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## Economic Commission for Europe

### Conference of European Statisticians

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**Coordination of international statistical work in the United Nations Economic Commission for Europe region**

### **In-depth review of diversification of population census methodology and sources**

**Note by Statistics Finland and the Turkish Statistical Institute**

#### *Summary*

The present note is the in-depth review paper on diversification of population census methodology and sources. The Bureau of the Conference of European Statisticians (CES) conducted the in-depth review at its meeting in October 2015. The purpose of the reviews is to improve coordination of statistical activities in the region of the United Nations Economic Commission for Europe, identify gaps or duplication of work, and address emerging issues.

The note gives an overview of the various changes in methodology, sources and technology in census taking and provides recommendations for further work.

The outcome of the review is provided in document ECE/CES/2016/6/Add.1.



## I. Executive summary

1. In the modern world, decision and policy makers need more accurate, timely, up-to-date and detailed data for realization and evaluation of rapid changes in the society. Accordingly, National Statistical Offices (NSOs) require taking steps to meet the demands of users over time in parallel with technological innovations and country circumstances.

2. Data on society is mostly provided by population and housing censuses in the smallest administrative units' detail. This makes censuses the fundamental source for determining the current status and following the changes of the population of a country. The traditional census method based on field enumeration of all individuals, however, has a number of limitations such as high costs, managing a complex field operation, working with high volumes of enumerators, long duration of data processing, providing information in ten year intervals, respondent burden of the census questionnaire, doubts about data privacy, etc. These limitations have made NSOs to consider innovations on census methodology and look at different sources and methods in census taking. In the course of time, various methods have begun to be used by the NSOs depending on the country circumstances and available technology.

3. Beside different needs of the countries, there are also contributions of globalization to the census taking. Exchanging experiences between countries, different types of support provided by international bodies, international recommendations at the global (UNSD) and regional (UNECE) level and EU regulations can be counted as main contributions. Also, to obtain accurate world population figures and to have comparable data at the country level, standardization and combination of output data derived from divergent methods and data sources used by NSOs determine the needs for coordination at the international level.

4. The Conference of European Statisticians (CES) and its Bureau play a key role to coordinate statistical activities at the international level in the region of the United Nations Economic Commission for Europe (UNECE). Each year, the CES Bureau reviews selected statistical areas in depth. The purpose of the reviews is to improve the coordination of statistical activities, identify the gaps or duplication of work and address emerging issues. These reviews focus on the strategic issues and highlight concerns of statistical offices of both a conceptual and coordinating nature.

5. The CES Bureau selected in February 2015 population and housing censuses for an in-depth review. Turkey and Finland drafted this paper which provides the basis for the review. The paper gives an overview to the various census methodologies used in the UNECE region, identifies issues and challenges and makes some recommendations on possible follow-up actions in the area.

6. The paper provides a review of the current state of the making of population and housing censuses across a number of countries. It describes the main issues and challenges in the area. Issues are considered from a future-oriented viewpoint. The in-depth review pays particular attention to the analysis of user needs for census statistics.

7. The review is focused on the different methods of making censuses and on current issues around the census taking in the UNECE region. The paper provides a short overview of the ongoing activities of international organizations and census taking in seven different countries with different census methodologies. The report highlights some of the issues and challenges faced by population and housing censuses, including: managerial, conceptual issues and methodological issues. Besides that, the paper highlights issues like timeliness, the legal frameworks, cooperation of various administrations and impact of the growing users' needs for more frequent and detailed census data.

8. The report concludes with some suggested requirements for the next census round and key recommendations for the work in the UNECE region. A number of countries indicated that they would support activities to receive technical support in many areas of the census. A suggestion is made for the UNECE to organise a meeting for countries interested in developing their census to be able to use sample surveys in the estimation of some census variables. UNECE could support preparation of new guidelines on the use of registers for censuses prepared by a small task force of experts. In addition to the usual annual expert meetings, training workshops and other activities could be organized, aimed at supporting countries in the preparation of their next census.

## II. Scope/definition of the statistical area covered

9. The 2010 round of population censuses has just ended in 2014, and the information available shows that there were significant changes compared to the previous rounds, particularly with regard to census methodology. In the UNECE region, there was a substantial increase in the use of alternative census methods, based in most cases on the use of registers and on multiple response channels. Internet data collection was adopted in a significant number of countries and in some cases it was the main data collection method.

10. The objectives of a census are specific to individual countries and differ according to the local circumstances. Its unique role depends on the demand for statistics existing in a country and by the content and structure of its existing statistical system.

11. The population and housing census has a central role in the administration of a country. It is the heart of an integrated national statistical system, which may include other censuses (for example an agricultural census), surveys, registers and administrative files. It provides, at regular intervals the benchmark for the population count at national and local levels. For small geographical areas or sub-populations it may represent the only source of information for certain social, demographic and economic characteristics. For many countries, the census also provides a unique source for a solid framework to develop sampling frames.

12. The role of the population census is even more important in countries where other vital statistics are incomplete or inaccurate. In these countries, the census is the only statistical source which provides correct and detailed estimates of the population size and structure.

13. Traditionally, the definition of a census has been based on the basic principles of individual enumeration, simultaneity, universality and defined periodicity. In the last twenty years however different methods have emerged in the UNECE region whereby the census has assumed a wider concept. In some countries the traditional method based on the field enumeration of all individuals has moved to the use of data recorded in administrative registers. Furthermore, the priority of universal enumeration of individuals and their characteristics has shifted towards the need for more frequent and relevant data for the total population and the smallest local areas. Consequently, a common definition of a population and housing census for the UNECE region is now based more on the output produced rather than on the methodology used to collect the data.

