

Distr.: General  
08 August 2024

Original: English

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## **Economic Commission for Europe**

### **Conference of European Statisticians**

#### **Group of Experts on Population and Housing Censuses**

##### **Twenty-sixth Meeting**

Geneva, 2–4 October 2024

Item 2 (c) of the provisional agenda

##### **Revising the Conference of European Statisticians Recommendations for Population and Housing Censuses for the 2030 round:**

##### **Enumeration methods**

## **Developing the Recommendations on Enumeration**

### **Note by the Conference of European Statisticians Task Force on Enumeration Methods\***

#### *Summary*

This document includes the draft content on enumeration (both from the chapter previously entitled ‘Methodology’, and from relevant parts of the chapter previously entitled ‘Field and other operational activities’) for the Conference of European Statisticians (CES) Recommendations for the 2030 round of population and housing censuses, and a summary of the changes introduced in comparison to the Recommendations for the previous, 2020 round. The main purpose of the document is to elicit comments and suggestions from national census experts on the proposed text, to ensure that it reflects the needs and priorities of national statistical offices and the latest developments in the topic area.

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NOTE: The designations employed in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

## I. Introduction

1. Every ten years the Conference of European Statisticians (CES) issues Recommendations to guide countries in conducting their population and housing censuses. The Recommendations are developed by expert task forces overseen by the CES Steering Group on Population and Housing Censuses.
2. Section II of this document summarizes the changes introduced in the content pertaining to enumeration, in comparison with the Recommendations for the previous, 2020 round. Section III presents the draft chapter on census design and enumeration methods for the CES Recommendations for the 2030 round of population and housing censuses. Section IV presents the draft section on designing and delivering a census field operation.
3. The main purpose of the document is to elicit comments and suggestions from national census experts on the proposed draft text, to ensure that it reflects the needs and priorities of national statistical offices.

## II. Summary of changes from the 2020 Recommendations

4. In the 2020 Recommendations, the corresponding material was contained in the chapters entitled “Methodology” and “Field and other operational activities”.
5. The former chapter “Methodology” is proposed to be renamed to “Census design and enumeration methods”.
6. The former chapter “Field and other operational activities” is proposed to be removed in the 2030 Recommendations, its content being re-distributed into other relevant chapters. The present document contains text for a section “Designing and delivering a census field operation”, which contains part of the related material.
7. Reference is made to the Generic Statistical Business Process Model (GSBPM) that provides a framework for the methodology to be set in the context of the overall statistical design.
8. In the section on definitions, a paragraph was added to clarify what is meant by administrative and register data. This has become increasingly important, given how countries were using these sources and how the terms had been used interchangeably. The distinction of what is understood as a population register is essential.
9. A line is included about the possible need for a compulsory sample survey in a combined census. This would be important in the context of falling social survey response rates and the fact that the census can be unique in many countries by being compulsory.
10. The text on the combined census was updated considering the reported national experiences from the 2020 round. The focus was on differentiating between (i) the need to count the size of the population and (ii) the need to record the characteristics of the population.
11. It is proposed to redistribute the of the content of the former chapter “Field and other operational activities” into other relevant chapters. The present document presents a new related section “Designing and delivering a census field operation” (section IV), which provides recommendations on the field enumeration design. It also refers to hard-to-count groups where the standard enumeration approach may need to be adapted.
12. Recommendations on designing the field operations cover four main themes:
  - (a) Sequencing of field activity;
  - (b) Testing and rehearsal;
  - (c) Designing and training the field operation;
  - (d) Management information during the collection operation.
13. The proposal for enumerating hard-to-count groups is based on the model used by the United States Census Bureau in 2020. It has been adapted to make the names of the categories

more broadly applicable. In light of the large amount of reported country experience on adaptations for hard-to-count groups, this approach taken was to identify the aspects that must be considered, instead of trying to provide specific guidance for each group.

### **III. Draft text for the chapter on Census Design and Enumeration Methods for the Recommendations for the 2030 round of population and housing censuses<sup>1</sup>**

#### **A. Aims and objectives of a census**

##### **1. Role in national statistical systems**

14. 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.

15. The population and housing census represents one of the pillars for data collection on the number and characteristics of the population of a country, and should form a central part 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 country's population estimates programme. 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.

16. On 10 June 2015 the United Nations Economic and Social Council (ECOSOC) adopted a resolution<sup>2</sup> urging "Member States to conduct at least one population and housing census under the 2020 World Population and Housing Census Programme, taking into account international and regional recommendations relating to population and housing censuses and giving particular attention to advance planning, cost efficiency, coverage and the timely dissemination of, and easy access to, census results for national stakeholders, the United Nations and other appropriate intergovernmental organizations in order to inform decisions and facilitate the effective implementation of development plans and programmes".

17. An increasing number of countries now rely on data derived from administrative registers or sources 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. Moreover, census data is increasingly used for linkages with other data sources.

##### **2. Non-statistical functions of a census**

18. One of the Fundamental Principles of Official Statistics states that "individual data collected by statistical agencies for statistical compilation... are to be used exclusively for statistical purposes"<sup>3</sup> (see also Annex II). While the use of census data for administrative purposes would violate this Fundamental Principle some countries use the census operational infrastructure not only to collect statistical information for the census but also to collect information on individuals or households for the creation or updating of population registers. Countries who use the census operations in this way should consider:

- (a) Using two separate questionnaires for the two purposes;

<sup>1</sup> Cross-references internal to this chapter are given according to the numbering used in the present paper. For cross-references pointing outside the chapter, paragraph numbers or section titles in the counting of the 2020 Recommendations are given in square brackets. In both cases, it is understood that the cross-referenced paragraph numbers will differ in the final, published version of the complete 2030 Recommendations.

<sup>2</sup> ECOSOC Resolution 2015/10.

<sup>3</sup> General Assembly Resolution [A/RES/68/261](#) adopted on 29 January 2014, *Fundamental Principles of Official Statistics*.

(b) Clearly explaining to respondents the dual purpose of the census operations and that the information collected for the census will remain confidential and used only for statistical purposes;

(c) Ensuring there is a separate legislative framework for each of the operations; and

(d) Assigning responsibility for updating information required for administrative purposes to a different agency (one that is not the National Statistical Institute).

19. In some countries, in recognition of their sociological and historical value, census records are made available to the public after a period of closure (see paragraphs [314-316]). In doing so, a number of important issues arise; these are noted in the chapter on Dissemination, in paragraphs [146-148].

## **B. Definitions, essential features and phases of a census**

### **1. Background**

20. Traditionally, the definition of a census has been based on the basic principles of individual enumeration, simultaneity, universality, and defined periodicity. In the last thirty 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.

### **2. Definitions**

21. The '*population census*' is defined as '*the operation that produces at regular intervals the official counting (or benchmark) of the population in the territory of a country and in its smallest geographical sub-territories together with information on a selected number of demographic and social characteristics of the total population*'. This operation includes the process of collecting (through a field enumeration or the use of registered-based information), processing and aggregating individual information, and the evaluation, dissemination, measuring the precision, and analysis of demographic, economic and social data. In order to plan for, and implement, economic and social development policies, administrative activity or scientific research, it is necessary to have reliable and detailed data on the size, distribution and composition of the population. The population census is a primary source of these basic benchmark statistics, covering not only the settled population but homeless persons and nomadic groups as well. Data from population censuses may at times be presented and analysed in terms of statistics for a wide variety of geographical units ranging from the country as a whole to individual small localities or city blocks.

22. The '*housing census*' is similarly defined as '*the operation that produces at regular intervals the official counting (or benchmark) of all housing stock in the territory of a country and in its smallest geographical sub-territories together with information on a selected number of characteristics of housing*'. This operation includes the similar processes of data collection, processing and the aggregation of information related to housing, and the evaluation, dissemination and analysis of data related to the living quarters. The census should provide information on the stock of housing units together with information on the structural characteristics and facilities that have a bearing upon the development of normal family living conditions.

