	Traditional
Turkey	02-Oct-2011	Combined (reg. + survey)
Turkmenistan	**15-Dec-2012**	Traditional
Ukraine	**2013**	Traditional
United Kingdom	27-Mar-2011	Traditional
United States	01-Apr-2010	Trad. enum. with yearly updates
Uzbekistan	**01-Apr-2011**	**Mini-census (10% of pop.)**

Table 1 also presents information on the census methodology adopted in UNECE countries. For this purpose, countries are classified in the following broad categories of census methodology, described also in the previous sections:

(a) The traditional census, where data are collected in the field through a full enumeration conducted in a relative short period of time, possibly with limited use of data from registers in support of the enumeration;

(b) The register-based census, where the census is based exclusively on data from registers and administrative sources;

(c) The combined census, where data from registers are used in combination with other sources, that may include a full field enumeration or an *ad hoc* sample survey for the census; some countries conduct a combined census without questionnaire, using data from registers and existing surveys (such as LFS).

Based on the information on the 55 UNECE countries where it is expected that a census will be carried out by the end of 2014, the traditional approach is still the most common approach in the 2010 round, but it was adopted by only 31 countries (56% of the total). The combined approach (registers + other sources) was used by 14 countries (25% of the total), while 8 countries (15% of the total) conducted a register-based census. Overall, 22 countries (40%) used registers for their census. In addition, the "rolling census" was conducted in France, and the traditional enumeration with yearly updates in the United States. A general description of these census methodological approaches is available in Appendix II to the "Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing" (UNECE, 2006)

The comparison of the percent distributions of UNECE countries by census method used in the 2000[3] and the 2010 rounds (figure 1) shows that in only ten years there were significant changes. In particular, the number of countries conducting a traditional census dropped from 40 to 31 (from 80% to 56% considering the percentage of the total number of countries in the two census rounds). This was due to a sharp increase in the number of countries conducting a register-based census (from 4 to 8) or a combined census (from 6 to 14). In total, the number of countries using registers for the census has more than doubled, from 10 in the 2000 round (20% of the total) to 22 in the 2010 round (40% of the total).

[3] Data for the 2000 census round are from the publication "Measuring population and housing – Practices of UNECE countries in the 2000 round of censuses" (UNECE, 2008).

Figure 1.

Census methods used in United Nations Economic Commission for Europe countries in 2000 and 2010 census rounds

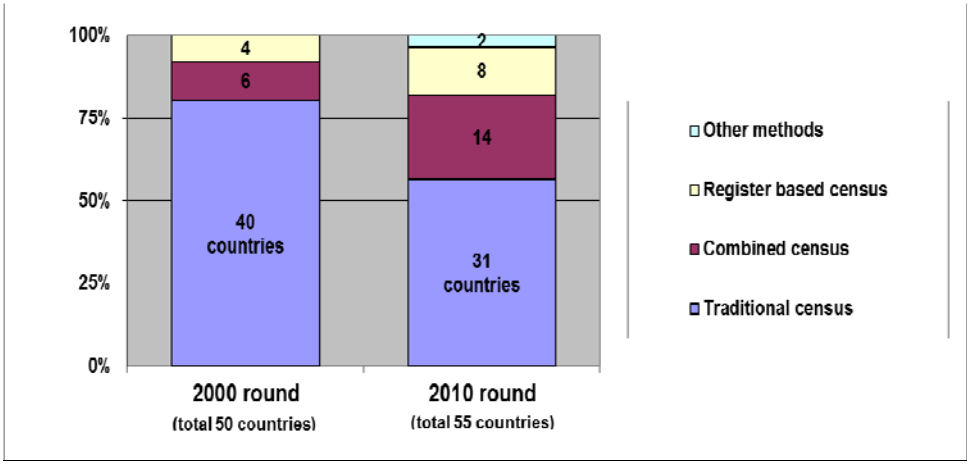


Table 2 presents in detail the UNECE countries by census method adopted in the 2000 and 2010 rounds, and shows which countries changed methodology between the two census rounds. In the 2010 census round, eleven countries moved away from the traditional census. The majority of them (eight countries) adopted a combined census. Austria moved directly from the traditional census to the register-based census, while France and the United States developed alternative methods that make no use of data from registers.

Of the six countries that conducted a combined census in the 2000 round, Belgium and Slovenia moved to a register-based census in the 2010 round, while four countries conducted a combined census again in the 2010 round (Latvia, Netherlands, Spain and Switzerland).

Table 2.