14. An increasing number of countries now rely on data derived from administrative registers to produce some or all of their population and housing statistics. In these countries there is an opportunity to provide an integrated view of the country where social, demographic and economic characteristics are linked together.

15. Between 2005 and 2014, some 53 countries of a total 56 countries in the UNECE region carried out a census in one form or another. The majority of the countries (33) had a

traditional census, of which nine countries reported used register information as a sampling frame or control. A register-based census was conducted in nine countries (compared to three countries in 2010 census round), a combined census in ten countries and a rolling census in one country (France). A short description of these methods is provided below<sup>1</sup>. More detailed experiences of some countries with different census methods are presented as an appendix.

## A. The traditional census

16. In general, traditional censuses use two alternative main methods of enumeration. Either census enumerators collect the information from the households through an interview and fill out of census forms, or forms are filled in by members of the household (self-enumeration). In this last approach, the forms are delivered to the households and collected back by enumerators or by mail.

17. Some countries use two types of questionnaires to reduce the amount of information to be processed. A sample of the population gets an extensive long form while a short form is used for the rest of the population. This method has its advantages: it reduces the amount of time and labour to process the collected information and limits the complexity and costs of the census operations. However, since the information collected with long forms only represents a sample of the population, census results on detailed characteristics (covered in the long form) are not available for small areas or small population groups. This approach has been used in the United States and Canada since the 1970s.

18. Although the concept of the traditional census is relatively simple, its implementation is a huge and very complex operation that requires significant financial resources (employing enumerators, supervisors, etc., printing, distributing, collecting census forms, entering the data, data processing). Moreover, in a traditional census, the costs are concentrated around the year when data are collected and are much lower in the other years of the census cycle. This cost distribution over time can create problems in management and budgeting.

19. Some countries using the traditional census model have reported that it is increasingly difficult to enumerate population with high mobility and multiple residences like young professionals, students, workers, retired people, or other categories that commute regularly between two or more places. Moreover, identifying the place of usual residence of these people is often complicated.

20. Several countries have reported an increasing reluctance of the population to participate in the census. This can be due to various reasons and is more common among specific subgroups like aged population, ethnic minorities, etc.

21. Finally, there are also some problems with the outputs produced by traditional censuses. Publishing census results often takes a long time because of the large amount of information that is being processed. There is also need for data more frequently than every ten years, which is often the case with the traditional census.

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<sup>1</sup> See also: Valente, P., 2015. Censuses: Current Approaches and Methods. In: James D. Wright(editor-in-chief), *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Vol 3. Oxford: Elsevier. pp. 296–301.

## **B. The register-based census**

22. An alternative to the traditional census is the register-based census. It is built around a set of basic registers that contain comprehensive data on the units that are to be described in the population and housing census. The most common registers used are population register, building and dwelling register, business register, social security registers and educational registers.

23. The data on different registers are normally combined by a unique identification number which is used in all administrative registers. Also, all statistical units are linked to each other by means of the identification system: persons to the dwellings/household-dwelling units and buildings, employed to their employers/enterprises and establishments. Similarly, it is possible to locate all units geographically by the map co-ordinates.

24. The development of a totally register-based population census system is a long process. It requires significant initial investments, good co-operation between national statistical institutes and the authorities responsible for different registers. Legislation that allows the use of administrative data sources for statistical purposes has a central role in developing the register-based statistical system.

25. One disadvantage of the register-based census system is that the data to be collected are limited to those available in registers, and the quality of the statistics depends on the coverage and quality of the registers themselves. However, statistical agencies can combine data from different registers to assess and increase quality and derive new variables. Another method of providing the data on variables that do not exist in registers is to make use of results from existing household sampling surveys, like in the Netherlands Virtual Censuses in 2001 and 2011.

## **C. The combined census (registers and field data collection)**

26. Many countries have registers with population and other data that could potentially be used for a census, but coverage and quality of the data are not sufficient for producing reliable census data. Sometimes key variables, like occupation, educational attainment or the composition of households are not available in registers.

27. Some countries have adopted a combined methodological approach where some information is taken from registers while other information on selected variables is collected through field operation. This can be done by using census forms completed by all households in a way similar to the traditional census or by means of ad hoc sample surveys. In addition to collect information on topics that are not covered in registers, the data collected in field operation can be used to evaluate the coverage and accuracy of register data. For this reason, this method is sometimes used to transition from a traditional to a fully register-based census.

28. The balance of the amount of data collected from different sources varied from country to country. For example, in the 2010 census round Estonia reported that only one per cent of its data were taken from registers, whereas Switzerland derived 97 percent of its data from registers.

29. Often, when a combined census approach is used, the respondents have the opportunity to fill in the web-based census questionnaire. In the 2010 Census round, eight of total ten countries where the combined method were used, had a possibility to answer in web.

#### **D. Rolling census**

30. In the rolling census, the data are collected by cumulative and continuous field data collection over a long time period compared to other census methods where the reference time is very exact date and the data collection takes place in a short time period. Using this method there is no need for data from any administrative register. This method was developed conceptually in the 1970s and it has been used only in France since 2004.

31. Data are collected in the field every year in the various municipalities in a rolling base, like in France in a 5-years cycle. Census results are based on rolling average calculated over the 5-year cycle and updated yearly.

32. The main advantage of this method is that the data are provided more frequently (every year) than every tenth year. Also the costs of data collection and processing are spread over time instead of being concentrated in few years around the census date.

33. However, this method is very complex and it is hard to implement. A disadvantage is that this approach no longer provides a simultaneous snapshot of the whole population. Both over- and undercounting can occur, given the possibility of migration between regions. In this method, the comparisons between areas due to different enumeration times can be complicated.

#### **E. Trends of census methodology**

34. Even if new census methodologies and technologies are increasingly used in recent years, the traditional census approach is still the most commonly used method in the world.

