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Conference of European Statisticians
Recommendations for the 2020 Censuses
of Population and Housing



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Conference of European Statisticians Recommendations for the 2020 Censuses of Population and Housing



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NOTE

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PREFACE

The main objectives of the *Conference of European Statisticians Recommendations for the 2020 Censuses of Population and Housing* are:

- (a) to provide guidance and assistance to countries in the planning and execution of their population and housing censuses; and
- (b) to facilitate and improve the comparability of census at the UN regional level through the identification of a core set of census topics¹ and the harmonization of concepts, definitions and classifications.

The Recommendations are also expected to be used as the general framework for the European Union programme for the 2021 round of population and housing censuses from which data are to be provided to Eurostat by Member States under the provisions of Regulation (EC) 763/2008.

The present Recommendations were prepared between September 2012 and May 2015 under the work programme of the Conference of European Statisticians (CES), and were adopted by the CES at its 63rd plenary session in June 2015. The Statistical Division of the United Nations Economic Commission for Europe (UNECE) organized this work in close collaboration with Eurostat and in conjunction with the revision of the global *Principles and Recommendations for Population and Housing Censuses: the 2020 Round*² by the UN Statistics Division in New York. Account was also taken of the *Resolution concerning statistics of work, employment and labour underutilization* adopted by the 19th International Conference of Labour Statisticians held in Geneva on 2-11 October 2013.

In order to coordinate such a diverse undertaking, a Steering Group on Population and Housing Censuses consisting of representatives of UNECE, Eurostat and a number of Member States was established. The Steering Group coordinated the work of a number of topic-related Task Forces that were established to prepare drafts of the various chapters that would cover most of the recommendations. In addition, some of the recommendations, which did not fall within the scope of the main topic themes, were prepared by individual members of the Steering Group.

Each of the Task Forces had a designated lead representative. Their membership comprised expert officials from National Statistical Institutes (NSIs) and international organisations across the UNECE region, such as the International Labour Organization (ILO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the Interstate Statistical Committee of the Commonwealth of Independent States (CIS-Stat). To ensure that each country had the opportunity to participate in the discussions on the structure and content of the draft recommendations from each Task Force, meetings were held in Geneva in 2013 and 2014 to which all UNECE Member States were invited. Most countries attended, and a number provided written submissions in addition to the drafts prepared by each of the Task Forces. The organisers were particularly grateful for the support of the Russian Federation, Eurostat and the United Nations Population Fund (UNFPA) who funded the attendance of experts from a number of countries.

¹ The term "topic" refers to the subject regarding which information is to be sought for each unit enumerated in the census (person, household, dwelling or building)

² *Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3*; United Nations, New York 2015.

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- Alistair Calder (United Kingdom), Task Force on Costs and Benefits
- Peter Benton (United Kingdom), Task Force on Quality and Coverage
- Harald Utne (Norway) and Giampaolo Lanzieri (Eurostat), Task Force on Population Bases and Geographic Characteristics
- Howard Hogan (United States), Task Force on Demographic, Household and Family Characteristics
- Kaija Ruotsalainen and Jari Nieminen (Finland), Task Force on Economic and Educational Characteristics
- Jane Badets (Canada), Task Force on Migration and Ethno-Cultural Characteristics
- Adelheid Bauer (Austria), Task Force on Housing Characteristics

Further specific contributions were provided by Jairo Castano (FAO), Elisa Benes (ILO), Friedrich Huebler (UNESCO), and Mitchell Loeb (United States).

Ian White edited the final text of the Recommendations and contributed much to the work of each of the Task Forces. The Russian version of the Recommendations was edited by the Interstate Statistical Committee of the Commonwealth of Independent States.

Altogether, over 100 census experts from National Statistical Institutes and international organizations participated in the preparation of the Recommendations.

UNECE is grateful to all these experts for their contribution.

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INTRODUCTION

The contents of the publication

1. The first part of this publication (covering Chapters I-IV) presents a broad description of how countries conduct censuses.
2. Chapter I provides a broad overview of the different methodologies that are being adopted by countries in the 2020 round of population and housing censuses in the UNECE region. It looks at the aims and objectives of a census as well as methodological issues associated with the different phases of census. Additional information can be found in the *Principles and Recommendations for Population and Housing Censuses: the 2020 Round, Revision 3*. Chapter I also covers some aspects of census data confidentiality and security.
3. Chapter II looks at some of the technologies that are applicable to carrying out the several stages of a census operation. Also, various aspects related to the outsourcing of different elements of the different stages, particularly those involving technological solutions, are discussed.
4. Chapter III covers some operational aspects of the census, including legislation, communications and publicity, dissemination, documentation, costs and benefits.
5. Chapter IV is dedicated to census quality and contains two major sections. The first is on quality assurance and quality management and focuses on the various elements of risk associated with the census. The second is on quality evaluation. Major elements include the evaluation of the quality of the results from the perspectives of coverage, sampling error, item non-response, processing error, imputation, and the effects of disclosure control, with a view to learning lessons for the future.
6. The second and third parts of the publication present a number of recommendations for the collection of information and classification of data on a range of population and housing topics respectively. The recommendations aim to describe different topics that are relevant for censuses in the UNECE region, presenting not only standard practices and definitions, but also analysing their relevance to, and relationship with, other census topics and other non-census data collection activities. The topics are presented by broad theme. Chapters V-XIV cover those topics on which data is often collected in a population census. Chapter XV describes those that are usually included in a housing census.
7. Topics are designated as being either 'core' or 'non-core' on the basis of their relative importance and relevance for inclusion in any country's census. 'Core' topics are those that have traditionally been regarded as being essential for providing key information that meets most national and local user requirements, and these Recommendations thus stress the importance of including such topics in the census. 'Non-core' topics are those whose inclusion may, in general, be considered less vital and therefore are optional, though some countries, because of their particular circumstances and requirements, may regard some of them as equally important as the core topics. These Recommendations intrinsically recognise, however, that the data requirements from any one country's census over time must reflect changing circumstances, attitudes and capabilities, and, thus, the boundary

between what is to be regarded as 'core' and 'non-core' for some topics may be subject to national interpretation. Some examples include:

- (a) the adoption of a 1km² grid geography (described in Chapter VI) presented as a new non-core topic but considered as a key topic for European Union countries;
- (b) the 'de facto marital status' (Chapter VII) upgraded to 'core' status in these Recommendations;
- (c) the 'own-use production of goods' (Chapter VIII) presented as a non-core topic in these Recommendations but considered as a very important topic in countries where this phenomenon is particularly relevant in the analysis of work activities; and
- (d) the number of the household amenity characteristics (Chapter XV) presented as 'core' although they may be considered by some countries as being less relevant as discriminating variables in the analysis of housing standards and conditions.

8. Ten years hence, when the successors to the current generation of census takers come to prepare the recommendations for the 2030 round they may wish to further review these topics.

9. Depending on their own national circumstances and data requirements, countries may want to include in their censuses other topics that are not specifically covered in these Recommendations, and are of course free to do so.

Relation to the 2015-2024 UN World Census Programme

10. The planning, research and development that have led to these CES Recommendations were carried out simultaneously to the process that led to the revision of the UN's global *Principles and Recommendations for Population and Housing Censuses* (prepared to coincide with the start of the 2015-2024 World Census Programme) with a great deal of coordination. Countries in the UNECE region are encouraged to use the two sets of census recommendations in a complementary manner. While the CES Recommendations attempt to conform and harmonise with the UN's global equivalent as far as practicable, they are intended to reflect the reality and specific needs of countries in the UNECE region, where, generally, there are less diverse population and housing characteristics than at the global level.

11. In general, therefore, the two sets of Recommendations are consistent, but if the global Recommendations are broader in scope (in terms of issues and coverage), the CES Recommendations are more specific in the prescription of some definitions and classifications. Only a few topics (such as 'location of place of work' and 'useful floor space') designated as 'non-core' in the global Recommendations have been 'upgraded' to 'core' in these CES Recommendations, and similarly few, designated as 'core' in the global Recommendations and 'non-core' in these CES Recommendations.

PART ONE: CENSUS METHODOLOGY, TECHNOLOGY AND OPERATIONAL ASPECTS

Introduction

12. The chapters in Part One present a broad description as to how countries conduct censuses. While these chapters are not designed to provide recommendations, they do give some guidance. Chapter I on methodology provides a broad overview of the range of methodologies that UNECE countries might adopt to carry out their censuses of population and housing in the 2020 round of censuses. It looks at the aims and objectives of a census in general as well as the methodological issues associated with the different phases of census. The chapter also covers some aspects of census data confidentiality and security to which references are made throughout these Recommendations. Chapter II on technology looks at some of the technologies that have not been traditionally used in population censuses, but which are now being seriously investigated by some member countries. This chapter also looks at various aspects related to the outsourcing of different census operations. Chapter III covers some operational aspects of the census, including legislation, communications and publicity, dissemination, documentation, costs and benefits. Chapter IV is dedicated to census quality and contains two major subchapters. The first one is on quality assurance and quality management. In the text on quality management the notion of risk is more visible than in the previous recommendations. The second is on quality evaluation. Major elements include the evaluation of the quality of the results from the perspectives of coverage, sampling error, item non-response, processing error, imputation, and the effects of disclosure control, with a view to learning lessons for the future.

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Aims and objectives of a census

Role in national statistical systems

13. 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.

14. 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.

15. On 10 June 2015 the United Nations Economic and Social Council (ECOSOC) adopted a resolution³ 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".

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

Non-statistical functions of a census

17. 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"⁴ (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:

³ ECOSOC Resolution 2015/10.

⁴ "The Fundamental Principles of Official Statistics in the Region of the Economic Commission for Europe" (doc. E/1992/32, E/ECE/1266), (<http://www.unece.org/fileadmin/DAM/stats/documents/e/1992/32.e.pdf>)

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- (a) using two separate questionnaires for the two purposes;
- (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).

18. 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 paragraphs 146-148 below.

Definitions, essential features and phases of a census

Background

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

Definitions

20. 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.

21. 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.

22. 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.

Essential features of a population and housing census

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

(a) *Individual enumeration*

24. 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*

25. 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*

26. 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.

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(d) *Small area data*

27. 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*

28. 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.

Census phases

29. 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. 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),
- (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.

30. 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 'fits-the-purpose'.

Strategic objectives and criteria for the selection of census topics

31. Given the costs required and the massive involvement of the population, the content and the methods used in a census should be carefully scrutinized 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 traditional 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.

32. In addition to these three factors, the countries following the census programme of the European Union will have to take into account possible requirements of that programme⁵ in terms of census content, aimed at ensuring international comparability of census results specifically among countries of the European Union.

33. 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.

34. 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.

35. 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.

⁵ At the time of preparation of the Conference of European Statisticians Recommendations for the 2020 census round, information is not yet available on the 2021 census programme of the European Union and possible requirements in terms of census content. The topic content of the 2010 round of censuses carried out in the European Union Member States had a very strong focus on enabling international comparisons regardless of the methodology adopted. Indeed the content of the censuses in these countries was as much influenced by the EU as by the requirements for information at the national and local area levels so that it would be possible for Eurostat to provide international comparisons. It is likely that, as the EU Framework Census Regulation will also be in place for the 2020 round, the range of topics to be reported to Eurostat will remain unchanged, though the scope and content of the prescribed outputs may be less detailed.

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36. In those censuses where a paper census questionnaire is used, the limited space available on the questionnaire should be optimised; 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.

37. 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.

38. 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 2020 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.

The relation between traditional censuses and sample surveys

39. 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.

40. 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.

Use of long and short forms

41. 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.

42. 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 ever 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.

The census as benchmark and sampling frame

43. 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). 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.

44. 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.

45. 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.

46. 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.

47. 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.

Inter-census surveys

48. 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.

49. 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 reasonableness 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.

The relation between population and housing census and the agricultural census

50. 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.

51. 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.

Methodology approaches in the UNECE region

52. 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 (usually referred to as a "traditional 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

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- 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 full field enumeration for selected variables or by sample field data for selected variables, supported by data taken from registers; and
- (c) the method of using registers and other administrative sources (either exclusively or supported by data from existing sample surveys for selected variables).

53. 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.

54. Registers and other administrative sources are increasingly becoming a viable alternative to the traditional census in so far as they contain the relevant topics, use similar definitions and classifications and cover the entire population. 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*', while 'administrative registers' are taken to mean '*administrative information systems used for decision on individuals*'.^{6,7} Sample surveys alone cannot provide equivalent data but they can be used in combination or to supplement census information on specific topics.

55. Whatever alternative method is adopted it is important that the aim should be to adhere to the essential features of the census as closely as possible. When choosing and planning to work according to a new method statisticians have to keep these features in mind, as these give the basis for all censuses in all countries.

56. 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

⁶ Register-Based Statistics in the Nordic Countries, UNECE 2007, UNITED NATIONS PUBLICATION Sales No. E.07.II.E.11 (<http://www.unece.org/stats/census.html>)

⁷ Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3; United Nations, New York 2015 (paragraphs 1.80-1.84).

- (j) public understanding and acceptance.

57. The results of the UNECE Online Survey on National Practices in the 2010 Census Round, carried out in spring 2013,⁸ show that the traditional census approach was still the most commonly adopted approach in the UNECE region. However, since the previous census round, more countries than ever before had moved to a combined or register-based census methodology. Countries with such censuses normally use a population register as the backbone for their census. Registers thus now play a more prominent role in census taking than in previous census rounds, and it can only be expected that this trend will continue in the future. Some countries that have previously taken a traditional approach may move towards a combined census, while others may move directly towards an approach based only on registers. Some countries that conducted a combined approach plan to move to a register-based approach next time. This can either be a fully register-based approach or an approach where some variables are 'recycled' from an existing survey.

58. But even among those countries planning to continue with a fundamentally traditional 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.

59. 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.

The traditional census

Description

60. The traditional 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).

⁸ 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 30 September - 3 October 2013. They are available at: <http://www.unece.org/index.php?id=31953#/>

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61. 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.

62. 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 Institute's (NSI'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.

63. 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 traditional 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.

64. 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.

65. 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 NSI 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.

66. 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.

Necessary conditions

67. Both short and long forms may be used within the context of traditional 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.

68. The traditional census approach to census-taking is the one that is still adopted by the majority of countries. 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.⁹

Advantages and disadvantages

69. The main advantages of the traditional approach are in providing a snap shot of the entire population at a specified period and the potential availability of multivariate data for relatively small areas and population sub-groups.

70. Traditional 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.

71. 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.

72. 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.

⁹ Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3; United Nations, New York 2015.

73. 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.¹⁰ However, overly complex designs should be avoided.

Implications for the various phases of census-taking

74. 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 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.

75. 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.

76. 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.

77. 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

¹⁰ Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3; United Nations, New York 2015, para. 3.122.

the two events and be less responsive to the enumerator at home. Unfortunately NSIs 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.

78. 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.

79. 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.

80. 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.

Implications for content

81. The traditional 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 minimise respondent burden.

Traditional enumeration with yearly updates of characteristics

Description

82. 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.

83. The survey samples a percentage of addresses each year to approximate a long form sampling rate over a certain period of the census cycle (five years in the United States). To achieve increased reliability and quality of the estimates for small administrative/geographical areas, larger proportions of addresses will need to be sampled.

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In the United States, where this approach has been implemented, the sample size is fixed at 3.54 million housing unit addresses which is a sampling rate of approximately 2.5 per cent. Annual sampling rates for the American Community Survey (ACS), depending on the size of the geographic area, range from 0.51 per cent to 15 per cent. Over a five-year period, with the fixed sample size of 3.54 million housing unit addresses, the sampling rates range from 2.55 per cent to 75 per cent.

84. The sample is cumulated over time to produce the lowest levels of geographic detail required that is similar to the long form sample in the traditional census. Again in the United States, five years of data are required for areas with a population of less than 65,000. Single year estimates are sufficient for areas with a population of 65,000 persons or greater.

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.

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.

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.

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 (traditional) 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.

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.

The rolling census

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.

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.

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.

Implications for the various phases of census-taking

100. It is better to introduce a rolling census just after a full traditional 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.

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 organisation of the census, it may be possible to add some thematic surveys.

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

Description

102. While many countries utilizing the traditional approach employ administrative lists, such as address lists, to support to the enumeration (but do not use administrative data to derive directly the census data), the essence of this type of ‘combined’ census approach is

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to make use of more complete 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 a sample or exhaustive field data collection, with the aims of improving the accuracy of population counts, and to obtain data on those census variables not available from the combination of registers.

103. Countries using this approach should be aware of the fact that, as discussed in paragraph 17, if the data collection results 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 106 below.

104. 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 116-121 below:

- (a) variables not available from administrative registers are obtained through an exhaustive field operation, as in a traditional 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.

Necessary conditions

105. 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.

106. 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.

Advantages and disadvantages

107. The population counts in this approach may be more precise than in a wholly traditional census because of the generally more up-to-date information contained in the population register that helps to minimise 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).

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

109. 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.

110. 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 traditional census since the knowledge of the location where every person is registered permits the use of more efficient collection methods.

111. 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.

Implications for the various phases of census-taking

112. 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.

113. Previous census information and related administrative data facilitates a much more informed editing and imputation of erroneous and/or missing responses.

Implications for content

114. 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 traditional census collecting the same information.

115. 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.

The ‘combined’ census approach: registers and sample field data

Description

116. Some countries create census type statistics by using registers and 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) open to those countries that do not have all census information available in registers. If this option is chosen, some census tables can be produced by simply counting from register information, 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. Israel, for example, uses a population register as the basis for a 100 per cent enumeration, and a census sample survey to evaluate the accuracy of the register addresses and to collect the traditional long-form census data.

Necessary conditions

117. 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 NSI 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.

Advantages and disadvantages

118. The advantages of a combined census with sample field data are that it is much less costly than any census with an element of full field enumeration and imposes less of a burden on respondents. A traditional 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.

119. A disadvantage is that this option requires more processing to produce the tables from the microdata as weighting problems may arise. 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.

Implications for the various phases of census-taking

120. It would generally be expected to take longer to instigate such a combined census from scratch than to plan a traditional census since a country should not consider doing so until it is confident that all data sources are available. Nevertheless, once off the ground 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.

Implications for content

121. 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 full particulars. 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 NSIs can make wider use of registers where they are relevant and suitable for the census.

The register-based census

Description

122. 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 a traditional 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.

123. 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.

124. Population census data are produced using the method of register estimation in which several register 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.

Necessary conditions

125. 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 NSI 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.

126. 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.

127. 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.

128. 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.

129. 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.

Advantages and disadvantages

130. Reduced costs and increased frequency of outputs are without question the biggest advantages of using administrative register 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).

131. 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.

132. 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.

133. 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. In the 2010 census round, for example, some countries with register-based census decided to add one or two variables from their pre-existing Labour Force Survey (LFS) that were missing in their registers. The LFS microdata were then weighted to the population totals. In this way it was possible to compare all core variables with data from other countries, but of course the level of detail in analyses with LFS variables was limited by the sampling fraction of the LFS.

134. The use of registers also imposes on the statistical agency a dependency on the authorities responsible for holding and maintaining the registers as well as on any changes in legislation and administrative policy and practices. It is therefore crucially important to have close collaboration between the NSI 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 administrative registers being used for the census are being considered, the NSI should be consulted in advance.

Implications for the various phases of census-taking

135. 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.

136. 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.

137. 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.

Implications for content

138. 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 116-121. (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.)

139. 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.

Confidentiality and security

Confidentiality principles

140. The census collects information on each person and household in the country. In its uses it is not concerned with facts about individuals as such. Its purpose is to provide statistics about the community, and groups within the community, as a whole. The public, therefore, has a right to expect, and needs to be assured that, personal information provided in confidence will be respected. Names, addresses and personal identification numbers (PINs) should be separated from other data as soon as possible in the census process, and not released, so that the data output contains no personal identifiers. The confidentiality requirement encompasses the whole census operation, ranging from the security of the completed census questionnaires both in the field and during processing to the protection of the information contained in the outputs and made publicly available.

141. Assurances should be given to the public that all the information given will be treated in strict confidence by the census authorities and any person who is employed by, or provides a service to, the census authority for the purposes of carrying out the census. Many countries will have domestic legislation that protects such information in the form either of specific census legislation or of more general legislation relating to data protection and freedom of information.

142. The following additional principles should govern the treatment of the information given in the census returns:

- (a) Only persons under the management of the census authorities, or agents acting on their behalf, should have access to personal census information.
- (b) Completed questionnaires should be collected or returned in such a way that will not reveal information to other members of the public. Additionally, individual household members should, if they wish, be able to give personal information on a separate questionnaire in a way that will not reveal it to others in their household or establishment, or to the enumerator.
- (c) All members of the census organisation and outside agents providing services to the census authority in connection with the census should be given strict instructions, and be required to sign legal undertakings, about confidentiality. They should be liable to prosecution for any breaches of the law.
- (d) The physical security of census documents containing personal information held by the census authorities, by field staff or by authorised agents should be strictly enforced and, if felt necessary, independently reviewed.
- (e) The computer systems handling census data should have strict safeguards to prevent unauthorised access to the information.
- (f) In releasing statistics from the census, all possible steps should be taken to prevent the inadvertent disclosure of information about identifiable individuals and households. Special precautions may apply particularly to statistical output for small areas.

Statistical disclosure control

143. Statistical disclosure control (SDC) is the process that seeks to protect statistical data in such a way that they can be released without giving away confidential information that can be linked to specific individuals or entities.¹¹ SDC methods should also be applied to ensure the confidentiality guarantee. The key objective of any SDC methodology should be to ensure minimum information loss and maximum data utility.

144. Measures to prevent the disclosure of tabular data may include some, or all, of the following procedures:

- (a) Swapping the unit record data before the tables are produced by selecting a sample of the records, finding a match in the data based on a set of predetermined variables, and swapping all or some of the other variables between the matched records.
- (b) Restricting the number of output categories into which a variable may be classified, such as aggregated age groups rather than single years of age, particularly for the older ages (this is called a global recode).
- (c) Where the number of people or households in an area falls below a minimum threshold, suppressing statistical output (a so-called local suppression) – except, perhaps, for basic headcounts – or amalgamating it with that for a sufficiently large enough neighbouring area.
- (d) Adding ‘noise’ to the tables produced, for example by rounding cell values up or down to the nearest multiple of the predefined rounding base (conventional rounding).

145. In case of the release of census microdata (such as microdata under contract or public use files) it is important that all information from databases relating to name, address and any unique characteristics that might permit the identification of individual respondents is removed. In addition, applying global recodes and local suppressions to the microdata can be used to diminish the risk of disclosure. Also, disturbing the microdata or making use of synthetic microdata may help to protect confidential information.

Public access to closed census records

146. Many NSIs receive requests from time to time from genealogists, social historians and individual members of the public, to allow public access to, or reduce the period of closure for, census records for the purpose of researching family histories.

147. The period of closure of census records in many countries is prescribed specifically by statute but may vary from country to country. Other countries may rely on more general provisions within data protection and/or freedom of information legislation to keep confidential records closed until such a time that minimises the risk of disclosure of information about living individuals. Some countries, however, may choose to destroy the

¹¹ See Hundepool, A., J. Domingo-Ferrer, L. Franconi, S. Giessing, E. Schulte Nordholt, K. Spicer and P.P. de Wolf, 2012. Statistical Disclosure Control. In: Wiley Series in Survey Methodology. Wiley, Chichester, United Kingdom, 2012.

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census forms once processing of the data has been completed. (See also paragraphs 315-316)

148. While national governments may recognise both the sociological and commercial value of historical census records, they should also recognise that the ability of NSIs to collect information from the general public may be seriously compromised if assurances given about the confidentiality of the information collected are not honoured. Public confidence in the security and confidentiality of the information given in the census should be regarded, therefore, as paramount.

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Introduction

149. Technology has been used to assist in all phases of population censuses for many years. The focus of this chapter is on new technologies that might be used for data collection, processing and dissemination activities. Some of these technologies have been used in past census activities in some countries and are presented here to provide a review of possible options for other countries. There is no doubt that emerging, or yet to be developed, technologies will impact future census taking.

150. Well-established technologies, such as key-entry-systems or Optical Character Recognition (OCR)/Optical Mark Recognition (OMR), are not covered in any detail because these systems are already well understood and documented. Countries interested in traditional technologies should refer to *Principles and Recommendations for Population and Housing Censuses: the 2020 Round – Revision 3*, United Nations, New York 2015 and *Handbook on Census Management for Population and Housing Censuses*, United Nations, New York 2001. These well-established approaches and technologies might continue to be the most viable option for many countries. Adoption of new technologies or methodological approaches should only be considered where there is a sound understanding of their benefits and where their developments can be managed. There should also be a clear understanding of any associated risks.

151. The feasibility of adopting any technology that is previously untested in a census environment should be carefully evaluated in advance, taking into consideration the national context and, in particular, factors such as the size of the country (in terms of population and/or area), the relative costs compared with traditional solutions, the work needed for development and testing, and the potential implications for the overall organisation of the census operations. Potential effects on the quality of census results as well as the impact on the general population also need to be carefully considered.

152. Nor does this chapter focus on ancillary systems that are required to conduct a census. Census operations involve a range of administrative processes that are common to other large-scale projects. For example, the planning of a complex operation such as the census may be assisted by the use of appropriate project planning software. Also, many countries may require systems and processes to recruit and pay large numbers of temporarily employed census enumerators. The National Statistics Institute (NSI) should consider how technology might assist in improving the efficiency and effectiveness of these operations. This can contribute both to containing the cost of the census and improving the overall quality of the census by allowing resources to be focused on the primary tasks of enumeration, processing and dissemination rather than on administrative processes such as paying staff.

153. The complexity of much of the new software and the infrastructure required for many of the new and emerging technologies may go beyond the current technical capabilities of many census agencies to manage. It is likely, therefore, that some countries will want to consider whether or not significant components of any (technical) solutions to the census operation could be outsourced. This chapter presents some general considerations on the potential benefits of outsourcing specific components of the census,

the necessary requirements to do so, and the implications of outsourcing on the census process, in particular with regard to confidentiality and quality assurance.

Drivers for technological innovation

154. Census programmes in many countries have been fertile grounds for the introduction of innovations. Many of the new approaches that are used in survey programmes today had their origin in censuses. The use of technology has most often been the principal enabler of innovation. In contemplating the numerous challenges facing the taking of a census of population and housing, census organisations should consider how technological innovations can be applied to any steps of their process to increase efficiencies, improve quality, and possibly reduce costs. Such considerations should also be done within the wider context of the statistical organisation, since in times of fiscal constraints, new approaches can benefit more than just the census.

155. However, the introduction of innovative technologies or approaches may present various risks to census operations. How will they perform? What will be the reactions of respondent, or census staff? Because of the long intervals between census cycles (5 to 10 years), opportunities to learn first-hand from new approaches may be limited. In considering the introduction of innovations, the census organisation should strongly consider learning from the experience of other census organisations internationally. Consideration may also be given to collaboration with other organisations in jointly testing new approaches or technologies before their introduction.

156. Technology has the potential to improve the quality of censuses and greatly reduce the cost – though in the short term, the introduction of new technology may actually increase costs. Census agencies need to consider how the new opportunities provided by technological innovation may contribute to improving the relevance, accuracy and timeliness of the census. For example, with reductions in processing cost, it may be possible to expand the content of the census or increase sampling rate for sampled questions in order to improve the quality of data for small population groups and small geographic areas. Any content expansion, however, needs to be balanced against the impact on respondents.

157. The demand for evidence-based policy and planning generates a demand for census data from an increasingly wide range of users. Output systems therefore need to be able to cope with a diverse range of users, some of whom may have limited knowledge of census data while others may no longer be content with the limited tabular output that may have been traditionally available.

158. In some countries there is a legislative requirement that governments should permit (or even require) citizens to conduct government business electronically. But even without such provisions, growing use of the Internet generates expectations that this is the way to do business.

Determining what systems are appropriate

159. Census agencies should undertake an evaluation well in advance of the census to determine what systems and processes are appropriate for their own situation. Issues to be considered include:

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- (a) the relative costs of staff and clerical-based processes compared with costs of possible computer systems and associated infrastructure;
- (b) the technological capability and infrastructure within both the census agency and the country as a whole; and
- (c) the capacity of the census agency to manage complex and sophisticated systems development processes.

Outsourcing

160. As noted in paragraph 153 above, the complexity of much of the new software and the infrastructure required for many of the new and emerging technologies may go beyond the current technical capabilities of many census agencies to manage. It is likely therefore that some countries will want to consider whether or not significant components of any technical solutions to the census operation (but also some non-technical activities like large scale recruitment of field staff) could be outsourced. The value of doing so is that external suppliers bring with them considerable technical experience and expertise which would otherwise be unavailable to census takers, and allows NSIs to focus on their main task of carrying out the census rather than developing in-house procedures and skills that are not part of their core competencies. Furthermore, the 5- or 10-year cycle for the traditional census activities, the short collection and processing timetable and extensive data systems required, mean that outsourcing can provide the opportunity for efficiencies and better value for money.

161. The appropriateness of contracting out should be determined following a methodological or step-by-step approach, and after subdividing the overall census operation into separate stages. It is likely that a number of components will offer themselves as potential candidates for outsourcing. These might include (but are not limited to):

- (a) printing of questionnaires and other field documents/material,
- (b) recruitment and training of field staff,
- (c) publicity campaign,
- (d) translation of field materials into other languages,
- (e) delivery and/or collection/return of questionnaires/field documents,
- (f) design and provision of questionnaire tracking system,
- (g) provision of mapping services,
- (h) primary data capture and coding,
- (i) provision of call centre/telephone help line,
- (j) design and provision of online response technology,
- (k) online/web access design for outputs,
- (l) data storage,
- (m) data editing and/or imputation,
- (n) post-processing questionnaire destruction,

- (o) quality assurance, and
- (p) evaluation.

162. Many of these activities will, of course, be less relevant to those countries that carry out a full register-based census, in which the opportunities for effective outsourcing are clearly much reduced — if one considers that the creation and maintenance, by external agencies, of the registers from which the census information is extracted, is not ‘outsourcing’ in the generally accepted meaning of the concept.

163. The decision to outsource will depend on the requirements of the census agency, whether the skills are available in-house and the ability of the agency to manage complex system development projects. Total outsourcing might seem at first to be a simpler process to manage. However, it is unlikely that a census agency will choose to outsource the total solution to the census operation, but rather identify discrete components of the system that involve a combination of outsourced elements, different external service providers working as contractors on specific projects, and in-house developments. Nevertheless, there will be advantages if several linked activities are provided by a single contractor; for example, the technical requirements for the printing and scanning of the questionnaires are so closely inter-related that a single contractor to provide both services would seem to be a prerequisite.

164. A clear understanding of the NSI’s requirements is needed before any contracts can be tendered so that these can be specified unambiguously to the contractor. These include understanding the objectives of the project, the outputs to be achieved and the standards these outputs must meet (quality, timeliness, cost), and confidentiality and public sensitivity issues. Specifications must allow for the possibility of requirements and objectives changing over the lifetime of the project. How these changes are agreed to and approved by the census agency and the provider needs to be determined and managed.

165. Timetabling, including milestones for key deliverables linked to payment schedules, needs to be agreed with the contractor. Regular monitoring on a routine basis needs to be undertaken at an operational level. In addition, processes should be established to allow senior staff to monitor progress and to deal with any major issues that cannot be resolved at the operational level.

166. A mixed approach to systems development is one in which the overall solution may consist of outsourced systems, systems developed by external contractors working alongside census agency staff, and systems developed in-house. This approach can have many advantages, such as greater flexibility to adapt systems as more is learned through the systems development and testing programme, and the actual census processing operations.

167. This can lead to improved data quality and savings in processing costs as systems are optimised. However, census agencies will need to be aware that, for such an approach, management becomes much more complex. The census agency must be skilled in the management of complex projects, have a clear understanding of business processes and manage carefully the integration of both the technological and clerical processes. It is important, therefore, to set up a dedicated team within the NSI to draft and manage contracts, deal with contractors, monitor processes, oversee quality, and liaise with statisticians. Such a team should also have sufficient familiarity with appropriate project

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management tools. Team-based working, where external contractors work very closely with census agency staff is essential, if this method of systems development is to be successful.

168. Throughout the overall process, activities should be conducted by a method that can best meet the requirements of users (with regard to the accuracy and timeliness of the results), and reassures the general public on matters relating to confidentiality and data protection. Indeed, it is important that no part of the outsourced operations should be done by a method that may result in loss of trust of the general public. So, in judging the propriety of contracting out, it is recommended that census agencies should carefully consider the following criteria:

- (a) strict protection of data confidentiality;
- (b) a method of confidentiality assurance that satisfies the general public;
- (c) relevant government policies and procedures, if applicable;
- (d) guaranteed measures of quality assurance;
- (e) ability to manage and monitor the outsourced census tasks/activities; and
- (f) control over the core competence of the national statistical office.

169. Confidentiality assurance is perhaps the first and foremost issue that has to be considered, above cost and efficiency. NSIs are responsible for data confidentiality, in terms of both reality and perception. Consequently, contracting out tasks that pose an actual or perceived risk to security or data confidentiality should be avoided. For example, for any of the data collection or processing operations carried out by external suppliers, safeguards should be put in place to ensure that there is strict protection of confidentiality. The contracting out of such services should be carefully considered so that public trust and confidence in the census is not eroded. Where, for example, temporary enumeration staff are engaged under contract, this should be done in such a way that they are subject to strict monitoring and control by the census agency. Such field staff should be engaged in such a way that their activities are governed by the relevant statistical legislation to preserve the confidentiality of the data that they collect.

170. Another key issue to be considered in outsourcing is the quality assurance that should be guaranteed. The census agency must be satisfied that the goods or services paid for are provided to an agreed and acceptable standard. In this respect, cost should not be the first priority in considering and judging the successful bidder if possible. Although it is desirable to engage in fair competition among several companies to reduce costs, the census agency must be aware that merely considering low price bidding as a determining factor may adversely affect the quality of the service provided by the successful bidder. Poor quality work could cause a significant loss of trust among the user and general public as would the risk to confidentiality.

171. To assess the quality of work, as part of any contract allocation process, potential contractors should be required to provide samples of their work or to list referees who could be contacted to verify their claims and/or sites at which previous work can be inspected. Once the contract has been awarded, continuous monitoring of the progress of work entrusted to the selected company is necessary and the census agency should ensure that a system or process for monitoring quality is built into the contract.

172. Further discussion of the issues to be considered in outsourcing, and in the evaluation of software and hardware can be found in the *Principles and Recommendations for Population and Housing Censuses: the 2020 Round, Revision 3*,¹² and the *Handbook on Census Management for Population and Housing Censuses*, United Nations, New York 2001.

Data collection

173. The following three data collection technologies are considered: an Internet response option; telephone interviewing; and hand-held devices (such as tablet computers, laptop computers, pocket computers, smart phones, and mobile or cellular phones). Technology now allows data collection and processing for some steps to be done simultaneously. The opportunities that new technologies offer for better managing the collection operations, and the use of technology in developing the means of accessing data held in administrative registers for census purposes, are also discussed.