Countries by census method in 2000 and 2010 rounds – United Nations Economic Commission for Europe countries

Census method in 2000 round	*Census method in 2010 round*				
	Traditional	*Combined*	*Register-based*	*Other*	*TOTAL*
Traditional	29 Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Canada, Croatia, Cyprus, Georgia, Greece, Hungary, Ireland, Kazakhstan, Kyrgyzstan, Luxembourg, Malta, Monaco, Montenegro, Portugal, Rep. of Moldova, Romania, Russian Fed., Serbia, Slovakia,Tajikistan, The FYR of Macedonia, Turkmenistan, Ukraine, United Kingdom	8 Czech Rep. Estonia Israel Italy Lichtenstein Lithuania Poland Turkey	1 Austria	2 France United States	**40**
Combined	0	4 Latvia Netherlands* Spain Switzerland	2 Belgium Slovenia	0	**6**
Register-based	0	0	4 Andorra Denmark Finland Norway	0	**4**
No census in 2000 round	*2* *Bosnia-Herzegovina* *San Marino*	*2* *Germany* *Iceland**	*1* *Sweden*	*0*	***5***
TOTAL	**31**	**14**	**8**	**2**	**55**

Legend:

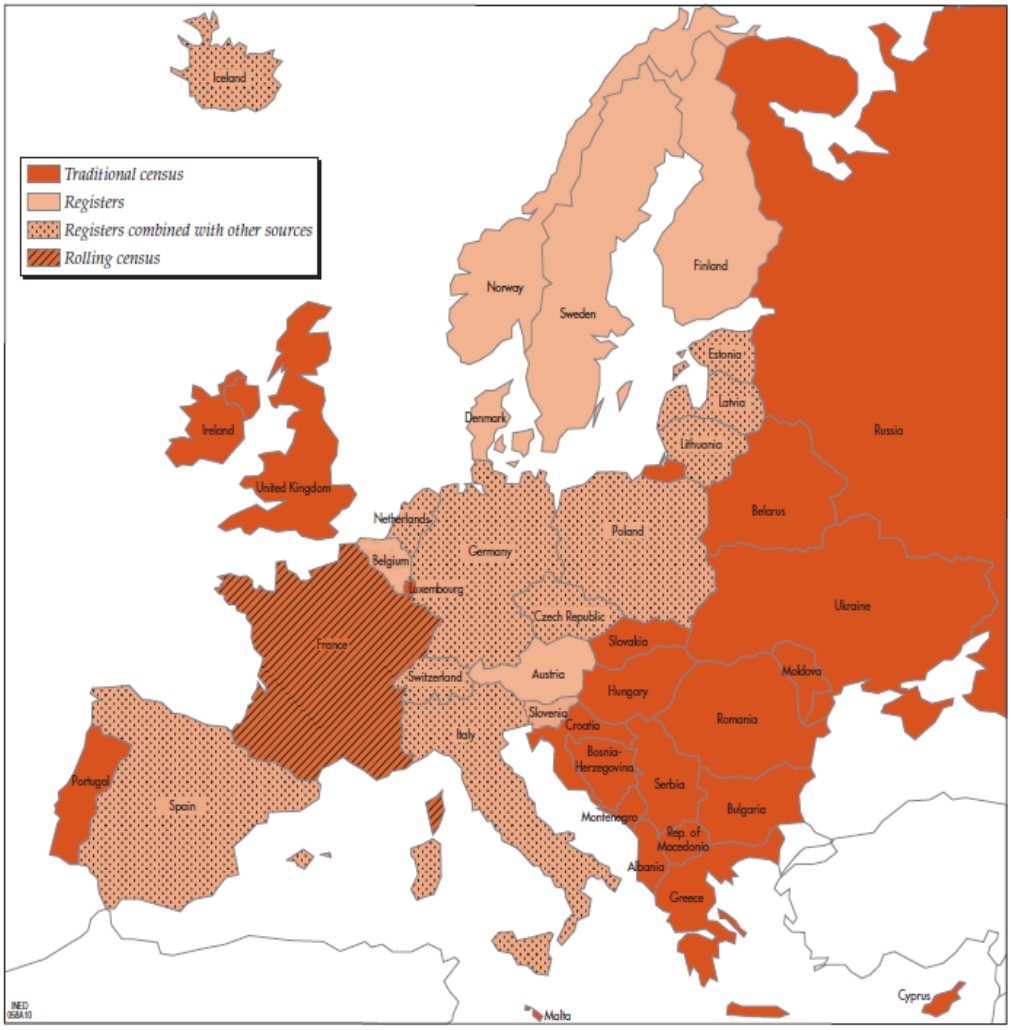
Same method in 2000 and 2010 rounds	**Different method in 2000 and 2010 rounds**

** In Iceland and the Netherlands, a combined census without questionnaire was carried out, using data from registers and existing surveys.*

A map of European countries by census methods used in the 2010 round is presented in Figure 2. The map shows a clear divide. All the countries in Eastern and South-Eastern Europe (but also those in the Caucasus and Central Asia not shown in the map) conducted a traditional census in the 2010 round. In Western, Central and Northern Europe, on the contrary, the large majority of countries used an alternative census method.