35. From 1970 register data were used for the first time in Census in the Nordic countries, which started to develop the register-based census. In 1980, Denmark conducted a fully register-based census, as the first country in the world, and ten years after, in 1990, Finland followed. At this time, register data were also used in some other countries (other Nordic countries, Singapore). For the 2000 census round, the number of countries using alternative census methods increased significantly in Europe. Three countries conducted the register-based census and five countries conducted the combined census.

36. In the 2010 census round, the trend was more and more from the traditional census towards to the alternative methods: nearly 36 per cent of the countries in the UNECE region adopted new methodologies based on the administrative registers and combinations of sources to produce census information. Besides this, 30 per cent of countries conducting the traditional census reported using register data as a sampling frame or control data.

### **III. Overview of international statistical activities in the area of population and housing censuses**

37. Besides countries designing their census methodology according to their specific circumstances, international comparability is one of the main important issues to be taken into account. Standardization of census variables, their definitions and breakdowns should be outlined by some international organizations. Also, these organizations provide valuable inputs to the NSOs by facilitating the sharing of experiences and providing technical assistance while conducting such a complex operation.

38. This section provides a brief overview of the past and ongoing census activities of UNSD (United Nations Statistical Division)<sup>2</sup>, UNECE (United Nations Economic Commission for Europe)<sup>3</sup> and Eurostat<sup>4</sup>.

## A. United Nations Statistical Division (UNSD)

39. The United Nations Statistical Division (UNSD) of the Department of Economic and Social Affairs (DESA) has a role as the secretariat of the 2010 and 2020 World Population and Housing Census Programmes. It has acted as the umbrella organization for setting standards, providing technical expertise and training and setting priorities as needed at the launch of the 2010 Census Programme since 2005.

40. For 2010 World Population Census round, the Division also developed and issued international census guidelines including the *Principles and Recommendations for Population and Housing Censuses, Revision 2*; the *Handbook on Geospatial Infrastructure in Support of Census Activities*; the *Handbook on Population and Housing Census Editing, Revision 1*; *Measuring the Economically Active in Population Censuses: A Handbook*; the technical report entitled “*Census data capture methodology*”; the technical report entitled “*Post enumeration surveys: operational guidelines*”.

41. The Division developed a software package, CensusInfo, to help countries to disseminate census data and conducted training workshops on the use of the software.

42. In the period 2006-2014, UNSD conducted 59 regional, sub-regional and national workshops with 1420 participants from 140 countries in order to help countries process to prepare for and carry out their censuses and to analyze and disseminate the results. The Division provided technical assistance to national statistical authorities on various country-specific aspects of the census process in order to strengthen their capacity to plan for and carry out population and housing censuses.

43. The Statistics Division carried out two surveys on national practices for censuses of the 2010 round and prepared two comprehensive documents. The first survey was carried out in 2009/2010 in collaboration with UNECE. A working paper entitled “*Report on the results of a survey on census methods used by countries in the 2010 census round*” was issued. The second survey was undertaken in collaboration with the United States Census Bureau in 2011. The division prepared a report entitled “*Overview of national experiences for population and housing censuses of the 2010 round*”.

44. In December 2014, the Statistics Division prepared another comprehensive report on the implementation of the 2010 World Population and Housing Census Programme and a timetable for the development of the 2020 World Population and Housing Census Programme, including the *Principles and Recommendations for Population and Housing Censuses: the 2020 Round, Revision 3*.

45. The report<sup>5</sup> provides a brief overview of the implementation of the 2010 World Population and Housing Census Programme, including information on national participation in the 2010 census round, successes and challenges and a summary of

<sup>2</sup> UNSD Main Site: <http://unstats.un.org/unsd/default.htm>

<sup>3</sup> UNECE Statistical Division Main Site: [http://www.unece.org/stats/stats\\_h.html](http://www.unece.org/stats/stats_h.html) **Error! Hyperlink reference not valid.;**

UNECE Population Unit Main Site: <http://www.unece.org/pau/Welcome.html>

<sup>4</sup> Eurostat Main Site: <http://ec.europa.eu/eurostat>

<sup>5</sup> The report prepared by UNSD for the 2015 UN Statistical Commission: <http://unstats.un.org/unsd/statcom/doc15/2015-6-Censuses-E.pdf>

activities carried out by the Statistics Division in support of the 2010 World Programme. The report also describes the preparatory activities for the 2020 World Population and Housing Census Programme.

46. The Statistics Division established an international expert group in 2013, comprising census experts from countries in both developed and developing regions, UN regional commissions and relevant international and regional organizations to review the text of the *Principles and Recommendations for Population and Housing Censuses, Revision 2* and propose changes and updates.

47. Through the international expert group, the Statistics Division has prepared a draft version of the *Principles and Recommendations for Population and Housing Censuses: the 2020 Round, Revision 3*.

48. The Statistics Division is planning to prepare or update international census guidelines for the 2020 round as had been done for the previous census round. The *Handbook on Census Management for Population and Housing Censuses*, the *Handbook on Population and Housing Census Editing, Revision 1* and *Measuring the Economically Active in Population Censuses: A Handbook* will be updated or revised by the UNSD.

49. The Statistics Division, in collaboration with the UN regional commissions and other relevant regional and international organizations, *plans to organize regional technical training workshops, to provide direct technical assistance to countries and to organize study visits (South-South cooperation) for countries to learn from one another* in order to strengthen the capacities of countries to undertake census operations .

50. For the 2020 census round, the Statistics Division will maintain the World Population and Housing Census Programme website as a resource for countries to exchange their experiences and share their knowledge and information on census-taking.

51. The Division will take on the role as part of its responsibilities for an international organization with the responsibility of collecting and making accessible census microdata samples from countries for the 2020 World Population and Housing Census Programme.