Internet response option

174. Using the Internet as the medium for data collection means that the census collection methodology will, generally, need to be self-enumeration rather than interview-based. The Internet option can be incorporated into any of the traditional methods of delivering and collecting census forms (for example drop-off/pick-up, mail-out, mail back). The key factor to be considered is managing the collection control operations – that is, ensuring that every household and individual is counted once and once only. This requires the ability to provide linkage between each household (and any individual within the household) to its geographic location. An added complication for those countries where forms are also collected by census enumerators (rather than mailed back) is to have suitable and timely feedback to enumerators in order for them to update their own collection control information so that they do not visit households that have already returned forms.

175. The potential level of take-up of an Internet option should be considered by assessing the proportion of the population who can access the Internet from home, the proportion who use broadband services, or the general use of the Internet for other business purposes (for example, online banking, filing tax returns, shopping). It is worth mentioning that some target groups (such as younger age groups in urban areas) may prefer to fill in the forms via the Internet, and therefore delivering a paper questionnaire to such respondents may be unnecessary. It is worth considering, therefore, initially only sending out access information to the Internet response option.

176. Systems and processes that allow for Internet return of census forms will also need to be developed. These may increase some costs, but on the other hand there are potential savings in reducing enumerator workloads and data capture costs, as well as printing and postage costs. However, scanning and Intelligent Character Recognition when using paper questionnaires are in themselves cost efficient. Therefore, savings in data capture costs may be less than the costs of developing and implementing the Internet system.

¹² Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3; United Nations, New York 2015, Part TWO, Section XII. "Contracting out" and Section XIV.E.6 "Evaluation"

177. Data security is a very important issue and should be a key consideration in designing the infrastructure. Physically separate infrastructures should be set up to collect and to process the census information. Completed individual census forms, after their collection and capture, should be moved behind firewalls into a data processing infrastructure that is completely separate from the collection infrastructure.

178. A standard census questionnaire that is downloadable from the Internet requires much less infrastructure than a form that is completed online. However, downloadable forms generally require a greater level of computer literacy than online forms. They will not necessarily work on different computer configurations and there will be an expectation that the census agency will be able to deal with each individual problem. From the respondents' point of view, recent experience has shown that they are much more likely to prefer completing the form online. For these reasons it is expected that countries will want to consider adopting online completion of census forms.

179. Adopting an Internet response option requires the provision of credentials to the respondents and methods of delivering of the logins and password needed to access the online form which might include:

- (a) posting the paper forms or letters,
- (b) delivery by enumerator directly to the respondent's address, and
- (c) defining the logins and passwords based on data coming from registers. The combination of data typically for the whole population should be used to authenticate the respondent's identity (by using, for example, a Personal Identification Number).

180. An electronic (online) form offers the possibility of interactive editing to improve response quality that is not possible on a paper form. People using electronic forms have a certain level of expectation that a certain amount of guidance will be offered – at the very minimum that they will be sequenced through the form and not asked questions that are not relevant to their situation. In order to ensure a high quality of data collected via the Internet, it is important to provide mechanisms to control response errors on the form. Such control should be conducted in real time, and the respondent should be immediately able to modify any incorrect data.

181. Providing an Internet option may contribute to improving the quality of the census by making it easier for some hard-to-enumerate groups to respond. Most countries report difficulties in enumerating, for example, young adults and people living in secured accommodation where access is restricted. Some people with disabilities may also find it easier to complete an Internet form than a paper questionnaire. These groups are also more likely to be using the Internet for other purposes, and therefore, if available, this option should be promoted to these groups as a means of encouraging participation in the census.

182. Provision of sufficient infrastructure provides one of the major challenges for offering an Internet option. The census occurs over a relatively short period of time and involves the whole population of a country, and it is unlikely that the census agency will already have the needed infrastructure to cope with the peak demands of a census. It is therefore likely that this component, at least, of the Internet solution can justifiably be outsourced. It may be necessary for collection procedures to be modified to constrain demand. For example, staggering the delivery of census questionnaires or invitation letters or requiring people

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outside predetermined target populations/areas to contact the census agency before they can use the Internet form may be a means of restricting use of the Internet form.

183. Census agencies should, therefore, assess how they wish to promote the use of the Internet. Promotion of the Internet option should be determined by the capacity of the service to handle the expected load and should be coordinated with other data collection procedures. The public relations strategy should encompass assurances about the security and confidentiality of the information supplied via the Internet. Assuming that the Internet option is targeted to the whole population, the public relations strategy should also encompass managing public expectations about the ability to access the site during periods of peak demand. Simple messages of so called 'graceful referrals' advising people to use the Internet option at 'off peak' times should be prepared and used if necessary on the census Internet site itself, through any census telephone inquiry service, and in any media promotion.

184. Even taking into account the experience from the 2010 census round it is not possible to predict the extent of online take up as percentage total response. It depends on the level of promotion of the use of the Internet option and the attitude of society to modern technology. During the data collection, NSIs should constantly monitor the levels of public response generally and make an effort to increase the level of online response if necessary.

Telephone interviewing

185. Automated telephone interviewing generally may be a cost-effective solution particularly for countries that have a 'short form' census questionnaire requiring only the capture of basic demographic information. As with the Internet solution described above, each household would need a unique code to enable proper collection control.

186. Voice recognition software can be used to lead the respondent through the census form with either voice recognition or the phone keypad used as the response mechanism. Confirmation that important census variables such as date of birth/age have been captured correctly would need to be provided. Countries should be aware, however, that the user friendliness of such systems decreases greatly as either, the number and complexity of the questions increase, or the number of people in the household increases.

187. Computer Assisted Telephone Interviewing (CATI) method can be used to collect data via the census questionnaire and/or to verify and complete any missing data collected on a long-form questionnaire.

Hand-held devices

188. The increasing sophistication and the reduction in unit costs of communication using hand-held devices means that these may be a cost-effective solution for some aspects of census data collection. Possible applications for such devices include the replacement of enumerator paper maps, address registers and lists, and as a means of data capture in the field. They have possible applications in the full range of census collection methodologies from drop-off/pick up through to the collection of the census questionnaires.

189. Hand-held devices have the advantage of being able to provide real time two-way management information. Census managers can be informed of the progress of the

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collection operations as the enumerators deliver census forms and collect completed returns. Likewise, census managers can provide the enumerator, via the hand-held device, with updates on forms received and which households need to be followed-up. Census managers can identify, in real time, areas where the enumeration is falling behind schedule or not meeting quality standards, and instigate appropriate interventions.

190. Use of hand-held devices should allow greater opportunities for increased efficiency in data collection. However, several technical issues need to be considered in using such devices:

- (a) Storage capacity is related to the cost of the devices, but is of itself not now a limitation on their use.
- (b) Screen size may affect the ability of the enumerator to record and verify responses accurately. For the same reason, countries considering the option of Internet response with mobile devices should be aware of the risk of fragmentation of the data (with a threat to the integrity of the concept of household, and the link between the individual and the dwelling) due to the small size of the screens.
- (c) To ensure the safety of data, completed information should be held in the hand-held devices for as short a time as possible - preferably no longer than 24 hours.
- (d) The length of battery life should be considered in relation to the daily workloads of field staff.
- (e) Devices should be able to deal with being off line for periods of time.
- (f) System and software updates should be avoided during the data collection phase since this may result in loss of data.
- (g) An assessment of mobile web connectivity should be done particularly if the hand-held device uses web-based collection.

191. Solutions based on hand-held devices should be extensively tested before the census phase.

192. There is also a range of security issues associated with the use of hand-held devices:

- (a) There is a greater risk of being stolen or lost compared with bundles of paper forms. However, regular uploading of the data from such devices should minimise the need to re-enumerate areas if the devices are lost.
- (b) Measures are needed to protect the confidentiality of any data either on the device, in the event of loss of the device, or in transmission of the data. Data stored on hand-held devices should be encrypted and only accessible through password protection.
- (c) Transmission of the data also needs to be secured through encryption and use of secure channels. There are several commercial software packages that can be used for these purposes.

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- (d) Security software should be loaded to the hand-held device and must be compatible with the other applications on the hand-held device. However, security software and passwords add an extra level of complication in use.

193. These security measures will add to the support costs.

194. Training and technical support for enumeration staff is an important issue. It should not be assumed that the people who are likely to be recruited for enumerator tasks are technically competent. These factors become increasingly complex and difficult to manage as the size of the enumerator work force, and the physical distances involved, increase. In larger countries, enumerators may be able to rely on training and technical support being delivered remotely via the Internet or phone.

Census management software

195. At a basic level, multi-modal collection operations require that timely information be provided to census enumerators so that they do not visit households that have already submitted a census form. This is both an efficiency issue and a public relations issue. Modern technologies provide opportunities to improve the management of field operations and thus the quality of the census itself.

196. While the key issue is the flow of timely information to the census enumerator, the same systems set up to ensure this can also provide for a close to real time two-way flow of information between census managers and enumeration staff. Such monitoring of enumerator work will allow for more timely interventions where the data collection process is falling behind schedule.

197. It is unlikely, however, that the census agency will have the knowledge or capacity to develop and run these systems in-house, and will, therefore, need to rely on external organisations for key parts of the solution. An integrated field communication system can use, and build on, already existing infrastructure present in most developed countries. The following contains a brief description of a possible solution that uses a combination of systems and processes developed in-house, call centres and mobile (cell) phone technology. A prerequisite is that the census agency should have a central register of all enumerators, their enumeration areas and their mobile (cell) phone number:

- (a) The census agency might want to establish an electronic central register of forms received either by mail or via the Internet, which could be compared against the census frame (an address register or other source). Such a register would need to contain the unique identification number for each form and/or dwelling (such as the geographic coordinates, Internet access code, barcode information, etc.). This number would allow the identification of the enumerator responsible for that enumeration area and ultimately each physical address. (For doorstep collections the actual address may only be known at this stage by the census enumerator.)
- (b) Most census agencies establish some form of telephone inquiry service to handle queries from the public during the census collection period. Call centres use technologies that can be readily adapted to meet census requirements. The call centre systems would record the callers' unique identification number or derive that number from the address supplied by the

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caller. The call centre also records what action is required for the enumerator (for example, that the census form needs to be picked up, assistance is required in completing the form, a form has not been received, etc.).

- (c) The information from the electronic register and the call centre could be sent to the enumerator via a short message text service. Such a message only need contain the census reference number and a code to indicate the action required on the part of the enumerator.
- (d) The solution can be cost-effective as it relies on a readily available commercial infrastructure (a call centre) in a highly competitive industry (and most of this cost should not be a new requirement for censuses) and the fact that most enumerators are likely to own their own mobile phones. Furthermore, the cost of text messaging is small. The census agency needs to develop the electronic register and manage the integration of the various systems.

GIS technology

198. There is widespread recognition that it is important for NSIs to develop a continuing capability to serve their specialized cartographic needs. It should be stressed that there is now a wide range of techniques and technologies available for use in a census mapping exercise. There is a strong and growing interest in the use of geographic information systems (GIS) as a tool to support the process of conducting the census (through the use, for example, of vector data and digital statistical division boundaries), and as a tool for user-friendly visualization of statistical results (such as GIS web-based mapping tools to disseminate census results). Maps, which are now commonly in the form of digital products, play an increasingly important role in the dissemination phase.

199. GIS, as far as it is possible, should be used at all stages of the census (inventory preparation, progress monitoring, and dissemination of census results). Despite a significant majority of countries implementing GIS technology within their NSI it is still the case that in many countries there are only a limited range of maps available and these often do not show sufficient detail to enable the boundaries of small areas to be clearly delineated.

200. GIS technology should be considered only at a level appropriate to the skills and resources available, and should constitute an integral part of the overall work of the NSI. Collaborative arrangements with other organisations, such as national mapping and survey agencies should be pursued, particularly with regard to the acquisition and maintenance of base maps and digital databases, which would not usually be the responsibility of the NSI. Therefore as many administrative sources as possible should be reviewed for presence of spatially referenced data and tested for the possibility of using it for statistical purposes.

201. Wherever it is possible, data should be collected with reference to an address point; results can then be disseminated using any desired spatial divisions.

202. A very broad and comprehensive description of the use of maps and GIS technology at all stages of census has been developed in the document *Principles and Recommendations*

*for Population and Housing Censuses: the 2020 Round, Revision 3.*¹³ Countries are highly encouraged to adopt these recommendations; particular attention should be paid to the chapters dedicated to mapping, GIS, and Interactive digital outputs.

Data processing

203. Recent years have seen significant improvements in intelligent character recognition, data repair, imaging and automated coding technologies that have reduced the cost of census processing, and improved data quality.

204. Based on the conclusions from a review of countries practices in the 2010 census round, it can be assumed that more countries will use an Internet response option in their next census.¹⁴ Many countries will, however, still choose to use paper forms and OCR/OMR technology, but a declining trend in the use of this technology has been observed.

Data capture methods

205. Several data capture technologies have traditionally been used in census processing such as key entry and optical mark recognition (OMR).

206. Key entry requires simple software and low-end computing hardware. However, it requires many more staff than other automated methods of data entry and is likely to take more elapsed time to complete. The cost-effectiveness of this method is dependent on the relativities between staff costs and those hardware/system development costs required for other methods.

207. OMR can be a cost-effective option where the census form contains only tick-box responses. Additional means of data capture/computer assisted coding operation are required to handle write-in responses. However, OMR has largely been superseded by intelligent character recognition (ICR) technologies.

208. For most countries, the most cost-effective option is likely to be a combination of digital imaging, ICR, repair and automated coding. An example of this process is briefly described below.

- (a) The census forms are processed through scanners to produce an image. Recognition software is used to identify tick box responses and translate handwritten responses into textual values. Confidence levels are set to determine which responses are of acceptable quality and which responses require further repair or validation.
- (b) Automated repair is designed to reduce the need for operator intervention and typically involves the use of dictionary look-up tables and contextual editing. The dictionaries are tailored according to the census question being

¹³ Principles and Recommendations for Population and Housing Censuses: the 2020 Round - Revision 3; United Nations, New York 2015, Part THREE, Section IV. "Mapping and geo-spatial data"

¹⁴ Measuring Population and Housing - Practices of UNECE countries in the 2010 round of censuses, UNECE 2014, page 214 (http://www.unece.org/fileadmin/DAM/stats/publications/2013/Measuring_population_and_housing_2010.pdf)

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processed. Thus, for example, the dictionary for country of birth question would only contain names of countries. Preparatory work on the construction of natural language dictionaries of terms will greatly increase the efficiency of coding.

- (c) Operator repair can be undertaken on images not recognised. This is only cost-effective for those questions where there is a high probability that the repaired data can then be automatically coded.
- (d) Automatic coding uses computerised algorithms to match captured responses against indexes. Those responses that cannot be matched are then passed to a computer-assisted coding process. To further constrain costs and improve quality, responses that are not coded should be analysed for common responses. These responses could either be added to the coding indexes and resubmitted through automated coding, or some other form of bulk coding could be undertaken.

209. The combination of ICR/automatic coding/imaging technology described above is likely to provide the most cost-effective solution for most countries. Staffing can be reduced through automatic coding and use of these systems. Use of images greatly reduces the need to move paper forms, and it has been shown that referring to images for follow-up coding of responses that cannot be automatically captured is much more efficient than referring to the paper forms.

210. Importantly, this methodology offers the opportunity to improve the quality of the data. The consistent treatment of identical responses can be guaranteed. However, the quality of automated capture and coding needs to be carefully monitored during processing to ensure that the system is functioning as specified. Character substitution rates should be monitored closely and for critical questions or parts of questions (such as the year of birth as compared with the day of birth) may require more stringent confidence rules that require higher level of inspection and quality assurance than other fields or values. Numeric values in particular may require extra scrutiny as there may be no contextual information that can be used to automatically check their validity. The design of the work flow for repair and coding can greatly increase the efficiency and accuracy of the process by routing the results of particular questions to specialised operators or coding in blocks of questions.

211. There should be on-going quality assurance of the final outputs of the system – such as manually recoding from the images a sample of the responses and comparing them with the automatically captured and coded responses. This should allow a proper balancing of the quality/cost equation including the reducing the amount of manual repair and not therefore wasting resources for marginal improvements in quality.

212. For this reason it is vital that even if these systems are outsourced, census managers have a good understanding of the quality/cost equation implicit in the confidence levels being implemented in the ICR/data repair software, and any effect on the substitution rate and the ultimate quality of the census data. Contracts should allow ready adjustments of these parameters to meet the quality and the operational requirements of the census agency.

213. Census agencies need to consider how the data are going to be held throughout the processing stream. Traditionally, census processing has been conducted using a flat file that

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gets progressively updated with the earlier version of the file retained for backup and recovery processes. Typically this has been allied with batch processing where a discrete group of forms (typically for an enumeration area) are processed together. Thus the forms will be data entered, edited and coded as a group. This allows a high degree of workload control. Databases allow information to be held and processed at the individual field level. This provides a greater degree of flexibility, because once census data is electronically captured it is easily organised to maximise both processing efficiency and quality, allowing similar responses to be readily grouped and coded together. However, holding the census data in a database requires more complex systems to manage and deliver work. Consideration also needs to be given to backup and recovery mechanisms.

214. Early examination of standard tables of processed results for a defined area should be done to ensure that results are internally consistent and compare well with other sources. This can identify coding biases and sub-optimal OMR recognition. Examination of coding profiles across individual operators should be done identify coding biases and overuse of bucket codes.

215. These systems typically require far more extensive development and testing than does a traditional census processing system. There are a number of factors that need to be considered through the systems design and integrated into the systems development, such as the work organisation of the remaining clerical processes.

216. Adequate network capacity is critical because of the large number and size of the files associated with images; techniques such as form drop-out, where fixed background information is dropped from the final image can greatly reduce the size of the files. This need to be designed into the Census form and tested throughout the form printing process to ensure that print density is consistent with form drop out.

Output production

217. Traditionally, census output comprises aggregated tables, statistics, illustrations, maps, with appropriate metadata. (See Chapter 3 for a more general discussion of outputs and metadata.)

218. Online dissemination via the Internet allows for: the design of appropriate products to better meet the needs of different types of census data users - from the novice to more sophisticated or experienced users; the cost-effective dissemination of a much wider range of census data; and improved usability of the data.

219. Functionality and data content can be targeted to satisfy the different levels of users. This functionality should be seamless - from the simple to the sophisticated - with the users being led by the nature of the query or analysis they are wishing to undertake using different products.

220. One of the main objectives of the census is to produce information for small geographic areas and for small population groups (both social and economic). Internet dissemination can support both types of use of the data. For small geographic areas, GIS technology (see paragraphs 198-202 above) can be used as means for both defining areas of interest in searching for data and for mapping of the outputs of the search. There is a range of packages that can be used to zone in on populations of interest from large pre-defined matrix tables.

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221. The Internet dissemination system should provide freedom for users to specify the form of the output – whether as hard copy or as a data file that can be exported into a range of commonly available statistical analysis, tabulation or mapping packages.

222. Some countries may wish to consider allowing users to submit requests for tabulations directly online (or off-line) to be run against the census unit record file.

223. Whatever the means of access or dissemination, protecting the statistical confidentiality of the census data is a prime consideration in any such systems. In implementing any statistical disclosure control procedures (see paragraphs 143-145) there may be a requirement to limit the size of tabulations that can be submitted through this method.

224. An important point to note, in conclusion, is that whatever technologies are adopted throughout the earlier census processes (field mapping, data collection, scanning, etc.) should be compatible with those applied in the final (and, from the users point of view, most critical) stage of output production and dissemination. Countries should ensure, therefore, that sufficient costs and resources are allocated to this phase of the census operation so that the outputs designed to meet users' needs are delivered in a timely manner through the most appropriate technology.

The use of technology in adopting new census methodologies and data sources

225. The use of particular technologies in the census depends on the applied methodology. Technology is generally applied in wholly register-based censuses to a lesser extent than that used in those censuses that involve some degree of data collection in the field.

226. The development and increase in availability of new information and telecommunication technology (ICT) allows administrative registers to be utilised more widely in population and housing censuses. The efforts of statistical institutes to make greater use of data from administrative registers in censuses are primarily dictated by the necessity to reduce data collection costs and the burden on respondents. The use of data from administrative registers is particularly effective in NSIs where data from registers are used not just for a single purpose, but continuously and consistently in various surveys and other many data collection operations. This issue is important because of the necessarily increased expenditure that is incurred in the initial period of development when moving to the use data from administrative registers for census purposes.

227. The new approaches to statistics production based on multimodal data collection and integration, now being increasingly adopted by NSIs, trigger the necessity of creating or modernising a suitable software and hardware infrastructure. The dynamic development, in the 2010 census round, of new ICTs and their increasingly broad application in statistics production, even in countries with a long-standing tradition of the use of administrative data in censuses, caused the necessity to modernise the infrastructure for collecting, storing and linking data from administrative registers and storing metadata on processes and products. Bearing in mind the development of state-of-the-art technologies and the commitment of NSIs to implement innovative solutions in censuses in the 2020 census round it will be necessary to create or modernise the software and hardware infrastructure.

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228. The quality of the source data, including administrative registers, has a large impact on the quality of output products. Therefore, the methodology for improving the quality of data from administrative registers, (for example by adjusting them to statistical requirements) is of vital importance. The use of data from administrative registers, as a rule, requires a more comprehensive preparation than in the case of traditional censuses. State-of-the-art ICTs may prove very useful here and have a key impact on improving the efficiency and effectiveness of these operations.

229. Census results are the outcome of the implementation of a large number of processes and sub-processes. As the quality of census results largely depends on the quality of these processes, measures should be undertaken to improve the quality of statistical processes by determining and measuring the key variables in the process, particularly the variables which have the greatest impact on product quality. Process-quality indicators should be used to evaluate the impact of process quality on product quality. The use of the Generic Statistical Business Process Model (GSBPM) to design, describe, and define the set of statistical processes in the census might contribute to improved census quality.

230. As part of the preparatory work for the census, particularly in the design phase, the necessary technical requirements related to the use of data from administrative registers, which may affect the need to modernize infrastructure should be determined in the following areas:

- (a) data collection,
- (b) data storage,
- (c) data linking, and
- (d) storage of metadata or information on processes and products.

231. The application of several techniques of collecting data from administrative registers and other sources for use in population and housing censuses will require a more comprehensive organisation and management processes and more complex systems. Modern technologies provide opportunities for improvement in this case as well. The process of collecting data from administrative registers should include the preparation of a data-collection strategy using various data-collection modes.

232. In the 2010 census round, NSIs used various methods of obtaining data from administrative registers. The data obtaining process was dominated by electronic data collection through:

- (a) transfer of data sets through a secure ICT channel, by administrative data keepers;
- (b) delivery/receipt of external electronic data carriers containing data files directly by/from administrative data keepers; and
- (c) remote access and capturing of data in electronic form, allowing its processing.

233. The condition necessary for electronic data collection from administrative registers is the preparation of secure IT infrastructure. A crucial issue connected with the process of data collection is the protection of data. Regardless of the technology applied, the data collection strategy, often including the entire population, should ensure information

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security. This requirement should be addressed at the early stages of designing the process of obtaining and gathering data from administrative registers, and designing the proper software and hardware infrastructure. A number of technical issues concerning the coding of data transmission should be considered in detail, together with the use of secure transmission channels.

234. In the 2010 census round, many countries used various techniques of automatically converting administrative data into statistical data, which, in the context of a dynamic development of ICTs and a growing quantity and availability of administrative registers for statistical purposes, should be taken into consideration in the 2020 census round. During the 2010 census round, the following techniques were used: validation, conversion, parsing, standardization and upcaseing (that is, converting all letters to upper case letters). With the procedure of automatic data cleaning in place, it is possible to eliminate errors in source data from administrative registers. The use of data cleaning tools makes data editing process efficient. Modern technologies might prove useful in the process of linking records and data.

235. In assessing the possible use of administrative registers as census data sources, and the impact on the quality of the resulting outputs, account should be taken of the collection transformation model, that is, the set of rules and principles governing data control and adjustment and defining the required quality level of input data. Moreover, it is recommended that NSIs should prepare descriptions both of the specific procedures of transforming the data from administrative registers and of the data quality measurements, on the basis of the applied scope of validation checks and the agreed principles. It is also essential to ensure that the data transformation process is documented; this will allow the monitoring of the progress, and evaluation, of the data processing.

236. It is recommended as good practice to use metadata in steering and monitoring the processing of data from administrative registers, including their transformation. The use of metadata and principles should be used in the programming of the implementation of processes, collecting information on the course of the processes, and the outcomes of their implementation. Ensuring the high quality of census data is the overriding objective of these operations.

237. As a postscript to this chapter it should be noted that there is an increasing potential for the use of more innovative data sources and techniques, such as Big Data and synthetic data, for the purposes of the census. But even the consideration of the use of such data is at a very preliminary stage as these Recommendations are being prepared, and it may be unwise to speculate here on extent to which such data will be viable (and of a sufficient quality) to meet the requirements of census data users or on the technologies to access it.

Chapter III. Field and other operational activities

Introduction

238. While the census of population and housing is in essence a statistical data collection exercise, because of its scale it incorporates components that are not present in routine surveys conducted within the framework of the national statistical system. This chapter focuses on a number of operational activities necessary for carrying out the census, particularly those that are associated with the data collection process through a field enumeration where the cooperation and active participation of the general public is not only requisite but mandatory, and those where there is an important interface between the National Statistical Institute (NSI) and the users of census data. A discussion on the importance of monitoring costs and assessing benefits is also included.

239. Activities and issues that are more closely associated with the data processing operation are covered in Chapter II.

The legal basis for a census

240. In most countries, the preparation and conduct of a census regardless of the methodology adopted requires a legal basis, which may include regulating issues such as:

- (a) the allocation of funds for the census operations;
- (b) the general scope, content and timing of the census;
- (c) the obligation of citizens to provide complete and accurate census information, and of the enumerator to record the responses faithfully, and the sanctions and penalties to be imposed for failure to comply;
- (d) the relationships between the agency responsible for the census and other public administrations involved in the census operations; and
- (e) the uses and linkage of registers to produce census data or to support field operations.

241. In addition, the confidentiality of the individual information should be strongly and clearly established in the legislation and guaranteed by appropriate sanctions so as to provide a basis for the confident cooperation of the public. In some cases, general purpose data-protection laws may include all the provisions necessary to cover the specific needs of censuses, including for instance the possible use of register data for censuses, or specific measures to be applied to census enumerators. In others cases, specific provisions on data confidentiality have to be included in the census acts, to take into account those aspects that are specific to the census.

242. In many countries, a specific census act or appropriate regulations are approved before each census, both to authorise the topic content and to deal with the issues mentioned above. In some countries, however, a more general statistics act includes all the necessary provisions required for the conduct of a population and housing census and/or the production and dissemination of statistical data, thereby obviating the need for specific census legislation.

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243. In countries that lack permanent or primary legal authority for the taking of periodic censuses, or where secondary legislation is required to enable a particular census to take place, it is important to act early to establish the necessary legal authority. The legislative process, and the timeframe necessary to complete it, will of course, vary from country to country, but sufficient time should be allowed for the completion of such a process well before any activity that is dependent on the legislation (such as the appointment of field staff for example) is scheduled to begin. In planning such a timetable, countries should always build in a contingency to allow for unscheduled delays in the legislative process.

244. The principle of conceptual and organizational flexibility should be observed in drafting primary or framework census legislation. Thus, the inclusion of provisions that are too rigid or prescriptive regarding the type of data to be collected or the structure and relationships of the various parts of the census organisation should, if possible, be avoided. Instead, the necessary detail should be contained in the census regulations promulgated by the census authorities. Moreover, provision should be made, in either the primary legislation or implementing regulations, for sanctioning the use of administrative procedures, including the appropriate delegations of authority for the procurement of equipment and supplies and the recruitment of personnel during the operational phase of the census. Where the authority for executing elements of the census is devolved to bodies or organizations not under the direct control of the NSIs (such as local administrative committees), such power must be clearly prescribed in regulations or other statutory instruments so that the authority to act cannot be challenged.

245. Where census data is primarily collected or derived from administrative registers or other data sources, that will often be owned, held, and controlled by legal bodies or agencies other than the census agency, sufficient legal powers must be available to the NSI to allow it lawfully to access, hold, process and disseminate the necessary data, within the provisions of conventional national data protection and confidentiality legislation.

246. Countries moving from a census methodology based on a long-standing tradition of field enumeration to one based primarily on the use of shared and/or linked administrative data, or where the information is to be collected from mandatory sample surveys will, in particular, need to allow additional time for any necessary new legislation to be drafted, having previously demonstrated that such new legislation is publicly acceptable.

247. General or specific legislation will often also be necessary to provide the NSI with the authority to disseminate the census data, and/or to charge for the provisions of statistical services related to the census data such as the preparation and supply of customised cross-tabulations of variables not otherwise available in standard outputs. There will often be a requirement for the confidentiality of the data to be protected in law through, for example, the use statistical disclosure control measures, though it is not recommended that the details or parameter values of such measures be prescribed (see also the section on Confidentiality and security in Chapter I, paragraphs 140-145).

Communications and publicity

248. An effective communications strategy, together with far reaching publicity and information campaigns, play an essential role in ensuring the success of the census. This is especially so for those countries adopting a field enumeration methodology, either wholly or

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in part, where the general public is expected to actively participate in the census activities as respondents and, possibly, as temporary employees as part of either the field staff or in the data processing operation. But even among countries adopting an entirely register-based approach, where direct engagement with the public may be minimal, communication with key stakeholders is nevertheless important to ensure that acceptable levels of quality for such components as the relevance and accessibility of outputs can be achieved.

249. In the planning phases of the census, consultation with a wide range of stakeholders is necessary to ensure that user requirements are met, questionnaire design is effective, the methodology is accepted, working partnerships are forged, and that technical specifications are well understood.

250. During the operational phase, publicity and information campaigns are usually necessary to inform the public that a census is taking place and also to provide the necessary information to allow and encourage them to participate. Special attention is often given to identifying and targeting hard-to-reach population groups in order to ensure consistent levels of response across the country. In essence, the aim of these is to engage, educate, explain, and encourage, and (if necessary) enforce participation.

251. In recent years, due to the complexities of collecting information from the population, the issue of effectively informing the population of the forthcoming census and explaining its purposes and tasks, through good communications and a publicity campaign, has become increasingly necessary for the purposes of ensuring a good coverage and the collection of reliable information, particularly in those countries adopting a field enumeration methodology either fully (as in a traditional census) or in part (as a component of a combined approach).

252. The main task in any such publicity campaign, is the explanation of the importance of the census for the purposes of the depiction of society, the socio-economic development of the country, and the analysis of social, regional and national demographic change. The census has a large cultural and historical context, not only to the country itself, but also on a global scale. The campaign should highlight the fact that the census is an integral part of the country's official statistics programme.

253. With particular reference to a traditional field enumeration, the main (and perhaps most important) practical goal is to encourage a positive attitude of the society to the census, prompting the inhabitants of the country to participate and give reliable information about themselves. But a good communications and publicity campaign should encompass a wider set of messages, whose components might conveniently be summarised as follows:

- (a) *Engagement*: to make people aware of the census;
- (b) *Education*: to tell people about the benefits (to them and to the country) of the census;
- (c) *Explanation*: to tell people what to do and when;
- (d) *Encouragement*: to persuade people who had not yet responded to do so;
- (e) *Enforcement*: to remind people about their legal obligation and duty to take part if they persistently refuse to do so;
- (f) *Expression* of thanks for taking part; and

- (g) *Extolment* of the value of the data in order to *Expand* the use of the published results.

254. Important messages about when and how the census is going to be held, what is expected from the public, and how the public can find out more about the census need to be communicated. Public understanding of these aspects of the census will contribute to the smooth conduct of the data collection operation. The implementation of a communications and publicity campaign — before, during, and after data collection — is described in more detail in the following sections.

The scope and design of consultation programmes

255. Consultation on a range of subject areas is an indispensable step in the preparations for the census and should be instigated early in the planning cycle. In order to ensure that the census is fit for purpose, consultations should cover (where appropriate):

- (a) enumeration methodology,
- (b) identification of hard-to-count populations,
- (c) language, community liaison and outreach programmes,
- (d) user requirements for census topics and questions,
- (e) definitions,
- (f) classifications,
- (g) sampling,
- (h) planned tabulations,
- (i) geographic boundaries,
- (j) processing,
- (k) editing and imputation,
- (l) confidentiality and disclosure control,
- (m) coverage and data quality,
- (n) design, content and dissemination of output and conditions of use of the data, and
- (o) evaluations.

256. Some of these topics will be aimed more at users and others at informed experts, but all such consultations will assist the census authorities in planning for a census that is as responsive as possible to the needs and views of all stakeholders, and can also serve to foster a wider and more informed understanding of, and support for, census plans and activities. The ultimate goal will be a greater participation in the census enumeration.

257. The key user communities to be encompassed by such a programme of consultation should include (either individually or collectively):

- (a) central government departments and agencies,
- (b) local government authorities,

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- (c) health service providers,
- (d) public and utility services, such as energy suppliers, water authorities, fire departments, the police, etc.,
- (e) academics and education service providers,
- (f) market researchers and other professional and/or private sector bodies, and
- (g) other organisations or individuals representing the economic, social, and cultural life of the country.

258. Many countries will want to include in the latter group organisations or bodies representing in particular, ethnic communities, religious/faith groups, the disabled, housing associations and those agencies with particular interests in catering for the homeless.

259. Other key stakeholders may include partners, with whom the census agency collaborates for the provision of specialist services, and donors who may help fund elements of the census operation. It is also important not to overlook the role that the press and other media can play in the success (or otherwise) of the census. These, too, should therefore, be engaged wherever practicable.

260. Consultation may be conducted through a variety of means and media. It can, for example, be carried out through formal and regular meetings of Advisory Groups or Working Groups comprising invited representatives of the user communities and census authorities, or more directly, by means of public consultation papers and questionnaires. The increasing accessibility and use of census authorities' websites and social media enables such direct consultation and feedback to be carried out among a much wider audience including individual organisations and members of the public alike. In addition, census authorities may wish to consider *ad hoc* public meetings or bilateral meetings as means of discussing either particular census issues or more general plans and developments.

261. It is often more useful to conduct consultations separately with different types of users or stakeholders with common interests and perspectives, such as administrators, planners, policy makers, finance controllers, demographers, market researchers, community leaders etc., rather than adopting a strategy of holding simultaneous meetings for all data users. Such combined meetings often prove to be less effective because there are substantial differences among users and stakeholders in their technical background and expertise, priorities, and in the level of their interest in the detail of the census content and operation.

262. Cognitive tests, pilot tests, focus groups, and other tools can be used to understand how respondents interpret and react to census questions and instructions, in order to design better questionnaires. This type of testing can also evaluate different field techniques to increase response and participation, and can help to sort out the meaning of survey responses. During a pilot, the effectiveness of census questions and instructions can be better evaluated under typical field conditions.