23. A '*population and housing census*' is thus the process that produces, at the same time, inter-related information on the population and housing stock as described above. This operation has the advantage of obtaining information on two universes (population and housing). The outputs of a census process related to the total population and housing stock are indispensable for providing statistics on the population, family, household and housing

situation on a uniform basis for small areas or population sub-groups. The characteristics of the population include geographic, demographic, social, economic, and household and family characteristics. For many countries, the outputs obtained through a census process are vital for providing such information since the census is the only source available and there are no other viable alternatives.

24. Since an increasing number of countries rely on data derived from registers and administrative data sources for their census, it is worthwhile to define the source. For the purposes of this discussion, a 'register' can be defined as 'a systematic collection of unit level data organized in such a way that updating is possible'. The term "population register" was defined by the United Nations as "an individualized data system, that is, a mechanism of continuous recording, and/or of coordinated linkage, of selected information pertaining to each member of the resident population of a country in such a way to provide the possibility of determining up-to-date information concerning the size and characteristics of that population at selected time intervals". Moreover 'administrative registers' are taken to mean 'administrative information systems used for decisions on individuals'. A register usually contains all units (persons, buildings, dwellings, enterprises, businesses etc.) relevant to that administrative process (e.g. register of foreign nationals) Administrative data is the by-product of the interaction with a government system be this a 'register' or another service such as a child's school place or paying tax. It is recognized that not all children will attend school and not all individuals pay tax.

25. Countries with a register-based census normally use a population register as the backbone for their census. Where population registers do not exist, countries are increasingly using linked administrative data and a series of rules to de-duplicate and determine which records and units should be considered as part of the usual resident population. The administrative 'Signs of activity' method is also used by countries that do have a population register but wish to assess and correct coverage errors of the population register through the use of other administrative sources.

### **3. Essential features of a population and housing census**

26. The set of essential features that makes a population and housing census unique is the following:

#### **(a) Individual enumeration**

27. Information on each enumerated person (and each set of living quarters) is obtained so that their characteristics can be separately recorded. This allows cross-classifying the various characteristics and obtaining data by more than one characteristic.

#### **(b) Simultaneity**

28. Information obtained on individuals and housing in a census should refer to a well-defined and unique reference period (or specific moment in time). Ideally data on all individuals and living quarters should be collected simultaneously. However, if data are not collected simultaneously, adjustments should be made so that the reported data have the same reference period.

#### **(c) Universality**

29. The population and housing census should provide data on the total number of persons, households and housing within a precisely defined territory of a country. The counting (or benchmarking) of the population should include every person residing and/or present in the defined territory of a country at a defined singular point in time (commonly referred to as the census day – see [paragraph 391]). The data on the basic level of enumeration provided by the census should be validated with an independent coverage check like a post-enumeration survey.

**(d) Small area data**

30. The census should produce data on the number and characteristics of the population and housing related to the smallest geographic areas of the country, and to small population sub-groups, consistent with the overriding requirement to protect individual confidentiality.

**(e) Defined periodicity**

31. The census should be taken at regular intervals so that comparable information is made available in a fixed sequence. It is recommended that census data be produced at least every ten years.

**4. Census phases**

32. Censuses conducted by means of a field enumeration do not necessarily follow a uniform pattern among different countries, but they have certain major common elements. They can be organized with the help of the Generic Statistical Business Process model (GSBPM) which describes and defines the business processes needed to produce official statistics.<sup>4</sup> Thus, in general, census operations can be divided into several phases which are not entirely separate chronologically or mutually exclusive. These are:

- (a) Involvement of stakeholders;
- (b) Preparatory work (including legislation, testing and outsourcing, contingency planning);
- (c) Enumeration;
- (d) Data processing;
- (e) Quality assurance of data prior to its dissemination;
- (f) Dissemination of the results;
- (g) Evaluation of the coverage and data quality; and
- (h) Analysis of the results.

33. It is important that appropriate quality assurance strategies (see [Chapter IV]) be applied in all these phases to make sure that all aspects of data quality (relevance, accuracy, timeliness, accessibility, interpretability, coherence) are taken into consideration, and that each choice made in all census phases is the best trade-off that achieves 'fit-purpose'.

**C. Strategic objectives and criteria for the selection of census topics**

34. Given the costs required and the massive involvement of the population, the content and the methods used in a census should be scrutinized carefully to make sure that all the aspects of collection operations and the dissemination of results comply with the highest standards of relevance, quality, confidentiality, privacy and ethics. Data should be collected using the most viable and/or cost-effective means. The content of a census should be decided after looking into:

- (a) The demand for data at national and local levels;
- (b) The availability of data from other statistical sources; and
- (c) The constraints of a census for data collection where (for enumeration-based censuses at least) only a limited number of questions can be asked on single topics and where sensitive or more complex topics that require extended modules and specialized training of interviewers can be covered only to a limited extent.

35. In addition to these three factors, the countries following the census and population statistics programme of the European Union will have to take into account possible

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<sup>4</sup> <https://statswiki.unece.org/display/GSBPM/Generic+Statistical+Business+Process+Model>.

requirements of that programme in terms of census content, aimed at ensuring international comparability of census results specifically among countries of the European Union.

36. Each census topic should meet a number of key user requirement criteria:

(a) The topic carries a strong and clearly defined user need, and is of major national importance and relevant at the local level;

(b) Data on the topic are required for small population groups and/or at detailed geographical levels, and are expected to be used in multivariate analyses with other census topics respecting data confidentiality principles;

(c) The data to be collected has been shown to be reliable and accurate;

(d) The content does not differ drastically from previous censuses and where appropriate any new or modified topic can still provide comparison with previous censuses.

37. The user requirement for data should be balanced against a number of other factors when evaluating what information can be collected from the census. A topic should NOT be included in a census if:

(a) It is sensitive or potentially intrusive, or requires lengthy explanations or instructions to collect;

(b) It imposes an excessive burden on the population, or seeks information not readily known;

(c) Its inclusion is likely to have a detrimental impact on coverage or the quality of the information collected;

(d) It enquires about opinions or attitudes; or

(e) It is likely to present major coding problems or extensive processing or significantly add to the overall cost of the census.

38. In addition to these factors, the census should be considered as an exercise carried out purely for statistical purposes, and should not, therefore, be used to collect data that will deliberately promote political or sectarian groups, or sponsor particular causes.

39. In those censuses where a paper census questionnaire is used, the limited space available on the questionnaire should be optimized; the design and size of a question will also be an important factor in a census questionnaire in deciding whether certain data can be collected.

40. The inclusion of any new topic should always be tested to ensure successful collection and production of reliable results. In general, a population and housing census should be seen as part of an integrated programme of data collection and compilation aimed at providing a comprehensive source of statistical information for economic and social development planning, for administrative purposes, for assessing conditions in human settlements, for research and for commercial and other uses. The value of the census is increased if the results can be analysed together with the results of other investigations.

41. A list of recommended topics can be found in [Annex I]. The list distinguishes between core and non-core topics and reflects the recommendations contained in [Chapters V-XV]. *Core topics* are those considered to be of basic interest and value to CES member countries, and it is recommended that these countries cover these topics in their 2030 round of population and housing censuses. *Non-core topics* are those topics that countries could select based on their national priorities (see also [paragraph 7] of the Introduction to these Recommendations). Some topics are referred to as *derived topics*. These topics are those for which information is obtained indirectly (that is, from the data collected on other topics), and therefore are not required to be collected separately. The derived topics are presented in general after the topics from which they are derived.

## **D. The relation between enumeration-based censuses and sample surveys**

42. While population censuses go back at least 6,000 years, as suggested by clay tablets found in ancient Babylon, the history of 'modern' censuses can be traced to the mid-seventeenth century. Sampling, in turn, is a more recent technique.

43. Traditionally, censuses started out as a simple enumeration of people. Over the years they grew in size and scope as users' demands for information on other areas of social and economic life in addition to basic demographic characteristics increased. Consequently, as new issues emerged, there were pressures to ask more census questions. Allowing for too many extra questions may result in exceedingly large census forms. This can cause concern for the quality of all of the information collected. Indeed, the advantages of simultaneous investigation of several topics can be offset to some extent by the additional burden on the respondent and the enumerator resulting from the increased amount of information that has to be collected at one time.