Considering the 31 countries that are members of the European Union (EU) or the European Free Trade Association (EFTA), only 11 countries (35%) conducted a traditional census in 2011 (in the 2000 census round they were 19, or 61%), 12 countries conducted a combined census, seven countries a register-based census, and France the rolling census. All UNECE countries that conducted a register-based or combined census in the 2010 round belong to the EU or EFTA, with the exceptions of Israel and Turkey.

Figure 2.
Methods used by European countries for the 2010 round population census[4]



[4] Derived from a map published in the article "Census taking in Europe: how are populations counted in 2010?" published by INED (Valente, 2010)

5 Benefits and risks of alternative census methods – First results from the 2010 round

The decision on whether to carry out the census with the traditional method or adopt an alternative methodology such as a register-based method, is normally the result of a careful evaluation where a number of factors are taken into account, including: users' needs, quality of the data, completeness of the count, data protection and security, comparability of results over time, respondent burden, timeliness of outputs, financial and political implications, and public understanding and acceptance.

The decision to move from a traditional census to an alternative method is usually based on the expectation to derive some advantages from such change in terms of some of the factors listed above. On the other hand, changing the methodology may result in some disadvantages in terms of other factors, as there are various trade-offs. For instance, a register-based census may eliminate respondent burden and improve timeliness of results, but it may also affect comparability of results over time or create problems in terms of data protection and security, public understanding and acceptance, and relevance of the information produced.

Moreover, there are also risks associated with the adoption of alternative census methodologies, particularly when innovative IT solutions are used. These risks have to be anticipated and managed in advance as far as possible, to avoid or at least to minimize the possibility that unexpected problems eventually affect the quality of census results.

Information on benefits and risks of alternative census methodologies, including predicted and realized savings, was collected from countries in the framework of the 2011 survey by UNSD and the US Census Bureau. Some results from that survey are presented in this section. The results refer in particular to 11 countries that conducted a combined census, and five countries that conducted a register-based census.

5.1 Cost savings

One of the main reasons why countries decide to move away from the traditional census and adopt an alternative register-based approach is to reduce costs. From the information collected in the survey, most countries that used register data for the census (14 countries out of 16) predicted some savings compared to the cost of a traditional census. As expected, the predicted savings are particularly high for countries that used data only from registers and did not conduct any field collection, amounting at around 85% of the total cost for Austria, 90% for Iceland and Norway, and 99% in the Netherlands (this figure refers to actual savings). It can be assumed – although information is not available on this aspect – that these savings refer only to the additional costs for conducting the census and do not take into account the costs for setting up and maintaining the register-based statistical system.

In countries where data from registers were used in combination with a field data collection, the expected cost savings are lower but still very significant: 40% in Poland (this figure refers to actual savings), 50% in Turkey, and 75% in Spain. In the Czech Republic and Italy no cost savings were predicted, also because a full field enumeration was carried out in combination with the use of data from registers. With regard to the actual (and not only predicted) costs, the majority of countries reported that at the time the survey was conducted it was still too early to assess the actual cost saving, with the exceptions of the Netherlands and Poland mentioned above.

The results presented seem to confirm that using registers for the census can substantially reduce the census costs, particularly when no field data collection is carried out. However,

in order to conduct a complete assessment of the cost implications of adopting a register-based census system, information on the costs for setting up and maintaining the necessary systems should be taken into account. It can be expected that if these costs are fully taken into account, moving from a traditional census to a register-based census may lead to net cost saving only in the medium-long term. In the short term, the significant investments necessary to set up the systems may result in costs comparable or even higher to those of a traditional census.

5.2 Time savings

One of main shortcomings of the traditional census methodology is the very long time needed to process the huge amount of questionnaires. This is the main cause for the poor timeliness of the results from a traditionally conducted census. So, the possibility to shorten the time necessary to process the data and to improve timeliness of the census is often one of the main reasons for countries to consider alternative methodologies.