263. A particularly key area for consultation with users will be in establishing the requirements for statistical data on each census topic. Though there will likely be a set of core topics on which NSIs will want to collect information to fulfil international obligations (such as the EU Census Regulations), many questions will be included to meet purely national and local requirements. To justify the inclusion of particular census topics,

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therefore, consultation with the user community should aim to ascertain the relative merits of the business cases for a range of topics to be considered. The criteria for accepting these topics should be that:

- (a) there is a clearly demonstrated need for the information at both national and local area level;
- (b) users' requirements cannot adequately be met by information from other sources;
- (c) relevant questions should be shown, in tests, to have no significantly adverse effect on the census as a whole, particularly the level of public response; and that
- (d) practicable questions can be devised to collect data that is sufficiently accurate to meet users' requirements.

264. In order to complete the preparatory work for the census and to carry out the enumeration, the census agency will often have to expand its staff substantially and may require the cooperation of numerous government and non-governmental bodies to assist in providing personnel, equipment, supplies, accommodation, transportation or communication facilities to help in the census work. As a result, large numbers of temporary personnel may have to be trained and/or specialist consultants recruited, and the contribution of a diverse group of national and local organisations may have to be effectively mobilised.

265. Because of the particular importance of the role that local government authorities can play in planning and assisting in carrying out the census, NSIs may wish to establish special working relationships with such bodies through separate liaison mechanisms. Areas in which such partnerships can be beneficial to both the national census agency and local authorities themselves are in:

- (a) establishing mutually agreed address lists for enumeration (since local authorities and other stakeholders may often have access to alternative address lists than those generally available to census takers, particularly if there is no standard national address register established);
- (b) local authorities appointing their own census liaison officer to act as a focus for ensuring that local needs and conditions are well understood by the census authority and that good communication with local census field staff is established;
- (c) advising on the characteristics of local populations, particularly the location of hard-to-count groups (such as the elderly or infirm) in order to determine the most effective means of carrying out the enumeration at the local area level;
- (d) assisting with local recruitment of field staff, publicity and helpfulness; and
- (e) assuring the quality of results at the local area level.

Implementation of a publicity and information campaign

266. Particularly in the case of countries that undertake a significant field operation, public acceptance and cooperation is essential to ensure the success of the census. A large-scale publicity and information campaign is recommended to inform the population of the census and to explain its purpose. Implementation of the publicity programme is best undertaken by experts in the field of public relations, advertising and sociology. Such expertise is frequently not found within the NSI itself, and it may therefore be appropriate to outsource some or all of this work. The publicity programme may include:

- (a) a public relations campaign,
- (b) a community liaison (or outreach) programme,
- (c) an advertising campaign,
- (d) monitoring of public opinion, and
- (e) media relations including monitoring of the mass media.

267. Following the data collection phase of the census, a second information campaign is recommended to inform the public about the census results, to demonstrate how the statistical data collected are being used, and to thank the general public for participating in the census. Reassurances can also be given that privacy and confidentiality will continue to be respected. This will have the effect of strengthening the NSI's image and credibility.

Defining issues and target audiences

268. The pre-enumeration campaign is the main part of the programme, and will have the strongest influence on the success of the population and housing censuses and on the quality of data produced. An important first step is the identification of the specific data collection issues and the target audiences for the publicity.

269. The key issues relevant to the censuses should be defined on the basis of the existing situation of each country, taking into account the demographic, economic, ethnic, language and religious structure of the population. It is necessary to identify citizens' concerns to define the particular target audiences, as well as to select appropriate implementation methods to effectively reach these groups, inform them about the census, and foster a more positive attitude toward the census.

270. Some basic issues common to most countries relate to those individuals who:

- (a) refuse to participate in social or communal activities;
- (b) provide unreliable information about themselves; or
- (c) are difficult to locate, especially the more mobile youth.

271. Specific issues can include the following:

- (a) presence within the country of territories with unstable political and social conditions, where relations between the people and state authorities may be volatile;

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- (b) presence of socially uncooperative population groups with an unwillingness to participate in public activities; and
- (c) desire from lobby groups or individuals to express a protest against the census on the grounds of cost, perceived intrusiveness, confidentiality and/or for reasons of ethical reasons.

272. In particular the public's concerns may include that the census is/will be used for one or more of the following:

- (a) for fiscal (taxation) purposes,
- (b) to build a government database,
- (c) for the oppression of minority national and religious groups,
- (d) to reveal illegal migrants, and
- (e) to identify and control 'anti-social elements', and persons on the outside of established society.

273. Moreover, respondents could be concerned that criminal elements will impersonate census-takers in order to gain access to property or personal information for the purposes, for example, of identity theft.

274. Target audiences can be both broad and specific. Some examples are given here:

Social-demographic groups:

- (a) population in particular age groups (young babies, children of school age and teenagers, men under 30 years, elderly people);
- (b) social groups by employment type (school children, students, the employed, housewives and unemployed population);
- (c) professional groups; and
- (d) inhabitants of inner cities or other densely urban areas, large, and (in contrast) people living in remote rural areas.

Groups with specific concerns or sensitivities, or those living in particular circumstances (who may include):

- (a) illegal migrants;
- (b) persons without a fixed or legal residence;
- (c) uncooperative landlords who may not wish to report the presence of tenants such as economic migrants;
- (d) persons working far from their usual residence and family, or who may find it difficult to participate in the census procedures due to long periods of stay at work; and
- (e) inhabitants of areas where there are ethnic or religious tensions or conflicts.

Main messages

275. There are a wide variety of potential issues that can affect a census publicity campaign, and identifying them is an important part of the before-census campaign, for example:

- (a) privacy and confidentiality of information given,
- (b) whether or not the information provided is actually put to good use,
- (c) cost of the census,
- (d) potential use of census information for non-statistical purposes,
- (e) requirement that name and address be included on the census form, and
- (f) concerns about potential government intrusion into private affairs.

276. There are several main messages that census agencies will need to communicate to the public in order maximize outcomes for the census, for example:

- (a) privacy and confidentiality will be protected (there are penalties for enumerators and other staff who misuse information, the information will not be used for administrative purposes, individuals will not be identified in any published information);
- (b) the census serves the public good as an important source of information to plan for the future;
- (c) filling in the form is a duty of the citizen, which will benefit the person's country and community;
- (d) cooperation is mandatory.

277. Care is necessary in finding the correct balance between these different messages. For example, an over-emphasis on the obligatory nature of the census may serve to reinforce negative perceptions that the census is an imposition by the state on the population, rather than an activity for the common good.

278. Many countries successfully develop a census 'brand' including a logo and slogan. A simple but effective slogan and distinct logo can be used in all national and local advertising campaign and in all types of media, booklets, posters, brochures and souvenirs. The slogan and logo should be memorable and positively perceived. A logo and/or slogan that are well recognised from initial stages of the publicity campaign may serve to improve 'brand recognition' for the census. The aim should be to encourage the respondent to feel more reassured that the census is an inclusive and beneficial activity.

279. Examples of slogans used in the 2010 round of censuses in the UNECE region included:

- (a) "The future starts here" (Italy)
- (b) "Everyone counts" (Estonia)
- (c) "We count on you" (Luxembourg and Portugal)
- (d) "Help tomorrow take shape" (United Kingdom)

Publicity campaign activities

280. The public relations campaign may represent interactions with: national and regional mass-medias; regional statistical institutes; municipal bodies; other organizations; and the general public. The following methods and media may readily be utilised in any part of the publicity campaign to reach one or more sectors of the community:

- (a) national and local press and magazines,
- (b) national, regional and local TV and radio,
- (c) community-based media,
- (d) press conferences, round table discussions and briefings,
- (e) ad hoc statistical or scientific conferences/events,
- (f) Internet websites, social media and mobile technology,
- (g) leaflets, posters, billboards,
- (h) call centres (telephone helplines) and local drop-in help centres,
- (i) paid/free advertising,
- (j) audio tapes, CDs, DVDs, and
- (k) school promotions.

281. Locations used to promote the census during the publicity campaign may include:

- (a) regional or local government offices,
- (b) schools, colleges and universities,
- (c) banks, post offices, police stations and other public user facilities,
- (d) stations, airports and seaports,
- (e) public libraries,
- (f) local information help points,
- (g) places of religious worship,
- (h) factories and other workplaces,
- (i) bars, pubs theatres and other places of entertainment, and
- (j) sports facilities.

282. Choice of location, the content of the publicity material and the mode of dissemination will often reflect the need to attract the attention of particular hard-to-reach groups. As noted above, schoolchildren and students (particularly older students living away from home) are notoriously difficult to reach in a census with a traditional field enumeration. But young people, especially young men (particularly those in urban areas), the elderly, the infirm or disabled and recent immigrants also represent population groups that are generally hard to enumerate. Furthermore, many parents often forget to include recently born babies in their census returns. Other groups that may need to be specially targeted include the homeless, people with literacy and language difficulties and inner city populations.

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283. Any advertising campaign should seek to ensure the greatest possible coverage of its audience. It should be based on specially developed creative concepts through rigorous use of expert testing including focus groups, keeping in mind the needs and concerns of various target groups and regional features. The census is not a 'conventional' product or service, and innovative forms of advertising may need to be considered, particularly to target certain 'problem' groups in the population.

284. As noted above, the publicity campaign can consist of a number of phased stages to time with different elements of the census operation. Initial engagement in the run-in to the census (but not too soon) should make people aware of the importance of the census, and to explain the benefits not only to the country as a whole but to the individuals themselves. As the enumeration phase come into operation the publicity messages should focus on explaining what people have to do and when and to encourage them to take part. Some (but not too much) emphasis should be given to mandatory nature of the obligation to take part, but far more attention should be given to public assurances about confidentiality and data security at this stage — though, of course, the importance of confidentiality should always be emphasised throughout their entire census operation. More emphasis can then be given to enforcement at the stage when the follow-up of non-response and refusal takes place after census day.

285. Census agencies may then want to extend their communications programme to include messages of thanks and appreciation to the general public for taking part in the census, and then in due course to go on to promote the availability of the census results and to encourage their use.

286. Introduction of central and regional television and radio channels at different stages depends on the publicity strategy developed. It is not essential to film professional actors in advertising clips or promotional films, although commercial advertising agencies, if employed, will tend to do so. It may sometimes, however, be more persuasive to use non-actors.

287. The languages used for advertising and other publicity media should reflect the variety of languages that may be spoken in the country or in specific regions. This will help to ensure inclusivity across a wide of minority groups in the population.

288. At the last stage, directly before the census, placement of direct publicity – in the form of outdoor advertisement boards, posters, distribution of leaflets and souvenirs, can be effective.

289. Monitoring public opinion can be carried out through social surveys, with increasing intensity. These surveys can provide information for:

- (a) monitoring of dynamics of public opinion attitude to the census,
- (b) testing of advertising production, and
- (c) supporting the on-going publicity campaign with materials for press conferences, press releases, and direct advertising campaigns in response to emerging public attitudes.

290. Monitoring of mass media involves an analysis of mass-media publications concerning the issues of the census, and particularly the extent to which different population groups have been targeted. It is an on-going accumulation of information for the

detection and prevention of the development of negative published comments on the census, and the preparation of appropriate responses to negative comments and criticisms.

291. Increasingly the media has a significant influence on people's behaviour and even minor distractions and mistruths can have a detrimental effect on the outcome of the census. Therefore, in developing its publicity campaign (whether outsourced or done in-house) NSIs should give particular attention to preparing for unexpected events (such as negative attitudes, malicious lobbying, technical difficulties, delays, misleading information, etc.). It is advisable to have, in advance, up-to date and flexible responses to a wide variety of questions and issues, and to be able to react quickly to unexpected negative (or positive) comments or unusual events in order to maintain a smooth census operation. It is also recommended that all official participants involved, from senior NSI officials to field managers, to know their roles in the communication process both with the media and the public at large.

Dissemination, documentation, metadata and archiving

Dissemination

292. A census is not complete until the information collected is made available to users in a form, and to a timetable, suited to their ever changing needs. Thus in disseminating the results of the census much emphasis should be put on responsiveness to users and on high standards of quality in the production of statistics. Census results should be disseminated simultaneously to all users, and the greatest care should be exercised to avoid the inadvertent disclosure of information about identifiable individuals. To protect confidentiality, various statistical measures can be applied (see paragraphs 140-145).

293. There are several conventional ways of making the results of a census available to the user:

- (a) as published reports (either in hard copy or, more commonly, in digital media) containing standard and pre-agreed tabulations, usually at the national, regional or local district area level, that may be obtained from government agencies or directly from other outlets;
- (b) as unpublished reports (often referred to as abstracts) comprising standard tables but produced for either smaller geographies or population sub-groups not otherwise included in the published reports — these may often be commissioned by users who may have to contribute towards a proportion of the marginal costs of their production;
- (c) as datasets available online through NSI websites or other electronic media, with or without dynamic or interactive data visualisation tools to enhance the value of the statistics;
- (d) as commissioned or customised output produced from a database, comprising customised cross-tabulations of variables not otherwise available from standard reports or abstracts but which should conform to the same statistical disclosure controls applied to standard outputs; and

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- (e) as microdata (often referred to as public use samples), usually available in a restricted format only and often supplied or accessed under secure and strictly controlled conditions where thorough steps have been taken to protect the confidentiality of the data.

294. Tabulations required by only a few users, such as certain government offices or specialized research organizations, can be supplied in unpublished form (that is to say, unpublished hard copy tables or tabulations in electronic format). Such data need not be tabulated until they are required. Once produced, however, there should be no restriction on making them publicly available.

295. Due to their ever-increasing production costs, printed hard copy publications are becoming less the preferred choice for the main dissemination method of census results, though paper still provides a medium that does not readily deteriorate and does not require the user to have any particular hardware, software or technical skills. The role of traditional publications, though they may still often be in printed form, is changing. Such publications can provide coherent and consistent commentary on individual topics and therefore may suit particular users or markets, but users will generally expect outputs to move from their previous static hard copy or PDF format to more interactive, dynamic, digital forms of dissemination.

296. Concurrent release of large data sets may, however, be made possible only by distribution through the use of high capacity electronic media. Moreover, when data are provided in electronic format, or online, special attention should be given to providing users with easy means of data retrieval. The options for obtaining the outputs and relevant metadata should be accessible in standard formats as well as in common database and spread sheet format for easy retrieval and manipulation. Dissemination strategies should also be harmonised with any national government policies on open data.

297. With the increasing importance of, and the users' familiarity with, the use of the Internet, online facilities for ordering, specifying, and receiving census tabulations and public use samples (microdata) should be developed wherever possible, ensuring that appropriate measures are in place to protect statistical confidentiality of the data and the security of transmission. In the design of census outputs, consideration should be given to all forms of developing technology used by users, such as smart phones and other portable devices. Social media are likely to become an increasingly popular and effective means of disseminating small amounts of output, particularly to the non-specialist user, though the rate in which such technology is developing makes it difficult to recommend now specific media for use throughout the post-2020 decade. The use of such media, however will often demonstrate an NSI's commitment to engage and establish a dialogue with users in order to respond more readily to their questions and concerns.

298. While online access or dissemination of such micro- and/or macro-databases on computer media can greatly contribute to an enlargement of the user base and thus to a greater demand for census data, two cautionary notes are important to keep in mind.

299. First, certain cross-tabulations may be of questionable value from a substantive viewpoint because of non-response, sampling or processing errors, or because of processing or imputation procedures. The census authorities should establish procedures for warning potential users about such problems to help safeguard the credibility of the entire census. Some census organizations refuse to permit the release of certain cross-tabulations for

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reasons related to substantive quality, although such a policy may often alienate users. Other organizations will release such cross-tabulations only where there is a clear policy that takes into account both substantive and technical considerations.

300. Second, some detailed cross-tabulations and all files with individual records potentially pose problems in respect of disclosing information about identifiable individual respondents in violation of the rules on census confidentiality. This issue is more fully discussed in paragraphs 140-145. Both the substantive quality and confidentiality issues need to be addressed and appropriate safeguards established. On the other hand, neither issue should pose any problem with respect to the dissemination of a wide range of census products.

301. A range of products should be available to meet the changing requirements of users. There is likely to be a need for:

- (a) national, regional and local area summaries;
- (b) reports on key findings on particular topics, supplemented detailed results and analyses either in a standard form for areas down to the more local geographic levels, or more detailed statistics on particular topics;
- (c) population profiles or key summary statistics for small areas and small population groups;
- (d) spatial and graphical analyses, including a census atlas;
- (e) value-added products such as area and/or household classifications; and
- (f) supplementary metadata covering definitions, classifications, and coverage and quality assessments.

302. The main national and local results should be released, to a pre-announced timetable, as speedily and over as short a period of time as is possible once processing and quality assurance are completed and the total population of the country has been determined.

303. The initial release of population counts is generally awaited with anticipation among users ranging from the general public to programme and policy administrators. Thus, some countries release provisional results very soon after enumeration is completed. Subject to change once the full data-processing and verification operations have been completed, these nevertheless provide a general picture of population trends. Data users should, however, be made aware of implications of using provisional population counts which may differ substantially from the finally produced and validated figures.

304. The schedule and description of upcoming releases of final results and products should be made public early in the process in order to maintain public interest in the census. The releases can be staggered, from simple, short descriptive summaries, covering a country's major geographical divisions initially, to more comprehensive cross-tabulations and descriptive thematic and analytical reports later on.

305. Data should in principle be free at the point of access or delivery, but charges, where they are necessary (for example in the case of customised/commissioned outputs), should be set to make access to the results affordable to all types of users. There may, for example, be a requirement for NSIs to provide a paid print-on-demand service to supply census

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material to users who prefer paper copies. Such users should not be disadvantaged by the lack of paper-based output.

306. Products should be developed which will allow statistical and geographical information to be delivered together with Geographical Information Systems (GIS) and/or the use of other application programme interfaces (APIs) to meet as widespread an interest, and with as much flexibility and inter-connectivity, as possible commensurate with the necessary assurances on confidentiality. Users should be able to find information quickly and simply and in a mobile format. By having associated graphic and mapping capabilities, NSIs will greatly increase the usefulness of their census data. Ideally, users should, themselves, be able to generate graphs and/or maps easily, and then to print or plot them or make the images available for other uses. Several countries now produce this kind of census product, sometimes in cooperation with commercial agencies. The mashing-up of census information with other databases will offer even further opportunity for the data to be more widely utilised.

307. Thematic mapping and data visualisation will become an increasingly important element of dissemination of outputs and is likely to appeal to NSIs because of its ability to engage with users and increase the outreach of census data. But data visualisation is a broad field, with content and structures ranging from simple info graphics through to sophisticated tools for exploring multi-dimensional data analysis. Moreover, data visualisation may present difficulties for some census agencies. It may be the case that the skills required for effective visualisation are in short supply, and there are problems with dedicating sufficient resources to its development, especially given the budgetary constraints that are being faced by many agencies during the decennial period. However, users are increasingly expecting web content to be visual, engaging and personal, so developing a data visualisation capability should be a high priority on many NSIs' wish list.

Documentation and metadata

308. An important component of any country's programme of disseminating the results of its census is a comprehensive portfolio of supporting documentation and metadata to help explain, clarify, and enhance the value of the statistical outputs, particularly with regard to making comparisons with previous censuses and other data sources.

309. A metadata system provides supplementary information on characteristics of surveyed and published data. Each NSI will use its own metadata system based on international standards while corresponding, at the same time, to the specifics of national requirements. Since a census and its results are often closely connected with other areas of statistical activities, it is recommended that the census metadata system in each country should use the same elements as the entire metadata system of the particular NSI. What is also usually necessary, however, is that the census metadata should contain some elements that are used only for that census. The metadata system should also ensure the widest possible comparability of data internationally.

310. The census for the 2020 round should also ensure comparability with data from the previous censuses while at the same time including new elements relevant for any development that has taken place during the time since that previous census. Thus the metadata system should also be comparable with that of the previous census but updated in

line with the needs arising from subsequent developments. The metadata systems of individual NSIs should also reflect the extent to which they use traditional and/or administrative data sources.

311. A metadata system should at least encompass:

- (a) definitions of terms and concepts used,
- (b) data dictionary or glossary of terms,
- (c) explanatory notes to the tables,
- (d) classifications and nomenclatures,
- (e) the census questions (in the case where the information is collected through a conventional field enumeration process,
- (f) the purposes for which the information is collected, particularly in the case of administrative data, and
- (g) the data sources used, most particularly where data is derived from administrative registers.

312. For indicators for which international standard classifications have been created, those international classifications should be used. For indicators that cannot be classified by such international classifications, new nomenclatures may need to be created. Supporting documentation might cover a wide range of specific issues such as: basic methodology, coverage, response, data sources, pilots and tests, derived variables, Internet responses, imputation, and post-enumeration surveys, as well as reports covering more general descriptions of the census operation as a whole and the quality of the data. The extent of documentation dealing specifically with coverage and quality issues is covered in Chapter IV but it is recommended here that, as a minimum, countries should include specific quality and coverage measurements such as levels of response (nationally and locally) and levels of data imputation for the data source as a whole and for individual topics) as part of the census metadata.

313. Methodological reports are particularly important where the underlying methodology has changed since the previous census (such as moving from a traditional field enumeration to a wholly or partially register-based approach). Such changes are likely to affect the definitions and concepts used and hence the comparability between censuses.

Archiving

314. The census is a special statistical data source where continuous and comparable information covering a period of up to 100-150 years may be available. This provides the opportunity to create a unique source of data but puts a big responsibility on the NSI (or appropriate national archive agency) to keep this special historical picture of society for the future. Census data is thus valuable not only for present decision makers and users but also for future generations. The NSI has the responsibility to handle, archive and store this 'treasure'.

315. Many countries retain the census information relating to individual persons and households only for as long it is required for data processing and the production of the statistical result, or until the entire census operation is conducted. However, the scientific,

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socio-historical and genealogical value of the individual records should not be underestimated when considering the overall cost benefits of the census. If countries do intend to retain the records for such research, they should ensure that there is a robust legal and physical framework in place to protect the security and confidentiality of the records until they become open to the public.

316. Closure of census records should extend to cover a period that is sufficient to protect the confidentiality of the information, particularly any sensitive information, about living people, or at least minimise the risk of breaching such confidentiality. Countries should resist any move among the genealogical and family history community to seek to reduce the closure period to an extent that this risk becomes critical. A period of 100 years is therefore recommended, although with life expectancy ever increasing, countries may wish to consider extending that, depending on national circumstances.

317. In addition to the archiving of the census records (for those countries that do so) it is equally important - more so in fact - for all countries to ensure the preservation of, and easy access to, all the metadata and procedural/operational material, including all project management documentation, created during the entire census process. Not only does this provide a valuable audit trail when coming to evaluate the success and effectiveness of the census, but will also enable future census planners to learn from the successes achieved, and the challenges faced, by their predecessors.

318. In doing so, countries should ensure that, as technology rapidly develops, the media and systems on which this valuable information is archived, is regularly reviewed in order to ensure that it can be readily retrieved whenever it may be required in future years 20-50 years hence.

Costs and benefits

Planning and monitoring costs

319. Since financial practices vary greatly among countries it is not possible, or appropriate, to recommend a single approach to census budgeting and cost control. Nonetheless a few generally accepted principles should be noted.

320. First and foremost, effective planning and control of the various census operations are not possible without a careful financial estimate of the cost of the census operation, including all of its key components. It is recommended that a detailed list of census activities is drafted and, as far as possible, that the budget is designed to correspond to this list of activities.

321. Because practice varies so widely it is not possible to specify a definitive list of such activities but in defining these activities account should be taken of what is appropriate to allow monitoring of costs, effective audit and planning of future operations. For many purposes it may be helpful to make use of the six main operational phases:

- (1) preparatory work,
- (2) enumeration/data collection,
- (3) data processing,

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- (4) tabulation and the dissemination of results,
- (5) evaluation, and
- (6) analysis.

These phases might be applied to both traditional and register-based censuses.

322. Consideration of the potential cost of each element, and where appropriate alternative approaches, will obviously play a role in deciding the approach to future census taking.

323. Secondly, (and where appropriate), it is critical that the census plan and budget is presented by NSIs to their respective Governments with adequate lead time, to ensure the availability of sufficient resources from national budgets. Practices on this will differ from country to country but the lead time for obtaining funds must be taken into account at the planning stage. Culture or historical reasons may determine the public perception of conducting a census and how much a country is willing to spend on collecting census data. In some countries the benefits of conducting a census are well-recognized or considered 'obvious' while in others the census costs are the focus of close attention and challenge.

324. Information on expenditures from previous operations will provide an important basis for estimating the budget of the current census (all things being equal) and this is one key reason why careful monitoring and recording of costs is critical. Figures from the previous census will of course have to be modified in order to take into account of changes in underlying costs (for example, related to changes in technological or wage rates), in methodology, and anticipated changes in the population itself (for example, total size, the percentage in urban areas - which are usually more difficult to enumerate - and the average household size), all of which may affect the cost structure of the census.

325. NSIs should set up appropriate robust financial management systems that will ensure speedy disbursement of wages and other funds, proper receipting of their expenditure and an efficient audit. As far as possible, transparent and consistent accounting procedures should be applied at all stages and at all levels of the census operation, and all significant costs should be recorded to an agreed classification as discussed above.

326. Effective recording of costs is critical not only to ensure control of spending but also to allow the examination of the trade-offs in terms of costs and benefits of alternative ways of carrying out census operations. Although cost experience from a previous census in a country may provide useful experience for planning the next census, considerably more caution should be exercised in using the cost parameters from other countries. Differences in census content, organisation and operations, as well as different approaches to cost accounting, can introduce serious incompatibilities into such country-to-country cost comparisons.

327. There may be value in involving staff at the administrative and supervisory levels in estimating and monitoring costs locally in order to help promote 'cost-consciousness' throughout all levels of the census operation.

328. The complexity of carrying out a census means that the operation (and so the costs) will rarely align exactly with plans. A perfect correspondence between the estimates and the final costs is not to be expected. Changes in the prices of major components of census costs should be monitored on a regular basis with either the census budget adjusted accordingly

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or the census plans modified. The development of the census budget is usually an incremental process in which rough initial estimates are replaced by more detailed and precise statements of resource requirements. Sufficient contingency should be built into the system to accommodate the inevitable unexpected additional costs and increases in planned costs. As far as possible the approach should be discussed and agreed with funding agencies in advance and any risks associated with changes of costs fully assessed.

329. Estimating and evaluating costs associated with those censuses that depend upon use of a population register or other administrative sources will require a rather different approach — although many of the same principles hold. Such censuses often use a public infrastructure (for example, administrative registers) which is not set up for census purposes, and accounting for the associated costs and benefits of using such an infrastructure is generally complex. Depending upon national practice and how these sources are funded, it may be appropriate to record the whole or part of the cost of these sources — or just the costs of those elements of work required to prepare data to support the census or statistical purposes. Whatever the case, the approach taken should be transparent when reporting on costs.

330. Again the principle is the same — budgeting and recording of costs should be at a level appropriate to support effective monitoring and audit of spend and to help inform future decisions on approach.

331. For each stage of the census the costs must be optimized, and this will be assisted by making careful choice of the appropriate technology. Recent advances in technologies such as scanning, data processing and data management may be of assistance in achieving significant reductions in cost (or doing more within the same cost) (see Chapter II). In addition, the use of such technologies will speed up the computation of results and enhance their preservation. However, the choice of technology should be made only after carefully evaluating the costs and benefits of possible options. Some potential risks to be aware of include the following:

- (a) some approaches only become cost effective for large operations;
- (b) some are dependent on expensive and scarce inputs (for example very high quality paper); and
- (c) others require significant upfront investments in high quality computers.

332. The options examined in the benefit/cost analysis could incorporate consideration of leasing (rather than purchasing) equipment and/or sharing it between countries that are undertaking censuses at convenient times.

333. Outsourcing elements of the census with the private sector could be considered as another cost-saving option, particularly in the context of publicity or for systems development for data collection or data processing. While not necessarily less costly, it may contribute technical expertise or resources not available within the national statistical office (see paragraphs 160-172).

Assessing the benefits

334. Practice and experience on assessing the benefit that arises from census data also varies a great deal between countries. Accordingly, and even more so than with costs, it is not possible to recommend a universal approach to assessing benefits. Nonetheless countries are strongly encouraged to carry out and publish an assessment of the benefits that arise from their census outputs.

335. It is only by assessing the social and economic benefit that arises from the census that it is possible to truly justify the (often) significant expenditure involved. Equally, only by understanding the benefit that arises from particular outputs is it possible to assess whether the (marginal) effort involved in their production is appropriate. In some cases individual outputs are mandated by law, but even so there is value in understanding both how the data is used and where it adds benefit.

336. Assessing the benefits of statistics is often problematic because the social benefit is difficult to quantify and equate to any measurable financial benefit. Equally the value of data often extends far beyond direct use — for example, where data is used as the denominator in other statistics, or, looking further ahead, where the individual census records are subsequently used for socio-historical and genealogical research.

337. Nonetheless some general advice is possible. There may be value in:

- (a) identifying where the census is adding real value in resource allocation — by comparing outcomes with those that would arise using the next best possible available sources, and considering how much users would spend on purchasing data from other sources or on commissioning their own surveys, if census data were not available; and
- (b) identifying where particular census outputs contribute to delivering or monitoring particular policy goals — particularly where there are funds directly associated with the policy.

338. In cases where there are clear social or economic benefits — but no easily quantifiable financial benefit — it may be appropriate to record ‘case-studies’ which can be used to support any future case or decision making.

339. In assessing the overall benefit of the census it may also be appropriate to consider the economic and social value of employment and other expenditure associated with the operation.

340. As ever, the approach to benefit assessment and any assumptions made in the process should be clearly documented.

Chapter IV. Quality management

The need for a quality management programme

341. The product of any census of population and housing is information, and confidence in the quality of that information is critical. The management of quality must therefore play a central role within any country's census.

342. A quality management programme is an essential element in the overall census programme and should touch on all activities during planning, the development period, operational activities such as data collection and processing, through to evaluation and dissemination of results.

343. A major goal of any quality management programme is to systematically build in quality from the beginning through the sound application of knowledge and expertise by employees at many levels, and through defined quality assurance processes and reviews. It will also include reactive components to detect errors so that remedial actions can be taken during census operations. Without such a programme, the census data, when finally produced, may contain errors, which might severely diminish the usefulness of the results. If data are of poor quality then decisions based on these data can lead to costly mistakes. Eventually the credibility of the entire census may be called into question.

344. Firstly, this chapter defines the different dimensions of 'information quality' and then describes a framework that can be used to manage quality across these dimensions through the full census lifecycle. Annex III provides further guidance about how the framework can be applied in practice to each dimension.

Defining information quality

345. It is generally accepted that there are six dimensions of statistical quality:

(a) *Relevance*

346. The relevance of statistical information reflects *the degree to which it meets the needs of users*. The challenge for a census programme is to balance conflicting user requirements so as to go as far as possible in satisfying the most important needs within resource constraints. This dimension of quality is particularly important in census content development and in dissemination.

(b) *Accuracy*

347. The accuracy of statistical information is *the degree to which the information correctly describes the phenomena it was designed to measure*. It is usually characterized in terms of error in statistical estimates and is traditionally broken down into bias and variance. In a census context, variance only applies in situations where a portion of the questionnaire is used for a sample of persons or households, or where only a sample of records is processed. Accuracy can also be described in terms of major sources of error (for example coverage, sampling, non-response, response, data capture, coding).

(c) *Timeliness*

348. Timeliness refers to *the delay between the time reference point (usually census day) to which the information pertains and the date on which the information becomes available*. Often for a census there are several release dates to be considered in a dissemination schedule. Typically there is a trade-off against accuracy. Timeliness can also affect relevance.

(d) *Accessibility*

349. The accessibility of statistical information refers to *the ease with which it can be obtained*. This includes the ease with which the existence of information can be ascertained, as well as the suitability of the form or medium through which the information can be accessed. The data obtained are of great value to many users including central government, local administrations, private organizations and the public at large. To maximize the benefit of the information obtained, it should be widely accessible to all of these potential users. Consequently, censuses often provide a mix of free products, standard cost products and a user pay service for ad hoc commissioned/customised products. The strategy adopted and the cost of the services also affects accessibility.

(e) *Interpretability*

350. The interpretability of statistical information reflects *the availability of supplementary information and metadata necessary to interpret and use it*. This information usually covers the underlying concepts, definitions, variables and classifications used, the methodology of data collection and processing, and indications of the accuracy of the information.

(f) *Coherence*

351. Coherence reflects *the degree to which the census information can be successfully brought together with other statistical information within a broad analytic framework and over time*. The use of standard concepts, definitions and classifications — possibly agreed at the international level — promotes coherence. The degree of quality on coherence can be assessed via a programme of certification and validation of the census information as compared to corresponding information from surveys and administrative sources.

A quality management framework

352. Quality management has five main components:

- (1) Setting quality targets
- (2) Quality design
- (3) Operational quality control
- (4) Quality assurance and improvement
- (5) Quality evaluation and reporting

Setting quality targets

353. Setting census quality targets for each of these dimensions at the outset of the census programme enables all involved to know what they are aiming to achieve and,

crucially, to determine what it will cost. Early publication of these targets also involves stakeholders, users of the data in particular, to comment and feed in their requirements. In reality, there will be iterations of such targets as initial aspirations may turn out to be unaffordable or unachievable in the time available. Having such a discussion is crucial at the outset to enable realistic, affordable targets to be set and stakeholder expectations to be managed.

354. Simplistically, setting quality targets enables an NSI to answer the question “What does good look like?” and enables a dialogue with stakeholders about “How good is good enough?”.

355. It is easier to set targets for some dimensions than others. It is relatively straightforward to set targets for accuracy, timeliness and accessibility. For example, simple targets could be of the form:

- (a) Accuracy: “We will aim to produce national population estimates that are within X per cent of the (unknown) true value with 95 per cent confidence.”
- (b) Timeliness: “We will aim to publish our first population estimates within one year of census day.”
- (c) Accessibility: “We will aim to disseminate all outputs online.”

356. Setting targets for some of the other dimensions, however, is not so straightforward, and it is sometime helpful to consider setting process-related, rather than outcome-related, targets. For example:

- (a) Relevance: We will consult with users on the required census content at least two years before finalising the content of the census questionnaire.

357. It is clear that even such simplistic targets will have a significant impact on cost and timetable, hence the necessity of considering such aims early in the planning process. It is suggested, therefore, that all NSIs should set targets for each dimension of quality at the early stages in the census programmes, and that these should be published to enable stakeholder views to be taken into account. It is particularly important to set targets for accuracy.

Quality design

358. Having set quality targets, it is necessary to consider whether or not the census statistical and operation design is capable of meeting those targets. This can draw on experience of previous censuses or wider international experience.

359. Pre-census tests (or pilots) provide a useful vehicle for planning and developing the actual census. Census tests can be conducted as a national sample (useful for testing content, mail and/or Internet response, and other questionnaire-related features of the census), or as a site test (useful for testing operational procedures). Other pre-census testing could involve cognitive testing of the questionnaire, research and testing of the automated processes for address list development, questionnaire addressing and mail out, data collection, data capture, data processing, conducting innovative research into the use of administrative records, improved cost modelling, and improved methods of coverage measurement.

360. Prior to conducting the actual census, a dress rehearsal provides an opportunity to test the full array of operations, procedures, and questions, much like a play's dress rehearsal provides an opportunity to 'fix things' before the opening night.