52. The Division prepared a draft resolution on the 2020 World Population and Housing Census Programme that was approved by the UN Statistical Commission in March 2015 and endorsed by the Economic and Social Council in June 2015.

53. The United Nations Statistics Division collects from all the National Statistical Offices several population censuses' datasets. The data are collected via the *Demographic Yearbook* census questionnaires. Data have been collected since 1948 through a set of questionnaires dispatched annually to over 230 national statistical offices and have been published in the Demographic Yearbook collection. The Demographic Yearbook disseminates statistics on population size and composition, births, deaths, marriage and divorce, as well as respective rates, on an annual basis. The Demographic Yearbook census datasets cover a wide range of additional topics including economic activity, educational attainment, household characteristics, housing characteristics, ethnicity, and language, foreign-born and foreign population. The available Population and Housing Censuses' datasets reported to UNSD for the censuses conducted worldwide since 1995 are now available in *UNdata*<sup>6</sup>.

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<sup>6</sup> <http://unstats.un.org/unsd/demographic/products/dyb/dybcensusdata.htm>

## B. United Nations Economic Commission for Europe (UNECE)

54. Population and Housing Census is one of the main areas of work of the UNECE Statistical Division. The activities in the period 2005-2015 were aimed at promoting the implementation of the *Conference of European Statisticians (CES) Recommendations for the 2010 Round of Population and Housing Censuses*, and the preparation of the CES Recommendations for the 2020 Census Round. UNECE also supports member countries in the preparation for their next population and housing census. The activities include the organization of annual expert meetings and training workshops at regional and sub-regional levels to discuss emerging issues in census methodology and management, the preparation of publications and training material on censuses, and the collection and dissemination of information about censuses in UNECE countries.

55. In May 2012, a work plan was drafted at the UNECE-Eurostat Meeting on Population and Housing Censuses and endorsed by the CES, in order to review the 2010 round of censuses in the UNECE region and to prepare new Recommendations for the 2020 Censuses. According to this work plan, nine task forces were constituted as<sup>7</sup>:

- Census methodology;
- Census technology;
- Census costs and benefits;
- Census coverage and quality;
- Population to be enumerated and geographic characteristics;
- Economic and educational characteristics;
- Migration and ethno-cultural characteristics;
- Demographic, household and family characteristics;
- Housing topics.

56. Between 2012 and the end of 2014 the task forces reviewed the 2010 round of censuses in the UNECE region and prepared the draft CES Recommendations for the 2020 round of censuses.

57. The work of the Task Forces, coordinated by the UNECE Steering Group on Censuses, was based on the results of a comprehensive online survey carried out by UNECE in early 2013. The results of the work of the Task Forces were used to prepare the volume *Measuring Population and Housing: Practices of UNECE Countries in the 2010 Round of Censuses*<sup>8</sup>, published by UNECE in 2014 in English and Russian.

58. In January 2015, the Steering Group and all of the task forces completed the final draft of the *CES Recommendations for the 2020 Censuses of Population and Housing*<sup>9</sup> which were reviewed by the CES members through an electronic consultation in March 2015, and then adopted by the CES at its 63<sup>rd</sup> plenary session in June 2015.

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<sup>7</sup> Terms of Reference (ToR) of Steering Group on Censuses(ECE/CES/BUR/2012/NOV/7) (4th November 2012):

<http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/bur/2012/november/7.pdf>

<sup>8</sup> [http://www.unece.org/fileadmin/DAM/stats/publications/2013/Measuring\\_population\\_and\\_housing\\_2010.pdf](http://www.unece.org/fileadmin/DAM/stats/publications/2013/Measuring_population_and_housing_2010.pdf)

<sup>9</sup> [http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/bur/2015/February/18-Cover\\_note\\_on\\_Population\\_and\\_Housing\\_Censuses.pdf](http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/bur/2015/February/18-Cover_note_on_Population_and_Housing_Censuses.pdf)

59. The main objectives of the Conference of European Statisticians Recommendations for the 2020 Round of Population and Housing Censuses are to provide guidance and assistance to countries in the planning and execution of their population and housing censuses; and to facilitate and improve the international comparability of census results through the identification of a core set of census topics and the harmonization of concepts, definitions and classifications.

60. The UNECE Statistical Division coordinated the preparation of the CES Recommendations in close collaboration with Eurostat and in conjunction with the revision of the global Principles and recommendations for population and housing censuses for the 2020 round by the UN Statistics Division in New York. The new recommendations on labour force statistics that emerged from the 19th International Conference of Labour Statisticians held in Geneva on 2-11 October 2013<sup>10</sup> were also taken into account.

61. The UNECE Census Wiki<sup>11</sup> platform is used to share work material, develop documents and organize discussion forums. A lot of material and links to various articles, papers, and publications are presented on various pages of the UNECE Census Wiki<sup>12</sup>. Publications and papers on census methodology and related issues are presented. Comparisons and sorting countries by selected indicators about census methodology in 2010 Round is available. Papers on transitions to new census methods from countries are presented. Challenges, experiences and lessons learnt are shared within the countries.

### C. Eurostat<sup>13,14</sup>

62. Through the 2011 Population and Housing Census, for the first time, the European legislation defined in detail a set of harmonized high-quality data from the population and housing censuses conducted in the EU Member States.

63. As a result, the data from the 2011 round of censuses:

- is a collective work of the European Statistical System (ESS);
- provide accession to a richness of harmonized and comparable information;
- provide exceptional flexibility to cross-tabulate different variables;
- provide geographically detailed data.