### **1. Use of long and short forms**

44. In order, therefore, to reduce the burden on the respondent when information is collected on many topics in a traditional census environment, the data collection could involve both a short form (with selected questions) and a long form (with more questions for specific topics). The long form is then completed only for a sample of dwellings, households or people.

45. The use of long and short forms has made it possible to collect more information while keeping planning, training and field operations relatively simple, and costs in check. However, in view of the increasing demand for information, this strategy may lead to new compromises since the number of questions contained on any long form cannot keep growing for reasons already explained. Should 'simultaneity' become an overriding principle, countries may wish to consider data collection involving a short form together with two or more longer forms (covering questions on different topics) and with each long form being completed for a separate sample of households or people. However, having more than one form introduces complexities in terms of designing the necessary 'interlocking' samples, keeping track of forms in the field, and weighting results to the total population. It also introduces restrictions for multivariate analysis.

### **2. The census as benchmark and sampling frame**

46. The value of either a population or a housing census is increased if the results can be used in connection with the results of other data collections. These could take the form of use of the census data as a basis or benchmark for statistics in the same field, or to furnish the information needed for conducting other subsequent statistical investigations. It can, for example, provide a statistical frame for other sample surveys or an agricultural census (see paragraphs [585–592]). If census data is used as a future sampling frame, it is important to inform census respondents that their data will be used in this way. As an example it has been noted that in each of Canada's recent censuses, post-censal follow-up surveys on disability or on aboriginal populations have been conducted using the census as the frame. The census is also important in developing the population estimates needed to calculate vital rates from civil registration data. In addition, these censuses are a major source of data used in official compilations of social indicators, particularly on topics that usually only change slowly over time.

47. The purposes of a continuing coordinated programme of data collection and compilation can best be served, therefore, if the relationship between the population census, the housing census and other statistical investigations is considered when census planning is under way and if provision is made for facilitating the joint use of the census and its results in connection with such investigations.

48. An essential ingredient of sample design is the existence of a complete, accurate and up-to-date sampling frame. A sampling frame is defined essentially as comprising the materials from which a sample is selected. It may be a list of structures, addresses, households, or persons. The census can be used to construct any of these lists. Indeed, most



countries use their census for such a frame. The census frame is almost always the departure point for the design of a household sample survey.

49. It is important to recognize, however, that any census – even one that is only one or two years old – will be out of date and may not be suitable as a frame. In such cases, it is essential to update the census frame with current fieldwork or with data from administrative records before using it as a frame for any household sample survey.

50. Population and household counts for the enumeration areas, taken from the census, are a highly useful ingredient to establish measures of size for the selection of first- or second-stage sampling units, or to help in various stratification schemes. Whenever the census captures socio-economic information, this can be used to complement such stratification schemes. Population and household counts of a census can also be used to calibrate weights calculated in sample surveys.

### **3. Inter-census surveys**

51. Regardless of whether or not information, historically, on a wide number of topics was collected simultaneously, the rapidity of current changes in the size and other characteristics of populations and the demand for additional detailed data on social, economic and housing characteristics that are not appropriate for collection in a full-scale census has maintained the need for continuing programmes of inter-census household sample surveys.

52. The population and housing census can provide the frame for scientific sample design in connection with such surveys; at the same time, it provides benchmark data for evaluating the validity of the overall survey results as well as a base against which changes in the characteristics investigated in both inquiries can be measured. To permit comparison of census and survey results, the definitions and classifications employed should be as similar as possible, while remaining consistent with the aims of each investigation.

## **E. The relation between population and housing census and the agricultural census**

53. While the population and housing censuses have a close inter-relationship, their relationship with the agricultural census is less well defined. However, as the result of increasing integration within programmes of data collection, this relationship is in some countries now closer than in the past, and these countries are increasingly looking at new ways to strengthen this relationship.

54. The relation between population and housing census and agricultural census is discussed in [Chapter IX] in which two non-core topics are presented for consideration by countries that may want to collect in the population census some information on agricultural activity, that could be used for instance for a subsequent agricultural census.

## **F. Methodology approaches in the UNECE region**

55. There are three basic approaches to conducting a census, based on the method of data collection:

(a) The traditional method of full enumeration (whether or not supported by registers as frame or control only) based (generally) on a field operation at a given moment, with an exhaustive collection of either all characteristics, or of some basic characteristics with a collection of other characteristics on a sample basis (long form/short form). The term 'field operation' here is used generally and would include a census where the data is collected primarily online with little or no enumeration activity carried out physically in the field. This approach (referred to as an "enumeration-based census") also includes alternative enumeration methods applied in two large countries:

(i) A traditional (short form) enumeration with annual updates of characteristics (long form data) on a sample basis (United States); and

(ii) A rolling census where information is collected by a continuous cumulative survey covering the whole country over an extended period of time (years) rather than on a particular day or short period of enumeration (France);

(b) A combined approach with integration of data taken from registers and/or administrative sources and field enumeration (whether complete/full field enumeration or ad hoc sample surveys) for selected variables and/or for completing/assessing the quality of the population count); and

(c) The method of using registers and other administrative sources (either exclusively or supported by data from existing sample surveys for selected variables).

56. These approaches are described below. Necessary conditions, advantages and disadvantages, implications for the phases of census taking, and implications for content are addressed for each approach.

57. Whichever method of data collection/data provision is to be used, countries should take into account a wide range of issues such as:

- (a) Users' needs;
- (b) Quality of the data;
- (c) Completeness of the count;
- (d) Data protection and security;
- (e) Comparability of the results between countries and over time;
- (f) Burden on the respondents;
- (g) Timeliness of outputs;
- (h) Costs;
- (i) Political and legislative implications; and
- (j) Public understanding and acceptance.

58. The results of the UNECE Online Survey on National Practices in the 2020 Census Round, carried out in 2023,<sup>5</sup> show that the traditional enumeration-based census approach was adopted in only less than half of the countries in the UNECE region. Registers and administrative sources thus now play a more prominent role in census taking than in previous census rounds, and it is likely that this trend will continue in the future. Indeed, since the previous census round, 5 more countries have joined the 'register-based census' group (from 9 in the 2010 round), while the number of countries conducting a census entirely based on full field enumeration, almost halved from the previous round (19, from 35). This trend was accentuated by the COVID-19 pandemic which forced many countries to adapt or complement their census methodology on very short term.

59. Even among those countries planning to continue with a fully enumeration-based approach, several reported in the UNECE survey that they would introduce significant methodological changes that will utilize additional sources of administrative data to develop information to support a conventional enumeration. The administrative sources would then be used as frame or control only.

60. Whatever the methodology to be applied, most countries in the UNECE region will continue to collect information on both each individual person and on housing through the same operation.

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<sup>5</sup> The results of the survey have been presented in a number of [papers discussed at the UNECE-Eurostat Group of experts on population and housing censuses](#), Geneva 20-22 September 2023.

## G. The enumeration-based census

### 1. Description

61. The enumeration-based census is the total process of collecting (by means of a full field enumeration), processing, evaluating, disseminating and analysing demographic, economic and social data pertaining, at a specific time, to all persons and the housing stock in a country or in a well-delimited part of a country. It is taken in a given limited period immediately near to a given reference date (census day). Data are generally recorded on census questionnaires, being either in paper or, increasingly, electronic format, or via a secure online service provision. There are two major methods of enumeration:

(a) Where the information is recorded directly by an enumerator (or interviewer);  
or

(b) Where the household members complete the questionnaire on their own (self-completion).

62. In the enumerator method, information for each individual (in a population census) and for each set of living quarters (in a housing census) is collected and entered on the questionnaire by a census official designated to perform this operation in a specified area during a specified and (usually) short period of time to meet the requirements of universality and simultaneity. In the self-completion method, the major responsibility for entering the information is given to a responsible person in the unit being enumerated (usually the head of the household or some other 'reference' person), although the questionnaire may often be distributed, collected and checked by a census official.

63. Questionnaires can be distributed either by post or by enumerators. In the 'more traditional' censuses, addresses are listed by enumerators who also conduct the enumeration or drop off questionnaires, but many traditional censuses now use either pre-existing national address lists, or a register that is purpose-built for the census, in all or part of their enumeration. The method adopted will depend on whether the census address list is based on an official postal address list or on the National Statistical Office's (NSO's) own address database. It may also depend on the quality of the list(s); coverage may be weak or even entirely missing in some parts of the country.