361. Such testing should result in a review of the initial quality targets to confirm their achievability. It may at this point be necessary to change budgets, timetables, or the targets themselves if testing has shown them to be unachievable. Rehearsals should, therefore, be undertaken late enough in the planning stage to be able to assess the final census design yet earlier enough to enable any necessary changes to be implemented.

Operational quality control

362. Because of the size and complexity of census operations, it is likely that errors of one kind or another may arise at any stage. These errors can easily lead to serious coverage or content errors, cost overruns or major delays in completing the census. If not anticipated and controlled during implementation they can introduce non-sampling error to the point of rendering results useless.

363. To minimize this risk, it is essential to monitor and control errors at all stages of census operations, including pre-enumeration, enumeration, document flow, coding, data capture, editing, tabulation and data dissemination. Every national census organization should establish a system of operational quality control.

364. The dimensions of quality, outlined above are overlapping and interrelated and each must be adequately managed if information is to be fit for use. Each phase in executing a census may require emphasis on different elements of quality. Again, this requires careful design at the outset to identify:

- (a) the types of errors that may occur at each phase of the operation;
- (b) what information is required to enable such errors to be identified, should they occur;
- (c) how this information will be collected in a timely fashion during live operations; and
- (d) what actions will be taken should the error be found to have occurred (ideally before the phase is complete).

365. Given the speed and scale of census operations, this is no simple task and it requires careful planning and testing.

366. There is no single standard operational quality control system that can be applied to all censuses or even to all steps within a census. Census designers and administrators must keep in mind that no matter how much effort is expended, complete coverage and accuracy in the census data are unattainable goals. However, clear quality targets should sit at the heart of decision making processes and efforts to first detect and then to control errors should be at a level that is sufficient to produce data of a reasonable quality within the constraints of the budget and time allotted.

Quality assurance and improvement

367. Once data collection and processing operations are complete, it is essential that final statistics are quality assured and, where possible, improvement made to the results prior to publication if significant problems are discovered.

368. Quality assurance can be through comparison with statistics from other surveys, through comparison with statistics from administrative data sources, or through analysis of information collected as part of operational quality control. But such quality assurance is challenging, and sufficient time should be allowed from the outset to enable such studies to be completed prior to publication.

Quality evaluation and reporting

369. It is generally recognized that a population census is never perfect and that, despite rigorous quality control and quality assurance, errors can, and do, occur. Most errors in the census results are classified into two major categories — coverage errors and content errors. Coverage errors are those that arise due to omissions or duplications of persons or housing units in the census enumeration. Content errors are errors that arise in the incorrect reporting or recording (or linking) of the characteristics of persons, households, and housing units enumerated in the census. A third type of error classified as operational error can occur during field data collection or during data processing.

370. Many countries recognize the need to evaluate the overall quality of their census results and employ various methods for evaluating census coverage as well as certain types of content error. In fact, some countries, the United Kingdom for example, includes coverage assessment as an integral part of the census process and aims to publish all results after an adjustment for coverage error. Most countries, however, undertake coverage assessment only as part of their evaluation process, as described here.

371. A comprehensive evaluation programme should, however, also include assessments of the success of census operations, in each of its phases. Countries should ensure, therefore, that their overall census evaluation effort addresses the census process (hereafter referred to as operational assessments), as well as the results (referred to as evaluations). Together, operational assessments and evaluations tell us “How well we did”. A third component of a comprehensive research includes experiments. Experiments tell us “How can we do better?” Thus:

- (a) Operational assessments document: final volumes, rates, and costs for individual operations or processes, using data from production files and activities; quality assurance files and activities; and information collected from debriefings and lessons learned. Operational assessments can include some discussion of the data, but do not involve explanation of error. The final volumes, rates and costs can be broken out by demographic, geographic level, and housing unit and/or person-level data at intermediate stages of operations or processes. Operational assessments may also document operational errors, although they will not necessarily include an explanation of how those errors affect the data.

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- (b) Evaluations analyse, interpret, and synthesize the effectiveness of census components and their impact on data quality and coverage using data collected from census operations, processes, systems, and auxiliary data collections.
- (c) Experiments are quantitative or qualitative studies that must occur during a census to have meaningful results to inform planning of future censuses. The census provides the best possible conditions to learn about the value of new or different methodologies or technologies and typically involve national surveys with multiple panels.

372. Evaluation efforts that focus on census results should generally be designed to serve one or more of the following main objectives:

- (a) to provide users with some measures of the quality of census data to help them interpret the results;
- (b) to identify as far as is practical the types and sources of error to assist the planning of future censuses; and/or
- (c) feed into the quality assurance and improvement processes and serve as a basis for constructing a best estimate of census aggregates, such as the total population, or to provide census results adjusted to take into account identified errors.

373. Evaluations of the completeness and accuracy of the data should be made by all countries, and should be issued with the initial census results to the fullest extent possible, including the detail of the methods used. Additional results can be issued after the initial results are published.

374. It is suggested that all NSIs should publish a national population estimate, adjusted in the light of quality assurance and evaluation activities.

375. More broadly, an assessment of all six dimensions of quality should ideally be made against the initial targets set, with the results published.

376. Such evaluations and measurements can be valuable to indicate priorities and establish quality targets standards for the next census, thus completing the quality cycle.

377. A number of methods exist for carrying out census evaluations and, in practice, many countries use a combination of such methods to fully serve these objectives.

Ensuring quality in an outsourcing environment

378. Some countries may wish to outsource certain parts of census operations. The motivations and considerations for outsourcing have already been discussed more fully in Chapter II. In the context of quality management, the outsourcing of components of census operations still requires the census agency to take full responsibility for, and manage the quality of, the census data. This aspect should never be delegated.

379. In setting up outsourcing arrangements, the census agency needs to ensure that it continues to have the ability to both understand and manipulate those elements that contribute to final data quality.

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380. Some approaches to outsourcing put an emphasis on ‘turnkey’ arrangements — in which contractors deliver systems according to a set of predetermined client specifications with the expectation that the client focuses solely on the outputs and not the internal workings of the system. This assumes that the census agency completely understands and can fully anticipate all data quality issues that might arise during the census and has included these in the specifications. The client is not expected to have any understanding of how these systems work or how they might contribute to the final outputs. Any changes to the system typically require cumbersome processes to determine contract responsibilities and heavy financial costs. This sort of approach effectively hands over the quality of the census data to the contractor, while the risks associated with intervention remain with the census agency. It removes any flexibility and greatly restricts the ability of the census agency to react to quality problems that emerge during processing. This ‘turnkey’ approach is not recommended.

381. Suppliers should be made fully aware of the quality targets set at the outset of the census programme, and the quality requirements of the outsourced components that enable the overall census quality targets to be achieved. Operational quality control should apply to outsourced services in the same way as those that are carried out internally.

382. Even when components are outsourced, census agency staff should have an understanding of how such systems work, for example, automatic text recognition engines and coding algorithms, and have the ability to change the tolerances or parameters of these systems at little cost and in a timely manner during processing. Varying these parameters will allow the census agency to determine and manage the appropriate balance between data quality, cost and timeliness as processing progresses.

PART TWO: POPULATION TOPICS

Chapter V. Population bases

General definitions

383. The recommendations and conventions set out in this chapter have been prepared with a view to ensuring that the census should allocate each person to one, and only one, place of usual residence. This is important in an international context in order to avoid persons either being counted in the populations of more than one country or not being counted at all. The same principle applies in a national context. The following paragraphs provide definitions that should be applied in the context of census operations.

384. '*Enumeration*' means the act of collecting data about a person (or household), irrespective of whether this occurs with the direct participation of that person (or household) through a field operation, or indirectly using data that is already recorded in administrative registers.

385. '*Population*' is any set of persons attributed to a geographic entity who meet defined criteria at the census reference time; these criteria should help to identify the qualifying adjectives (labels) that clarify which particular population is being referred to (such as the usually resident population or the working population).

386. To meet national requirements, a country may have an interest in various 'populations'. It is recommended that the qualifying adjectives (labels) attributed to the national populations are as close as possible to the meaning given in the international context.

387. A country may wish to enumerate all persons present in their territory and/or supposedly belonging to the population of interest. The '*population to be enumerated*' is the set of persons whom the country decides should be covered by the census, regardless of their subsequent exclusion from any specific population count, as defined below. The '*enumerated population base*' is composed of those persons who have *actually been enumerated*. This may or may not equate to the target population (the population to be enumerated), that is, the coverage of the census may represent either an under-count or over-count.

388. The '*population base*' is the population used for the compilation of statistical aggregates in a particular tabulation. This may be a sub-set, or the whole, of the 'population to be enumerated'. A country may adopt more than one population base (for different statistical purposes), but one of these should always be the population base used for international comparisons purposes (more often the 'usually resident' population).

389. A '*population count*' is the aggregate obtained by the simple addition of individual records from the enumerated population base. A '*population estimate*' is the aggregate obtained as outcome of a statistical method of estimation. Therefore, both the population count and the population estimate refer to a specific population base and are empirical measures.

390. Chart 1 clarifies the relation between the general population concepts given above, while Chart 2 shows an example of application.¹⁵

Chart 1 Relation between population concepts

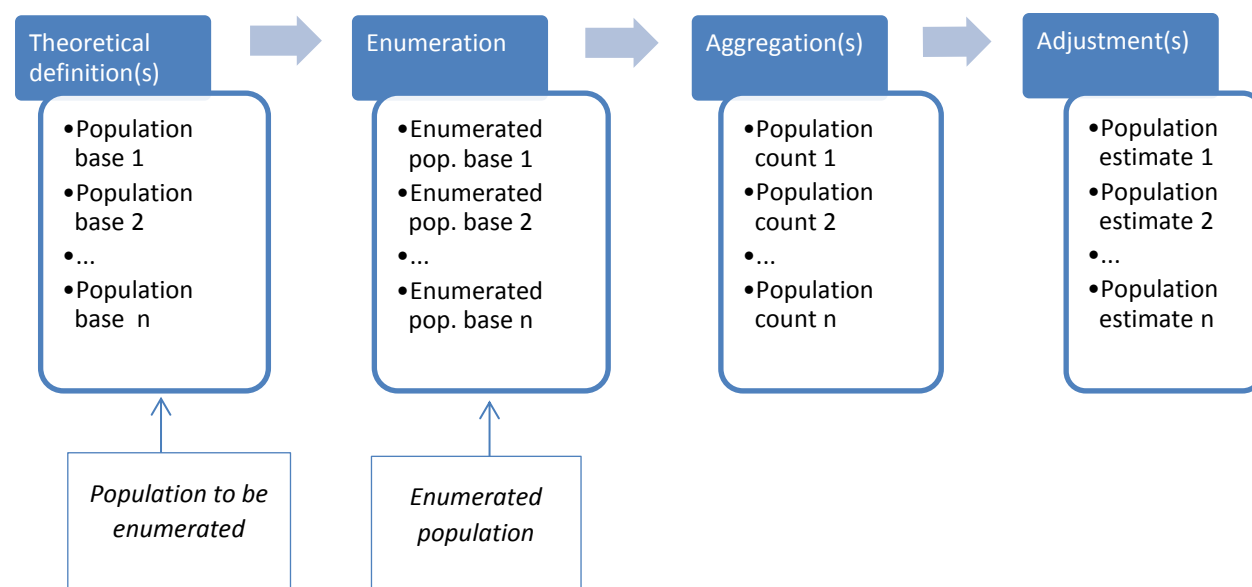
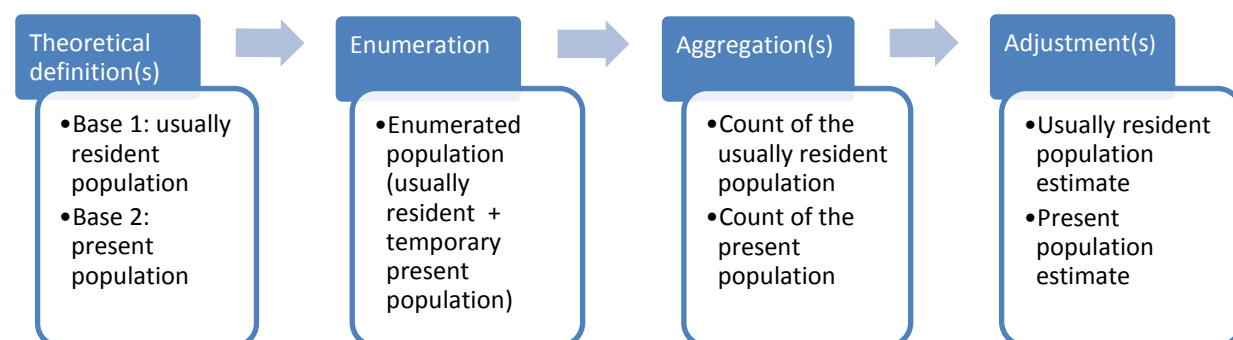


Chart 2 Example of application



391. The ‘*census reference time*’ is the time to which any information collected in a census refers. It can be either a precise moment of a day, usually the midnight (‘*census reference*

¹⁵ To clarify the difference between the various concepts presented here, the following example may be useful: in a country the theoretical populations of interest (the *population bases*) are the ‘usually resident’ and the ‘present’ populations. The *population to be enumerated* is then the theoretical set of persons belonging to at least one population base (thus usually resident plus temporary present persons) which should be covered by the census operation. These two concepts apply before the census enumeration. After that, there is the set of persons who have actually been enumerated, which is the *enumerated population base* and which may not make a distinction between population bases (thus includes both usually resident and temporary present enumerated persons). Two measures (the *population count* and *estimate*) follow then for each population base, the latter possibly including post-census adjustments (such as those based on information from a post-enumeration survey).

moment'), or a period of time (*'census reference period'*), or a day selected as indicative of a period (*'census reference average day'*). Some topics will refer to a particular moment (providing stock data), others to a period (flow data), and usually the census reference period includes the census reference time. The *'census day/period'* is the day/period in which a census is carried out and it should not be confused with the census reference time.

Recommended population base

392. The *'place of usual residence'* is the geographic place where the enumerated person usually spends their daily rest, assessed over a defined period of time including the census reference time.

393. The population base to be used for international comparisons purposes is the *'usually resident population'*. The *'usually resident population'* of a country is composed of those persons who have their place of usual residence in the country at the census reference time and have lived, or intend to live, there for a continuous period of time of at least 12 months. A *'continuous period of time'* means that absences (from the country of usual residence) whose durations are shorter than 12 months do not affect the country of usual residence. The same criteria apply for any relevant territorial division (being the place of usual residence) within the country.

394. If a country cannot adopt as (one of) its population base(s) the usually resident population, it should put all possible efforts into producing estimates that are as close to it as possible using its own population base(s).

395. As part of the estimation process in registers-based censuses, whenever reference is made to *actual* geographic places for the usually resident population base, it could be replaced by the *registered* place of residence, where the criterion of residence is similarly defined with reference to a qualification period of 12 months.

396. On the basis of the definition of the place of usual residence, persons usually resident in the enumeration place but absent, or expected to be absent, at the census reference time for less than one year should be considered as *'temporarily absent persons'* and thus included in the total population.

397. The group of *'absent persons living abroad'* (former members of a household that now live or are expected to live in another country) for one year or more can be particularly important in countries experiencing high levels of emigration. Some countries try to estimate emigration in the census by collecting data on these persons, for instance using an *'emigration module'* in the questionnaire. Previous experiences¹⁶ have shown that the census can hardly be expected to provide an accurate count of the total number of emigrants residing abroad. However, such an approach may provide some information on sub-sets of emigrants, such as those who emigrated recently and/or those who have close

¹⁶ See: *Measuring Emigration at the Census: lessons learned from four country experiences*, by O. Chudinovskikh, R. Anich and E. Bisogno, submitted to the Joint UNECE/Eurostat Meeting on Population and Housing Censuses, Geneva, 13-15 May 2008, available at: <http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.41/2008/11.e.pdf>

family ties in the country. If data on absent persons living abroad for one year or more are to be collected through the census, their information (in terms of numbers and characteristics) should be distinguished from the information collected for the usually resident population.

398. A total usually resident population count for each territorial division would normally be compiled by adding persons who are usually resident and present to those who are usually resident but temporarily absent. However, it is not always possible to collect information about persons absent from their place of usual residence, particularly if a whole household is temporarily absent at the census reference time. Provision must therefore be made to collect information about such persons at the place where they are found at the census reference time, and if necessary 'transfer' them to their place or territorial division of usual residence, using the information recorded about their place of residence.

399. Each country should compile a figure for the total usually resident population, and the detailed tabulations should in general be provided on this basis. In those countries where the total population figure has been adjusted for under- or over-enumeration (usually measured by use of a post-enumeration survey or by comparison with other sources), both the enumerated figure (the population count) and the adjusted population figure (the population estimate) should be shown and described. The detailed tabulations may, however, be based only on the population that was actually enumerated.

400. The composition of the usually resident population should be described in detail in the census report(s). As a general rule, the total usually resident population should include all persons who have their usual residence in the country or relevant territorial division regardless of their legal status.

Particular cases

401. There are various population groups for which some uncertainty may arise about their inclusion in the usually resident population of a country. The following persons should be *included*:

- (a) persons present at the census reference time to whom the concept of usual residence does not apply (such as nomads, vagrants, etc.), irrespective of whether or not they meet the 12-month criterion;
- (b) persons who regularly live in more than one country during a year, if the reporting country is the one where they live most of the time, irrespective of whether or not they are present in the reporting country at the census reference time;
- (c) national military, naval and diplomatic personnel and their families, located outside the country, irrespective of their duration of stay abroad;
- (d) foreign persons working within the country for international businesses or organisations (but not including foreign diplomats or military forces) and their families, provided that they meet the criteria for the usual residence in the country;
- (e) merchant seamen and fishermen usually resident in the country but at sea at the census reference time (including those who have no place of residence other than their quarters aboard ship);

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- (f) persons who may be illegal, irregular or undocumented migrants, as well as asylum seekers and persons who have applied for, or been granted, refugee status or similar types of international protections, provided that they meet the criteria for the usual residence in the country. The intention is not to distinguish these persons separately, but rather to ensure that they are not missed from the enumeration;
- (g) children born in the twelve months before the census reference time and whose families are usually resident in the country at the census reference time; and
- (h) persons whose stay in the country (actual and/or intended) is exactly one year.

402. The following persons should instead be *excluded* from the usually resident population of a country:

- (a) persons who regularly live in more than one country during a year, if the reporting country is NOT the one where they live most of the time, irrespective of whether or not they are present in the reporting country at the census reference time;
- (b) foreign military, naval and diplomatic personnel and their families, located in the country, regardless of their duration of stay; and
- (c) persons whose stay in the country (actual and/or intended) is less than one year, even if only for a single day less than a year.

403. For short-term international migrants¹⁷ – those whose stay abroad is at least 3 months but less than 12 months – the previous country of residence should continue to be their country of usual residence. For long-term migrants – whose stay abroad is 12 months or longer – the country of destination should become the country of usual residence of the migrant.

404. For persons who, at the census reference time, have spent, or are likely to spend, twelve months or more as inmates in a communal establishment or institution, the institution should be taken as the place of usual residence. Examples of inmates of institutions include patients in hospitals or hospices, old persons in nursing homes or convalescent homes, prisoners and those in juvenile detention centres.

405. Persons who work/study away from home may be particularly problematic in determining their country of usual residence and/or their allocation to a place of usual residence within the country.

406. Table 1 summarises the recommended guidelines of classification for students and workers who live away from the family home for 12 months or more. For the sake of conformity with the recommendations on population censuses issued by UNSD,¹⁸ the students in tertiary education should be allocated to their term-time address, when studying

¹⁷ For the definitions of long-term and short-term migrants, see Recommendations on Statistics of International Migration – Revision 1, United Nations Statistics Division, 1998, paragraphs 36-37.

¹⁸ Principles and Recommendations for Population and Housing Censuses: the 2020 Round – Revision 3, United Nations publication, New York 2015.

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within the country. When studying abroad they should not be included in the population of the country of their family home, since their place of usual residence should be the term-time address in the country where they study, even if they are regularly returning to the family home. However, it is acknowledged that in some countries there may be considerations (such as higher coverage during field enumeration, or particularly high quota of emigrating student population) that would justify the allocation of these students at their family home.

407. There are other population groups for which some uncertainty may arise in defining their place of usual residence within the country. The recommended conventional treatment of these cases is as follows:

- (a) For persons without a usual residence, such as homeless or roofless persons, and nomads, the place of enumeration should be taken to be the place of usual residence.
- (b) When a person regularly lives in more than one residence within the country during the year, the place of usual residence should be the place where the person spends most of their time, irrespective of whether or not the person is present in that place at the census reference time.
- (c) A child who alternates between two households within the country (for instance after his or her parents have separated or divorced) should consider the household where he or she currently spends the majority of the time as his or her place of usual residence. Where an equal amount of time is spent with both parents, the place of usual residence should be the same of that of the parent/household with whom the child is living at the census reference time.

408. For the national military, naval and diplomatic service personnel and their families located outside the country the following classification rules should be applied:

- (a) If they are residing abroad for less than 12 months and they are intending to return to the place of departure, they should be allocated within the country in accordance with the rules for usual residence. In particular, they could be allocated to (by decreasing order of priority):
 - i. the family home address within the country, if any, or
 - ii. the duty station within the country to which they were attached before leaving.
- (b) If they are residing abroad for at least 12 months or if they are not intending to return to the place of departure (although returning in the country within a 12-month period), they should be attributed to a 'virtual place' (extra-region) of the country of departure.

Table 1 Guidelines for usual residence of workers and students living away from family home for 12 months or more

Category	Place of work/study	Regular* return to family home	Inclusion in the usually resident population of the country	Place of usual residence <i>within</i> the country
Workers	In the country	Yes	Yes	Family home
		No	Yes	Own address
	Abroad	Yes	Yes	Family home
		No	No	None
Children in a family nucleus** in education below tertiary level***	In the country	Yes	Yes	Family home
		No	Yes	Family home
	Abroad	Yes	Yes	Family home
		No	Yes	Family home
Adults in a family nucleus** in education below tertiary level***	In the country	Yes	Yes	Family home
		No	Yes	Term-time address^
	Abroad	Yes	Yes	Family home
		No	No	None
Persons not in a family nucleus** in education below tertiary level***	In the country	Not applicable	According to usual rules	According to usual rules
	Abroad	Not applicable	According to usual rules	According to usual rules
Students in tertiary education****	In the country	Yes	Yes	Term-time address^
		No	Yes	Term-time address^
	Abroad	Yes	No	None
		No	No	None
Student workers	Persons who study and work at the same time will be allocated to the pertinent country/geographic division according to the rules for students or workers depending on which one between work and study is considered the main activity.			

* 'Regular' is taken to mean more than twice each month (such as twice a week, weekly, etc).

** See paragraph 783 for definition of family nucleus.

*** ISCED 2011 levels 0-4.

**** ISCED 2011 levels 5-8.

^ Term-time address is the address at which a schoolchild or student lives while attending their studies. This may or may not be the same as their family address.

Chapter VI. Geographic characteristics

Introduction

409. One of the distinguishing features of censuses of population and housing is the extent to which a comprehensive classification of geographic characteristics can be undertaken. Once the population base has been determined it is then possible to examine how this population is geographically located. This aspect is considered in this chapter.

Location of place of residence (core topic)

410. The location of place of residence is the precise location of the 'usual place of residence' as defined in Chapter V (paragraphs 392-393). If a country cannot adopt as its population base the 'usually resident population', an estimate as close to it as possible should be used. The location should be coded to the smallest possible civil division and geo-referenced to geographical coordinates.

411. The place of usual residence should be geo-referenced to a pair of precise geographical coordinates¹⁹ of the address point, or in the absence of such coordinates, to a precise and complete postal address for geocoding purposes. The purpose is to enable tabulations and spatial aggregations to be referenced to any small geographic or administrative subdivisions and, if possible, population grids. This is required to meet users' needs for information necessary for spatial analysis. The link between the census information and the location of the place of usual residence should form a permanent and integrated part of the census information at individual record level.

Locality (derived core topic)

412. For census purposes, a locality is defined as a distinct population cluster or settlement, that is, the area defined by population with place of usual residence located in neighbouring or contiguous buildings.

413. Such buildings referred to in this definition may either:

- (a) form a continuous built-up area with a clearly recognizable street formation; or
- (b) though not part of such a built-up area, comprise a group of buildings to which a locally recognized place name is uniquely attached; or
- (c) though not coming within either of the above two requirements, constitute a group of buildings, none of which is separated from its nearest neighbour by more than 200 metres.

¹⁹ In the EU and continental Europe the geographic coordinates should refer to the European Terrestrial Reference System 1989 (ETRS89, EPSG 4258). In regions outside continental Europe the geographic coordinates may also refer to the global coordinate reference system WGS-84 (EPSG code 4326)

414. In applying this definition certain land-use categories should not be regarded as breaking the continuity of a built-up area (and accordingly should not be counted in applying the 200-metre criterion above). Such categories include: industrial and commercial buildings and facilities, public parks, playgrounds and gardens, football fields and other sports facilities, bridged rivers, railway lines, canals, parking lots and other transport infrastructure, churchyards and cemeteries, etc.

415. This definition is intended to provide general guidance to countries in identifying localities and in determining their boundaries, and it may need to be adapted in accordance with national circumstances and practices. The population not living in clusters as defined above may be described as living in scattered or isolated buildings. Whatever definition of a locality is adopted for the census, it should be given in detail in the relevant census report and/or metadata.

416. Localities, as defined above, should not be confused with the smallest civil divisions of a country. In some cases, the two may coincide. In others, however, even the smallest civil division may contain two or more localities as defined. On the other hand, some large cities or towns may comprise two or more civil divisions, which should then be considered only as sub-divisions of a single locality rather than as separate localities.

417. A large locality of a country (that is to say, a city or a town) is often part of an urban agglomeration, which comprises the city or town proper and also the suburban fringe or thickly settled territory lying outside, but adjacent to, its boundaries. The urban agglomeration is, therefore, not identical with the locality but is an additional geographical unit, which may include more than one locality. In some cases, a single large urban agglomeration may comprise several cities or towns and their suburban fringes. The components of such large agglomerations should be specified in the census results.

418. Countries are recommended to develop their census statistics for localities in accordance with national needs and capabilities. In doing so, they should try to approach as closely as possible the concept of the population cluster as defined above. Countries which tabulate statistics only for civil divisions should, as a minimum, endeavour to compile data on the total population of each part of a civil division containing a population cluster, or part of a population cluster, of at least 2,000 inhabitants and so provide a basis for making a more clear-cut distinction between urban and rural areas and their populations (see paragraphs 422-427 below).

419. It is recommended that the population be classified by size of locality according to the following size-classes:

(1.0)	1,000,000 or more inhabitants	
(2.0)	500,000 - 999,999	"
(3.0)	200,000 - 499,999	"
(4.0)	100,000 - 199,999	"
(5.0)	50,000 - 99,999	"
(6.0)	20,000 - 49,999	"
(7.0)	10,000 - 19,999	"
(8.0)	5,000 - 9,999	"

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- (9.0) 2,000 - 4,999 "
- (10.0) 1,000 - 1,999 "
- (11.0) 500 - 999 "
- (12.0) 200 - 499 "
- (13.0) Population living in localities with less than 200 inhabitants or in scattered/isolated buildings
 - (13.1) Population living in localities with 50-199 inhabitants
 - (13.2) Population living in localities with less than 50 inhabitants or in scattered/isolated buildings

420. This classification could also be applied to analyse other relevant population bases such as the economically active population, households, families and dwellings (though it may be necessary to adopt different scales).

Location of living quarters (core topic)

421. As defined in paragraph 872 in the chapter on Housing, living quarters are those types of housing which are the usual residence of one or more persons (whether or not they are present there at the census reference time). Therefore, it is possible to classify them to the same detailed geography as 'location of place of residence' (paragraph 411 above), and the definitions and classifications set out in paragraphs 412-420 and 422-438 apply equally, but the extent to which this is done will vary according to each country's statistical needs for information on localities and smallest relevant civil division.

Urban and rural areas (derived core topic)

422. It is recommended that for purposes of international comparisons, countries define *urban areas* as localities with a population of 2,000 or more, and *rural areas* as localities with a population of less than 2,000 and sparsely populated areas. Some countries might also wish to consider defining urban areas in other ways, for example in terms of:

- (a) administrative boundaries;
- (b) built-up areas; or
- (c) the area for which services such as shops, educational facilities, recreational facilities, employment, etc., are provided.

Whatever approach is taken should be clearly described in the relevant census report and/or metadata.

423. For national purposes, as well as for international comparability, the most appropriate unit of classification for distinguishing urban and rural areas is the locality as defined in paragraphs 412-418 above. However, it is left to countries to decide whether to use the locality or the smallest civil division as the unit of classification.

424. Countries that use the smallest civil division as the unit are encouraged to endeavour to obtain results that correspond as closely as possible to those obtained by countries that

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use the locality as the unit. The approach to be adopted to achieve this aim will depend mainly on the nature of the smallest civil divisions in the countries concerned. In some countries the smallest civil divisions (and the average number of inhabitants) are relatively small and generally do not contain more than one population cluster (or part of a larger population cluster). If it is not feasible for some of these countries to use the locality as the unit, they are encouraged to make use of the concept of the multi-communal agglomeration (that is, to treat as single units groups of two or more contiguous minor civil divisions that form part of the same population cluster). It is also suggested that minor civil divisions at the periphery of such an agglomeration be included in the agglomeration if the major part of their resident populations live in areas belonging to the continuous built-up area of the agglomeration, and that minor civil divisions containing one or more isolated localities be classified according to the number of inhabitants of the largest population cluster within the unit.

425. The situation is different, however, in the case of countries in which the smallest civil divisions (and the average number of inhabitants) are relatively large and often contain two or more population clusters of varying sizes. If it is not feasible for some of these countries to use the locality as the unit, they should endeavour to use units smaller than minor civil divisions for this purpose, for example parishes, enumeration districts, grid squares, etc. They should endeavour to use these smaller units as building blocks and to aggregate them so as to correspond as closely as possible with the boundaries of localities in the same way as described above in the case of multi-communal agglomerations. If it is not feasible for some countries to adopt this approach, they should endeavour to develop new approaches to the classification of entire minor civil divisions in ways which will yield results that are as comparable as possible with those obtained by using the locality as the unit.

426. It is recommended that localities or similar units be grouped into the following seven categories:

- | | | |
|-------|-------------------------------|---|
| (1.0) | 1,000,000 or more inhabitants | |
| (2.0) | 250,000 to 999,999 | " |
| (3.0) | 100,000 to 249,999 | " |
| (4.0) | 50,000 to 99,999 | " |
| (5.0) | 10,000 to 49,999 | " |
| (6.0) | 2,000 to 9,999 | " |
| (7.0) | Less than 2,000 | " |

427. Countries are also encouraged to develop typologies of localities or similar areas based on additional criteria that could be used to distinguish different types of areas within particular categories of the suggested classification. For example, some countries may wish to subdivide category (1.0) (and in some cases category (2.0) as well) to distinguish agricultural localities from other types of small localities. Some countries may wish to subdivide one or more of the intermediate categories to distinguish market towns, industrial centres, service centres, etc. Some countries may wish to subdivide the large urban agglomerations included in categories (4.0) to (7.0) to distinguish various types of central and suburban areas. Extensions of the classification in these and other ways would enhance its analytical usefulness.

Grid square characteristics

Population grid (derived non-core topic)

428. For census purposes, a population grid is defined as a geo-referencing framework for population in the form of a grid net with fixed and unambiguously defined locations of equal-area grid cells.

429. Each grid cell contains the aggregated number of persons for whom the location of place of usual residence, as described in paragraphs 410-411 above, is geo-referenced to a point located within the grid cell. In countries where such aggregation is not possible, the population grid could be disaggregated from the smallest civil division using auxiliary information such as land use maps, built-up area detection, or cadastral information.

430. In addition to assigning usual residents to a grid net, the same grid can be used to assign people to their place of work or location of school, college or university. The same grid net could also be used for assigning households, families and dwellings. The size of each grid cell should be 1km² to ensure cross-border interoperability. To meet national requirements, countries may wish to create other grid cell sizes in addition.

431. Though the topic is included in these recommendations on a non-core basis, countries are strongly urged to consider adopting the use of grid square data. For those in continental Europe that do so, the grid system should be defined in line with the INSPIRE legal framework.²⁰ In regions outside of continental Europe countries may define their own grid based on a geodetic coordinate reference system compliant with the International Terrestrial Reference System (ITRS) and a Lambert Azimuthal Equal Area projection, following the same principles as laid down for the INSPIRE grid. In this case, an identifier for the coordinate reference system should be created and included in the metadata of the population grid.

432. Census statistics are traditionally reported on administrative areas or specific census output areas. Population grids are very useful complementary output systems offering several advantages. Grid cells are all of the same size, making them perfect for area- or distance-based comparisons (for the purposes for example, of accessibility to services). Grids are stable over time and hence independent of changes in civil divisions. Furthermore, grids integrate easily with other scientific data (such as climate data). Grid cells are flexible as they can be assembled to form areas reflecting a specific purpose or study area. Grid systems can be constructed hierarchically in terms of cell size, thus matching study areas from the local to the global level.

433. In a census context it is important to notice that grids are very powerful for spatial analysis in an international and cross-border context as they are not affected by variation in municipality size between countries. However, grid statistics may give rise to concerns over confidentiality or significance of the data in thinly populated areas, or when data come from a sample source. Therefore the topics for which grid statistics are to be produced should be

²⁰ Commission Regulation (EU) No 1253/2013 of 21 October 2013 amending Regulation (EU) No 1089/2010 implementing Directive 2007/2/EC as regards interoperability of spatial data sets and services

carefully selected, and the choice should always represent a compromise between the demand for detailed and flexible statistics and data protection concerns.

Degree of urbanisation (derived non-core topic)

434. Degree of urbanisation²¹ classifies the areas where persons have their usual place of residence as being densely populated areas, intermediate density areas, or thinly populated areas. The classification is based on a combination of geographical contiguity and minimum population thresholds applied to the 1 km² population grid cells (defined in paragraph 428 above). These grid cells all have the same shape and size, which avoids distortions caused by units varying in size.

435. The degree of urbanisation creates a classification of local administrative units/municipalities as follows:

- (a) Densely populated areas have more than 50 per cent of their population living in high-density clusters²² (urban centres).
- (b) Intermediate density areas have more than 50 per cent of their population living in urban clusters, but are not densely populated areas.
- (c) Thinly populated area has more than 50 per cent of their population living in rural grid cells.

436. Degree of urbanization may also be used to create an alternative classification of areas as being either 'urban' or 'rural', with intermediate and densely populated areas being classified as 'urban' while thinly populated areas are classified as 'rural'.