64. Data from the 2011 population and housing census were collected by Eurostat in accordance with Regulation EC No 763/2008 on population and housing census and the three implementing Commission regulations (Regulations No 1201/2009, No 519/2010 and 1151/2010) are only valid for the 2011 exercise. A set of new Commission implementing regulations specific to the 2021 census round will therefore need to be developed. The *CES*

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<sup>10</sup> Economic Commission for Europe Conference of European Statisticians Sixty-third plenary session Geneva, 15-17 June 2015 Item 5 (c) of the provisional agenda  
Recommendations for the 2020 Round of Population and Housing Censuses

<sup>11</sup> UNECE Census Wiki Main Site:

<http://www1.unece.org/stat/platform/display/censuses/UNECE+Census+Wiki>

<sup>12</sup> UNECE Census Wiki Page for Sources:

<http://www1.unece.org/stat/platform/display/censuses/UNECE+publications+and+papers+on+census+methodology+and+related+issues>

<sup>13</sup> Eurostat materials are on the website: <http://ec.europa.eu/eurostat/web/population-and-housing-census/>

<sup>14</sup> Meeting documents of Working Group on Population and Housing Censuses and Task Force on the future EU censuses of population and housing

*recommendations for the 2020 census round* (adopted by the CES in June 2015) will also be taken into account. In order to achieve this goal a Task Force has been created by Eurostat and is currently working.

65. The Task Force is expected to review the technical requirements set by the framework regulation (Regulation EC No 763/2008), as well as the results of the quality assessment exercise on the 2011 data and metadata, and provide Eurostat with appropriate advice and assistance.

66. In particular, the Task Force is expected to:

- review practical difficulties encountered by Member States when implementing the different aspects of the 2011 Census exercise, and propose possible measures to overcome these difficulties;
- review the CES Recommendations for the 2011 and 2020 census rounds in order to see where technical advice may be necessary to help implement these as part of the 2021 EU census data requirements;
- facilitate as far as possible the use of administrative data in those countries that wish to do so;
- identify emerging user needs for data and incorporate them if appropriate into planned 2021 Census outputs;
- identify and document instances of good practice in overcoming data source problems and in applying statistical definitions to meet the essential features of censuses to the highest possible extent;
- suggest the best ways of introducing the geo-referencing (1km<sup>2</sup> grid) to the regulations;
- make comments and suggestions to assist with the drafting of technical aspects of the Commission implementing legislation.

67. The work and recommendations of the Task Force will have to reflect as much as possible with the ongoing changes at national level in the approaches, methods and data sources used for census-type statistics; and ongoing work on the modernisation of European social statistics. The work of other organizations and task forces will need to be taken into account, including the work organised by:

- UN Statistical Division and Economic Commission for Europe on recommendations for the 2020 census round;
- the Eurostat Task Force on Integration of Statistics and Geospatial Information.

#### **D. The Census Hub<sup>15,16</sup>**

68. The richness and the volume of data collected by the NSIs demanded new means of data transmission. To handle this challenge, the Census Hub has been developed as a modern and innovative technical solution for the transmission and dissemination.

<sup>15</sup>The Census Hub: <http://ec.europa.eu/eurostat/web/population-and-housing-census/census-data/2011-census>

<sup>16</sup>The Census Hub (Compact Guide): <http://ec.europa.eu/eurostat/documents/4031688/6285607/KS-02-14-480-EN-N.pdf/05b4ca91-1f72-4dbb-ae2c-d3a07f56d795>

69. The 2011 Census database is the result of work by the European Statistical System (ESS) to better disseminate the results of the Population and Housing Censuses in Europe. It provides easy access to detailed census data that are structured in the same way and methodologically comparable between countries. It is a data sharing platform, where NSIs provide access to their data according to standard processes, formats and technologies. Eurostat provides the IT structure for quickly accessible, flexible, easily compilation and extraction of data stored in the different national census databases.

70. The data disseminated by the Census Hub are not microdata. They are aggregated data that are structured according to the tables agreed by Member States and defined in the legal implementing rules<sup>17</sup>.

## 1. Databases<sup>18</sup>

71. Eurostat disseminates various levels of detailed data for 1990/91, 2001 and 2011 rounds, at regional and national levels. All tables have metadata documents both for national and European level. Under the title “3. Statistical Presentation”, including:

- Data descriptions (relevant regulations and definitions etc.)
- Classification systems
- Coverage and sector
- Statistical concepts and definitions
- Statistical unit
- Statistical population
- Reference area
- Coverage and time
- Base period

## 2. Legislation<sup>19</sup>

72. Eurostat also disseminates the relevant legislation on the website:

*Regulation on population and housing censuses (EC-763/2008 of 9 July 2008):*

This Regulation establishes common rules for the decennial provision of comprehensive data on population and housing. Diversity of data sources is mentioned in “Article 4- Data Sources”. These are:

- conventional censuses
- register-based censuses
- a combination of conventional censuses and sample surveys
- a combination of register-based censuses and sample surveys
- a combination of register-based censuses and conventional censuses

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<sup>17</sup> To access the new 2011 Census database:

<https://ec.europa.eu/CensusHub2/query.do?step=selectHyperCube&qhc=false>

<sup>18</sup> EuroStat Database for Population and Housing Census:

<http://ec.europa.eu/eurostat/web/population-and-housing-census/census-data/database>

<sup>19</sup> EuroStat Legislations: <http://ec.europa.eu/eurostat/web/population-and-housing-census/legislation>

- a combination of register-based censuses, sample surveys and conventional censuses
- appropriate surveys with rotating samples (rolling censuses)

73. Topics to be covered in Population and Housing Censuses are also mentioned.

(a) *Regulation on population and housing censuses as regards the technical specifications of the topics and of their breakdowns (EC-1201/2009 of 30 November 2009)*: The main aim of the regulation is to ensure that data from the population and housing censuses conducted in the Member States are comparable, and to allow reliable Community-wide overviews to be drawn up, the census topics as required by Regulation (EC) No 763/2008 must be defined and broken down in the same way in all Member States. It lays down the technical specifications for the census topics and their breakdowns required implementing Regulation (EC) No 763/2008.