64. A postal service should be used to distribute the census forms only when a comprehensive up-to-date and nationally agreed list of addresses is available or can be prepared. In enumeration-based censuses, a big problem used to be how to cover uniquely all addresses in the country as there might exist many types of address lists in a country made for different purposes. For this reason, it may be necessary, in some cases, to undertake a field verification of address lists before the census. However, this is costly, and a cost/benefit analysis of carrying out such an operation is important. In other cases, instead of address checking, using enumerators for capturing new addresses during the enumeration might be a better approach than using the post for delivering questionnaires.

65. If an address list is not judged adequate for delivery of questionnaires by post, then enumerators should deliver them. In this situation, when an address list is available a decision must be made regarding how exactly to use that list. Alternatives include: ignore it; undertake a pre-enumeration address checking operation; or provide it to enumerators and ask them to update it as they drop off questionnaires.

66. Another consideration might be to outsource the delivery to an official postal service provider. Questionnaires can be collected by enumerators, or can be sent back by post or can be delivered by the respondents to an agency (either the NSO itself or to a local government collection point) or online in case of Internet data collection. Traditional methods can use these delivery and collection methods depending on the circumstances.

67. In some countries, postal distribution of the questionnaire, with or without postal return, is used in conjunction with the self-completion method. This mail-out and mail-back procedure can be used exclusively or combined with on-site checking by a census official.

## 2. Necessary conditions

68. Both short and long forms may be used within the context of enumeration-based censuses, or there may be an exhaustive collection of all characteristics data. If the former approach is used, the short form should contain only those questions intended for universal coverage, while the long form may be used to collect a wider range of information only from a sample of households and population. This form usually contains detailed questions on particular topics in addition to covering complex enquires such as fertility or disability. Both are utilized during the same time frame of the census, with no content data collected outside of that time frame.

69. The enumeration-based census approach to census-taking is the one that in the 2020 round was adopted by less than half of the countries in the UNECE region. However, it has a long-standing tradition of use, and is more fully described in the United Nations' Principles and Recommendations for Population and Housing Censuses.<sup>6</sup>

## 3. Advantages and disadvantages

70. The main advantages of the enumeration-based approach are in providing a snapshot of the entire population at a specified period and the potential availability of multivariate data for relatively small areas and population sub-groups.

71. Enumeration-based censuses have been singled out as the most elaborate, complex and costly data collection activity that national statistical offices undertake. In addition to the cost, this complex task requires full awareness and cooperation of the public to participate in it. Because of their complexity and expense, such censuses are usually carried out only once every five or ten years, so that even the most recent census data available are often several years out of date.

72. Each enumeration approach (interview or self-completion) also has its own advantages and limitations. The interview method is the most common practice for collecting data and may result in good quality data if the enumerators are well trained. This is the only approach that can be used in widely illiterate populations or in other population groups that may be unwilling to complete the census forms themselves, or find it difficult to do so. However, this usually requires a large number of field staff and public acceptance in letting the enumerators enter their home.

73. On the other hand, in countries where literacy is virtually universal and educational attainment relatively high, the self-completion method may often yield reliable results too, at substantially lower field costs, particularly if a mail-out/mail-back procedure can be used. This method is often preferred by respondents, who find that completing the questionnaire by themselves is more convenient than waiting for the enumerator, and offers a greater degree of confidentiality. However, notwithstanding the potential to reduce general costs, the census agency must design the questionnaire, instructions and related materials so as to be user friendly, encourage response, and minimize respondent error and item non-response. To achieve these results, a thorough questionnaire testing programme is necessary.

74. It may sometimes be desirable to rely on one method for enumerating most of the population and to use another method in certain areas or for special groups of the population.<sup>7</sup> However, overly complex designs should be avoided.

## 4. Implications for the various phases of census-taking

75. The decision regarding the method of enumeration to be employed should be taken at a very early stage in planning on the basis of thorough testing of the various alternatives in terms of their costs, the quality of the data produced and their operational feasibility. Even where a method has been followed traditionally, it is well to periodically reassess its relative advantages in light of current census needs and changing techniques. An early decision is required because the method of enumeration used affects the budget, the organizational

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<sup>6</sup> Principles and Recommendations for Population and Housing Censuses: the 2030 Round - Revision 4; United Nations, New York 2025 (to be updated when new version is published).

<sup>7</sup> Ibid.

structure, the publicity plan, the training programme, the design of the questionnaire and, to some extent, the kind of data that can be collected. Especially when using several types of data collection, testing the public acceptance of the methods used is important as it affects the number of enumerators employed and thus the costs.

76. Timing and length of the enumeration period is of great importance. The main consideration should be to select a period in which the census is likely to be most successful in terms of coverage and quality of the data collected. This may depend on a number of factors. Firstly, it is necessary to avoid those seasons in which it will be difficult to reach inhabited areas, or in which the work will be particularly arduous, because of severe or extreme weather conditions.

77. Secondly, a time should be chosen when most people are staying at their place of usual residence; such a choice will simplify the census operations both in a *de jure* census (where people are enumerated at their place of usual residence whether or not they are present there at the census reference time) and in a *de facto* census (where people are counted where they happen to be present at the census reference time). The season of peak agricultural activity should be avoided because of the difficulty of contacting persons who, at such times, work late every day and who may even stay on their land at night if the land is far from home. Periods of traditional holidays, festivals, pilgrimages and fasting are also unsuitable times for the census enumeration. Exceptions could be made for specific traditional holidays for nomadic populations (for example, the "day of "reindeer herder" in Russia), when the population groups are assembled in certain places for a short period of time. Where a *de facto* census is carried out it will be necessary to request each person enumerated away from home to state their usual residence address and code this address to a detailed level of geography to ensure that usually resident population counts can be calculated at a detailed level of geography. Usually resident persons who are abroad on census night for a period of less than 12 months should also be counted. This can be achieved for example by requesting details of the person absent on census night from the household.

78. It is very important that the timing of the census should not overlap with major political events such as state or local election campaigns, since the population may confuse the two events and be less responsive to the enumerator at home. Unfortunately NSOs may have sometimes little or no control over this. It is also very important that the census should be taken within a stable political and socially secure environment in the country. In times of political or military instability the public are less likely to be compliant and the security of enumerators may not be guaranteed. The level of security should allow enumerators to reach all parts of the country safely.

79. Once a particular census has been taken successfully and the census date is found to have been on the whole satisfactory, the next census should be taken at a similar time of the year, unless there are strong reasons for changing this date. A regular census date enhances the comparability of the data and facilitates analysis and also provides administrative discipline, motivating all those involved in the census to make necessary preparations in a timely manner.

80. It is desirable to keep the enumeration period short in order to minimize double counting and omissions, which can occur in spite of a precise reference date. On the other hand, the shorter the enumeration period, the greater the size of the field staff that has to be employed. This increases the cost and may lower the quality of the data. How these different considerations should be reconciled depends on the size and nature of the country and on the resources at its disposal.

81. In recent censuses, most developing countries have allowed about up to ten days for the training of enumerators, while the enumeration period itself has generally varied from a few days to two or three weeks. Short periods are sometimes feasible in small countries while longer periods may often be necessary in countries where the population is much more widely dispersed.

## 5. Implications for content

82. The enumeration-based approach to census-taking creates, generally, fewer content limitations than those that might be found with a register-based approach. However, overall

content in this approach must result from a careful balance between the statistical requirements of users and the desire to minimize respondent burden.

## **H. Traditional enumeration with yearly updates of characteristics**

### **1. Description**

83. This design – as adopted in the United States - is a variation on the traditional census design described above and focuses on counting the population and collecting only the basic mainly demographic data in the census year. A large household survey then collects and tabulates detailed demographic, social, economic, and housing data every year throughout the decade, replacing the need for a census long form to collect this detailed data from a sample of the population.