437. In the above classification of local administrative units/municipalities, the following definitions, population and density²³ thresholds should be used:

- (a) High-density clusters (urban centres) are clusters of contiguous grid cells of 1 km² with a density of at least 1,500 inhabitants per km² and a minimum population of 50,000. Contiguity for high-density clusters does not include the 'diagonal' (that is, cells with only the corners touching), and gaps in the cluster are filled (that is, those cells surrounded by high-density cells).
- (b) Urban clusters are clusters of contiguous grid cells of 1 km² with a density of at least 300 inhabitants per km² and a minimum population of 5,000. The same 'contiguity' rule for high-density clusters, described at (a), also applies, but gaps in the cluster are not filled (that is, cells surrounded by urban cells).
- (c) Rural grid cells are grid cells which do not belong to an urban cluster.

²¹ The Degree of urbanisation (DEGURBA) classification is developed by the OECD and the European Commission; see Directorates General Regional Policy and Urban Development, Agriculture, Eurostat and the Joint Research Centre.

²² Each high-density cluster should have at least 75 per cent of its population in densely populated local administrative units/municipalities. This also ensures that all high-density clusters are part of at least one densely populated local administrative unit/municipality, even when this cluster represents less than 50 per cent of the population of the local administrative units/municipalities.

²³ In Europe, the same threshold has been used in all countries. In other regions of the world, however, the two density thresholds may need adjusting up or downward.

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438. As local administrative units/municipalities vary considerably in area, this methodology will lead to a closer match between high-density clusters and densely populated local administrative units/municipalities in countries with small local administrative units/municipalities than in those with large local administrative units/municipalities. To take this difference into account, the classification can be adjusted as following:

- (a) A densely populated local administrative unit/municipality can be classified intermediate as long as 75 per cent of its high-density cluster population remains in densely populated local administrative units/municipalities.
- (b) A thinly populated or intermediate density local administrative unit/municipality can be classified as densely populated if it belongs to a group of local administrative units/municipalities with a political function and if the majority of population of this group of local administrative units/municipalities lives in a high-density cluster.

Commuting characteristics

439. The following topics examine issues associated with commuting from home to workplace, school, college or university. Accurate commuter flows are important for a whole raft of reasons including transport planning, housing development and economic development.

Location of place of work (core topic)

440. The location of place of work is the precise location in which a currently employed person performs his/her job. The location should preferably be coded to the precise address and/or geographic coordinates²⁴ or, if this is not possible, to the smallest possible civil division.²⁵

441. The main reason why place of work information is collected is to link it with place of usual residence in order to shed further light on commuter flows in addition to that provided by mode of transport to work, distance travelled and time taken. The precise address of place of work should be collected and the data coded to the smallest possible civil division in order to establish accurate commuter flows from the place of usual residence to the place of work. Information on persons who do not have a fixed place of work but who report to a fixed address at the beginning of their work period (for example bus drivers, airline crew, operators of street market stalls that are not removed at the end of the workday) should refer to that address. This group may also include individuals who travel to work, on a regular basis, across the border to a neighbouring country. However, it may not be possible to allocate the place of work of some persons, such as sailors, fishermen and offshore

²⁴ In the EU and continental Europe the geographic coordinates should refer to the European Terrestrial Reference System 1989 (ETRS89, EPSG 4258). In regions outside continental Europe the geographic coordinates may also refer to global coordinate reference system WGS-84 (EPSG code 4326).

²⁵ It is recognised that where the location of place of work is outside the country it is generally only necessary to code it to the country concerned.

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workers. Such persons should be coded as having 'no fixed place of work' (see classification in paragraph 443 below).

442. In order to monitor commuter flows, a classification comparing location of place of work and location of place of residence is recommended. Commuting should be measured between place of origin and place of destination of the daily journey. It should be noted, however, that for some persons in employment, the place of origin may not necessarily be their place of usual residence if they have, of example, a separate week-day address from which they usually travel to work.

443. The following classification is recommended:

- (1.0) Same minor civil division as place of residence
- (2.0) Other minor civil division within same major civil division as place of residence
- (3.0) Other major civil division
- (4.0) Abroad
- (5.0) Other place of work
 - (5.1) Offshore installation
 - (5.2) No fixed place of work

444. Minor civil division refers to the lowest level of geography for which commuter flows should be measured. Depending on national circumstances and user requirements this could be small areas (such as wards or communes) or areas at a higher level (such as municipalities or districts). Major civil division refers to a higher level of geography such as municipalities (if the minor division is small areas) or counties/departments (if the minor division is municipalities or districts).

445. An alternative and more detailed two-digit classification may be considered by some countries that wish, for example, to identify, separately, persons working at home or longer-distance commuters:

- (1.0) Same minor civil division as place of residence
 - (1.1) Working at home
 - (1.2) Working elsewhere within the same minor civil division
- (2.0) Neighbouring minor civil division
- (3.0) Other minor civil division
 - (3.1) In same major civil division
 - (3.2) In some other major civil division
- (4.0) Abroad
- (5.0) Other place of work
 - (5.1) Offshore installation
 - (5.2) No fixed place of work

Location of school, college or university (non-core topic)

446. By including this topic in their census, countries can extend the scope of their data on commuting patterns to cover pupils and students in addition to the coverage of the employed provided by place of work. In order to maintain comparability with the place of work topic, the location of school, college or university should be coded to the same level of geography.

Mode of transport to work (or to place of education) (non-core topic)

447. Mode of transport to work relates to the daily journey made. For people making several journeys or using more than one mode of transport, the mode of transport used for the greatest distance in the daily journey should be indicated. People not traveling to work should be classified as having no journey.

448. The following classification is suggested:

- (1.0) Rail
 - (1.1) National/international rail network
 - (1.2) Metro/underground
 - (1.3) Tram/light railway
- (2.0) Bus, minibus or coach
- (3.0) Car or van
 - (3.1) Driver
 - (3.2) Passenger
- (4.0) Other
 - (4.1) Motorcycle
 - (4.2) Pedal cycle
 - (4.3) Walk
 - (4.4) Boat or ferry
 - (4.5) Other
- (5.0) No journey made
 - (5.1) Working at home
 - (5.2) Other reason

449. Some countries may wish to consider further subdividing category (3.1) to distinguish person who drive alone from those who drive with other passengers, though this would require collecting additional information in the census.

450. In order to provide more complete information on commuting patterns, some countries may wish to extend the topic of mode of transport to include daily journeys made by children and students to their respective place of education. As for the mode of travel to

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work, the mode of transport used for the greatest distance in the journey should be indicated. The classification set out in paragraph 448 should be adopted.

Distance travelled to work (or to place of education) and time taken (non-core topic)

451. Countries may wish to collect information on the distance travelled to work (or place of education) on a daily basis and the time taken with a view to monitoring the extent to which persons are living at greater distances from their place or work (or education), and the impact which traffic congestion has on the travel time taken. When collecting this information, consideration should be given to the address from which the journey commenced.

Chapter VII. Demographic characteristics

Introduction

452. The demographic characteristics of sex, age and marital status are core variables, which are fundamental in classifying and reporting on other information from the census to help in the understanding of various socio-economic and demographic issues. In the case of sex and age, it is considered important that this information be recorded for every person for whom census information has been collected. It is therefore recommended that where this information is incomplete it be derived or imputed for census purposes rather than report it as being 'not stated'.

453. The population census also provides an opportunity to collect data for estimating levels of fertility at both national and sub-national levels in a cost-effective manner. The investigation of fertility in population censuses is particularly important in countries lacking a reliable registration system for the production of vital statistics because of the opportunity that census data provides for estimating vital rates that would not otherwise be available. But even in countries with complete birth registration, some of the topics (covering the numbers of 'children born alive' and 'children still living', as well as 'age at marriage or union') are equally appropriate because they provide data, such as the cross-tabulation with socio-economic characteristics, that are not easily available from registration data alone.

Sex (core topic)

454. The sex of each person should be recorded in the census. Sex is, together with age, the census topic that is most frequently cross-classified with other characteristics of the population. Therefore, it is fundamental that information on sex is as complete and accurate as possible. If information on sex is missing, an imputation based on other individual or household entries should be undertaken.

455. The sex (male or female) of every individual should be recorded in the census questionnaire (or taken from the appropriate administrative source for those countries using registers). Sex disaggregation of data is a fundamental requirement for gender statistics. For many socio-economic and demographic characteristics that could be collected through a census, such as education, labour force status, marital status, migration, disability and living arrangements, there are generally variations by sex. Sex, together with age, represents the most basic type of demographic information collected about individuals in censuses and surveys, as well as through administrative recording systems, and the cross-classification of these data with other characteristics forms the basis of most analyses of the social and demographic characteristics of the population as it provides the context within which all other information is placed.

456. Some countries have started recognising additional 'sex' (or 'gender') response categories in order to allow persons of cross-gender or indeterminate sex to self-identify in surveys. Such countries may, therefore, wish to attempt to record such information in the census (or may even be required, by national legislation, to do so). However, in attempting to collect these data through a national census, particular attention should be given to issues of data quality. It is known that a small proportional error occurs in reporting or coding large

response categories (such as 'male' or 'female') but that these can nevertheless be larger than the number of correctly captured responses for a rare category (such as a 'third' sex). Even among the sub-group of particular interest, response patterns may be particularly sensitive to question wording. It is strongly recommended, therefore, that countries should undertake a rigorous testing programme before attempting to collect such information in the census. Furthermore, it should be noted that including such categories in outputs imposes risk to statistical disclosure since the relevant numbers are likely to be very small, particularly when cross-classified with other census variables. If, for this or other sensitivity reasons, countries are not able to release such information, it is arguable that they should not attempt to collect it.

Age (core topic)

457. To obtain information on age, it is recommended that information on date of birth be collected. This yields more precise information than collecting data on exact age at the census reference time. Collecting information on the date of birth allows for the tabulation of data in two ways: by year of birth and by completed years of age. Date of birth also allows the calculation of age to be made in respect of points in time other than at census reference time. Given that age is one of the most important variables collected in a census, used in many tabulations and analyses, it is fundamental that information on age be as complete and accurate as possible. If information on age is missing, imprecise or contradictory, imputation based on other individual or household entries should be undertaken.

458. In countries where the exact date of birth may be difficult to collect for a significant proportion of the population, the census questionnaire might allow calendar quarter or season of the year to be substituted. However, in census questionnaires with specifically designated response boxes for day/month/year, such write-in responses as season of the year would not be codable. Impossible ages, such as children older than their parents, should be edited. If age in years is collected, attention must be given to parents incorrectly reporting their infant's age in months. Additionally, care should be taken in collecting and quality assuring information for the elderly as misreporting can be more common at the older ages.

459. Many countries in the region have identified children, young persons, and the elderly as particular population groups for which various types of census data will be required. The types of data on children and youths that are likely to be of interest include topics such as family type (two-parent or one-parent family), family income, labour force status of parents, and school attainment and/or educational attainment of parents. For the elderly, data on marital status, labour force status, position in the family and household, disability, and type of living quarters, are examples of some of the topics that are usually cross-classified by age and sex, and that are likely to be of interest to countries. It is recommended that countries ensure that the definitions and classifications planned to be used in the census for these and other topics of interest are appropriate for the dissemination of the required data on children, youths and the elderly.

Legal marital status (core topic)

460. Marital status is defined as the (legal) conjugal status of each individual in relation to the marriage laws (or customs) of the country (often referred to as the *de jure* status).

461. Information on the legal marital status of each person should be collected at least for persons aged 15 and over. However, since the minimum legal age (or the customary age) for marriage varies between countries, and since the population may also include young persons who have been married in other countries with lower minimum ages, the collection of the data for all persons is encouraged.

462. The following basic classification of the population by marital status is recommended:

- (1.0) Never married
- (2.0) Married
- (3.0) Widowed and not remarried
- (4.0) Divorced and not remarried

463. It should be emphasised here that insofar as this recommended classification of legal marital status is concerned, all persons living in consensual unions (see paragraph 471) should be classified as 'never married', 'married', 'widowed' or 'divorced' in accordance with their *de jure* (legal) status.

464. In countries with legal provision for registered/legal partnerships (for opposite-sex couples and/or same-sex couples), or where same-sex couples can legally marry, additional categories may be included in the category of the 'married', for example:

- (2.1) Opposite-sex husband/wife/spouse
- (2.2) Same-sex husband/wife/spouse

465. Alternatively, one example of how the classification in paragraph 462 may be expanded is:

- (1.0) Never married
- (2.0) Married
 - (2.1) Opposite-sex husband/wife/spouse
 - (2.2) Same-sex husband/wife/spouse
- (3.0) Registered or other legal partnership
 - (3.1) Opposite-sex partner
 - (3.2) Same-sex partner
- (4.0) Widowed and not remarried
- (5.0) Divorced and not remarried

466. The choice of terms actually used for 'husband/wife/spouse' should be appropriate to the language and the culture of each country. Many languages lack a gender neutral word for 'spouse'. However, in choosing terms, it should be recognised that opposite-sex couples

may prefer different terms from same-sex couples. Regardless of the approach chosen, it is strongly encouraged that a thorough testing programme be conducted prior to introducing these potentially sensitive categories in the census.

467. A separate category for 'legally separated' could be considered in countries where the legislation includes provisions for this status, as being distinct from 'married' or 'divorced'. Also some countries may wish to identify separately within the 'married' category, those persons who are remarried.

468. In countries where the group of persons whose only, or latest, marriage has been annulled is substantial in size, a separate category may also be considered for this group. Where a separate category is not considered for this group, however, the individuals should be classified according to their marital status prior to the annulled marriage.

De facto marital status (core topic)

469. *De facto* marital status is defined as the status of each individual in terms of his or her actual living arrangements within the household being enumerated regardless of that person's legal marital status. It is recommended that information on this topic be collected for persons of the same age categories as those for whom information on the legal status is collected.

470. The recommended classification is:

- (1.0) Person living with spouse or partner (registered or in a consensual union) having usual residence in the same household
- (2.0) Person not living with spouse or partner (registered or in a consensual union) having usual residence in the same household

471. Two persons are taken to be partners in a consensual union when: they have usual residence in the same household, they are not married to, nor are in a registered/legal partnership with, each other, and they have a marriage-like relationship to each other. People in such a relationship are also known as 'cohabiting partners' or a 'cohabiting couple'.

472. An optional distinction within category (1.0) between (1.1) 'Person living with opposite-sex spouse or partner' and (1.2) 'Person living with same-sex spouse or partner' might be considered by countries that would like to produce more detailed data for the purposes, for example, of analysis of family behaviour or developing family policies.

473. It is to be noted that information on *de facto* marital status can also be derived from information collected on topics related to household and family characteristics of persons, characteristics of family nuclei and characteristics of private households, based on the relationship to the reference person question or the full household relationship matrix in those countries adopting a traditional census where such a matrix is used. Where such a matrix is not used, a specific question on living arrangements would need to be asked.

474. It is recognised that in countries where census information is derived from administrative registers, data on consensual unions may not be readily available.

Total number and sex of children born alive (non-core topic)

475. Information on total number of children born alive can be collected in the census by countries that plan to use it to calculate estimates of fertility based on indirect techniques. In countries with unreliable or incomplete registration on births, census information on this topic can be useful for assessing the completeness of the registers and for estimating levels of lifetime fertility of older cohorts.

476. Countries should be aware of the potential sensitivity of this topic for mothers who have experienced still-births. This issue should be carefully considered in the testing programme. If this topic is included in the census, it is suggested that information on total number of live-born children be collected for all women age 15 and older. In populations where significant fertility occurs at younger ages, the lower limit should be adjusted accordingly.

477. The data collected on total number and sex of live-born children should, in principle, include all children born alive during the lifetime of the women concerned up to the census date (that is excluding foetal deaths and stillbirths). Adopted children should not be included. The number recorded should comprise all live-born children whether born of the present or prior marriage(s), whether born of consensual or other unions or by a single mother, within country or abroad, and regardless of whether or not such children are living at the census reference time, or where they may be living.

Date(s) of legal marriage(s) of ever-married women: (i) first marriage and (ii) current marriage (non-core topic)

478. Information on dates/duration of marriage is valuable for fertility statistics and extends the knowledge that can be derived from data on number of live-born children. In the case of women who have been married more than once, information may be obtained on the dates of both the first marriage and the current marriage.

479. For women who are widowed, separated or divorced at the census reference time, 'date of/age at/number of years since the dissolution of first marriage' should be collected. Information on dissolution of first marriage (if pertinent) provides data necessary to calculate 'duration of first marriage' as a derived topic at the processing stage. In countries in which duration of marriage is reported more reliably than age, tabulations of children ever born by duration of marriage yield better fertility estimates than those based on data on children born alive classified by age of the woman. Data on duration of marriage can be obtained by subtracting the age at marriage from the current age, or directly from the number of years elapsed since the marriage took place. Some countries may find it useful to also collect the order of the current marriage.

Date(s) of the beginning of the consensual union(s) of women having ever been in consensual union: (i) first consensual union and (ii) current consensual union (non-core topic)

480. Information on dates/duration of consensual union, as well as information on dates/duration of marriage, is valuable for fertility statistics and extends the knowledge that can be derived from data on number of live-born children. In the case of women who have been in consensual union more than once, it is suggested to obtain information on the dates of both the first and the current consensual union. Information on dates/duration of consensual union(s) can be combined with the information on the date(s) of legal marriage(s).

481. It should be recognized that the beginning, and thus the beginning date, of a consensual union may be imprecise.

Chapter VIII. Economic characteristics

Introduction

482. Statistics on the economic characteristics of persons are needed from population censuses for many reasons. Information on the productive activities of persons is vital to establish a comprehensive picture of the economic structure of a country, and the work patterns, labour market participation, and extent of labour underutilization of its population. This information, when combined with other personal, household and dwelling characteristics collected in the census, enable assessments of the socio-economic situation of persons and households, which are essential to inform the formulation and planning of a wide range of economic and social policies and programmes related to employment creation, poverty reduction, work-life balance, vocational education and training, provision of social security and other social benefits, gender equality, social inclusion, civic participation, etc.

483. Such statistics might be obtained from other sources such as a household-based labour force survey or administrative records, but these other sources have certain limitations. Household surveys, especially labour force surveys, are particularly well suited for generating a broad range of statistics on the economic characteristics of the population at aggregate levels, such as national and broad regional groupings. Data obtained from labour force surveys, however, are subject to sampling error and, therefore, rarely provide reliable estimates for small areas, or for detailed groups of industries and occupations. By contrast population censuses can provide certain core statistics at the lowest levels of aggregation, for small population groups and for small occupation and industry groups. Administrative records, however, may not have the same quality of occupational and industry coding, nor have the same comprehensiveness in population or activity coverage.

484. The population census also provides benchmark information to which statistics from other sources can be related. Population censuses likewise provide the sample frames for most household-based surveys, including labour force surveys. In deciding which topics relating to the economic characteristics of the population to include in the population census, countries will need to assess the existence of other sources of the statistics and their complementary uses. The aim should be to cover the core topics needed as benchmark information, for the preparation of sample frames, and to provide essential statistics for small areas and small population groups, and for small occupation and industry groups, as relevant in the national context.

485. International resolutions and guidelines to produce statistics relating to the economic characteristics of the population are adopted by the International Conference of Labour Statisticians (ICLS) and approved by the Governing Body of the International Labour Organization (ILO).²⁶

²⁶ See <http://www.ilo.org/stat> The complete labour statistics standards are available at: <http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/lang--en/index.htm>.

Reference concepts for work statistics

Work

486. Measurement of the economic characteristics of the population is based on the conceptual framework for work statistics (see Box 1 below). In this framework, “work” is defined for reference purposes as *‘any activity performed by persons of any sex and age to produce goods or to provide services for use by others or for own use’*.

Box 1. New international recommendations concerning statistics of work, employment and labour underutilization

In October 2013, the Nineteenth International Conference of Labour Statisticians (ICLS) adopted the *Resolution concerning statistics of work, employment and labour underutilization*.²⁷ This Resolution replaced the previous international recommendations relating to the measurement of the economically active population, employment, unemployment and underemployment dating from 1982 (13th ICLS) and related guidelines.

These new standards introduced a number of important revisions, among which are: a conceptual framework for work statistics consistent with the System of National Accounts; guidelines for separately measuring different forms of work, including a more targeted definition of *employment* as *‘work for pay or profit’*, and for expanding the range of measures of labour underutilization beyond the traditional unemployment. New terminology was also introduced, as relevant, and terms considered to be out-of-date, particularly the *‘economically active/inactive population’* were replaced with *‘labour force/outside the labour force’*.

Important elements from the previous standards essential to the internal consistency of the statistics remain unchanged. The refinements to the definition of employment and new measures of labour underutilization may result, however, in breaks in the historical series of statistics of the economically active population, employment, unemployment and underemployment. In particular, productive activities carried out without pay such as:

- (a) production of goods intended mainly for own final use by the household,
- (b) unpaid work by apprentices, interns and trainees,
- (c) organization-based volunteer work, and
- (d) direct volunteering to produce goods for other households

are no longer included within the scope of employment. Participation in these activities is now to be measured separately through the newly defined forms of work: own-use production work, unpaid trainee work and volunteer work, respectively.

Countries are encouraged to develop their statistical system so as to cover work

²⁷ See *Resolution concerning statistics of work, employment and labour underutilization*, adopted by the Nineteenth International Conference of Labour Statisticians (Geneva, October 2013), available at: http://www.ilo.org/global/statistics-and-databases/meetings-and-events/international-conference-of-labour-statisticians/19/WCMS_230304/lang--en/index.htm

statistics, including statistics on the labour force, based on their specific national needs and resources. In the case of the measures affected by the 19th ICLS Resolution, the updated international standards would ideally be implemented over time, as feasible for national statistical systems. During the transition period it is of utmost importance that the institutions and persons responsible for planning and managing the production of work and labour market statistics develop a strategic and coordinated approach that takes into account all official sources of the statistics, including the population census, labour force survey and other household-based surveys and administrative records, as relevant. Data users will need to be kept well informed of the process, including by widely disseminating the relevant metadata and by maintaining parallel series for a specified period following their implementation.

487. The concept of work is aligned with the general production boundary as defined in the System of National Accounts 2008,²⁸ enabling full integration between work statistics and production statistics. All work or productive activities are thus included, irrespective of their formal or informal character or the legality of the activity. Excluded are activities that do not involve producing goods or providing services (for example, begging and stealing), self-care (personal grooming and hygiene), and activities that cannot be performed by another person on one's own behalf (sleeping, learning and activities for own recreation).

488. Work can be performed in any kind of economic unit comprising market units (that is, units producing goods and services mostly for sale at prices that are economically significant), non-market units (units producing goods and services mostly for supply to other units without charge or at prices that are not economically significant) and households that produce goods or services for own final use or fixed capital formation by the producers.

Forms of work

489. The conceptual framework for work statistics identifies five mutually exclusive *forms of work* (that is to say the type of productive activity) for separate measurement (see Chart 3):

- (a) own-use production work comprising production of goods and services for own final use;
- (b) employment work comprising work performed for pay or profit;
- (c) unpaid trainee work comprising work performed for others without pay to acquire workplace experience or skills;
- (d) volunteer work comprising non-compulsory work performed for others without pay;
- (e) other work activities including unpaid compulsory work performed for others such as community service and work by prisoners, when ordered by a court or similar authority, and unpaid military or alternative civilian service.

²⁸ United Nations, *System of National Accounts 2008* (New York, 2008).

Chart 3 Forms of work (type of productive activities) and the System of National Accounts 2008

Intended destination of production	for own final use		for use by others				
	Own-use production work		Employment (work for pay or profit)	Unpaid trainee work	Other work activities	Volunteer work	
Forms of work	of services	of goods				in market and non-market units	in households producing
			goods	services			
Relation to 2008 SNA		Activities within the SNA production boundary					
		Activities inside the SNA General production boundary					

490. During a given reference period, persons may engage in one or more forms of work in parallel or consecutively, that is, persons may be employed, be volunteering, doing unpaid trainee work and/or producing for own final use, in any combination.

Measurement in the population census

491. To meet different objectives, countries may measure the economic characteristics of the population in the census with respect to their participation in one or in several forms of work. In particular, the measurement of:

- (a) persons in employment is essential as part of the preparation of labour force statistics that include unemployment and other measures of labour underutilization needed to assess the labour market participation of the population, and to classify the population according to their labour force status in a short reference period (see paragraphs 501-509 below); and
- (b) persons in own-use production of goods is especially important in countries where particular groups of the population engage in agriculture, fishing and/or hunting and gathering for own final use, including for subsistence (see paragraphs 564-569), and to support integration of the population census with the agricultural census (see Chapter IX).

492. Given the need for detailed probing, the measurement of participation in own-use provision of services, unpaid trainee work, and in volunteer work is more appropriate

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through household surveys or, if desired, through the census by means of a long form applied to a sub-set of the population.²⁹

493. Information on the economic characteristics of the population should be collected for each person at or above a minimum age set in accordance with the conditions in each country. Where national programmes of statistics on the working-age population or on child labour exist, the statistics derived from the census will serve to complement those other bodies of statistics. For purposes of compiling statistics on the working-age population, the international standards recommend that countries set the lower age limit taking into consideration the minimum age for employment and exceptions specified in national laws or regulations, or the age of completion of compulsory schooling.³⁰ For compiling child labour statistics, the relevant international standards identify the target population as all persons in the 5-17 year age group.³¹

494. Countries, in which many children participate in employment or in other forms of work, including in agriculture, will need to select a lower minimum age than countries where work of young children is uncommon. In such cases tabulations of economic characteristics should distinguish persons less than 15 years of age and those 15 years of age or over. Countries where the minimum school-leaving age is higher than 15 years and where there is a significant number of children engaged in productive activities below this age should endeavour to collect data on the economic characteristics of these children with a view to achieving international comparability at least for persons 15 years of age or over.

495. Use of a maximum age limit for measurement of economic characteristics of the population is not recommended, as many people continue to be engaged in different forms of work beyond their normal retirement age and because the numbers involved are likely to increase as a result of factors associated with the ageing of the population. Countries may, however, wish to balance the cost of collecting and processing information relating to the economic characteristics of elderly persons (those aged 75 years or more) and the additional response burden imposed on them against the significance and reliability of the information provided.

Labour force characteristics

Labour force status (core topic)

496. A classification of persons by their labour force status provides important information about their relation to the labour market, in particular, to work performed for pay or profit, in a short reference period. Persons may be classified in a short reference period according to their labour force status as being 'employed', 'unemployed', or 'outside the labour force' as defined below.

²⁹ For more details see *Resolution concerning statistics of work, employment and labour underutilization*, adopted by the Nineteenth International Conference of Labour Statisticians (Geneva, 2013), paragraphs 22(c) and 37-39.

³⁰ *Resolution concerning statistics of work, employment and labour underutilization*, adopted by the Nineteenth International Conference of Labour Statisticians (Geneva, 2013), para. 65.

³¹ *Resolution concerning statistics of child labour*, adopted by the Eighteenth International Conference of Labour Statisticians (Geneva, 2008).

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497. The three categories of labour force status referred to above are mutually exclusive and exhaustive. While even during a short period persons may be engaged in multiple activities, to establish their labour force status, priority is given to employment over the other two categories; and to unemployment over outside the labour force (see Chart 4). Thus, a student who is also seeking and available for employment should be classified as unemployed, while a person who has a part-time job, working only a few hours for pay and who is also seeking another job, should be classified as employed. The sum of persons in employment plus persons in unemployment comprises the labour force.³² More details of the international standards are given in the Resolution concerning statistics of work, employment and labour underutilization, adopted by the 19th International Conference of Labour Statisticians in 2013.³³

498. It is recommended that in presenting the total population according to labour force status the following classification at the two-digit level should be used:

- (1.0) Labour force
 - (1.1) Employed
 - (1.2) Unemployed
- (2.0) Outside the labour force
 - (2.1) Attending an educational institution
 - (2.2) Pension or capital income recipients
 - (2.3) Performing unpaid household services
 - (2.4) Others

499. Additional reasons for being outside the labour force that are considered particularly important at national level, such as 'engaged in own-use production of goods' (such as foodstuffs from agriculture, fishing, hunting or gathering) may be added as a separate category of persons outside the labour force (2.0) as relevant. In countries where it is not possible to distinguish the category 'Performing unpaid household services' (2.3) such persons they should be classified with 'Others'.

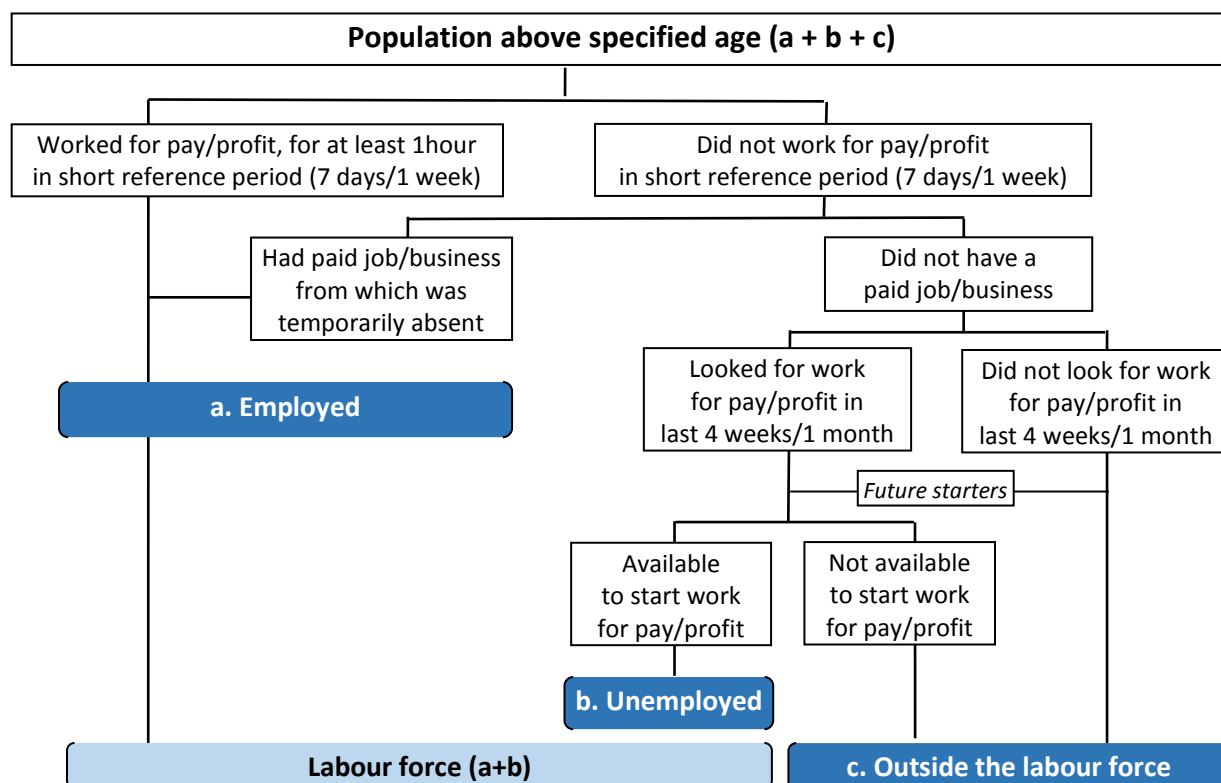
500. The labour force status of persons should be established with reference to a short reference period of 7 days or one week, which may be either the previous 7 days, or the last completed calendar week, prior to the start of the census reference period, or a specified recent fixed week. For comparability purposes, it is particularly useful to apply the same short-reference period for the census as for the national labour force survey, if any. This short reference period serves to provide a snap-shot picture of labour market participation in the country around the census reference time. As such, the labour force (that is, persons in employment plus persons in unemployment) reflects the supply of labour for the production of goods and services in exchange for pay or profit at a specified point in time. Seasonal variations in employment and unemployment levels, that may be significant both in industrialized and in developing economies, will not be captured. Assessments of such

³² Formerly also referred to as "currently active population"

³³ Available at http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_230304/lang--en/index.htm

temporal variations in work patterns may be captured better through sub-annual (such as monthly, quarterly, etc.) household surveys, though some countries may wish to collect this information, additionally, in the census.

Chart 4 Classification of working age population by labour force status



Employed persons

501. Persons in employment are all those above the specified age who, during a short reference period of 7 days or one week, were engaged in any activity to produce goods or provide services for pay or profit. The notion ‘for pay or profit’ refers to work done as part of a transaction in exchange for remuneration payable in the form of wages or salaries for time worked or work done or in the form of profits derived through market transactions from the goods and services produced. It includes remuneration in cash or in kind, whether actually received or not, payable directly to the person performing the work or indirectly to a household or family member.

502. Two categories of persons in employment are:

- (a) employed persons ‘at work’, that is, who worked for pay or profit for at least one hour; and
- (b) employed persons ‘not at work’ due to working-time arrangements (such as shift work, flexitime and compensatory leave for overtime) or to a temporary absence from a job for pay or profit.

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503. Use of the one-hour criterion serves to ensure coverage of all types of job, including part-time, temporary or casual jobs, thereby supporting the identification of all persons in employment and the analysis of their working conditions. It is also essential, in order to ensure that unemployed persons should refer to those without any employment, who are seeking and available for work for pay or profit. Moreover, this criterion is a prerequisite for the consistency of employment statistics with national accounts data on production. When information on working time is also collected in the census (as determined by the information collected on hours usually worked - see paragraphs 557-560 below), it is recommended that employed persons be classified by specified bands of working time so as to enable identification of persons with both short and excessive working time.³⁴

504. Persons on 'temporary absence' from a job, including employees or the self-employed (as defined paragraphs 539-541 below) should be considered in employment, provided that they were 'not at work' for only a short duration and maintained a job attachment during the absence. The existence of a job attachment should be established on the basis of the reason for the absence and, in the case of certain reasons, the continued receipt of remuneration and/or the total duration of the absence (in general not greater than 3 months).

505. Reasons for absence where job attachment is generally maintained, and thus, do not require further enquiry include:

- (a) sick leave due to own illness or injury;
- (b) public holidays, vacation or annual leave; and
- (c) maternity or paternity leave, as specified by legislation.

506. Reasons for absence requiring further assessment of continued receipt of remuneration and/or total duration include:

- (a) parental leave,
- (b) educational or training leave,
- (c) care for others and other personal absences,
- (d) strikes or lockouts,
- (e) reduction in economic activity (due, for example, to temporary lay-off or slack work),
- (f) temporary disorganization or suspension of work (due to such reasons as bad weather, mechanical, electrical or communication breakdowns, problems with information and communication technology, shortage of raw materials or fuels, and
- (g) other temporary absence with or without leave.

507. It is recognised, however, that it may be impracticable to attempt to collect information in a census that will identify such reasons.

³⁴ See *Resolution concerning the measurement of working time*, adopted by the Eighteenth International Conference of Labour Statisticians (Geneva, 2008).