(b) *Regulation adopting the programme of the statistical data and of the metadata for population and housing censuses provided for by Regulation (EC-763/2008) (EU-519/2010 of 16 June 2010)*: This Regulation establishes the programme of the statistical data and the metadata for the population and housing censuses to be transmitted to the Commission (Eurostat) for the reference year 2011. It mentions about the requirement of hypercubes.

(c) *Regulation implementing Regulation EC-763/2008 on population and housing censuses, as regards the modalities and structure of the quality reports and the technical format for data transmission (EU-1151/2010 of 8 December 2010)*: This Regulation lays down the modalities and structure of the quality reports to be submitted by Member States on the quality of the data they transmit to the Commission (Eurostat) from their population and housing censuses for the reference year 2011, as well as the technical format for data transmission, to fulfil the requirements of Regulation (EC) No 763/2008.

74. Eurostat disseminated “*EU legislation on the 2011 Population and Housing Censuses - Explanatory Notes*”<sup>20</sup>. It is a guide on the EU legislation on the 2011 population and housing censuses. The objective is to disseminate more detailed data in a user-friendly way, and to make the data more comparable. The European Union’s legislation on population and housing censuses aims to achieve comprehensive and flexible dissemination of census data, plus transparency about their quality. At the same time, it respects the diversity of traditions and methods in the Member States. This publication describes and explains the current legislation.

### 3. Recent progress

75. In September 2014, meeting of the Census Working Group, launching the Task Force to develop the 2021 census data collection was proposed. The Directors of Social Statistics asked to combine the new 2021 Task Force with the existing Task Force on the post-2021 census strategy. New combined Task Force created met for first time in December 2014.

<sup>20</sup>EU legislation on the 2011 Population and Housing Censuses - Explanatory Notes:  
<http://ec.europa.eu/eurostat/documents/3859598/5916677/KS-RA-11-006-EN.PDF/5bec0655-4a55-466d-9a00-fabe83d54649?version=1.0>

## **IV. Issues and challenges**

### **A. Measurement issues**

76. When more and more countries are collecting the census data with different types of collection methods and data sources, there will be challenges to ensure that the collection method does not affect the comparability of the results. Even with traditional censuses, when the form is exactly the same in the web and paper questionnaire, the respondents sometimes do not give the same answers. When we discuss different types of collection methods, like the register-based census, the combined census or the rolling census, the issue will be more problematic.

77. A related big challenge in the future is how to measure the different dimensions of census quality (in particular, accuracy and coverage) between countries/years when the census is carried out with different methods. Clearly, possible significant differences in census quality may affect also the comparability of the census results.

78. On the other hand, if we try to keep the data content comparable over time, how we are going to react to the changes of the world?

79. An additional challenge is brought by fact that the data content is limited by the characteristics of the enumeration. For instance, 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. On the other hand, in a register-based census obviously information is available only on topics that are included in the registers.

### **B. Managerial issues**

80. From the point of view of census managers the cost of the census is a very important issue – often the most important – especially in the current period of financial crisis. Many countries have identified census cost as a major challenge in the planning and conducting of their censuses for the 2010 round. This was the number one challenge in all regions of the world, in particular in the countries where the census was conducted using the traditional approach, which requires huge financial resources, in particular to pay the large number of fieldwork staff.

81. A possible long-term solution to reduce the cost of the census is to move towards the use of registers. In fact, the cost of a register-based census – once a high quality register-based statistical system is in place - is much lower than the cost of a traditional census. However, in order to create such system important initial investments are required and a long development process is normally necessary. Therefore, many countries are confronted with the dilemma whether it is worth or not investing resources to develop their registers (or create new ones if necessary) for possible use in future censuses. An accurate and detailed review of the content and status of the existing registers and administrative sources is necessary to assess their potential use for a population and housing census, and take a decision. Consideration should also be given to legal aspects and the acceptance by the public of the use of registers for the censuses. For these purposes, the experience and advice of countries that developed a register-based census – especially those having a similar social, administrative, and institutional context – would be particularly useful.

82. Another important managerial issue is recruiting and retaining skilled census staff. Population and housing censuses – regardless of the methodology used - need experienced, high-skilled and particularly permanent team. Permanency of the staff is necessary for

passing along experiences between census decades as well as following the recent improvements and professionalism. In addition, having experts within the NSOs census team who have skills related especially to using innovative technologies to adopt it in census methodology, to analyze data in timely and accurately, to be familiar with GIS technologies etc. will be a good advantage. Otherwise, outsourcing which is another important issue for NSOs is being used to take support mostly on IT related areas. For the field collection (except for register-based censuses) or editing process, enumerator pool can provide easiness in finding too many enumerators with expected skills.

83. The organization of census team can be discussed due to process' complex and unique structure. How a census expert should be defined related to a chosen method? Or what kind of experts should be included in a census team? Census operation may require wide knowledge of areas such as sampling, questionnaire design, data analysis, definitions of variables, field organization, IT solutions, GIS applications, etc. While being proficient in each area is difficult, census experts should have an idea or general knowledge of each area to shape the methodology, to be able to make connections on different dimensions of censuses and to find solutions on specific issues. The composition of the census team and the areas of knowledge of the staff clearly depend on the census methodology used. This should be taken into consideration in countries that consider possibly changes in the methodology.

84. For countries conducting the census in the traditional way, normally a certain number of staff members are recruited and trained to work for the census for a relatively short period of the 10 year census cycle. However, often it is not possible to retain this staff after the census. As a result, unfortunately, the knowledge accumulated while planning and conducting the census is lost. When other census methodologies are used, this is less of a problem. For instance, the register-based census and the rolling census require a number of census staff more or less constant over time, possibly with limited fluctuations.