84. Depending on the needs of the country, the survey may sample addresses yearly or at some other interval to yield detailed characteristic data in years between censuses. The approach in the United States was to approximate a long form sampling rate based on cumulating data collected annually spread equally over a five-year period. Other approaches may utilize a lower sampling rate during non-census years and spike during census years or other designs. In the latter design, data may only be released for higher levels of geography for some years between censuses and then for lower levels of geography in other years. For example, they may only release lower levels of geography in the year of the census. Other examples have considered rolling samples by geography where complete data are published by region of the country.

85. The survey data must be weighted to produce reliable and usable estimates. Survey data are weighted to reflect the sample design, to adjust for the effects of non-response, and to correct for survey under-coverage or over-coverage. This final weighting adjustment helps to ensure that estimates of the characteristics are comparable to official population estimates. Once the final weights are applied, the statistics are then generated, including population estimates, proportions, means, medians, and ratios.

### **2. Necessary conditions**

86. Among a number of necessary conditions, this approach requires the agreement of census stakeholders and government policy makers to introduce such a major variation in design. Users of traditional census data products should understand the consequences of, and be willing to accept the transition from, once-a-decade products to such a new set of annually updated multi-year products. The users' desire for more timely data leads to a cost of more complexity (in terms, for example, of one-, three- and five-year estimates). This approach requires annual funding, rather than funding clustered in a one to three-year period each decade. The funding level is thus smoother over the years than it was previously.

87. In order to adopt this method a country also needs to have high quality population estimates at lower levels of geography that will be used to control the results of the survey. These population estimates also need to be kept up-to-date from year-to-year. Operationally, this approach requires an address frame for sample selection. It is critical that this frame not only be maintained but kept up-to-date from year-to-year, especially in rural areas.

88. Conducting a traditional enumeration with yearly updates of characteristics requires an on-going high level of professional staff throughout the decade to support the implementation of the survey. In addition, it requires staff to oversee a programme of early and comprehensive planning, development and testing designed to continually seek efficiencies in the management and performance of the short form component of the census.

### **3. Advantages and disadvantages**

89. The primary impetus for this approach is twofold: to provide more frequent and relevant data on the population than is available from a census that is conducted only once a decade, and to reduce the operational risks associated with the census. Such an approach requires a multi-year programme of comprehensive planning, development, and testing. In the United States with its long-standing statutory requirement for complete counts of the

population at prescribed intervals, the complete count component of the census design is crucial.

90. In a traditional census design, even when detailed census data are released as soon as possible after the census year, data users are required to work with results that are, on the average throughout the decade, seven years old. The production of more timely data to support decision-making at all levels of government is a major motivation for this approach. These timely and, therefore, more relevant data can greatly enhance the value of the information to government officials, policymakers, and businesses that are currently obtained from a once-in-a-decade long form.

#### **4. Implications for the various phases of census-taking**

91. This design transfers to the on-going survey the responsibility to provide estimates of detailed demographic, socio-economic and housing data throughout the decade. This transfer eliminates the data collection, data processing and tabulation responsibilities for these data from the decennial census enumeration. Removing the responsibility for the collection of detailed data from a sample of the population as part of the census will allow the short-form-only census to focus more directly on meeting the most basic census objectives. Innovations, including the use of some new technologies, may become possible when the census task is limited to short-form data collection. Eliminating the need for the census to capture, process, and tabulate detailed data from the whole population will reduce the processing workload and allow the census to develop processing methods specific to the short-form requirements. The time required for the tabulation and release of census data should also be dramatically reduced. The focus of the census office thus switches to an on-going smaller (although still substantial) activity instead of a very large spike of activity every 10 years.

92. Many components of the previous (enumeration-based) census, however, should still be coordinated across the operational period surrounding the short-form census and the survey (throughout the decade). This includes consultation, outreach, promotion and publicity, and partnership programmes designed to increase stakeholder and public cooperation and awareness. It also includes maintaining a master file of addresses that must be updated regularly.

93. The fact that the survey is on-going throughout the decade provides an opportunity to develop a strong foundation to support data collection during the year of the census. Information obtained from the survey itself (for example, language spoken) can be of great use in planning for data collection in the census year. The survey-taking experience can be used to better allocate resources during the census.

#### **5. Implications for content**

94. As with the census long form, the on-going survey can provide data on a wide variety of socio-demographic topics including household and family composition, income and poverty, educational attainment, work and unemployment, disability, migration, and housing. In the most obvious approach, the content of the survey, designed to meet national needs, will be that of the census long form it replaces. Requirements for adding to, or revising, the topic content must be clearly defined and determined well in advance of its implementation since a survey that relies on aggregating sample data for multiple years to support the production of estimates cannot easily accommodate short-term content changes.

### **I. The rolling census**

#### **1. Description**

95. A rolling census – as adopted in France - represents a further alternative approach to the traditional model of census taking by means of a cumulative continuous sample survey, covering the whole country over an extended period of time rather than an enumeration carried out simultaneously in all areas relating to a specific reference date. There are two main parameters in a rolling census:

(a) The length of the period of time, which is linked to the frequency of update required; and

(b) The sample rate, which depends on the budget and the geographical levels required for dissemination (country, regions, towns, local areas, etc.).

96. For example, it is possible to build a sample framework in order to produce national results with a single annual survey; regional results by cumulating a few consecutive annual surveys; and small area results by cumulating a more substantial number of years' data. An annual survey may be conducted over the course of a year, or in a particular month or shorter time frame.

## **2. Necessary conditions**

97. The conditions necessary for the successful implementation of a rolling census methodology depend on the complexity of the sample framework. If the sampling units are addresses, a master address file is a necessary prerequisite. But if the sampling unit is larger, for example at the municipality level, it is only necessary to have enough information to spread the municipalities over the different years as each will be representative. However, it will be necessary to explain to the users of census data what the consequences will be and how they should use these data, because it is likely that they will be more used to snapshot data rather than periodic cumulative counts. It is important that users understand the methodology (as is the case, of course, with any census design) so that they will continue to have confidence in the data.

## **3. Advantages and disadvantages**

98. The main advantage of the rolling census approach is the greater frequency of updating data: a traditional census provides decennial, or sometimes quinquennial, benchmarks, whereas the rolling census can provide annual updates. Furthermore, it offers the possibility of improving the census process year by year; introducing new topics as and when they become relevant; and adopting new technologies as they emerge. The rolling census also allows for the deployment of permanent teams that can focus on the continuous evaluation of data quality and the training of field staff.

99. A major disadvantage, however, is that the essential feature of simultaneity is lost in that it no longer provides a snapshot of the whole population, at any one time, thus complicating comparisons between areas due to different enumeration periods. However, a range of mathematical techniques (for example, averaging and/or projections and/or interpolation) may be employed so that the data are a statistical depiction of the average situation at any one specific period of time. Also, as the rolling census covers the whole country over a long period of time, any respondents that move may be surveyed several times, while some other people will not be captured by the census at all, resulting in the potential loss of another of the essential features of the census, universality, unless careful methodological adjustments are made. For these reasons, the rolling census demands a sophisticated methodological design, yet is one that can be readily acceptable to users.

## **4. Implications for the various phases of census-taking**

100. It is better to introduce a rolling census just after a full enumeration-based census, in order to reap the benefit of recent information from which to build the sample framework. As the operational process is annual (or continuous), it must be very carefully prepared, since any delay can be problematic for the following stages.

## **5. Implications for content**

101. A rolling census is able to include all usual census topics and (as noted above) there is the possibility of changing the questions more regularly than in a decennial cycle. This enables the census to be more reactive to changes in social conditions and the needs of users, even if comparability over time must be preserved. However, for regional information, data for a number of consecutive years have to be aggregated and that implies the need for some stability in the content of the questionnaire. Depending on the organization of the census, it may be possible to add some thematic surveys.



## J. The ‘combined’ census approach

102. The ‘combined’ category includes many census approaches quite different one from the other, e.g. there are countries producing a fully register-based count and combining registers and survey data for producing census variables, and countries conducting a complete field data collection using the registers/administrative sources to complete the count/impute the population missed by the field enumeration. Sometimes different approaches are used for the population count and for the census variables, even though in the 2020 round most countries used both sources for both the population count and census variables, even though the balance of data collected from each source varies from country to country.