The information collected by UNSD and the US Census Bureau shows that only eight of the 16 countries using registers for the census (mainly countries that conducted a combined census) were expecting some time savings. Turkey estimated the time savings as 50% compared to a traditional approach. The other countries did not indicate any estimates. Among the countries with register-based census, Slovenia is the only one that expected time savings. Austria, Finland, Norway and Sweden did not report expecting time savings, quite surprisingly. For some of these countries (particularly for Austria and Sweden) this could be explained by the fact that it is the first time that they conduct a fully register-based census, and relatively more time may be needed to produce the results.

Two countries that adopted a combined approach including a full field enumeration (Germany and Poland) indicated that there were potentially some risks for *increasing* the time needed to produce the results. Israel, where the census was conducted in 2008, was the only country confirming that the adoption of the combined census reduced the time needed to produce the census results. For the other countries where the census was carried out in 2011, the information is not yet available.

5.3 Other benefits and risks

In addition to cost and time savings, there are various other potential benefits deriving from adopting an alternative census methodology. The benefits expected by most of the 16 countries that used data from registers for the census concern improved data quality (11 countries) and coverage (9 countries). Other benefits are expected by a smaller number of countries, including the reduction or elimination of response burden (6 countries), decreased item non-response (5 countries), increased response rate (4 countries), the possibility of producing yearly statistics (4 countries) and the reduction of field work (3 countries).

With regard to concepts and definitions used for census topics, the results are apparently contradictory. In fact, seven countries that used registers for the census reported that they expect benefits deriving from the use of standardized census topics concepts and definitions. But seven countries also considered the fact of using data source definitions instead of census definition as a potential risk. Two countries (Israel and Norway) belong to both groups. This could mean that for some census topics the use of data source concepts and definitions could be beneficial as it could ensure standardization, while for others it could entail some risks, for instance if the data source definition is different from the recommended census definition.

In terms of content, reduced topics were reported as a risk by six countries using registers for the census. They include four countries with register-based census (Austria, Norway, Slovenia and Sweden) and the two countries using data from registers and existing surveys but no field collection (Iceland and Netherlands). Finland is the only country with register-based census that did not report this as a risk, like all countries that use registers and carry out a field collection, which allows collecting data on topics not adequately covered in registers.

Three countries adopting a combined census using registers and sample surveys (Germany, Israel and Spain) reported the risk of providing limited output, particularly for small areas and for the variables covered by the sample surveys. Finally, the negative public perception was mentioned as a risk by two countries only (Estonia and Spain).

6 Conclusions

The information available on census methodology adopted by UNECE countries for the census of the 2010 round shows very significant changes compared to the previous rounds.

One clear result is that a significant number of countries (especially EU and EFTA countries) moved away from the traditional census and adopted an alternative methodology, in most cases making use of data from registers combined with data from other sources. The percentage of countries conducting the census in the traditional way in the UNECE region decreased from 80% in the 2000 round to 56% in the 2010 round. Among EU and EFTA countries the percentage of traditional censuses dropped even more sharply, from 61% in the 2000 round to only 35% in the 2010 round.

The traditional census, however, was still the most common method in the UNECE region in the 2010 round, as it was adopted in virtually all countries in Eastern and South-Eastern Europe, the Caucasus and Central Asia. For the future, it can be expected that more countries will consider adopting some of the alternative methods, while others will continue using the traditional approach.

The results also show a clear diversification of the census methodologies in the UNECE region. In particular, various forms of “combined censuses” were developed, using different combinations of sources (such as a full enumeration, ad hoc sample surveys, or data from existing sample surveys) to supplement data from registers. This development makes the classification of the various census methods more complicated than in the past.

The adoption of alternative census method is normally driven by a number of factors, including cost and quality issues, public expectations, and changes in technology. Preliminary information about the expected benefits deriving from the adoption of alternative methodology indicates that the large majority of countries predict some cost saving, which can be particularly relevant when no field data collection is carried out. However, limited information is still available on actual cost savings. A complete assessment of the cost implications of adopting a register-based census will be possible only at a later stage when more information will be available, covering also the costs for setting up and maintaining the necessary systems.

The majority of the countries using registers for the census also expect improvements in terms of data quality and coverage compared to a traditional census, while time savings are expected by only about half of these countries.

Adopting an alternative census method using data from registers also implies some risks. The risks reported by the highest number of countries depend on the fact that data source

definitions used may differ from the recommended census definitions. Moreover, the reduced number of topics was reported as a risk, particularly by countries using registers and not conducting any field collection.

A more complete assessment of the impact of the adoption of innovative census methodologies will be available once countries will have concluded the census operations, and more complete information will be available.

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