508. The following treatment of specific groups of employed persons is recommended:
- (a) Persons with a job for pay or profit who, during the reference period were on training or skills-enhancement activities required by their job or for another job in the same economic unit should be considered to be employed.
 - (b) Contributing family workers should be considered to be at work on the same basis as other employed persons; that is irrespective of the number of hours worked during the reference period. Similarly, persons who perform tasks or duties of an employee job held by a family member living in the same, or in another, household should also be classified as employed.
 - (c) Apprentices, interns and trainees who receive pay in cash or in kind should be considered in paid employment and classified as 'at work' or 'not at work' on the same basis as other employees.
 - (d) Participants in job training schemes who receive pay in cash or in kind are considered to be employed if the training takes place within the context of an enterprise and in connection with its production, or if the participants retain a formal job attachment to an enterprise in which they had formerly been employed, even if the training is outside the context of the enterprise or without connection to its production.
 - (e) Persons with seasonal jobs during the off-season, should be considered employed if they continue to perform some of the tasks and duties of the job, excluding, however, the fulfilment of legal or administrative obligations (for example, paying taxes).
 - (f) In accordance with the priority rules of the labour force framework, persons who, during the reference period, were mainly students, homemakers, pensioners, registered unemployed, etc, who at the same time were in employment as defined above should be considered employed on the same basis as other categories of employed persons.
 - (g) All members of the armed forces who receive pay in cash or in kind should be included among employed persons and classified as 'employees'. The 'armed forces' should include both the regular and any temporary members as specified in the most recent revision of the International Standard Classification of Occupations (ISCO).³⁵
509. Excluded from employment are:
- (a) apprentices, interns and trainees who work *without* pay in cash or in kind (that is, persons engaged in unpaid trainee work);
 - (b) participants in skills training or retraining schemes within employment promotion programmes, when not engaged in the production process of an economic unit;

³⁵See International Standard Classification of Occupations: ISCO-08/ International Labour Office - Geneva: ILO, 2012. p. 357.

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- (c) persons who are required to perform work as a condition of continued receipt of a government social benefit such as unemployment insurance;
- (d) persons receiving transfers, in cash or in kind, not related to employment;
- (e) persons with seasonal jobs during the off season, if they cease to perform the tasks and duties of the job;
- (f) persons who retain a right to return to the same economic unit but who were absent for reasons specified in paragraph 506 above, when the total duration of the absence exceeds the specified threshold and/or if the assessment of receipt of remuneration is not fulfilled;
- (g) persons on indefinite lay-off who do not have an assurance of return to employment with the same economic unit;
- (h) persons who work to produce goods intended mainly or exclusively for consumption or use by the household or family, even if a surplus or part of the output is sold or bartered (that is, persons engaged in own-use production of goods – see paragraphs 564-569 below);
- (i) household members who provide unpaid services for consumption or use by their household (that is, persons engaged in own-use provision of services); and
- (j) persons who work voluntarily and without pay to produce goods or services through or for other economic units, including market, non-market units and households (that is, persons engaged in volunteer work).

510. Information should be given in the census report(s) and/or relevant metadata describing how these groups and any other specific groups are treated. Consideration should also be given to the desirability of identifying some of the groups (for example working students) separately in tabulations.

Unemployed persons

511. The ‘unemployed’ are all those above the specified age who (a) were not in employment, *and* (b) carried out activities to seek employment during a specified recent period *and* (c) were currently available to take up employment given a job opportunity. To be classified as unemployed, a person must satisfy all of the three criteria, where:

- (a) ‘not in employment’ (that is, not engaged in work for pay or profit) is assessed with respect to the short reference period for the measurement of employment as defined in paragraph 501 above;
- (b) to ‘seek employment’ refers to any activity, when carried out during a specified recent period covering the four weeks, or calendar month, prior to the start of the census reference period, for the purpose of finding a job or setting up a business or agricultural undertaking. This also includes part-time, informal, temporary, seasonal or casual employment, paid apprenticeships, internships or traineeships, within the national territory or abroad. Examples of such activities are:
 - i. arranging for financial resources, or applying for permits or licences;

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- ii. looking for land, premises, machinery, supplies, farming inputs;
 - iii. seeking the assistance of friends, relatives or other types of intermediaries;
 - iv. registering with, or contacting, public or private employment services;
 - v. applying to employers directly, checking at worksites, farms, factory gates, markets or other assembly places;
 - vi. placing, or answering, newspaper or online job advertisements; and
 - vii. placing or updating résumés on professional or social networking sites online.
- (c) 'currently available' serves as a test of readiness to start a job in the present, assessed with respect to a short reference period comprising that used to measure employment. Depending on national circumstances, the reference period may be extended to include a short subsequent period not exceeding two weeks in total, so as to ensure adequate coverage of unemployment situations among different population groups.³⁶

512. In the treatment of specific groups, some groups of persons require careful treatment in order to be properly included among the 'unemployed'. The following treatment is recommended:

- (a) Future starters (that is, persons without a job and currently available for work who had made arrangements to start a job within a short subsequent period, set according to the general length of waiting time for starting a new job in the national context but generally not greater than three months), should be considered as 'unemployed', irrespective of whether or not they recently continued to seek employment.
- (b) Participants in skills training or retraining schemes, within employment promotion programmes, who on that basis were not in employment, not currently available, and did not seek employment because they had a job offer to start within a short subsequent period generally not greater than three months, should be considered as 'unemployed'.
- (c) Persons who retain a right to return to a job or another job in the same economic unit but who were absent for reasons specified in paragraph 506 above, when the total duration of the absence exceeds the specified threshold and/or if the assessment of receipt of remuneration is not fulfilled, and who at the same time satisfy the criteria for unemployment laid down in paragraph 26 above should be regarded as 'unemployed' in accordance with the standard definition of 'unemployment'.

513. In accordance with the priority rules to establish their labour force status, persons who during the reference period were mainly students, homemakers, pensioners, registered unemployed, etc., who at the same time satisfy the criteria for unemployment laid down in

³⁶ In EU countries, the reference period to assess "current availability" comprises the reference week and the subsequent two weeks.

paragraph 511 above should be also regarded as ‘unemployed’ on the same basis as other categories of unemployed persons and be identified separately, where possible.

514. Information should be given in the census reports and/or relevant metadata describing how persons in these and any other specific groups were treated.

Persons outside the labour force

515. ‘Persons outside the labour force’³⁷ comprise all persons above the specified age, who were neither ‘employed’ nor ‘unemployed’ as defined above.

516. Different classifications of persons outside the labour force may be used for analytical purposes. Particularly useful to inform labour market and social policies and programmes are classifications by ‘main activity’ or ‘reason for not entering the labour force’ and by ‘degree of labour market attachment’. These alternative classifications can be derived from the same questions used to identify the unemployed and may be used separately or in combination to enable further analysis.

517. It is recommended that this population be classified by their main activity or reason for not entering the labour force into the following four groups.

- (1) ‘Attending an educational institution’ (or ‘students’): persons outside the labour force, who attend any regular educational institution, public or private, for systematic instruction at any level of education (see also non-core topic ‘school attendance’ in paragraphs 619-623 in the following chapter on ‘Educational characteristics’);
- (2) ‘Pension or capital income recipients’ (or ‘retired’): persons, outside the labour force, who receive income from property or investments, interests, rents, royalties or pensions from former employment;
- (3) ‘Performing unpaid household services’ (or ‘homemakers’): persons, outside the labour force, who are engaged in unpaid household duties in their own home, for example, housewives/-men and other relatives responsible for the care of the home, children or elderly people. (Domestic and personal services produced by domestic employees working for pay, however, should be considered as employment); and
- (4) ‘Others’: persons outside labour force" who are receiving public aid or private support, and all other persons not falling into any of the above categories.

518. To support labour market analysis, persons outside the labour force may also be classified by degree of labour market attachment into the following groups:

- (a) ‘unavailable jobseekers’, (that is, those seeking employment but not currently available);
- (b) ‘available potential jobseekers’, (those not seeking employment but currently available);

³⁷ Formerly referred to as ‘not economically active’.

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- (c) 'willing non-jobseekers', (those neither seeking employment nor currently available but who want employment); and
- (d) 'others', (persons neither seeking employment nor currently available who do not want employment).

519. The classification of persons outside the labour force by degree of labour market attachment allows identification of the potential labour force, computed as the sum of (a) unavailable jobseekers plus (b) available potential job seekers. Together with unemployed persons, the potential labour force is a key measure of labour underutilization, relevant both in more and less developed settings, especially, when labour absorption is, at the time, inadequate; or where the conventional means of seeking employment are of limited relevance; or where the labour market is largely unorganized or of limited scope; or where persons are largely self-employed.

520. Although not a part of the potential labour force, the group (c) above represents another group of persons outside the labour force with an expressed interest in employment and is particularly relevant for social and gender analysis in specific contexts.

Characteristics of jobs and/or establishments

Selection of 'job' to be classified by descriptive variables

521. Individuals can be classified according to descriptive variables such as 'occupation', 'industry', 'status in employment' and 'institutional sector' only through their relationship with a job. This means that they must have been identified as being either 'employed' or 'unemployed' through the questions on 'labour force status'.

522. For this purpose, a 'job' is defined as "the set of tasks and duties performed or meant to be performed by one person for a single economic unit." A person may have had more than one job during the reference period. In such cases the main job is defined in the international standards as "that with the longest hours usually worked even if the employed person was not at work in the reference period."

523. For employed persons it is recommended that the main job held in the reference period is first established and then, the second job, as relevant. When ranking jobs held during the reference period, it is important to consider also jobs from which the person is temporarily absent during the reference period.

524. An unemployed person should be classified for the topics 'occupation', 'industry', 'status in employment', 'institutional sector' and place of work' on the basis of the last main job, which he/she had. The collection of data on characteristics of the last job (if any) of the unemployed is particularly important for users to have information on the characteristics of the unemployed in order to identify the specific areas of the economy or particular skills and occupations of unemployed people.

525. However, such data is of only limited relevance in respect of unemployed people who change jobs frequently or for the unemployed who last worked a long time ago. For the first group, it may be better to collect information on the characteristics of the type of job in which the person most frequently worked, and for the second group, it might be better to

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set a time limit for past work experience (for example during the last 10 years) and only collect information on the characteristics of the last job if it was held within the time limit.

526. It is important to design the census questionnaire or the information to be taken from registers, in a way that will ensure that the topics referred to in paragraph 524 all relate to the same job. This should be a particular concern for those countries that rely on the use of (sometimes different) administrative registers for collecting information on economic characteristics.

527. Some countries may want to describe in more detail the type of secondary work carried out by respondents engaged in more than one job during the reference period. In this case the information to be collected should allow for the identification and coding of a second, and perhaps even a third, job for which information about these topics and, if desired, 'hours usually worked', recognizing the resources that would be required for this additional collecting and processing.

Occupation (core topic)

528. 'Occupation' refers to the type of work done in the main job by the person employed (or in the last job held if the person is unemployed) as defined by the main tasks and duties performed in the job, irrespective of the industry in which the person's job is classified or the status in employment.

529. For purposes of international comparison, it is recommended that countries prepare tabulations in accordance with the latest revision of the *International Standard Classification of Occupations (ISCO)*. At the time the present set of census recommendations was approved the latest revision was the one adopted by a Tripartite Meeting of Experts in Labour Statistics in 2007 and endorsed by the Governing Body of the International Labour Organization (ILO) in 2008 and generally known as ISCO-08.³⁸

530. Countries should code the collected occupational data at the lowest possible level supported by the responses. To enhance data quality, it would be useful to collect information on both the occupational title and a brief description of the main tasks and duties performed in the job by each person employed and unemployed.

531. Countries coding occupation according to a national standard classification should establish correspondence with ISCO either through double coding or through 'mapping' from the detailed groups of the national classification to ISCO.

Industry (branch of economic activity) (core topic)

532. 'Industry' (branch of economic activity) refers to the kind of production or activity of the establishment or similar unit in which the main job of the employed person, or the last job of an unemployed person, was located.³⁹

³⁸ *International Standard Classification of Occupations (ISCO-08) Volume 1, Structure, Group Definitions and Correspondence Tables* (Geneva, International Labour Office, 2012).

³⁹ For those persons who are recruited and employed by one enterprise but who actually work at the place of work of another enterprise (called "agency workers" or "seconded workers" in some countries), there would

533. For purposes of international comparability, it is recommended that countries compile information on industry according to the latest revision of the *International Standard Industrial Classification of All Economic Activities (ISIC)* available at the census reference time. At the time the present set of census recommendations was approved, the fourth edition of ISIC, adopted by the *United Nations Statistical Commission* at its thirty-seventh session in 2006, was the latest revision available.⁴⁰ Countries belonging to the European Economic Area should refer to NACE Rev.2.⁴¹ Countries should code the collected industry information at the lowest possible level supported by the responses.

534. Countries coding industry according to a national standard classification should establish correspondence with ISIC either through double coding or through 'mapping' from the detailed groups of the national classification to ISIC.

535. For those who work in fixed places of work, it is recommended that the name and address of the enterprise or establishment be collected in order to permit a check on the reporting (and to assist in the coding) of the 'industry' variable. However, this is only feasible in a country where a statistical register exists that links business units to industry codes. Furthermore, it is recognized that, in some countries, the collection of name and address of a person's employer may be sensitive.

Status in employment (core topic)

536. 'Status in employment' refers to the type of explicit or implicit contract of employment with other persons or organizations, which the person has in his/her job. The basic criteria used to define the groups of the classification are the type of economic risk, an element of which is the strength of the attachment between the person and the job, and the type of authority over establishments and other workers, which the person has in the job.

537. For purposes of international comparison, it is recommended statistics on status in employment be compiled in accordance with the latest international standards for statistics on this topic. At the time the present set of census recommendations was approved, a revision of these standards was under way and expected to be completed by 2018. The latest standard was the International Classification of Status in Employment (ICSE-93) adopted by the 15th ICLS in 1993. Based on ICSE-93, jobs may be classified by status in employment as follows:⁴²

(1.0) Employees

(2.0) Self-employed

be user interest in gathering information about the industry of the employer as well as the industry of the place of work. However the collection of both would be more appropriate in a labour force survey rather than in a population census. The industry of the actual place of work may provide more reliable reporting of the "industry" variable in a population census.

⁴⁰International Standard Industrial Classification of All Economic Activities, Statistical Papers, Series M, No. 4, Rev. 4, United Nations, New York, 2008.

⁴¹ NACE Rev.2, Statistical Classification of Economic Activities in the European Community, Eurostat, Luxembourg, 2008

⁴² For further details see "Resolution concerning the International Classification of Status in Employment (ICSE)" of the 15th International Conference of Labour Statisticians. Available at <http://www.ilo.org/public/english/bureau/stat/download/res/icse.pdf>

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- (2.1) Employers
- (2.2) Own-account workers and members of producers' cooperatives
 - (2.2.1) Own-account workers
 - (2.2.2) Members of producers' cooperatives
- (2.3) Contributing family workers
- (3.0) Persons not classifiable by status

538. It is recommended that data for at least, the two main categories (1.0) 'employees' and (2.0) 'self-employed' should be separately tabulated in all outputs classified by status in employment, but that data for categories (2.1), (2.2) and (2.3) should also always be collected in the census. In the ICLS standards, 'members of producers' cooperatives' are identified as a separate category at the third digit level of the classification. However, in countries where they are statistically insignificant or not identifiable, it is recommended that they be aggregated with own-account workers as shown above.

539. An '*employee*' is a person who works in a 'paid employment' job, that is a job where the explicit or implicit contract of employment gives the incumbent a basic remuneration, which is independent of the revenue of the unit for which he/she works (this unit can be a corporation, a non-profit institution, government unit or a household). Persons in 'paid employment' jobs are typically remunerated by wages and salaries, but may be paid by commission from sales, by piece rates, bonuses or in-kind payment such as food, housing or training. Some or all of the tools, capital equipment, information systems and/or premises used by the incumbent may be owned by others, and the incumbent may work under direct supervision of, or according to strict guidelines set by the owner(s) or persons in the owners' employment.

540. In accordance with the European System of National Accounts, it is recommended that EU countries classify persons who are 'owner-managers of incorporated enterprises' as employees. Such persons are workers who hold a job in an incorporated enterprise in which they: (a) alone, or together with other members of their families or one or a few partners, hold controlling ownership of the enterprise; and (b) have the authority to act on its behalf as regards contracts with other organizations and the hiring and dismissal of "employees", subject only to national legislation regulating such matters and the rules established by the board of the enterprise. For international comparisons and in order to provide statistics on workers whose socio-economic and labour market characteristics are similar to the self-employed, as well as to inform government policies on promoting entrepreneurship, it is recommended that countries produce tabulations that enable separate identification of this group of workers.

541. The '*self-employed*' are persons hold a 'self-employment job' where the remuneration is directly dependent upon the profits (or the potential for profits) derived through market transactions from the goods and services produced. The term 'self-employed' refers to all the sub-categories under (2.0) in paragraph 537.

542. An '*employer*' is a person who, working on his or her own account or with a small number of partners, holds a 'self-employment' job and, in this capacity, on a continuous basis (including the reference period) has engaged one or more persons to work for him/her

as 'employees'. The incumbent makes the operational decisions affecting the enterprise, or delegates such decisions while retaining responsibility for the welfare of the enterprise. Some countries may wish to distinguish 'employers' according to the number of persons they employ (see paragraphs 554-555 on the non-core topic 'number of persons working in the local unit of the establishment').

543. An '*own-account worker*' is a person who, working on his/her own account or with one or a few partners, holds a 'self-employment job' and has not engaged, on a continuous basis, any 'employees'. (Note that an own-account worker, who during the reference period has engaged one or more employees on a short term and non-continuous basis, should not be classified as 'employer'). In line with the latest international recommendations on the topic, persons engaged in the cultivation of ancillary plots or the care of livestock for own consumption by their households are no longer included in employment on the basis of that activity. Participation in these productive activities is instead to be measured through the separate concept of 'own-use production of goods' (see paragraphs 564-569).

544. A '*member of a producers' co-operative*' is a person who holds a 'self-employment' job in an establishment organised as a co-operative, in which each member takes part on an equal footing with other members in determining the organisation of production, sales and/or other work, the investments and the distribution of the proceeds among the members. Note that 'employees' of producers' cooperatives should not be classified to this group but should be classified as 'employees'.

545. A '*contributing family worker*' is a person who holds a 'self-employment' job in a market-oriented establishment operated by a related person living in the same or in another household, and who cannot be regarded as a partner (that is, an employer or own account worker) because the degree of commitment to the operation of the establishment - in terms of working time or other factors to be determined by national circumstances - is not at a level comparable to that of the head of the establishment.

546. '*Persons not classifiable by status*' include those employed or unemployed persons for whom insufficient information is available, and/or who cannot be included in any of the preceding categories (for example unpaid workers assisting a family member in the completion of a paid employment job).

547. In traditional census questionnaires, the information relating to 'status in employment' will most often be captured through pre-coded alternatives where only a few words can be used to convey the intended meaning of each category. This may mean that classification of some of the situations on the borderline between two or more categories may be subject to the understanding of the respondent. This should be kept in mind when presenting the resulting statistics. Countries, which rely on the direct use of administrative records for the classification of persons' 'status in employment', may find that the group 'contributing family workers' cannot be separately identified. Those who would have been classified to this group when using a questionnaire may instead either be excluded from the labour force or be classified to one of the other groups.

Institutional sector (non-core topic)

548. 'Institutional sector' relates to the legal organisation and the principal functions, behaviour and objectives of the enterprise with which a job is associated.

549. Following the definitions provided in the *System of National Accounts*,⁴³ distinction should be made between the following institutional sectors:

- (a) 'corporations sector', consisting of non-financial and financial corporations (that is, incorporated enterprises, private and public companies, joint-stock companies, limited liability companies, registered cooperatives, limited liability partnerships, etc.) and quasi-corporations;
- (b) 'general government sector', consisting of central, state and local government units together with social security funds imposed or controlled by those units;
- (c) 'non-profit institutions serving households sector' (for example, churches, professional societies, sports and cultural clubs, charitable institutions, aid agencies) that provide goods or services to households free or at prices that are not economically significant; and
- (d) 'households sector' (including unincorporated enterprises owned by households).

Place of work

550. 'Place of work' is the location in which an employed person performs his or her job, or where an unemployed person last performed a job.

551. It is useful to distinguish the '*type of place of work*' from the '*geographic location of the place of work*'. Information on the type of place of work, distinguishing those working at home from those working in a fixed place outside home or with no fixed place of work, is useful in the analysis of employment characteristics. Information on the geographical location of the place of work, when combined with location of place of residence, is used mainly to study commuting issues. It also enables profiles of the employed population by place of work and/or daytime population (as opposed to profiles by place of usual residence) to be built up (see the topic 'location of place of work', in paragraphs 440-445 in the chapter on Geographic characteristics). Coordination with the name (and address if given) of the enterprise or establishment collected for the coding of industry variable is recommended (see paragraph 535).

Type of place of work (non-core topic)

552. 'Type of place of work' refers to the nature of the workplace and distinguishes between the home and other workplaces, whether fixed or otherwise

553. It is recommended that the following types of place of work be identified, or a variation thereof necessitated by national circumstances:

- (a) *With a fixed place of work outside the home*: To this group should also be added persons who do not have a fixed place of work but who report to a fixed address at the beginning of their work period (for example bus drivers, airline pilots and mobile delivery service providers), as well as operators of

⁴³ United Nations, *System of National Accounts 2008* (New York, 2008).

street or market stalls which are not removed at the end of the workday. This group may also include individuals who travel to work, on a regular basis, across the national border to a neighbouring country.

- (b) *Works at home*: This category will include farmers who work and live on their farms, home workers, self-employed persons operating inside their own home, and those both working and living at work camps.
- (c) *No fixed place of work*: This category includes persons whose work involves travel in different areas and who do not report daily in person to a fixed address, for example, travelling salesmen, and self-employed taxi-drivers. It also includes ambulant vendors, operators of street or market stalls, which are removed at the end of the workday, construction workers working at different sites during the reference period and push-cart operators, etc.

Number of persons working in the local unit of the establishment (non-core topic)

554. The 'number of persons working in the local unit of the establishment' is the number of persons usually employed in the establishment, workplace or similar unit in which the main job of persons in employment was located.

555. The suggested classification is:

- (1.0) 1-4 persons
- (2.0) 5-9 persons
- (3.0) 10-19 persons
- (4.0) 20-49 persons
- (5.0) 50 persons or more

556. Some countries might require a more detailed sub-classification of group (4.0).

Hours usually worked (non-core topic)

557. 'Hours usually worked' is defined as the typical value of the hours worked in a job in a short reference period (such as week) as determined over a longer observation period.⁴⁴

558. This working time measure includes the time usually spent carrying out the tasks and duties of the job, within regular working hours together with any usual overtime (i.e. direct hours). It also includes time spent preparing, repairing or maintaining the workplace or work instruments (i.e. related hours). In practice it will also include inactive time spent in the course of performing these activities, such as time spent waiting or standing by (i.e. down time), and other short rest breaks (i.e. resting time). Longer meal breaks, time spent on travel from home to work and vice versa, and time usually not worked because of regular

⁴⁴ *Resolution concerning the measurement of working time*, adopted by the Eighteen International Conference of Labour Statisticians (Geneva, 2008).

sickness, regular reductions in hours due to economic or technical reasons (that is partial unemployment), etc. should be excluded.

559. It is recommended that for persons who have had more than one job during the reference period, the countries should record the total time usually worked as the sum of the hours usually worked in each of the different jobs, but should identify separately the hours usually worked in the main job.

560. The inclusion of 'hours usually worked' as a topic is particularly useful for countries concerned about the relevance for some users of the one-hour criterion in the definition of 'employment'. Tabulations of persons in employment should be presented by specified working-time hour bands in accordance with national requirements.

Duration of job search (non-core topic)

561. 'Duration of job search' refers to the length of time an unemployed person as defined in paragraph 511 above has been in that state since previously being either employed or outside the labour force.

562. The duration of job search should be measured from when unemployed persons began actively seeking employment, or from the end of their last job (if any), whichever is shorter. To estimate the duration of job search countries should seek information on either when the search for employment started or for how long the search has been going on, adopting pre-coded periods of duration. It should be noted that the census can only provide information on the duration of incomplete spells of job search, that is, the elapsed duration of unemployment up to the census reference time.

563. Countries should decide on the basis of national priorities and conditions whether duration of job search should be measured in terms of number of days, weeks or other time frames, but in order to facilitate international comparisons, it is suggested that from the measure chosen it should be possible to produce numbers for durations of: (a) six months or more; and (b) one year or more. The latter category serves to identify those in long-term unemployment. Some countries, where long-term unemployment is an increasing phenomenon, may wish to collect information to separately identify those persons who have never been employed.

Participation in forms of work other than employment

Persons in own-use production of goods (non-core topic)

564. Countries where production of goods for own final use (such as foodstuffs from agriculture, fishing, hunting and gathering, water, firewood and other household goods), represents an important component of the livelihood of a part of the population, whether as a main or secondary activity, will need to consider collecting information in the census on the number of persons engaged in this form of work (previously included within the concept of 'employment'). Such information may be necessary for benchmarking purposes, especially where household surveys are not frequent, for comprehensive sectoral analysis particularly of work in agriculture, forestry and fishing, and to enable integration between the

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population census and the agricultural census (see Chapter IX). Many countries however, will have far less of a requirement to collect such information in their censuses.

565. 'Persons in own-use production of goods' are all those above the specified age who, during a specified reference period, performed any activity to produce goods for own final use. The notion 'for own final use' is interpreted to mean that the intended destination of the output is mainly for final use by the producer in the form of capital formation, or final consumption by household members, or by family members living in other households.

566. According to the international standards, 'any activity' to produce of goods (within the 2008 SNA production boundary) covers work performed for at least 1 hour in the following activities, when the intended destination of the output is mainly for own final use:

- (a) producing and/or processing for storage agricultural, fishing, hunting and gathering products;
- (b) collecting and/or processing for storage mining and forestry products, including firewood and other fuels;
- (c) fetching water from natural and other sources;
- (d) manufacturing household goods (such as furniture, textiles, clothing, footwear, pottery or other durables, including boats and canoes); and
- (e) building, or effecting major repairs to, one's own dwelling, farm buildings, etc.

567. For measurement purposes, the intended destination of the output should be established in reference to the specific goods produced, based on self-declaration (that is, mainly for own final use). In the case of goods from agriculture, fishing, hunting or gathering activities intended mainly for own consumption, a part or surplus may nevertheless be sold or bartered.

568. Persons may engage in own-use production of goods as a main or secondary activity, throughout the year or on a seasonal basis. To ensure complete coverage, the census questions on participation in own-use production of goods should be applied to all persons above the specified age for collecting information on the economic characteristics of the population, irrespective of their labour force status.

569. For assessments of the volume of work performed by persons in own-use production of goods, it may be useful to collect information on working time, either based on hours usually worked (see paragraph. 557), or on broad categories such as part-time/full-time, part-year/full-year, number of months, as feasible and relevant to the main uses of the statistics.

Topics on income

Main source of livelihood (non-core topic)

570. The 'main source of livelihood' is the principal source of income from which the consumption of each person was financed during a specified reference period. It is recommended that preference is given to a long reference period, such as the preceding twelve months, calendar year or financial year, in order to take account of sources which may actually provide an income at periodic or seasonal intervals (such as income from seasonal activities, payment of quarterly benefits from pension plans, annual payment of scholarships or dividends, income from intermittent secondary activities, etc.). Income in kind as well as in cash should be taken into account.

571. Information on 'main source of livelihood' should be obtained for all persons, irrespective of their labour force status, and may not necessarily coincide with the main activity status or the main form of work of the person.

572. The 'main source of livelihood' is a useful concept to complement the measurement of the labour force and of status in employment. However, it is not suitable for the measurement of labour force status and should not be used to classify the population according to activity status. The topic can be very useful to cross-classify the different activity statuses. For example, information on employed persons whose main source of livelihood is not through employment is relevant because those persons classified as 'employed' may include some who only work during a brief portion of the year and who depend on other sources of income (such as own-use production of goods as in the case of subsistence farming or fishing, unemployment benefits, rentals) or on other persons for their livelihood.

573. Where countries decide to include this topic, it is recommended that the information be obtained through direct questions, if possible, by means of a list of potential sources, which should be sufficiently detailed so as to avoid omitting particular sources that may otherwise be overlooked (for example, social welfare payments, pensions, rentals).

574. It is suggested that the following main sources of livelihood should be distinguished:

- (1.0) Employment
 - (1.1) Wage employment
 - (1.2) Self-employment
- (2.0) Own-use production of goods
- (3.0) Property and other investments
- (4.0) Pensions of all types
 - (4.1) Paid by the State and other public bodies
 - (4.2) Paid by enterprises, institutions, co-operative organizations and others
- (5.0) Other transfers
 - (5.1) Sickness and maternity allowances

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- (5.2) Unemployment benefits and relief
- (5.3) Scholarship
- (5.4) Benefits and assistance other than pensions, unemployment benefits, scholarship, and sickness and maternity allowances, provided by the State, other public bodies, co-operative organizations, enterprises or institutions
- (6.0) Loans or reduction of savings, realisation of capital
- (7.0) Dependency (mainly supported by another person or persons)
- (8.0) Other sources

575. Category (2.0) comprises persons whose main source of livelihood is the production of goods intended mainly for own final use or consumption by their household or family. It includes agricultural, fishing and hunting and gathering activities mainly for intended for own final use.

576. Category (6.0) covers the situation in which a person's main source of livelihood is the proceeds from the sale of assets or from drawing on savings or from loans.

577. Category (7.0) comprises those persons who rely on the support of another person or persons for their main source of livelihood. Such a dependant may have some income from employment or from other sources but this may be insufficient to constitute his or her main source of livelihood.

Household income (non-core topic)

578. 'Household income' may be defined as: "All receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals". Household income covers:

- (a) income from employment (both paid and self-employment);
- (b) income from the production of goods for own final use;
- (c) income from the provision of household services for own final use;
- (d) property income; and
- (e) current transfers received.

It excludes windfall gains and other such irregular and typically one-time receipts.⁴⁵

579. Countries may wish to collect information on the amounts of income received by individual persons and/or households during a specified reference period, from any source. If this topic is included in the census, it is recommended that data be obtained from all

⁴⁵ See *Resolution concerning household income and expenditure statistics*, adopted by the Seventeenth International Conference of Labour Statisticians (Geneva, 2003), paragraphs 4-5, available at http://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_087503.pdf

persons above a specified age, whether they are employed or not. Income should be measured both for the individual and for the household of which he/she is a member.

580. Depending on national circumstances, the necessary information can be collected either through a census questionnaire or through the direct use of administrative records. Problems of collecting data on income through a questionnaire are partly related to the sensitivity of such questions in many societies and partly to the difficulty, which many persons may have in finding, or remembering accurately, the requested information. Collection of reliable data on household income, especially income from self-employment and property income, is extremely difficult in general field inquiries, particularly population censuses. The inclusion of non-cash income (i.e. payments in kind and services) such as food, drink, accommodation, fuel, clothing, as well as other goods and services further compounds the difficulties given the need to assign a value amount to such receipts. Collection of household income data in a census, even when confined to cash income, presents special problems in terms of burden of work, response errors, and so forth. Therefore, this topic is generally considered more suitable in a sample survey of households. Depending on the national requirements, countries may nonetheless wish to obtain limited information on household income, by covering only some of the income components (such as, income only from employment), for shorter reference period (for example, one month), and restricted only to cash income. As thus defined, the information collected can provide some input into statistics that have many important uses.

581. According to international standards on the subject, the income from employment of employed persons should include wages and salaries of employees, income of members from producers' cooperatives and the mixed income of employers and own-account workers operating business and unincorporated enterprises. In addition to the income from employment of employed household members, the total income of the household should include, for example, the interest, dividends, rent, social security benefits, pensions and life insurance annuity benefits of all its members. The *Handbook on Household Income Statistics* provides further guidance on concepts and methods related to this topic.⁴⁶

582. The concepts involved in determining income are not simple to grasp and respondents may be unable or unwilling to provide exact information. For example, income should include social security, pension fund contributions and direct taxes withheld from employees' salaries, but some persons will undoubtedly not include these amounts in reporting their salaries. Significant items of total household income may also be excluded or misstated. Despite instructions given to enumerators, the data collected can therefore be expected to be approximate. Accordingly, in the presentation of results it is usually appropriate to use broad income or earnings size-classes. To aid the interpretation of the results, tabulations of the data should be accompanied by a description of the items of income assumed to be included and, if possible, an estimate of the accuracy of the figures.

⁴⁶ Canberra Group Handbook on Household Income Statistics, second edition, 2011, available at http://www.unece.org/fileadmin/DAM/stats/groups/cgh/Canberra_Handbook_2011_WEB.pdf

Socio-economic classifications

Socio-economic group (derived non-core topic)

583. The purpose of any socio-economic classification is to identify different groups of persons where the members of a particular group are, on the one hand, reasonably homogeneous and, on the other hand, fairly clearly distinguished from members of other groups in respect of their social, economic, demographic and/or cultural circumstances and behaviour. A set of 'socio-economic groups' can be derived from the detailed categories of the following classifications: status in employment; occupation; and main source of livelihood. However, as there is no international standard classification of the population by socio-economic group, countries will usually adopt a classification designed to meet their own users' particular requirements.

584. In any such classification, unemployed persons who have previously worked should be included in the category relating to their former employment activity.

Chapter IX. Agriculture

Introduction

585. As noted in Chapter I, while the population and housing censuses have a close inter-relationship, their relationship with a country's agricultural census is less well defined. However, as the result of increasing integration within programmes of data collection, the relationship between the population and housing census and the agricultural census is in some countries now closer than in the past, and these countries are increasingly looking at new ways to strengthen this relationship. The present chapter is dedicated to the collection in the population census of information on agricultural activity. This type of information can be collected by countries for use in a subsequent agricultural census, for instance to facilitate the preparation of the frame of agricultural holdings in the household sector. Although the topic of the chapter could be considered as part of the economic topics considered in the census discussed in the previous chapter, it is presented in a separate chapter due to the special character of this topic, which is also related to the agricultural census.

586. The chapter begins with a discussion of the relation between population and housing census and agricultural census. Then, two non-core alternative topics on agriculture are presented. With the first topic, at the household level, information is collected on whether any member of the household is engaged in own-account agricultural production activities at their place of usual residence or elsewhere. This information can be restricted to limited items or may include a more comprehensive agricultural module. With the second topic, at the individual person level, information is collected to identify persons involved in agricultural activities during a long period, such as a year (most of these information items are already included in population and housing census for a short reference period, such as a week before the census).

The relation between population and housing census and agricultural census

587. As noted in paragraph 585, the relationship between the population and housing census and the agricultural census is traditionally not well defined, but an increasing number of countries are looking at ways to strengthen this relationship with the objective to better integrate and make more effective their data collection activities. There are, however, a number of issues to consider when relating the two censuses, most significantly that they use different units of enumeration. The unit of enumeration in the agricultural census is the agricultural holding, which is the economic unit of agricultural production, while the units of enumeration in the population census are the household and the individual within the household. However, in many developing countries, most agricultural production activities are in the household sector, and households and agricultural holdings are very closely related, often in a one-to-one relationship. Establishing links between the two censuses is particularly relevant for such countries.