## **C. Conceptual issues**

85. There are a number of conceptual issues that emerged from the review of the national experiences in the 2010 census round and the work for the preparation of the new recommendations for the 2020 round. Even though work was done recently on these issues in the framework of the new recommendations, some of them may still require further work either in the short-medium term (to help countries planning their next census and implementing the new recommendations) or in the long term, when the new recommendations for the following (2030) census round will be prepared. This section of the report briefly presents some of these issues.

### **1. Undercounting and overcounting of specific population groups**

86. Both traditional and register-based censuses – but also other census methods - have one common issue. It is the difficulty to measure exactly the number of people living in a particular area at a specific time. In a traditional census the population size is more likely to be underestimated, because some groups of people are not reached by the enumerators. On the contrary, in the register-based census the population registers tend to overestimate the population due to the fact that the emigration is not easy task to update in the population register. On the other hand, some population groups can also be missed by the register-based census, like illegal and undocumented migrants. Since this issue may affect the comparability of census results between countries using different census methods, work could be promoted in this field in the short-medium term (see Proposal 4 in the section “Conclusions and Recommendations”), so that some guidelines might possibly be agreed for consideration by countries in the next (2020) census round.

87. The following other conceptual issues would possibly require modifications to the international recommendations which have been adopted recently. Therefore, these issues could be considered for work in the long term when the new recommendations for the following (2030) census round is be prepared:

**2. Concept of usual residence and one year criterion**

88. Globalization poses new challenges for the data collection. People move often for work or leisure between and within countries, and may have more than one place of residence during the census year. It becomes increasingly common that people live in different places for shorter periods and even live in several countries at the same time. The one year residence criterion as a base definition of the usual residence will become not only harder to define but may become more or less irrelevant as an analysis variable. Problematic groups to be counted are also nomads, migrant workers, illegal and undocumented migrants, refugees and other populations groups outside the ordinary citizens groups.

**3. Different concepts of population base in traditional and register-based censuses**

89. With regard to the definition of the population, there are differences between the countries depending on the census method and the source of the data used. While for the countries using registers the population is defined by the criteria governing the inclusion in the registers (set by the authorities that maintain them), for countries which conduct field collection the population is based on 12 months criterion. International recommendations and EU regulations accept both, because this is directly related to country circumstances.

**4. Other conceptual issues**

90. Besides globalization, changes in society and in population life style will cause problems from the point of view of concepts or definitions. For instance an increasing number of people work from home, they do not have fixed workplace where they go every morning. How should the lifelong learning to be handled in the data collection?

91. Concept of work and the definition of employment status are constantly changing and will be even more difficult to define in the future. People are having multiple sources of livelihood at same time and there may not be any main employment for a significant part of the employed.

92. Family concept is changing when families become more diverse. Not only families with same sex couples, but also shared custody and other mixed types of families are no longer exceptions. For example children having a residence with both parents are becoming increasingly common. Many individuals will also have more than one family or one, two or maybe four parents.

**D. Methodological issues**

93. In many countries, an increasing reluctance of the population to participate in the census has been observed over the last few years. Also, the costs of the traditional censuses are so high that alternative approaches to conduct the census are planned by many countries.

94. At the moment, a significant number of countries with traditional census also have registers that could potentially be used for census purposes. Anyway, there can be problems of utilising the register data, because of the poor quality and the coverage. Other barriers to the use of registers are the lack of standardisation among different data sources, technical and legal problems, the limited data content of registers and political or public opposition.

For these reasons it can be expected that in the 2020 census round some countries will start using registers, while other will continue using the traditional approach (see also paragraphs 83-84).

95. Anyway, more and more register data will be available and used in the future for statistical purposes. In many countries, also among those with the register-based approach, there is a huge interest to the possible use of Big Data in the statistics production. Thus, it seems clear that approaches of different kind to conduct the census will be the future.

96. Moreover, the timeliness and frequency of updating census data becomes divergent between countries. While some of the countries are able to present annual figures on population characteristics, others continue to take decennial population censuses for obtaining and presenting the data in required detail. In scope of globalization, more recent data also become important for international organizations to compare countries. For instance, in the European Union as part of long-term post 2020 census strategies, some options are being considered that include annual data collections, either extensive or limited to restricted sets of variables. Work could be possibly promoted at UNECE level to discuss whether a similar approach could be extended also to countries outside the EU. This activity could possibly build on the work being conducted in the EU, and benefit from the experience of the countries that can already produce annual data, with or without registers.

97. One question is how to adapt the international recommendations (after the 2020 round) so that they are relevant to the different census methodologies?

## **E. Technological issues**

98. Technology directly affects and makes possible the use of different methodology and different data sources. From the planning to the dissemination all stages of the census are conducted in parallel with available IT solutions and capacity of the NSO in the means of both IT staff and infrastructure.

99. IT related activities such as combining huge data sets, testing and analyzing sources/collected data, monitoring/ reporting/ supporting field collection, capturing data, editing, presenting and disseminating results, etc.: these are all crucial points which add a lot in the way of having accurate, timely, qualified data with less effort. Also, related to collecting data a variety of methods are used during the 2010 round censuses. Usage of internet for self-completion of the census questionnaire or using a device (laptop, mobile/cellular phones, tablet and hand held devices) in enumeration process are common examples of IT usage.

100. The success of internet usage for self-completion of the census questionnaire is not only related to NSOs' IT capacity, but also related to public ability of access to internet and usability of internet. Sometimes, local circumstances act as a barrier to technological improvements in methodology.

101. For common methods which are planned to be used for next census round, best country practices can be determined and method-specific guidelines can be prepared with the coordination of international organizations.