103. The majority of the countries that adopted a ‘combined’ census approach used a combination of registers and full-field enumeration. While many countries utilizing the traditional approach employ administrative lists, such as address lists, to support the enumeration (but do not use administrative data to derive directly the census data), the essence of this type of ‘combined’ census approach is to make use of population and other registers relevant to the census in order to directly produce census results (with the aim of reducing costs and to lessen the response burden). This is complemented with exhaustive field data collection, with the aims of improving the accuracy of population counts, and obtaining data on

## K. The ‘combined’ census approach: registers and a full field enumeration

### 1. Description

104. The approach of combining registers and a full field enumeration is likely to be one of the most complex and expensive approaches. In effect the approach though does combine the benefits of regular high-quality register-based population counts with the granularity of data provided by a full enumeration.

105. If data collected in the full enumeration are used to update population or other registers, this may violate one of the Fundamental Principles of Official Statistics stating that “*individual data collected by statistical agencies...are to be used exclusively for statistical purposes.*” The legislative requirements to support this approach are noted in paragraph 108 below.

106. There are two major differences between this particular combined approach and the similar methodology using a combination of administrative registers with sample surveys that is discussed in paragraphs 117-125 below:

(a) Variables not available from administrative registers are obtained through an exhaustive field operation, as in an enumeration-based census; and

(b) The population count based on the population register is not necessarily accepted as the best possible, but should be checked and corrected against reality through the complete enumeration. The census thus acts as an exhaustive evaluation of the coverage of the population register, and allows for the reduction of both under-coverage and over-coverage.

### 2. Necessary conditions

107. The main technical and legal conditions for this type of census to be practicable are:

(a) The availability of a population register: this need not necessarily be completely reliable for demographic purposes, but it must be reliable enough to serve as an initial means for determining how many people will be counted and where; and

(b) Other administrative registers usable for census purposes: examples include tax lists, social security files, unemployment registers, educational qualification records, and so on.

108. This type of census, with regard to its relationship with the population register, has two variants, depending on whether the census is simply supported by the population register,

or the benefits are mutual, such that the population register uses the census operation to update and improve its information. In the latter case, two additional conditions are required:

(a) The specific legislation governing the census and/or the population register must explicitly provide such use of the census operation to update the population register while preserving the statistical confidentiality in the strictly census-related information;

(b) Technical measures must be applied to ensure that the population register information to be checked, and which will be used for both (administrative and statistical) purposes, is treated in a proper and different way, throughout the whole operation. In questionnaire design this may be achieved by isolating the population variables on specific pages. In the processing phase, files containing personal identifications should not contain statistical information.

### **3. Advantages and disadvantages**

109. The population counts in this approach may be more precise than in a wholly enumeration-based census because of the generally more up-to-date information contained in the population register that helps to minimize coverage error. It may also be more accurate than in an exclusively register-based census (because of the checking against reality that a complete enumeration provides, which could correct for accumulated errors in a population register).

110. Information not available from a combination of data taken from registers is obtained from a traditional field operation approach, thus permitting maximum geographical and statistical detail.

111. The longitudinal perspective that the use of registers provides is also present in this census approach, for example by using the population register as the frame.

112. Disadvantages arise from the intermediate-point condition of this approach. For example, such combined approaches are much more expensive than exclusively register-based censuses, because of the cost of the field enumeration component of the data collection operation. However, they will generally be cheaper than the wholly enumeration-based census since the knowledge of the location where every person is registered permits the use of more efficient collection methods.

113. Response burden, other factors being equal, also falls somewhere between the minimum imposed in those censuses without any specific data collection operation and the maximum for censuses with a full enumeration and no administrative information support.

### **4. Implications for the various phases of census-taking**

114. Pre-filling questionnaires with population register information is a complex technical task, especially when associated with the large census volume and with the constraints imposed by available technology. In addition, problems of personal data confidentiality might arise if some pre-filled data about other household members was accessible to the respondent or to other persons living in the particular dwelling being enumerated. However, pre-filling has the potential to reduce the response burden and fieldwork costs.

115. Implications for content - The combination of registers and a full field enumeration permits maximum flexibility in the topic content, while reducing the response burden in comparison with a wholly enumeration-based census collecting the same information.

116. Compared with the method of combining registers and sample surveys (discussed below), the main advantage is the complete geographical coverage and conceptual detail of all the variables, whether available in the registers or not.

## **L. The 'combined' census approach: registers and sample field data**

### **1. Description**

117. Some countries create census type statistics by using registers and/or other administrative sources, together with information from sample field data for selected

variables. This option is (like the combined census with full field enumeration described above) used by countries that do not have all census information available in registers. If this option is chosen, some census tables are produced by counting from register information and/or deriving information by integrating registers, while for other census tables information from sample field data have to be weighted to population totals. This is, however, only one way to merge register and survey data to obtain census-type results. Some countries (such as Italy, Israel and Switzerland) use a population register as the basis for the population count, and a census sample survey to evaluate the accuracy of the register addresses (and in some cases to assess the population register coverage errors), and to collect data on census variables not available in registers (and in some cases to check the quality of variables available from registers).

118. The sample size should be determined in such a way that the precision obtained for variables collected in the sample survey quality objectives. It should also be pointed out that this combined census approach can produce more frequent statistics if repeated more frequently than a full enumeration.

## **2. Necessary conditions**

119. Legislation provides a key foundation for the use of administrative data sources for statistical purposes. As with the case of the use of registers with a full enumeration (discussed above) national legislation should allow the use of existing administrative data sources for statistical purposes rather than the re-collection of data whenever it is possible. Such legislation should also give powers to the NSO to access administrative data at the unit level with identification data to link them for statistical purposes. Furthermore, the appropriate legislation should provide a detailed definition of data protection. A country should only choose the option of a combined census if all variables not available in the administrative register sources can be captured in one or more census sample surveys. Moreover, it is a prerequisite to be able to link the information from the different sources at the unit record level.

120. Legislation may also be required if countries decide that to achieve response rates in the survey equivalent to those in a full enumeration census, response is made compulsory. Recent declining response rates in social surveys make such an option particularly important to consider.

## **3. Advantages and disadvantages**

121. The advantages of a combined census with sample field data are that it is much less costly than a census with full field enumeration and imposes less of a burden on respondents. An enumeration-based census can face many privacy objections to the seemingly intrusive collection of personal (and sometimes potentially sensitive) information. This increases the extent of non-response. There are generally fewer objections, and less risk of non-response, to a combined census in which data are collected only from a sample of the population. It may be the case that data from such a combined census will provide sufficiently reliable results, because they are derived to some extent at least from registers covering the whole population.

122. A disadvantage is that this option may require more processing to produce the tables from the microdata as weighting problems may arise or, in case of integrated use of survey data and register data, the need of statistical modelling. Furthermore, depending on the size of the sample, it might not be possible to ensure the same geographic and statistical detail allowed by the full-field enumeration. Moreover, it may be more difficult to raise public awareness of the census as only a sample of the population will be involved in the enumeration element.

123. Another disadvantage may be a loss of precision for the variables collected in the sample survey. However, in the case of a yearly combined census, pooling of several (e.g. 3 or 5) yearly samples considerably increases the precision, though at the expense of being able to detect change over time.

#### **4. Implications for the various phases of census-taking**

124. Adopting a combined census approach is likely to be a lengthy undertaking. There are also a significant number of dependencies such as data availability and confidence that a supplementary survey will provide the required quality. Nevertheless, once implemented, it is normally quicker to produce results from a combined census with partial enumeration as this has the advantage that fewer questionnaires need to be checked and processed. However, because only sample information is available for some variables it is sometimes impossible to meet the level of statistical and geographical detail required by users.

#### **5. Implications for content**

125. As some required variables may have to be constructed from different administrative sources, the information derived from registers may be rather different from the result obtained if everybody in the country provided direct responses. This implies that some extra data processing will be required if the results are expected to be comparable. If this is not done successfully, it may damage the comparability of the results among countries and over time. Registers have, on the other hand, the advantage that, generally, the information on the registered population is complete. It is becoming more and more advantageous if NSOs can make wider use of registers where they are relevant and suitable for the census.