588. The agricultural census collects various household/individual data for members of the agricultural holder's household. The FAO World Programme for the Census of Agriculture 2020 (planned to be adopted and published in 2015), recommends the collection of data on

holder's household size and limited data on demographic characteristics of holder's household members, as well as data on work inputs of holder's household members to the holding and some information on persons working as employees on the holding. Users may find some agricultural activity data from the agricultural census more comprehensive than from the population census because the latter normally investigates only the principal economic activity of each person during a short time-reference period and this may not identify persons connected with agricultural activity on a seasonal or part-time basis. On the other hand, the population census provides data on agricultural employment and agricultural population that is not available from the agricultural census because the latter only covers households associated with agricultural holders. To get a complete picture, agricultural data users will need both agricultural census data and data from the population census.

589. In planning the population and housing census, every opportunity for developing the relationship between it and the agricultural census should be explored. This can take several forms. Definitions used in the population and housing censuses should be compatible with those used in the agricultural census so that meaningful comparisons can be made between the two data sets. The population and housing census can also be of use in the preparation of the agricultural census, such as in the demarcation of enumeration areas, the preparation of the frame for the agricultural census or, if applicable, the sample design.

590. In planning any national census programme, consideration should be given to the possibility of collecting additional agricultural information as part of the population and housing census that would facilitate the preparation of the frame of agricultural holdings in the household sector, for a subsequent agricultural census. This could be done as part of the pre-census cartographic work and/or listing exercise, or by adding additional questions to the census questionnaire. In the latter case, an additional item at the household level could be included on whether any member of the household is engaged in own-account agricultural production activities. Additional data at the individual person level could be collected to identify persons involved in agricultural activities during a longer period, such as a year. These items are included in the present recommendations as non-core topics. Where countries choose to adopt this approach of using the population and housing census to establish a frame for the agricultural census, the agricultural census should be conducted as soon as possible after the population and housing census, while the frame is still up-to-date.

591. The opportunity of linking population and agricultural census data should also be explored. This could add considerable analytical value to data sets from both censuses and save on data collection costs. Much of the demographic and activity status data collected in the population census are also collected in the agricultural census. If data from the two censuses could be linked, it would no longer be necessary to collect these data again in the agricultural census.

592. Some countries conduct the data collection for the population and agricultural censuses as a joint field operation. Normally, each census retains its separate identity and uses its own questionnaire, but field operations are synchronized so that the two data collections can be done at the same time by the same enumerators. Occasionally, the two censuses are merged into one. This may have a number of advantages, but its effect on field operations and data quality needs to be carefully considered.

Own-account agriculture production (non-core topic)

593. Some countries may want to use the population census to identify households engaged in own-account agricultural production. This information is useful to enable further agriculture-related analysis of the population census and for use as a frame for a subsequent agricultural census or other surveys. In this case, information should be collected for all households on whether any member of the household is engaged in any form of own-account agricultural production activities.

594. Where possible, information should be collected to identify whether the household is engaged in any form of own-account agricultural production, covering the main agricultural activities important to the country (which can include crops, livestock and related activities). Information may also be collected on aquaculture, forestry, and fishery activities where these are important for a country. Additional information should also be collected giving a measure of farm size — such as the area of land, or number of plots, used for agricultural purposes. For countries wishing to collect a more comprehensive agricultural module, the essential data items recommended by the FAO World Programme for the Census of Agriculture 2020 and the FAO/UNFPA Guidelines for Linking Population and Housing Censuses with Agricultural Censuses⁴⁷ can be collected.

595. Agricultural production activities refer to Groups 011, 012, 013, 014 and 015 of the International Standard Industrial Classification (ISIC) (Rev. 4.0) namely:

Group 011: Growing of non - perennial crops

Group 012: Growing of perennial crops

Group 013: Plant propagation

Group 014: Animal production

Group 015: Mixed farming

596. Where aquacultural production is important at the household level, information can also be collected on whether any member of the household is engaged in any form of own-account aquacultural production activities. Aquacultural production activities refer to Group 032 of ISIC (Rev 4.0).

Characteristics of all agricultural activities during the last year (non-core topic)

597. The population census normally collects information about a person's main job or work activity during a short reference period, which may not cover all persons working in agriculture because of the seasonality of many agricultural activities and because agriculture may not be the main activity of the person. To overcome this problem, information should be collected about all agricultural activities carried out by persons *during the year preceding the population census day*. The information to be collected should include the occupation

⁴⁷ Guidelines for Linking Population and Housing Censuses with Agricultural Censuses with selected country practices, Special Issue of the FAO Statistical Development Series, Rome, Food and Agriculture Organization of the United Nations and United Nations Population Fund, 2012.

and status in employment of all agricultural jobs, and can be expanded to cover working time and whether the job was performed as a main or secondary activity. Given the newly adopted conceptual framework for work statistics (see Chapter VIII), information should also be collected on participation in own-use production of agricultural goods, particularly in countries where subsistence agriculture is practiced by part of the population.

598. Information on occupation and status in employment of all agricultural jobs (main and secondary), and on participation in own-use production of agricultural goods, can be used as an alternative way of identifying households engaged in own-account agricultural production activities. Status in employment and participation in own-use production of agricultural goods are used to distinguish between households which are engaged in own account agricultural production activities and households with members engaged in agricultural activities only as paid employees, which would not qualify as households with own-account agricultural production.

599. Where aquacultural production is important in a country, similar information on occupation and status in employment of all aquacultural jobs, and on participation in own-use production of aquacultural goods during the year preceding the population census day, can also be included and expanded to cover working time and whether it was performed as a main or secondary activity, as required.

600. An *agricultural job or work activity* is defined as a job or work activity in the agricultural industry as defined by Groups 011, 012, 013, 014 and 015 of ISIC (Rev 4.0) (see paragraph 595), while an *aquacultural job* is defined as a job in the aquacultural industry as defined by Class 032 (see paragraph 596).

Chapter X. Educational characteristics

Introduction

601. The term 'education' refers to all institutionalised, intentional and planned communication designed to bring about learning. While most of this is likely to be undertaken at schools or universities (or their equivalents), it is possible that education can be provided outside these institutions. For purposes of international comparisons, it is recommended that countries compile their data in accordance with the latest revision of the International Standard Classification of Education (ISCED).⁴⁸

Educational attainment (core topic)

602. Educational attainment is defined as the highest ISCED level successfully completed by an individual. Educational attainment is usually measured with respect to the highest education programme successfully completed, and which is typically certified by a recognised qualification.

603. It is recommended that data on educational attainment be collected for all persons ten years of age and over. In order to permit international comparisons, however, it is recommended that any tabulations of educational attainment not cross-classified by detailed age should at least distinguish between persons less than 15 years of age and those 15 years of age and over, and between persons less than 25 years of age and those 25 years of age and over.

604. Data should be collected based on the highest level of education successfully completed, which is typically certified by a recognised qualification. Recognised intermediate qualifications are classified at a lower level than the programme itself.

605. Countries should also consider collecting further information that captures data on levels of education not successfully completed. This may be achieved by asking whether a higher level than the one attained has been started and interrupted, or studies are on-going at the higher level. Alternatively, a question on the highest grade completed may be appropriate in this context.

606. The data collected should, in all cases, be coded to ISCED-A levels (for classification of educational attainment). The following ISCED-A levels should be distinguished:

- (a) ISCED level 0: Less than primary education;
- (b) ISCED level 1: Primary education;
- (c) ISCED level 2: Lower secondary education;
- (d) ISCED level 3: Upper secondary education;
- (e) ISCED level 4: Post-secondary non-tertiary education;
- (f) ISCED level 5: Short-cycle tertiary education;
- (g) ISCED level 6: Bachelor's or equivalent level;

⁴⁸ UNESCO Institute for Statistics (UIS). 2012. *International Standard Classification of Education: ISCED 2011*. Montreal: UIS. <http://www.uis.unesco.org/Education/Documents/isced-2011-en.pdf>.

- (h) ISCED level 7: Master's or equivalent level; and
- (i) ISCED level 8: Doctoral or equivalent level.

607. For the classification of educational attainment, ISCED level 0 has a different meaning in ISCED 2011 than for the classification of education programmes (see paragraph 624): it means not having successfully completed ISCED level 1. This includes individuals who: have never attended an education programme; have attended some early childhood education (defined as ISCED level 0 in the classification of education programmes); or have attended some primary education but have not successfully completed ISCED level 1.

608. Special attention needs to be paid to establishing the appropriate level/grade equivalence for persons who received their education under a different or foreign system, and to situations where the educational system may have changed over time. Countries may wish to consider collecting information on the foreign country where the education was received.

609. Necessary deviations from the recommended definitions and classifications that result from particular characteristics of the national education system should be explained in the census report and/or relevant metadata. If, for national purposes, it is necessary to publish the results entirely in terms of the designations used for the schools within a country, it is recommended that an effort be made to relate the categories distinguished for national users to those which will make it possible to use the data for international comparisons. Countries coding 'educational attainment' to a national standard classification can establish correspondence with the most recent version of ISCED either through double coding or through mapping from the detailed attainment categories of the national classification to the ISCED classification.⁴⁹

610. It is important to recognise that under certain circumstances a level of education may have been successfully completed even though a relevant qualification was not obtained. It is recommended that educational attainment data and data on qualifications are collected separately or in such a way that it is possible to draw a distinction. If data are not collected separately or the distinction is not possible this should be made clear in any census publications.

Educational qualifications (non-core topic)

611. An 'educational qualification' is the official confirmation, usually in the form of a document, certifying the successful completion of an education programme or a stage of a programme. Qualifications can be obtained through:

- (a) successful completion of a full education programme;
- (b) successful completion of a stage of an education programme (intermediate qualifications); or
- (c) validation of acquired knowledge, skills and competencies, independent of participation in an education programme.

⁴⁹ The UNESCO Institute for Statistics maintains a database with ISCED mappings at <http://www.uis.unesco.org/ISCED>.

612. It is suggested that information on educational qualifications be collected at least for all persons who have successfully completed a course of study at the post-secondary level of education. Such information should include the title of the highest degree, diploma or certificate received, with an indication of the field of study if the title does not make this clear.

Field of education and training (non-core topic)

613. Field of education and training, as defined in ISCED, is the broad domain, branch or area of content covered by an education programme or qualification.

614. Information on the distribution of educated persons by field of education and training is important for examining the match between the supply and demand for qualified workers with specific specializations within the labour market. It is equally crucial for planning and regulating the production capacities of different levels, types and branches of educational institutions and training programmes. Besides educational attainment, the field of education and training of a person represents a second important dimension of his or her qualification. Titles, degrees, diplomas and further training received, as well as experience gained on the job would constitute additional components of a qualification.

615. Information on the field of education and training should be collected primarily for persons within the adult population who have attained secondary education or above. This would mean that the information to be collected should relate principally to persons aged 15 years and over who have completed secondary, post-secondary or tertiary education or other organized education and training programmes at equivalent levels of education. Data collected on fields of education and training should be coded to the *International Standard Classification of Education: Fields of Education and Training 2013 (ISCED-F 2013)*.⁵⁰

616. A problem may arise in identifying the exact field(s) of education and training of persons with inter-disciplinary or multi-disciplinary specializations. In these cases, countries should follow the identification of the major or principal field of education and training. Where there is insufficient information available to determine the relative shares of learning credits or intended learning time, the programme or qualification should be classified in the field listed first in its title. Where a main subject cannot be identified because the programme or qualification covers several fields none of which dominates, the programme or qualification should be classified in an inter-disciplinary category. However, for national purposes countries may wish to identify specialization in different ways depending on the planned use of this information and data processing capacities.

617. The most common approach is to collect information that identifies only one principal field of education and training. However, this may result in loss of information on the other fields. Another approach is to accept multiple responses to the census question, in which case appropriate data processing facilities for handling and tabulating multiple responses must be put into place. If necessary, the data collection and processing

⁵⁰ UNESCO Institute for Statistics (UIS). 2014. *International Standard Classification of Education: Fields of Education and Training 2013 (ISCED-F 2013)*. Montreal: UIS.
<http://www.uis.unesco.org/Education/Documents/isced-fields-of-education-training-2013.pdf>.

procedures could be adapted to enable the distinction between principal and secondary fields of education and training.

618. To facilitate international comparison, countries that follow established national nomenclature should adopt the classifications and coding of fields of education and training of the most recent version of ISCED. Countries coding 'field of education and training' to a national standard classification can establish correspondence with the most recent version of ISCED either through double coding or through mapping from the national classification of fields to the ISCED classification. Guidance on classifying education programmes within the ISCED framework is available in *International Standard Classification of Education: Fields of Education and Training 2013 (ISCED-F 2013)*. The classification is accompanied by a comprehensive description of each field, with detailed examples of subjects that are included and excluded within each field.

School attendance (non-core topic)

619. School attendance is defined as regular attendance at any accredited educational institution or programme, public or private, for organised learning at any level of education. Instruction in a particular skill, which is not part of the recognised educational structure of the country (for example in-service training courses in factories), is not considered "school attendance" for census purposes. Data on school attendance should refer to the census reference time. If the census is taken during the school vacation period, school attendance during the period just before the vacation should be taken into account.

620. The concept of school attendance is different from, but complementary to, that of enrolment as normally covered by school statistics. Attendance means the day-to-day presence of participants at an institution of learning. Enrolment refers to the formal registration of the participant at the start of the course, for example the registration of a school pupil at the start of the school year. A person may be enrolled but does not attend, for example, due to illness. A person attending a training programme may not be formally enrolled in a school or an educational institution.

621. The definition of attendance as day-to-day presence at an institution of learning is most relevant to primary and secondary education. There may be other instances where a person is enrolled and actively participating in a course of education to achieve a qualification but does not regularly attend any institution. Examples of this include participation via an Internet-based course of study, correspondence courses and certain modes of tertiary education, which only require infrequent attendance.

622. Depending on national priorities, the data collected may be restricted to attendance in primary and secondary education. More broadly they may refer to all modes of participation in all levels of education and information on active participation in a course of study towards a qualification may be gathered. In every case it should be possible to draw a distinction between each type of participation and this should be made clear in the relevant census report and/or metadata.

623. Information on school attendance relates in particular to the population of official school age, which ranges from 5 to 29 years in general but varies from country to country depending on the national education system. In cases where data collection is extended to cover attendance in early childhood education and/or other systematic education and

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training programmes organized for adults in productive and service enterprises, community-based organizations and other non-educational institutions, the age range may be adjusted as appropriate. Note that those persons 'outside the labour force' (see paragraphs 496-498 and 515-517 in Chapter VIII) who are classified as 'students' will include only a sub-set of all persons attending school, as some of those attending school will either be classified as 'employed' or as 'unemployed'.

624. The data collected should, in all cases, be coded to ISCED-P levels (for classification of education programmes). The following ISCED-P levels should be distinguished:

- (a) ISCED level 0: Early childhood education;
- (b) ISCED level 1: Primary education;
- (c) ISCED level 2: Lower secondary education;
- (d) ISCED level 3: Upper secondary education;
- (e) ISCED level 4: Post-secondary non-tertiary education;
- (f) ISCED level 5: Short-cycle tertiary education;
- (g) ISCED level 6: Bachelor's or equivalent level;
- (h) ISCED level 7: Master's or equivalent level; and
- (i) ISCED level 8: Doctoral or equivalent level.

Literacy (non-core topic)

625. Literacy is defined as the ability both to read and to write. If this topic is included in the census, the information collected should be designed to distinguish persons who are literate from those who are illiterate. A person who can, with understanding, both read and write a short, simple statement on his or her everyday life is considered to be literate. A person who cannot, with understanding, both read and write such a statement on his or her everyday life is considered to be illiterate. Hence, a person capable of reading and writing only figures and his or her own name should be considered illiterate, as should a person who can read but not write and one who can read and write only a ritual phrase which has been memorized. Literacy is an applied skill and ideally needs to be measured in relation to a particular task such as reading, with understanding, a newspaper or writing a letter. Reading and writing may be measured separately to allow simpler questions to be asked and to enhance analytical power. A view of literacy as a continuum of skills is now more widely accepted and consideration should be given to distinguishing broad levels of actual literacy skills during data collection.

626. The collection and tabulation of statistics on literacy during the population census should not be based on assumed inferences between literacy, school attendance and educational attainment. There are circumstances in which people may leave school with only partial literacy skills and may lose these if they are not regularly required to read and write.

627. The language or languages in which a person can read and write is not a factor in determining literacy and need not be considered on the questionnaire. In multi-lingual countries, however, information on the ability to read and write in a particular language may

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be essential for the determination of educational policy and would, therefore, be a useful additional subject of inquiry.

628. UNESCO recommends that literacy tests should be administered in order to verify, as well as improve, the quality of literacy data. Countries may consider the introduction of some form of literacy assessment questions based on advice from regional experts and UNESCO. However, administering a literacy test to all household members in the course of enumeration may prove impractical and costly. Instead, administering such a test to a sample of respondents may be considered. Alternatively, a simple question on reading and writing literacy may be more appropriate.

629. It is suggested that data on literacy be collected for all persons ten years of age and over. In order to permit international comparisons of data on literacy, however, any tabulations of literacy not cross-classified by detailed age should at least distinguish between persons under 15 years of age and those 15 years of age and over.

Computer literacy (non-core topic)

630. Computer literacy is defined as the ability to use computers and/or other digital technology (including mobile devices) to acquire, evaluate and share information, communicate with others, solve problems and perform practical tasks. If this topic is included it is recommended that information about ability to use basic computer applications (such as word processors, spreadsheets, web browsers, social networking or e-mail software) should be collected.

Chapter XI. Migration

Introduction

631. Migratory movements, both international and internal, are generally increasing in both complexity and volume. Particularly in the case of international migration, measurement of the stocks and flows of migrants may need to take account of multiple movements between source and host country or circular movements involving more than one foreign country. International migration also brings diversity resulting in multi-ethnic, multi-racial and multi-linguistic societies.

632. National legal frameworks and country-specific contexts need to be considered when planning and conducting the enumeration of migratory populations, and when developing concepts to capture their characteristics and attributes.

633. In general, the recommendations for the 2020 census round are intended to provide a comprehensive guide to collecting information on the key migration characteristics — country of birth, country of citizenship, country of previous usual residence, time of arrival, and reason for migration — as well as a range of other information on internal migration. This is regardless of whether countries are collecting census data using questionnaires, administrative registers or other sources.

634. There are two different aspects relevant to migration that can be identified through the census:

- (a) measurement of stocks and in-flows of *international migrants* and of other groups relevant to international migration, with information on timing and geographical patterns of their international migrations; and
- (b) measurement of stocks and flows of *internal migrants*, with information on timing and geographical patterns of their internal migrations.

Population groups relevant to international migration

635. Two population groups relevant for international migration are usually identified in population censuses among those persons having usual residence in the country: the *foreign-born population* and the *foreign population*.⁵¹

- (a) *Foreign-born population*: This is the group of persons whose place of birth is located in another country. This group corresponds to the stock of international migrants that migrated at least once in their life and reside outside of their country of birth at the census reference time. Persons born in the country are defined as 'native born'.
- (b) *Foreign population*: This is the group of persons who do not have the citizenship of the country and are citizens of another country, or are stateless.

⁵¹Recommendations on Statistics of International Migration – Revision 1, United Nations, 1998, ST/ESA/STAT/SER.M/58/Rev.1, paragraphs 188 and 189. In particular, Chapter VI, Stock of Data Relevant for the Study of International Migration, has been consulted as the basis of the recommendations for this chapter.

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The foreign population is predominantly foreign born. However, depending on the citizenship laws of certain countries, some children born in the country to foreign-citizen parents may be legally classified as part of the foreign population; alternatively they may automatically be granted the right of citizenship of the country and considered to be 'native born' and therefore not part of the foreign population. Persons having the citizenship of the country are defined as 'citizens' or 'nationals'.

636. Information may be collected in the census that can provide a classification of the population that can be identified on the basis of the following topics:

- (a) joint use of 'country of birth' and 'country of citizenship'; or
- (b) joint use of 'country of birth', 'country of citizenship' and country of birth of parents.

637. These topics are discussed below. On the basis only of the two core topics — 'country of birth' and 'country of citizenship' — the following population groups, identified in Table 2 below, can be classified:

- (a) Native-born
 - i. Nationals: persons born in the country with the citizenship of the country. This group will be in large part formed by native-born with national background. This group comprises the population groups (1), (5) and (9) as classified in Table 2. It will also include those descendants of foreign-born who acquired citizenship of the country after birth.
 - ii. Foreign population: persons born in the country without the citizenship of the country (population groups (2), (6) and (10) in Table 2). This group will in the large part consist of descendants of the foreign born who have not acquired the citizenship of the host country. In most countries this population group will represent only a very small proportion of the overall total population.
- (b) Foreign-born
 - i. Nationals: persons born abroad and having the citizenship of the host country (population groups (3), (7) and (11) in Table 2). This group will in the large part consist either of persons with parents of national background who were born abroad, or of persons with foreign background who have acquired the citizenship of the host country.
 - ii. Foreign population: persons born abroad without the citizenship of the country (population groups (4), (8) and (12) in Table 2). This group will include foreign-born immigrants who have not acquired the citizenship of the host country.

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Table 2 Classification of population according to country of birth of parents, country of birth and citizenship

Country of birth of parents	Country of birth	Citizenship	Description of the population group				
Both parents born in country of census	Born in country of census	National	1. <i>Native-born nationals with national background</i> : persons with the country's citizenship and whose parents were born in the country. This group usually includes the large majority of the population.				
		Foreign Citizen	2. <i>Native-born foreign population with national background</i> : foreign citizens who were born in the country and whose parents were also born in the country. In practice this usually constitutes only a small population group. It may include members of the so-called 'third generation', persons with double citizenship who report only the foreign one or other persons with special cases.				
	Born abroad	National	3. <i>Foreign-born nationals with national background</i> : nationals who were born abroad but whose parents were born in the country. This group usually includes children of emigrants returned to the country of origin of their parents. This group can be sizeable, especially in countries that have experienced large emigration flows in the past. Foreign-born adopted children will also be part of this group.				
		Foreign Citizen	4. <i>Foreign-born foreign population with national background</i> : foreign citizens who were born abroad but whose parents were born in the country. Children of former emigrants can also be included in this group, if not entitled to national citizenship. This group is usually very small.				
Both parents born abroad	Born in country of census	National	5. <i>Native-born nationals with foreign background</i> : persons born in the country whose parents were born abroad. This group includes children of international immigrants who have got the citizenship of the host country, either at birth or by naturalization.	These two groups jointly form the group of <i>descendants of foreign born</i> . This group is also defined as <i>native born with foreign background</i>	Persons with foreign background	Part of 'second generation'	
		Foreign Citizen	6. <i>Native-born foreign population with foreign background</i> : foreign citizens born in the country but whose parents were born abroad. In this group there are children of immigrants who did not get the citizenship of the host country.				
	Born abroad	National	7. <i>Foreign-born nationals with foreign background</i> : nationals born abroad whose parents were also born abroad. This group includes the foreign-born immigrants who got naturalized.	These two groups jointly form the <i>foreign born with foreign background</i> . This group is often referred to as the 'first generation'.			
		Foreign Citizen	8. <i>Foreign-born foreign population with foreign background</i> : This group includes the foreign born immigrants living in the host countries and keeping their original citizenship. In many countries this is the largest group among all those with foreign background.				
Mixed (one parent born in the county and one born abroad)	Born in country of census	National	9. <i>Native-born nationals with mixed background</i> : persons with the country's citizenship born in the country with one parent born in the country and another born abroad. This is usually a small population group but it can be sizeable in countries with high immigration.				
		Foreign Citizen	10. <i>Native-born foreign population with mixed background</i> : foreign citizens who were born in the country with one parent born in the country and another born abroad. In practice this is a small population group in most countries, since citizenship would be acquired either through <i>ius soli</i> or through <i>ius sanguinis</i> .				
	Born abroad	National	11. <i>Foreign-born nationals with mixed background</i> : nationals who were born abroad with one parent born in the country and another born abroad. This group usually includes children of emigrants returned to the country of origin. This group can be sizeable, especially in countries that in the past experienced large emigration flows.				
		Foreign Citizen	12. <i>Foreign-born foreign population with mixed background</i> : foreign citizens who were born abroad with one parent born in the country and another born abroad. Children of former emigrants can also be included in this group, if not entitled to national citizenship. This group is usually very small.				

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638. Based on the same two core topics together with the non-core topic 'country of birth of parents', the following, alternative classification of population groups, is identified in Table 2.

- (a) Descendants of foreign born: This is the group of persons born in the country with at least one parent born abroad (population groups (5), (6), (9) and (10) in Table 2). In population censuses the focus is generally restricted to those persons whose parents were born abroad (this group is often referred to as the 'second generation immigrants'). Third generations of the foreign-born parents can only be distinguished if the country of birth of grandparents is also collected in addition to that of the parents.
- (b) Persons whose parents are of mixed country of birth background: These are defined as persons having one parent born in the country and the other parent born abroad (population groups (9)-(12) in Table 2). This group can represent a significant and growing share of the population in some countries. It is suggested that if possible this group should be shown separately in census outputs. Alternatively, this group could be considered part of the 'second-generation' referred to at (1) above.
- (c) International migrants: The Recommendations on Statistics of International Migration⁵² define an 'international migrant' as "any person who changes his or her country of usual residence". According to this definition, the stock of international migrants present in a country is 'the set of persons who have changed their country of usual residence, that is to say, persons who have spent at least one consecutive year of their lives in a country other than the one in which they live at the time the data are collected'. The Recommendations further define a person's country of usual residence as "the country where the person usually lives, that is to say, the country in which the person has a place to live where he or she normally spends the daily period of rest." This group includes all foreign born (population groups (3), (4), (7), (8), (11) and (12) in Table 2) plus those native born who have ever resided abroad.⁵³ Included in this group are recent arrivals, as well as persons who may have migrated to a country (called the host country) and have resided in this country for many years. Some may have obtained the citizenship of the host country, while others may still be considered foreign citizens.

639. The groups defined above are not mutually exclusive and they can overlap to a great extent, as shown in Chart 5. However, each group is relevant for different aspects of the migration and integration process and represents a potential target for different programmes and policies. The size of each group clearly depends on the country, its legislation and its migration history.

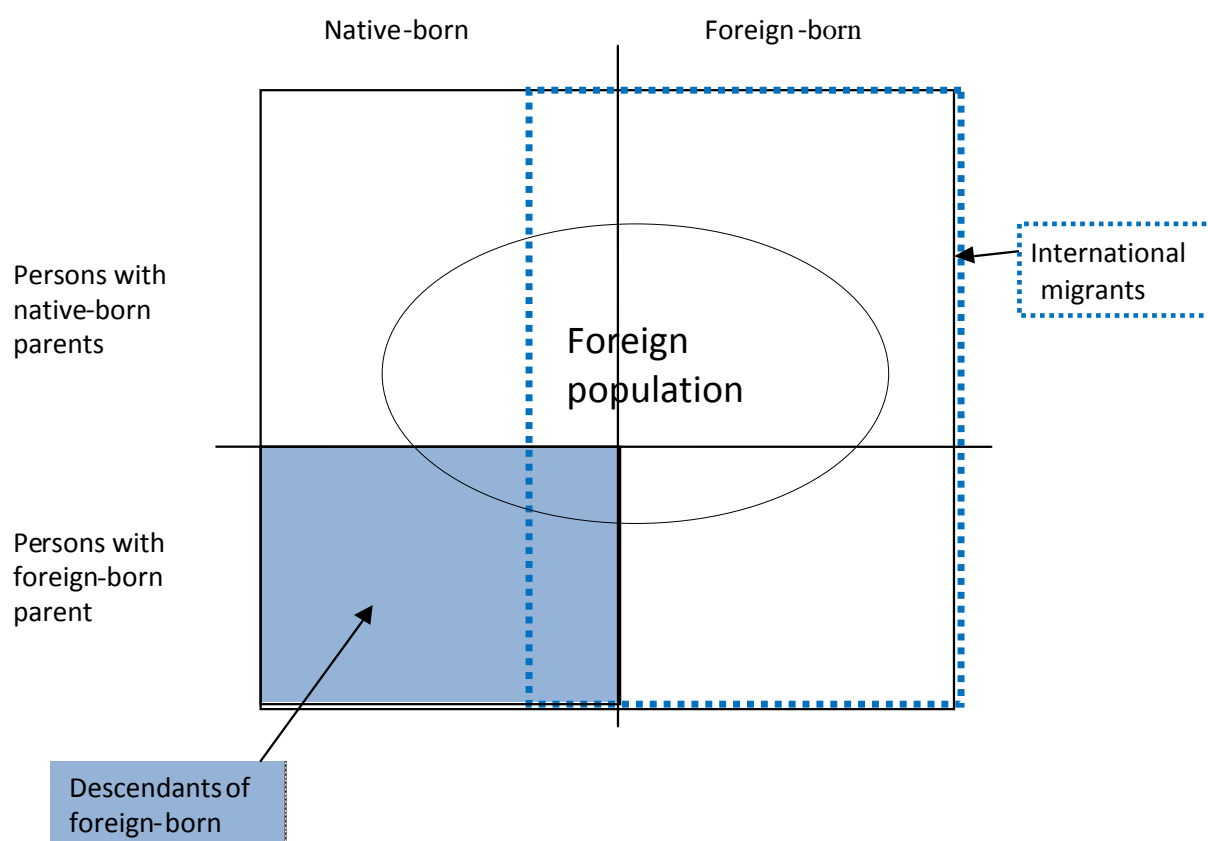
⁵² Recommendations on Statistics of International Migration – Revision 1, United Nations, 1998, ST/ESA/STAT/SER.M/58/Rev.1, paragraph 32.

⁵³ It is assumed that all foreign born are international migrants and that they all resided or were expected to reside in the country of birth for at least one year. Also included should be children under the age of one year who migrate with their parents and who may not have resided abroad for at least one year.

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640. The group of persons with a foreign background is composed of those persons both of whose parents were born outside the country (population groups (5)-(8) in Table 2). The persons in this group may or may not have directly experienced an international migration.

Chart 5 Native born, foreign born, foreign citizens, descendants of foreign born and international migrants



641. Persons whose parents were born in the country form the group of persons with a national background (population groups (1)-(4) in Table 2). As noted in paragraph 0(b), those persons who have one parent born in the country and the other born abroad form the group of persons whose parents are of mixed country of birth background (population groups (9)-(12) in Table 2).

642. Countries that do not ask for country of birth of parents but for acquisition of citizenship can approximate information on foreign/national background by using the following rules:

- (a) persons having national citizenship since birth will be considered as having national background;
- (b) persons who have received national citizenship by naturalization or other means will be considered as having foreign background; and
- (c) persons without national citizenship (that is all foreign citizens) will be considered as having foreign background.

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643. When using the topic on citizenship acquisition (see paragraph 660 below) to identify national/foreign background, the following issues should be considered:

- (a) persons with foreign background cannot be identified if, by the time of their birth, their foreign born parents had already acquired the citizenship of the country; and
- (b) persons whose parents are of mixed country of birth background cannot be identified using the topic of citizenship acquisition.

644. Persons with national/foreign background cannot be identified through information on citizenship acquisition in countries where granting of citizenship is based on the country of birth (the *jus soli* principle).

645. Analytical classifications can be built by using jointly 'country of birth', 'country citizenship' and 'country of birth of parents'. The classifications built using respectively place of birth/citizenship and place of birth/place of birth of parents/citizenship are particularly important since they allow the identification of various population groups relevant to international migration. A full description of these classifications is given in Table 2.

646. In all topics related to international borders (country of birth, country of birth of parents, country of citizenship, country of previous/current residence) reference should be made to boundaries existing *at the census reference time*. If there have been boundary changes that have affected the designation of a person's country of birth since the birth, it may be necessary to make an allowance for them in order to record the person's current country of birth.⁵⁴ This can have important implications in countries that originated from the splitting of a former country, since many persons that moved within the borders of the former country may now be counted as international migrants, if reference is made to their country of birth or their country of previous residence. It is therefore important to pay attention to the interpretation of data from these countries, particularly in relation to these two topics.

647. Wherever possible, complementary tabulations on population stocks relevant to international migration should be provided, distinguishing persons who migrated before the break-up of the former country from those who did so after the break-up. Persons who were born in a particular territory but whose country of birth has changed because of boundary changes should not be counted as foreign born.

Topics relevant to international migration

Country of birth (core topic)

648. Information on country of birth is essential for the analysis of international migration. (As a measure of internal migration countries may need to collect information on place of birth within the country – see paragraph 678)

⁵⁴ Recommendations on Statistics of International Migration – Revision 1, United Nations, 1998, ST/ESA/STAT/SER.M/58/Rev.1, paragraph 189.

649. The country of birth is the country in which the place of birth of a person (see paragraph 678) is located. Country of birth is used to distinguish between native-born and foreign-born residents. It should be noted that the country of birth of a person is not necessarily the same as his or her country of citizenship, which is a separate census topic (see paragraphs 655-659). The country of birth may refer either to the country where the physical birth occurred or to the country in which the mother was usually resident at the time of the birth if this is different. Countries should explain the concept adopted in the census report(s) and any accompanying metadata.

650. For purposes of international comparability, as well as for internal use, information on country of birth should be collected on the basis of international boundaries existing at the census reference time. It is recommended that the information on this topic be collected and coded in the most feasible detailed manner. For the foreign-born population, the collection of information on the specific country of birth is recommended so as to permit the classification by country based on the three-digit alphabetical codes presented in the classification issued by the UN Statistical Division.⁵⁵ For respondents who were born outside of the country of enumeration but cannot identify their country of birth, at least the continent or region where that country is located should be collected.

651. Countries may wish to add, in outputs, a category of 'born in the country' according to the boundaries at the time of the event for those countries where it may be sensitive to describe some respondents as 'foreign born' if they had had to leave their place of residence because of war or political disruption. In general, the 'foreign-born' category should refer to where there has been an act of physically crossing a national border.

Country of birth of parents (non-core topic)

652. Countries with a significant number of immigrants may want to collect information on the country of birth of both parents. This information on the country of birth of parents (father and mother) should be collected of all resident persons adopting the same criteria as for country of birth. This topic permits the identification of the group of descendants of foreign born. Special attention should be paid in collecting this topic in countries where boundaries have undergone major changes (see paragraph 646)

653. Information on country of birth of parents can be used, in combination with information on country of birth of the enumerated person, to identify native-born children of the foreign-born population (the so-called 'second generation'), as well as to study the integration processes and outcomes of migrants and their descendants. Moreover, in countries that have experienced return migration, information on this topic allows the identification of foreign-born children of native-born parents.

654. In case of adopted children, reference should always be made to the legal parents rather than to the natural parents.

⁵⁵ Standard Country or Area Codes for Statistical Use, ST/ESA/STAT/SER.M/49/Rev.4/ (<http://unstats.un.org/unsd/methods/m49/m49.htm>)

Country of citizenship (core topic)

655. 'Citizenship' is defined as the particular legal bond between an individual and his/her State, acquired by birth or naturalization, whether by declaration, option, marriage or other means according to national legislation. Citizenship is used to identify the population of foreign citizens, that is, those persons resident in the country but who do not hold the citizenship of that country of enumeration.

656. Country of citizenship should be collected separately from information on country of birth as the two are not necessarily the same.