## **F. Other issues**

102. A key dimension of statistical quality is *relevance*, which is usually defined as the degree to which the statistical information meets the needs of users (*CES Recommendations for the 2020 round of censuses*, para. 351). In case of the census, the consultations with users are particularly important because in the ten years that normally span between two

consecutive censuses the users' needs and priorities may change even significantly, reflecting also the societal changes. Apart from the census content, in many countries a key issue for users is the frequency of the censuses. Having results only every ten years may not be sufficient in the future for an increasing number of users. The *user needs* will add pressure to conduct censuses or other surveys to satisfy the need of "fresh" data more often than every ten years.

103. Legal frameworks are normally constructed at the national level through specific census legislation or as part of the generic statistical legislation, and are specific to national sources and circumstances. It has a very important role for planning the use of the register data for statistical purposes. For EU countries there is a Council Regulation on the free access to administrative data sources for statistical purposes. Anyway, even if there is also a national statistics law, which should give an access to the existing administrative sources, in practice it does not realise.

104. Participation of public or public approval is another discussion topic. The publicity campaigns may directly influence the public perception on population and housing censuses and increase participation, reassuring respondents about the confidentiality of personal data, safety of data collection and protection and respect of citizen rights. In recent years, non-response rates in censuses and the social surveys have increased in many countries. Register-based censuses from this point of view have the advantage that the population do not have to provide data. However, there must be public acceptance of this approach.

105. The cooperation at international level is becoming even more important in the means of obtaining comparable data and sharing the experiences. UNSD, UNECE and Eurostat are the main bodies which contribute to NSOs in their census activities. Determination of countries' needs, defining standards, bringing out solutions, creating discussion/ sharing platforms can be counted among the key roles of these organizations. When the rapid change of the world is taken into account, activities on the census should be continuous rather than decennial to be able to cope with variation of methods and sources.

## V. Conclusions and recommendations

106. During the last census round, many countries in the UNECE region have improved efficiency by using new census methodologies and advanced technology. However, some countries still face challenges including the rising cost of censuses, keeping abreast of ever-changing technology and rapidly changing lifestyles accompanied by the reluctance of respondents to participate and provide their personal information, and the increasing difficulty to enumerate certain population groups.

107. Even if the traditional approach will still be the most popular in the 2020 census round at global level, many countries in the UNECE region have plans to move totally or partly towards the use of registers in their censuses. Also there is the interest to use new technologies in the data collection. For the adoption of new methods for conducting the census, countries will need support in different areas. In occasion of the recent consultation on the new CES Recommendations, various countries indicated that they would like activities to receive technical support in the following areas:

- providing internet response option and designing electronic questionnaires
- using GIS technology, mobile devices, and other IT solutions
- methods of data protection in the delivering the small area data
- methods to give an access to the census micro data for researches

- assessing quality of administrative sources, for possible use in combined or register-based census

## A. Proposals for future work

108. In order to support countries in the planning of the censuses of the 2020 round, and in implementing the new CES Recommendations, it is proposed that UNECE promotes the following activities, in addition to the regular annual expert meetings:

(a) Regional training workshops in the areas listed in paragraph 110 above, to be organized in the period 2016-2017;

(b) Study tours for experts of interested countries, in the same areas and in the same period. The tours would take place in countries with extensive experience in the implementation of the specific methodologies/technologies;

(c) Preparation of guidelines on the use of registers for censuses, covering also the assessment of the quality of administrative sources. The new guidelines should build on the 2007 UNECE publication *Register-based Statistics in the Nordic Countries - Review of Best Practices with Focus on Population and Social Statistics*<sup>21</sup> (prepared by the Nordic countries) and cover also some forms of combined censuses. The guidelines could be prepared by a small task force of experts from countries with register-based or combined census, coordinated by UNECE and reporting to the existing UNECE Steering Group on Censuses.

(d) In addition and to complement the activities proposed above, it is also proposed that UNECE promotes a study on the impact of the census methodology on the comparability of census results across countries. The study could include a general assessment of the different dimensions of census quality (in particular, accuracy and coverage) for the main census methods. The study could be prepared by a small task force of experts representing countries that adopt the main census methodologies, coordinated by UNECE and reporting to the existing UNECE Steering Group on Censuses.

109. In future census rounds, it is expected that the diversity of methodologies among the countries and continents will increase further. That means that the harmonization of datasets for international comparability will be more difficult. An important question is therefore to what extent the diversification of census methodology affects the comparability of census outputs between countries (see also para. 89).

## B. Other areas to be considered for possible future work

110. More work must be promoted to integrate censuses with various statistical surveys and new data sources such as big data and mobile data.

111. The transition from traditional censuses towards a comprehensive or partly use of registers can be a complex and long process for many countries. A fully register-based census is not an alternative for most of the countries in the next census round. The use of sample surveys in a combined method that could be recommended to take into practice both in traditional and register-based countries as well. UNECE could organise a meeting or promote other activities for countries interested in developing their census to be able to use sample surveys in estimation of some census variables.

<sup>21</sup> [http://www.unece.org/fileadmin/DAM/stats/publications/Register\\_based\\_statistics\\_in\\_Nordic\\_countries.pdf](http://www.unece.org/fileadmin/DAM/stats/publications/Register_based_statistics_in_Nordic_countries.pdf)

112. Since the timeliness of population figures has become more important, some new guidelines about providing annual data with reduced numbers of indicators and reduced detail could be possibly developed for the countries that cannot provide regularly annual census data. This work could build on similar work currently being carried out at the EU level by the Eurostat Task Force on Future Censuses. A UNECE task force could be established on this subject and in particular experiences could be shared by the countries that can disseminate annual census data. In addition, rolling census or virtual census methods could be taken into account for the relevant countries which can meet the necessary conditions.

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