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

#### **1. Description**

126. The development of a wholly register-based population census system is a long process, which might take many years or even decades. Many countries will choose to continue to retain elements of an enumeration-based census in some way even when they start moving towards a register-based approach. The first data items to be taken from registers can be addresses, basic demographic data items, civil registration information, and income data. Usually, the share of administrative data increases stepwise census by census. It is essential, however, that countries have introduced a comprehensive and high-quality population register and a system of common identification numbers before they can attempt to link data from different administrative sources. The continuous updating of registers together with communication between the register systems must be effective.

127. The register-based population census system 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. These registers may include the data maintained in a population register and a register of buildings and dwellings, as well as data from a business register. Such registers should cover all people resident in the country (although the criteria for determining 'residency' in a population register may vary from country to country), the buildings and dwellings in the country, and all the business companies (including all the institutions in the public sector) and their establishments. All statistical units should be linked to one another by means of the identification systems: there should be the capacity to link persons to household-dwelling units and to the dwellings and buildings in which they live, and for employed persons to be linked to their employers. Employers and buildings also need to be linked in order to determine workplace. Similarly, all units should be geographically located by using local area codes or map coordinates.

128. Among register-based countries, a few also use some data from pre-existing sample surveys to produce census variables that are either missing, or cannot be accessed, from registers. The difference between this approach and the one mentioned under the combined approach (where ad hoc sample surveys are conducted in order to collect data for information not available from registers) is that such data amount to only a very small proportion of the variables.

129. Population census data are produced using the method of register estimation in which several register and/or administrative sources are used simultaneously to define, for each statistical unit, the value of the relevant variable. The decision rules should be defined in such a way that the data they produce come as close as possible to the data collected by means of

traditional census questionnaires. Data from earlier population censuses and register data from the same point of time should also be consulted in constructing these rules. These include rules on prioritisation between different sources in the event of contradictory data.

## 2. Necessary conditions

130. Legislation provides a key foundation for the use of administrative data sources for statistical purposes. National legislation must allow access to, and the use of, existing administrative data sources for statistical purposes rather than the re-collecting of data whenever it is possible. Such legislation should give powers to the NSO to access administrative data at the unit level with identification data and to link them for statistical purposes. Furthermore, the appropriate legislation should provide for sufficient levels of data protection.

131. It is also important that the general public appreciates and understands the benefits of using register sources for statistical purposes and that there is broad public acceptance of the use of these administrative data for purposes of statistical production. Open discussion and debate, explaining the rationale and benefits of the use of personal information held in registers, must always be considered a key principle. It is also important that the national register legislation is up-to-date and the activities of register authorities are open and transparent.

132. One major factor that facilitates the statistical use of administrative data records is the application of unified identification systems across different sources. The data linkage must occur at the individual level. In the absence of such unified systems it is extremely difficult and laborious, if not impossible, to link unit data from different registers, which is a pre-requisite for register-based statistical production.

133. Definitions of data items in the administrative sources should be the same as in census, or they should be transformable to meet the census definitions. It is also essential to harmonize the concepts and definitions between registers. To ensure this, quality assessments should be carried out periodically.

134. If any of these conditions are not met, the country should continue to rely on the traditional population census as the primary source of benchmark population statistics.

## 3. Advantages and disadvantages

135. Reduced costs and increased frequency of outputs are without question the biggest advantages of using registers and/or administrative data sources over the more traditional census approach. With the introduction of a register-based system initial costs may be high, but field costs can be reduced to zero and particular census statistics (such as those relating to employment, buildings and dwellings, and housing conditions) can be compiled on an annual basis. A further key advantage of administrative sources is that the need for processing can be confined to those data items that have changed. In the long run costs are much reduced if information is collected just once and processed only if and when it changes, such as for example changes of address. Personal characteristics such as country of birth, citizenship, religion, levels of completed education and qualifications, and housing characteristics such as period of construction, floor space and number of rooms change quite seldom (if at all in some cases).

136. Register-based statistics can be obtained for all geographical areas, since registers aim to cover the target population in its entirety, and because detailed geographical information can be obtained for all geographic units, municipalities, freely defined sub-areas and map grids of different sizes.

137. Register-based statistics are generally available every year. Growing information needs create new pressures to step up the production of regional statistics, but regional data from a decennial population census may not be sufficiently up-to-date to satisfy these needs. Again, this is a major asset of using register sources, allowing for more frequent statistics production.

138. The use of administrative data sources, however, involves certain drawbacks that need to be taken into account. One such disadvantage is the fact that register-based characteristics

have to rely exclusively on the information held for the administrative purpose of the available register; this is invariably a non-statistical purpose. This imposes some restrictions with respect to the variables that are available for analysis and may also undermine international comparability. However, exceptions to these restrictions exist.

139. The use of registers and administrative data also imposes on the statistical agency a dependency on the authorities responsible for holding and maintaining the registers and administrative data as well as on any changes in legislation and administrative policy and practices. It is therefore crucially important to have close collaboration between the NSO and the relevant authorities so that information on any such changes reaches the census agency as soon as possible. Ideally, where changes to the content and/or structure of those registers and administrative data being used for the census are being considered, the NSO should be consulted in advance.

#### **4. Implications for the various phases of census-taking**

140. Register-based systems can create problems with reference periods and consistency. For reasons of statistical reliability, it is important that change events are accurately recorded according to their true date. Information on dates of birth and death is usually accurate because it is recorded on the basis of certificates issued by the authorities, and in most cases the reference time point is therefore correct. Accurate information is also usually obtained on the dates of employment, unemployment and pension periods, whereas for periods of educational study the dates may be less accurate. In the event of a change of address the person who is moving may not provide notification sufficiently soon enough, or may neglect to do so altogether, particularly when moving abroad.

141. The linking of a person's data on such variables as place of work, occupation, and income from different register sources may sometimes give rise to consistency problems. It is, for instance, not always the case that the information on occupation and branch of industry describe the same period of employment.

142. Furthermore, there might be some items in the register system where the data linkage itself creates a particular difficulty. The data on employment pension, for example, may not use the same business code as the taxation and business registers, and therefore extra processing is needed to link individuals to the company where they are employed. As another example, the linking of business enterprises to the building where they are based is not always straightforward since the company address data may not necessarily be fully accurate, or they may differ from the information in the buildings register.

#### **5. Implications for content**

143. There are some data items that may have to be dropped from a wholly register-based population census system because the relevant information is simply not available from any register: these may include, for example, household composition characteristics, ethnicity, religion, language, and mode of transport to work. An option would then be to collect such information from sample surveys, but then the census becomes no longer register-based, but instead adopts the 'combined' approach that has been described in paragraphs 117-125. (The issue of the difficulty in collecting information on some census variables using registers only is referred to in the relevant topic-related chapters in [Parts Two and Three] of these Recommendations.)

144. Furthermore, without a traditional census questionnaire, there is no longer any collection tool for ad hoc needs. In many countries the population census system is an important vehicle of data collection that is used to meet emerging information needs to reflect changing social conditions (such as measuring economic migration). This flexibility is lost when data are no longer collected by means of traditional questionnaires.

## IV. Draft text on Designing and Delivering a Census Field Operation for the Recommendations for the 2030 round of population and housing censuses

### A. Preparing for and delivering field operations

145. As the census process has evolved, so has the role of the field operation. Historically the role of the census field officer was to *collect* information on the doorstep about all those living at an address. Such an approach is still used in some countries though is inevitably both expensive and labour intensive.

146. All addresses would still be visited if the objective of the field operation is to *enable* households to respond. This could include field staff providing households with paper questionnaires.

147. A smaller field force is required where the role is to *encourage* non-responding households to respond by communicating the importance and requirement to complete. As well as encouraging, field officers also provide guidance on how and who needs to return a questionnaire and where further support is available.

148. Whatever the role of the field officer, field staff also need to have the means to record information about individual addresses they visit. This could include when visits took place, whether contact was made or whether an individual refused to participate.

### B. Designing a Field Operation

149. Effective planning and preparation are essential given the complexity and expense of hiring large numbers of temporary staff.

#### 1. Sequencing of Field Activity

150. Field activity involves direct contact with the public so needs to be considered within the broader context of census communication and engagement plans. Media activity would for example normally begin before field visits took place, increasing awareness that the census is coming.

151. Some countries have developed a formal ‘wave of contact’ model to effectively sequence where field activity takes place<sup>8</sup>. It is essential that contact with householders is effectively sequenced to ensure efficient use of resources and to reduce the limit the burden on the public. It would clearly be inefficient to begin field visits to remind householders without giving any time for mailed returns to have been completed and mailing back.

#### 2. Testing and Rehearsal

152. Small scale testing in the years prior to the census is used by many countries to evolve field activities. By testing different approaches alongside each other a country can determine which are the most effective ahead of being used at greater scale and expense in a rehearsal or in the census itself. The value of testing can be seen with the evolving role of technology and during the 2020 census round when changes had to be made in response to pandemic related social distancing restrictions.

153. A large-scale rehearsal is used by many countries to evaluate readiness for the live operational period. An end-to-end rehearsal is most commonly carried out one or two years before the year of the census when technology and processes are in place. While the rehearsal generally isn’t used to test different approaches, it is necessary to incorporate lessons learnt in time for the census itself. Rehearsals are particularly important in countries who conduct

<sup>8</sup> Examples include for the Canadian Census ([Guide to the Census of Population, 2021, Chapter 7 – Field Operations \(statcan.gc.ca\)](#)) and the Census of England & Wales ([EAP149 - 2021 Census Statistical Design \(statisticsauthority.gov.uk\)](#)).

a census every ten years where staff may have less experience of the census operation compared to countries with a more frequent cycle.

154. The emphasis of the rehearsal should be on evaluating overall readiness rather than on achieving response levels of the census itself. It will also not be possible to conduct a rehearsal in all areas. It is useful to select a small number of areas which represent different collection challenges such as a densely populated conurbation in addition to a sparsely populated rural area.

### **3. Designing and Training the Field Operation**

155. Information from the previous census can be used to scope the size of the field force required and its distribution across the country. Assumptions need to be made about the level of response prior to field activity alongside information about the density and socio-economic characteristic of each area.

156. Modelling the size of the field operation based on assumptions will contain inherent uncertainty. There will also be uncertainty about the ability to recruit and train field staff across all areas. 'Mobile' field teams are recruited in some countries which can be moved across local areas or regions where there are unexpected patterns of lower response or where there are recruitment challenges. Rehearsals can be a useful opportunity to understand how such mobile resources are practically used.

157. Many countries reported that for the 2020 round the pandemic had a significant impact on how they recruited and trained staff. Far greater use was made of online training which also brings significant savings.

### **4. Management Information During the Collection Operation**

158. As the live operational period is so short it is essential that timely management information is available to understand where response patterns are not as expected. Technology has improved our ability to understand how a large and complex operation is performing.

159. The range and complexity of available information from a census operation is a challenge. Key metrics only should be identified and presented with deeper analysis and insight used to better understand response patterns when required. A rehearsal can be a useful way of refining key metrics. Online data capture has enabled a step change in the provision of up-to-date intelligence on response patterns with electronic field devices providing timely information on field activity.

160. Interpretation of management information is difficult without an expectation of response patterns over the course of the collection period. Many countries have developed forecast models to provide a measure against which to understand performance. Assumptions underpinning these models are based on the previous census and can potentially be updated from rehearsal learning.

161. The ability to act on managing the information is as important as the information itself. Two elements are worth considering as part of this:

- (i) what interventions are available and
- (ii) how are decisions made.

162. Available interventions are dependent on the design of the census but are likely to consist of increasing:

- (i) Publicity and associated media communication. Using existing or adapted messaging to promote the importance of completing based on need or what has been shown to be most effective during collection.
- (ii) Mailing material to households. Direct contact through additional reminder letters or sending paper questionnaires.
- (iii) Increasing field visits. Can include additional visits or changes in the timing for when visits take place.



- (iv) Tailored engagement for hard to count groups. As discussed in following sections, interventions for specific groups can include each of the above plus engagement with community organizations or leaders.

163. Decisions on using interventions need to be made in the context of the objectives of the census and balancing priorities across the country or region. Rehearsals are an opportunity to develop an understanding of the decision-making process and census takers can also benefit from observing how other countries run their operational period.

164. During the 2020 round most countries experienced additional uncertainty because of the pandemic. Scenario testing and ‘wargaming’ approaches were used to good effect in understanding the intelligence, interventions and decision-making processes involved.

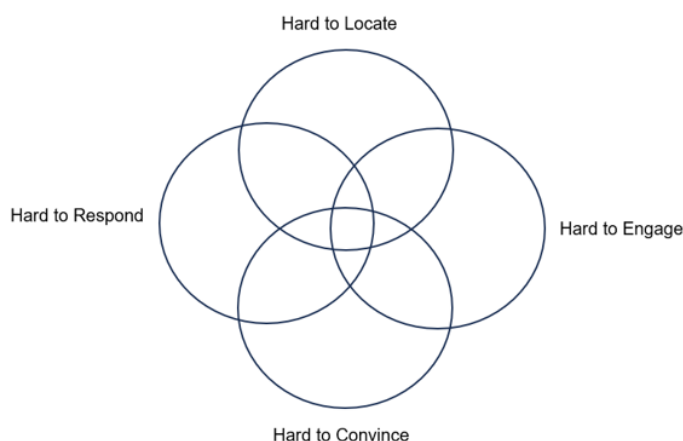
### C. Adapting the Design – Hard to Count Groups

165. Increasingly complex and diverse populations mean the challenge of enumerating the entire population once, only once and in the right place has never been harder. Inevitably some parts of the population will be harder to count than others meaning adaptations to the standard collection design are likely to be necessary.

166. In the United States, a framework is used to consider hard-to-count groups. The model recognizes segments of the hard-to-count population: Hard-to-Locate, Hard-to-Engage, Hard-to-Contact, Hard-to-Persuade and Hard-to-Interview<sup>9</sup>. An adapted version of this model is presented below.

Figure

**Hard to Count Framework**



*Hard to Locate – Unknown addresses, those parts of gated communities*

*Hard to Engage – Difficult to make initial contact with including homeless and transient populations*

*Hard to Convince – Suspicious about need for a census, providing data to government or low levels of engagement with government generally*

*Hard to Respond – Includes language barriers or those with limited digital access.*

167. An important aspect of this framework is that being ‘hard to count’ is not simply about willingness. For example, a predominantly online census resulted in the England and Wales census identifying a ‘digitally hard to count’ group including older age populations with less access to the internet. Historically this group has tended to be part of the population most willing to complete the census.

<sup>9</sup> Further information on the United States Hard to Count Framework is available at [2020 Census Operational Plan v5.0](#).

168. Adaptations of the standard design will depend on the groups identified but may include a mix of the following:

- (i) Clear messaging on census website and through trained staff (in the field or at contact centres) stating that:
  - a. No personal data will be shared with other organizations or government departments. Census data will only be used in the production of statistics.
  - b. The importance of census data and the ways in which data are used for policies that affect all parts of society.
- (ii) Engagement with community groups and/or relevant sector organizations in the planning, research and operational delivery of the census. This could include the identification of preferences in how and when to engage communities.
- (iii) Recruitment of field staff from local communities. US Census bureau for example has an overarching strategy for hiring people who will work in the communities they live in. They make explicit reference to the importance of being able to speak languages of local communities. Other countries go further, making explicit commitment about field visits only being made by members of the same community.
- (iv) Night counts for people who are not sleeping in a house/flat (apartment) or other form of managed accommodation. potentially in partnership with local authorities and relevant charities. Integrated with broader design for collection of census data for homeless including at hostels and people living temporarily at an address where they have no permanent other address.
- (v) Tailored media campaigns for specific sectors including radio, television and online channels. This can include the use of 'trusted voices' to promote and encourage response.
- (vi) Availability of relevant resources such as paper questionnaires, translated questionnaires and support guidance to enable responses. Trained field officers able to point to these resources or to where further support is available.

## V. Conclusion

169. The draft recommendations relating to enumeration for the 2030 round of population and housing censuses are presented for comments and discussion.

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