657. Information on country of citizenship should be collected for all persons and coded in the most feasible detailed manner, based on the three-digit alphabetical codes presented in the classification issued by the UN Statistical Division.⁵⁶ This classification of countries and areas is a useful tool for developing a classification of citizenships. Attention should be paid in considering those dependent territories included in the classification above but that may not have their own citizenship. For reasons of international comparability, each country should collect information on country of citizenship according to the list of countries recognized by the United Nations, and not by whether or not it recognizes a particular country.

658. Provisions should be made in order to identify stateless persons, that is, persons who are not considered as nationals by any State under the operation of its law.⁵⁷ In collecting information on citizenship, the option 'no citizenship' should be included.⁵⁸

659. Information on all citizenships held by respondents should be collected, in order to identify the population with dual or multiple citizenships. It is recommended that when collecting information on dual citizenships consideration be given to which is the first and the second country of citizenship with the first being the reporting country, that is the country of citizenship where the respondent lives.⁵⁹

Citizenship acquisition (non-core topic)

660. Countries with a significant number of naturalized persons may want to collect information on the year of acquisition of national citizenship and the way it was acquired, either at birth, by marriage or naturalization, or by some other means according to the national legislation.

⁵⁶ Standard Country or Area Codes for Statistical Use, ST/ESA/STAT/SER.M/49/Rev.4/ (<http://unstats.un.org/unsd/methods/m49/m49.htm>)

⁵⁷ See UN High Commissioner for Refugees (UNHCR), Measuring Statelessness through Population Census. Note by the Secretariat of the United Nations High Commissioner for Refugees, 13 May 2008, ECE/CES/AC.6/2008/SP/5, available at: <http://www.refworld.org/docid/4a705e4b2.html>

⁵⁸ To better assess the profile of the stateless population, countries may wish to collect – for persons who declare not having a citizenship or are unsure – information on country of birth of parents (paragraph 652), country of previous usual residence abroad (paragraph 666), and total duration of residence in the country (paragraph 669).

⁵⁹ Countries part of the European Union may wish to consult the Eurostat guidelines, "Implementing core variables in EU social surveys, Draft Methodological Guidelines, 2011, for determining how to report dual citizenships.

661. In countries that have emerged from the break-up of former states, an additional typology of citizenship acquisition may be added which should refer to those who received national citizenship when the new state was created. This typology should include those who were recognized as national citizens when the regulation on citizenship of the newly created state came into force.

Ever resided abroad and year of arrival in the country (core topic)

662. This topic focuses on all persons who have ever resided outside the current country of usual residence, regardless of country of birth or citizenship, and regardless of other changes of usual residence that may have occurred inside the country. In order to collect information on this topic, individuals should be classified depending on whether or not they have ever had a usual residence abroad. Information on this topic allows the identification of all international migrants (see paragraph 0(c)). For those who have ever resided abroad, the year of arrival in the current country of residence should also be collected.

663. The purpose of this topic is to measure duration of residence of international migrants in the host country. It is preferable to measure duration using the year of arrival, rather than the number of years elapsed since arrival in the country, because time of arrival is likely to yield more accurate information.⁶⁰ In order to have more detailed information on the time of arrival, information may also be collected on the month of arrival.

664. The year of arrival should be the calendar year when the person most recently established usual residence in the country. Accordingly, guidance to enumerators and respondents should emphasize that this topic relates only to the *most recent* immigration to the country since difficulties of understanding may occur where a person has undertaken multiple migrations and established residence in the country on more than one occasion. Recording the year of arrival provides an alternative to pre-coded answers in terms of time intervals⁶¹ for most recent arrival.

665. Some countries may, for national policy needs, also wish to collect information on the year that permanent residency was granted for international migrants. This may be different from the year of arrival, and provides a measure of the duration of the time permanent residency (that is, the legal right to live in a country as a permanent resident) was granted. Likewise, some countries may also choose to collect the year of first arrival to derive the entire period of duration in the country, which may be useful in conducting studies on immigrant integration (see also paragraph 669 below).

Country of previous usual residence abroad (non-core topic)

666. For persons that have ever resided abroad, the country of previous residence may also be recorded. This should be the country in which the person last established a usual residence prior to the move to the country of enumeration. This may not necessarily be the country from which the person travelled to the country of enumeration.

⁶⁰ For those arrived in recent years the individual calendar year should be recorded while broader time intervals could be used for those arrived in previous periods.

⁶¹ Recommendations on Statistics of International Migration – Revision 1, United Nations, 1998, ST/ESA/STAT/SER.M/58/Rev.1, paragraph 199.

667. For purposes of international comparability, as well as for internal use, information on country of previous residence should be collected on the basis of international boundaries existing at the census reference time. It is recommended that the information on this topic be collected and coded in the most feasible detailed manner, based on the three-digit alphabetical codes presented in the classification issued by the UN Statistical Division.⁶²

668. Place of previous usual residence within the country should be collected as a separate topic for all persons (see paragraph 682). It is an important topic for analysis of internal migration as well as to capture information on returning nationals to the home country.

Total duration of residence in the country (non-core topic)

669. This topic focuses on the total duration of residence in the country of international migrants. Total duration is defined as the total number of years that the international migrant has resided in the country, taking into account all periods of residence including the current one. This topic provides additional information with respect to the year of most recent arrival (see paragraph 662 above) for those persons who have established residence in the country on more than one occasion.

Reason for migration (non-core topic)

670. Some countries may wish to collect information on reasons for international and/or internal migration. This topic should refer to the main reason that drove the respondent to undertake the most recent migratory move. It is recommended that only one main reason for migration be recorded. It may be most appropriate to include this topic as a sub-topic of the item on residence abroad (see paragraph 666) or as a sub-topic of the item on the previous place of usual residence (see paragraph 682).

671. Examples of some of more common reasons for migration⁶³ are:

- (a) employment (including military service),
- (b) education and training,
- (c) marriage, family reunification or family formation,
- (d) admittance for humanitarian or political reasons, or
- (e) housing.

⁶² Standard Country or Area Codes for Statistical Use, ST/ESA/STAT/SER.M/49/Rev.4/ (<http://unstats.un.org/unsd/methods/m49/m49.htm>)

⁶³ Recommendations on Statistics of International Migration – Revision 1, United Nations, 1998, ST/ESA/STAT/SER.M/58/Rev.1, Box 4, pages 33-34.

Population with refugee background (derived non-core topic)

672. The ‘population with refugee background’ includes foreign citizens who were ‘forced migrants’ together with their dependents living in the same household at the census reference time, including children born after the forced migration. Such people can only be identified if the topic on ‘reason for international migration’ (paragraphs 670-671) is specifically included.

673. The stock of refugees (persons being granted asylum under national regulations and/or international conventions)⁶⁴ and asylum-seekers (persons seeking international protection and whose claim for refugee status has not yet been determined) living in a country is often difficult to measure because of mobility of persons and changes in the formal status of the refugee. Countries may use different definitions of the stock of refugees, with specific legal and administrative implications. How individuals perceive themselves may be different again from their legal situation within a country. At the international level, it is suggested to use the common definition of population with refugee background, a group of persons having experienced (directly or indirectly) a forced international migration. This group can be useful for cross-country and across time analyses.

674. The definition of this population group includes:

- (a) Persons who declared that their main reason for migration international migration was ‘forced migration.’ Some examples of categories that would qualify as ‘forced migration’ are: armed conflict, situations of general violence, violations of human rights, natural or human-made disasters.
- (b) Foreign-born persons who declared that their main reason for migration was ‘Family’ and are members of the same family nucleus of a person in group (a).
- (c) Native-born children members of the same family nucleus of the parents and having both parents in group (a) or one parent in the group (a) and the other parent of the group (b).

675. Further relevant details, such as country of birth, citizenship or date of arrival in the country can be obtained by cross-tabulating the population with a refugee background with other relevant topics.

Population groups relevant to internal migration

676. Internal migrants are broadly defined as persons who are usually resident in a particular geographical area and who have previously been resident in another geographical area in the country of enumeration. *Internal migrants*, as identified in the census, are, therefore, specifically defined as those who are usually resident in a civil division at the

⁶⁴ The 1951 *United Nations Convention Relating to the Status of Refugees* defines a refugee as a person who “owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality, and is unable to, or owing to such fear, is unwilling to avail himself of the protection of that country.” Two regional instruments in Africa and the Americas, respectively, enlarged the concept of refugee to include not only individual persecution, but also armed conflict and massive violations of human rights.

census reference time and who have previously been resident in another civil division within the country. In order to provide relevant information on internal migrants, a detailed classification should distinguish local, intra-regional or inter-regional moves (as well as any international moves). Geographic areas and civil divisions are defined by each country, but movements within the smallest civil divisions should be considered as 'residential mobility' rather than internal migrations.

677. Persons who are international migrants – who, regardless of country of birth or citizenship, have at some point in their lives been usually resident in another country – may also be counted as internal migrants if, subsequent to their international move, they have also moved internally and they were resident elsewhere in the country prior to the census.

Topics relevant to internal migration

Place of birth (core topic)

678. Place of birth is relevant for the analysis of internal migrants. Place of birth can be collected according to either the geographical unit in which the birth took place or to the place of usual residence of the mother at the time of the birth. Countries should collect information according to the criterion that best suits their information needs. Some countries may collect information according to both criteria. As with the topic 'country of birth' (paragraph 649), countries should explain the concept adopted in the census report(s) and any accompanying metadata. For persons born in the country, information on the smallest civil division should be collected. For persons born outside the country, it is sufficient to collect information on the country of birth.

679. Information on place of birth of the native-born population is used primarily for the investigation of internal migration. For countries that have been recently formed from parts of previously separate entities, however, such information may be of use in assessing the relative size of population segments from each of those entities and their distribution throughout the country.

680. For the latter purpose, it is usually sufficient to collect information only on the major civil division (state, province or department, for example) in which the place of birth is located. If desired, more detailed information on smaller civil divisions can be collected and used for accurate coding of the major division or for presenting data for smaller areas. However, to assist in such coding, a detailed and accurate index of place names, linking the smaller civil divisions to its higher geography is required.

681. For studies of internal migration, data on place of birth in terms of major civil divisions are not adequate in themselves. For an understanding of movements of people since birth, it is necessary to collect information as required according to the information needs of a country, bearing in mind that (a) the boundaries of administrative units such as cities and other civil divisions may change over time, which will give rise to ambiguity in data reported; and (b) the costs of coding reported data to these smaller units may be prohibitive especially where there are many units and the population is highly mobile. To overcome the first problem, to the extent possible both national and sub-national boundaries should refer to the boundaries applying at the census reference time. Countries should address the second problem in the light of their own circumstances.

Previous place of usual residence and date of arrival in the current place (core topic)

682. This topic provides information on geographic and time patterns of migration moves to the current place of residence. It is recommended that the place of previous residence should be identified in terms of the smallest civil division.

683. In operational terms this topic can be implemented in two modes:

- (1) **Extensive mode:** by enquiring into 'year and month of arrival in the current place of usual residence' plus 'previous place of usual residence'; or
- (2) **Reduced mode:** by enquiring into 'place of usual residence one year prior to the census'.

Year and month of arrival in the current place of usual residence

684. In the *extensive mode*, year and month of arrival should be the calendar year and month when the person most recently established residence in the current place of usual residence. The information is important for measuring long- and short-term internal migration. In order to reduce the burden on respondents' (when information is collected in the field), month of arrival could be asked only of those who arrived in the calendar year before the census.⁶⁵ The previous place of usual residence should be defined in terms of the smallest civil division. From the joint use of the two topics it is possible to analyse patterns and timing of internal migration. If previous place of usual residence was outside the country, the country of residence should be collected (see paragraph 666).

Place of usual residence one year prior to the census

685. The *reduced mode* is primarily intended to allow patterns of recent migration to be studied. If the place of usual residence one year prior to the census was within the country, the smallest civil division should be identified. If the place of usual residence one year prior to the census was outside the country, only the country of residence need be collected (see paragraphs 666-667 above).

686. The information on persons that arrived in the current place of residence during the last year collected through the reduced mode can be compared to the corresponding information provided by the extended mode. However, the extensive mode also provides important information on migrations events that took place in previous years. Countries should select either one or the other of the two modes on the basis of their information needs.

687. However, both the extensive and reduced mode provide only partial information on international migration, and it is therefore recommended that countries include the topic 'ever resided abroad and year of arrival in the country' (see paragraph 662 above) to collect more precise information on the timing of international migration.

⁶⁵ For those arrived in recent years the individual calendar year should be recorded while broader time intervals could be used for those arrived in previous periods

Place of usual residence five years prior to the census (non-core topic)

688. If information on the place of usual residence one year prior to the census is collected (in the reduced mode of the topic 'place of usual residence and date of arrival in the current place'), the place of usual residence five years prior to the census could also be collected. This extension of the time interval allows the capture of a larger number of moves but at the cost of an increased uncertainty about the exact timing of the migration. As with the one year enquiry, if the place of usual residence five years prior to the census was within the country, the smallest civil division should be identified, but if the place of usual residence was outside the country, only the country of residence need be collected.

Internally displaced persons (derived non-core topic)

689. Internally displaced persons (IDPs) are defined as nationals or citizens who were 'forced migrants' within their country of residence together with their dependents living in the same household at the census reference time, including children born after the forced migration took place.⁶⁶ As with the population with refugee background (paragraph 672), the IDP population can only be identified if the topic of reason for internal migration is included in the census.

690. In countries where massive flows of internal migration have occurred as a consequence of dramatic events like wars, social or political unrest, natural or environmental disasters, it is important to measure the magnitude of such movements. However, the count of the stock of IDPs is often difficult to enumerate because of multiple occurrence of movements and diversity of causes of mobility, as well as because of protection concerns or risks attached to such movements. Nevertheless, countries may have specific legal and administrative responsibilities for administering the needs of IDPs, for which information collected in the census would be required. At the international level, it is suggested that countries adopt a common definition of IDPs, namely *a group or persons having experienced (directly or indirectly) a forced internal migration*. This definition can be useful for both international and longitudinal analyses.

691. Further relevant details, such as date of arrival and the place of previous residence are important characteristics of IDPs and may be obtained by cross-tabulation with other topics.

⁶⁶ The 1998 *Guiding Principles on Internal Displacement* define IDPs as "persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border"

Chapter XII. Ethno-cultural characteristics

Introduction

692. Data on ethno-cultural characteristics of the population are of increasing relevance to countries of the UNECE region, particularly in the context of developing migration, integration, equality and minority policies.

693. Countries with a culturally diverse population may wish to collect information on the ethnic identity (or composition) of the population, mother tongue, the knowledge and practice of languages as well as on religious communities and denominations. These are all characteristics which allow people the flexibility to express their ethno-cultural identity in the way that they recognize and choose.

694. Countries may also wish to collect information on the ethno-cultural characteristics of parents and grand-parents (ancestry) to gain a deeper understanding of the origins of the population and of integration processes.

695. Ethno-cultural characteristics generally have a subjective dimension as there is often no common understanding as to what 'characteristic' or 'concept' is really being measured in any particular census. Moreover, different countries will adopt different concepts and definitions. The ethno-cultural characteristics may also be politically sensitive and may apply to very small, yet identifiable, populations. Members of certain minority groups may be particularly vulnerable to discrimination on the grounds of ethnicity, religion or language. However, the free and open declaration of respondents should be of essential importance. Special care, therefore, may be required in census procedures and outputs relating to ethnic group and religion in order to demonstrate to respondents that appropriate data protection and disclosure control measures are in place. In some cases, countries may even wish to collect such data on a voluntary basis if this is permitted by national legislation.

696. Countries may wish to implement special monitoring mechanisms in relation with the collection of data on ethno-cultural characteristics to guarantee the free declaration of the respondents and the protection of the information recorded.

697. For these reasons, together with the fact that the collection of information on topics such as ethnicity and religion may be prohibited by law in some UNECE countries, the topics covered in this Chapter are all included as non-core.

698. It is generally the case that data on these topics that are taken solely from registers and/or administrative sources are limited and can at best cover only certain dimensions, such as the formal membership of a church or religious community, or the official language of communication between the government and households in a multilingual environment.

699. It is recommended that in drafting and testing census questions, defining classifications and designing statistical outputs, consultations should be undertaken with representatives of ethnic, language and religious communities. This is important as engaging with such groups on the procedures, reasons for, and the conduct of, the census among minority populations promotes transparency, equality of treatment, a better understanding of the reasons for collecting such information, and the full participation of the population.

Ethnicity (non-core topic)

700. Ethnicity, as broadly defined, is based on a shared understanding of the history and territorial origins (regional, national) of an ethnic group or community as well as on particular cultural characteristics, such as language and/or religion and/or specific customs and ways of life.

701. Countries with long-established multi-ethnic minority communities and/or recently arrived immigrant populations may wish to collect information on the ethnic composition of the population or of certain sub-groups of the population. The data are relevant for the understanding of the cultural diversity of the population, the position of ethnic groups in society as well as for the definition and monitoring of equality and anti-discrimination policies. Ethnicity provides a more accurate picture of the stock of immigrant populations, than can be obtained from information on country of birth or country of parents' birth alone, which will not be relevant for second and third generation immigrants. However, respondents' understanding or views about ethnicity, awareness of their family background, the number of generations that have lived in a country, and the length of time since immigration are all possible factors affecting the reporting of ethnicity in a census.

702. Moreover, ethnicity is multi-dimensional and is considered to be more of a process than a static concept, and so ethnic classification should be treated as dynamic with movable boundaries. This may mean that classifications of ethnic categories will change between censuses which, while mirroring society at any one time, may lead to a degree of non-comparability between one census and another.

703. Ethnic identity can be measured using a variety of concepts, including ethnic ancestry or origin, ethnic group, cultural origins, nationality, race, colour, minority status, tribe, language, religion or various combinations of these concepts. But for census purposes an affiliation with certain ethnic group should be distinct from an affiliation with a language and/or religious group, although overlap may be frequent. The combined collection and analysis of data on several ethno-cultural characteristics is particularly informative for the understanding of a country's cultural diversity.

704. In some countries, ethnicity is also related to physical or racial characteristics of the population (in particular colour, for example White, Black). Data on physical or racial characteristics can be used in this way to identify visible minorities.

705. Some countries may consider collecting data on ancestry and ethnic origin of parents and grandparents, but generally it is not recommended that the census should seek to collect information on persons other than the data subject and other household members.

706. Data on ethnicity should not be confounded with data on country of citizenship or country of birth. The use of the term 'nationality' in place of ethnicity should be avoided.

707. The method and the wording of the question used to collect ethnicity data can influence the choices that respondents make regarding their ethnic identity and current ethnic identification. The subjective nature of the topic, together with the requirement to allow increasing numbers of persons of mixed ethnicity to identify themselves (and/or their children) as such, requires that information on ethnicity be acquired through self-declaration of a respondent, and also that respondents have the option of describing their identity in their own words. Census questions should therefore provide, in addition to any pre-coded

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response options, the facility for write-in (open) responses. Also, to guarantee the free self-declaration of ethnicity, respondents should be allowed to indicate 'none' or 'not declared' when asked for their ethnicity.

708. Respondents should be free to indicate more than one ethnic affiliation or a combination of ethnic affiliations if they wish to do so. Countries should explain in the census instructions and any census documentation how the ethnicity of children from mixed couples is to be reported (for example, explicit instructions to allow respondents to provide multiple responses and/or to allow for responses such as 'bi-racial').

709. When producing classifications of ethnic groups for the purposes of outputs, census agencies will need to be aware of the sensitivity and potential disclosiveness of the data, particularly at the lower geographic levels. While small numbers for certain groups may be subject to disclosure risks, countries should be careful in not setting a release threshold so high as to mask the reporting of minorities in census outputs.

710. Classifications on ethnicity, including the concepts and uses for the information, will depend essentially on national conditions. Consequently, the ethno-cultural composition of countries will vary widely and thus an internationally comparable classification is not recommended here.

711. Countries should document the basic criteria and classification procedures for ethnicity and inform the data users about the scientific and socio-political concepts on which they are based.

712. In countries where it is relevant, ethnicity questions can be used to collect information on indigenous populations. Generally, indigenous peoples of a particular country are social groups with an identity (or even, in some cases, legal status) that are distinct from the social and cultural identity of the dominant society in that country (such as people of Inuit, First Nations, Celtic or Roma origins.)

Religion (non-core topic)

713. Religion is generally regarded as a set of beliefs and practices, usually involving acknowledgment of a divine or higher being, power or principle, by which people order the conduct of their lives both practically and in a moral sense. For the purposes of collecting information in a census, this concept may be defined as either:

- (a) a religious or spiritual belief or faith, regardless of whether or not this belief or faith is represented by an organised group or body; or
- (b) an affiliation with, or membership of, an organised group or body having specific religious or spiritual tenets and/or practices.

714. Countries that are traditionally multi-denominational or have significant immigrant populations with different religions may wish to collect data on religion either in addition to, or instead of, data on ethnicity.

715. Each country that collects religion in its census should use the definition most appropriate to its specific information needs and circumstances. Depending on those needs and circumstances, the following data on religion may be collected:

- (a) formal membership of a church or a religious community;

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- (b) identification with a certain religion, religious community or denomination;
- (c) religious belief whether practiced or not;
- (d) religion in which a person was brought up; or
- (e) religious attendance or observance.

716. The decision to collect and disseminate information on religion in a national census is dependent upon a number of considerations and national circumstances, including, for example, the national needs for such information, and the suitability and sensitivity of asking a religion question in a country's census.

717. Owing to the particular sensitive nature of census questions on religion, special care may be required to demonstrate to respondents that appropriate data protection and disclosure control measures are in place. It is important that the responding public be informed of the potential uses and needs for such information. Census agencies should explain in the census instructions during collection the chosen concept(s) and definition(s), and in those cases where a question has been included on a voluntary basis, this should be made explicitly clear to the respondent at the time the data are collected. For privacy reasons, in some countries any such question on religion may be voluntary.

718. Data should always be based on the free self-declaration of each person. However, some countries may wish to consider setting a minimum age limit for the collection and dissemination of information on religion for children. In this case, the age limit should be determined on the basis of national circumstances and user needs. Questionnaires should, as with ethnicity, include write-in (open) responses to allow small groups of local denominations to identify freely. Whatever the mode of questions(s) used, respondents should have the option to declare 'no religion' and/or be given the option not to provide the information (that is 'no response').

719. Countries should also explain clearly, in any census outputs or instructions during data collection, the definition(s) that has been used.

720. Classifications should be comprehensive. They should include, at the finest level, groups of religions, religions, and subsets of religions, such as, religious denominations, administrative and organizational groupings, groups of churches, churches, and breakaway groups as well as belief systems that may not generally considered as conventional religions.

721. To facilitate consistency and comparability of international data, the following classification of world-wide religions is recommended at the highest level:

- (1.0) Christianity
 - (1.1) Catholic
 - (1.2) Orthodox
 - (1.3) Protestant (including Anglican, Baptist, Brethren, Calvinist, Evangelical, Lutheran, Methodist, Pentecostal, Pietist, Presbyterian, Reformed, and other Protestant groups)
 - (1.4) Jehovah's Witnesses
 - (1.5) Oriental Christian
 - (1.6) Other Christian

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- (2.0) Islam
 - (2.1) Alawit (Nusayris)
 - (2.2) Ismaili (Seveners)
 - (2.3) Ithna'ashari (Twelvers)
 - (2.4) Shia
 - (2.5) Sufi
 - (2.6) Sunni
 - (2.7) Zaydi (Fivers)
- (3.0) Judaism
- (4.0) Buddhism
- (5.0) Hinduism
- (6.0) Sikhism
- (7.0) Other religious groups
- (8.0) No religion

722. The amount of detail collected and disseminated on this topic will be dependent upon the information needs and requirements of each country.

Language (non-core topic)

723. Multilingual countries and countries with significant immigrant populations may wish to collect data on languages that are currently spoken and written, as an additional mode of measuring cultural identity and integration. In addition, where a country has more than one official language, it may be necessary to include questions on the use of the official languages for legislative or policy requirements. Depending on information needs the collection of data on one or more of the following concepts are recommended:

- (a) Mother tongue, defined as the first language spoken in early childhood at home;
- (b) Main language, defined as the language which the person commands best;
- (c) Usual language(s), defined as the ones most often currently spoken at home and/or work;
- (d) Knowledge of language(s), defined as the ability to speak and/or write one or more specific languages.

724. Data relating to each concept is likely to meet different analytical purposes or information needs. Data on (a) to (c) for example are more relevant to understand processes of language change and to determine language regions and/or language groups. Such questions will generally refer to one language only.

725. Some countries may decide to permit and capture the reporting of multiple languages, according to their national linguistic circumstances. Explicit instructions should be provided on the questionnaire to indicate that respondents may provide more than one response to the language question(s). The intent would be to capture information on

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respondents who have been exposed to, and acquired, multiple languages, sometimes during childhood as a result, for example, of intermarriage. The capture of multiple languages provides a more complete picture of the linguistic diversity of a country's population where there are multiple language groups and more than one official language is recognized. Nevertheless, collecting multiple responses to the language questions (as is also the case with multiple responses to question on ethnicity and religion) does pose challenges on how to display the information in tabulations and census output, so careful consideration should be given to whether there are sufficient numbers to justify the collection of multiple responses.

726. In compiling data on the usual language or on the mother tongue, it is preferable to show each language that is numerically important in the country and not merely the dominant language.

727. Data on (d) are relevant to understand language practices and knowledge of languages, including official national languages and languages learned at school. Questions will often refer to several languages and should thus allow for multiple responses.

728. Each country should decide which, if any of these types of information, or variants of them, is relevant to its own information needs. International comparability should not necessarily be a major factor in determining the type of data collected on this subject. However, it is recommended that countries should ask more than one question regarding language, and to combine at least one question measure cultural identity ((a) to (c) with a question on literacy (d)).

729. As with ethnicity and religion, the population of many language groups can be small. It is therefore recommended that countries should include a write-in (open) response in any census question in relation to (a) to (c). Questions in relation to (d) should attempt to measure different levels of literacy.

730. Countries should explain the chosen concepts and definitions and document the classification procedures for languages in the census documentation and reports.

731. Classifications should be comprehensive and include wherever possible (and subject to disclosure constraints) separate languages to the finest level possible, regional dialects, as well as the reporting of *invented* and sign languages. For those who are deaf, mute, or deaf-mute, special instructions may be needed to indicate that sign languages are accepted responses to the language questions. Special testing of the questions with these individuals may benefit the design of the language questions, which might be seen as sensitive.

Chapter XIII. Disability

Introduction

732. A census can provide valuable information on disability in a country. For countries that do not have regular special population-based disability surveys or disability modules in on-going surveys, the census can be the only source of information on the frequency and distribution of disability in the population at national, regional and local levels. Countries that have a registration system providing regular data on persons with the most severe types of impairments, may use the census to complement these data with information related to the broader concept of disability based on the International Classification of Functioning Disability and Health (ICF) as described below. Census data can be utilized for planning programmes and services (prevention and rehabilitation), monitoring disability trends in the country, evaluation of national programmes and services concerning the equalization of opportunities, and for international comparison of the disability prevalence in countries. Census data on disability can also be used by countries to produce and disseminate the statistics required by the Convention on the Rights of Persons with Disabilities.⁶⁷

Disability status (non-core topic)

733. Disability status characterises the population as those with and without a disability. *Persons with disabilities* are defined as those persons who are at *greater risk* than the general population for experiencing restrictions in performing specific tasks or participating in role activities. This group would include persons who experience limitations in basic activity functioning, such as walking or hearing, even if such limitations were ameliorated by the use of assistive devices, a supportive environment or plentiful resources. Such persons may not necessarily experience limitations in tasks, such as bathing or dressing, or participation activities, such as working or going to church, because the necessary adaptations have been made at the person or environmental levels. These persons would still, however, be considered to be at greater risk for restrictions in activities and/or participation than the general population because of the presence of limitations in basic activity functioning and because the absence of the current level of accommodation would jeopardise their current levels of participation.

734. A comprehensive measure to determine disability would include six domains of functioning:

- (1) walking,
- (2) seeing,
- (3) hearing,
- (4) cognition,

⁶⁷ See art. 31 "Statistics and data collection" of the Convention on the Rights of Persons with Disabilities (<http://www.ohchr.org/EN/HRBodies/CRPD/Pages/ConventionRightsPersonsWithDisabilities.aspx>)

- (5) self-care, and
- (6) communication.

It is, however, recommended that the first four domains be considered as essential in determining disability. Then, if countries wish, 'self-care' and 'communication' may also be considered as additional domains.

Disability framework and terminology

735. In 2001 The World Health Organization (WHO) issued the International Classification of Functioning, Disability and Health (ICF)⁶⁸ which is the successor of the International Classification of Impairments, Disabilities and Handicaps issued in 1980 (ICIDH).⁶⁹ The ICF is a classification system offering a conceptual framework with conceptual definitions, terminology and definitions of the terms, and classifications of contextual components associated with disability including both participation and environmental factors.

736. The ICF distinguishes multiple dimensions that can be used to monitor the situation of individuals with disability. The system is divided into two parts each with two components;

- (1.0) Functioning and disability, which include the components:
 - (1.1) Body functions and body structures (impairments)
 - (1.2) Activities (limitations) and participation (restrictions)
- (2.0) Contextual factors which include the components:
 - (2.1) Environmental factors
 - (2.2) Personal factors

737. The ICF provides classification schemes for all these elements except for personal factors.

Interactions between components of the ICF

738. The interactions between the parts and components are shown in Chart 6. The main structure of the classification is available on the web page of the ICF hosted on the WHO website.⁷⁰

Use of the census to measure disability at aggregate level

739. A census format offers only limited space and time for questions for one topic such as disability. Since the ICF offers several dimensions for use to develop a census measure, it is best to focus on a few of those dimensions, leaving the remaining dimensions for use in

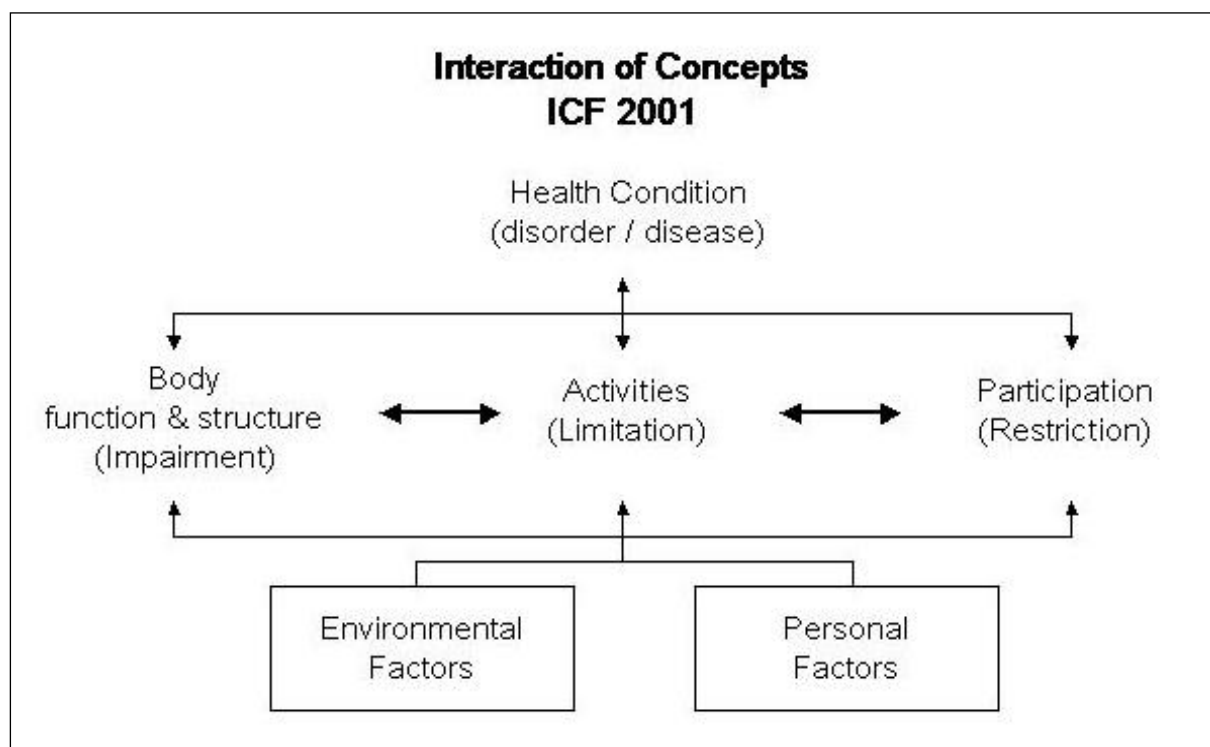
⁶⁸ International Classification of Functioning, Disability and Health (ICF), Geneva, World Health Organization, 2001.

⁶⁹ International Classification of Impairments, Disabilities and Handicaps (ICIDH), Geneva, World Health Organization, 1980.

⁷⁰ <http://www.who.int/classifications/icf/en/index.html>

more extensive household surveys. Short sets of disability questions, which can be included in censuses and extended sets to be recommended for inclusion in population-based surveys have been developed and tested.⁷¹ The aim of the recommended sets is to improve comparability of disability data across countries.

Chart 6 Interaction of disability concepts



740. Three major classes of purpose for measuring disability in a census are:

- (a) *To provide services*, including the development of programmes and policies for service provision and the evaluation of these programmes and services. The provision of services at the population level includes, but is not limited to, addressing needs for housing, transportation, assistive technology, vocational or educational rehabilitation, and long-term care.
- (b) *To monitor the level of functioning in the population*. Monitoring levels of functioning includes estimating rates and analysing trends. The level of functioning in the population is considered a primary health and social indicator, which characterizes the status of the population in a society.
- (c) *To assess equalization of opportunities*. The assessment of equalization of opportunity involves monitoring and evaluating outcomes of anti-discrimination laws and policies, and service and rehabilitation programmes

⁷¹ The Washington Group on Disability Statistics (WG), a UN City Group which focuses on proposing international measures of disability has developed these questions. See http://www.cdc.gov/nchs/washington_group.htm for updates on the questions.

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designed to improve and equalize the participation of persons with impairments in all aspects of life.

741. The intent of these purposes for measurement is consistent with that of the World Programme of Action concerning Disabled Persons (WPA),⁷² which provides a valuable guide for conceptualizing the uses of data on disability. The WPA outlines three major goals for policy formulation and programme planning, internationally: equalization of opportunities, rehabilitation and prevention. The common goal is to promote the participation of persons with disabilities in all aspects of life by preventing the onset and consequences of impairments, promoting optimal levels of functioning, and equalizing opportunities for participation.

742. The assessment of equalization of opportunity is the purpose that can be best achieved in a census. It is this purpose that is considered when determining 'disability status' (see paragraph 733).

743. The definition outlined in paragraph 733 requires that disability be defined in terms of limitations in basic activity functioning that would place a person at greater risk than the general population of restricted performance or participation in the organized activities (such as educational attendance or work participation).

744. While assessment of equalization of opportunities might seem to require measurement of both activities and participation, such an approach does not help to identify changes in the level of participation in the population in response to changes in opportunities. It only reflects the circumstances of those who, because of unfriendly environments or lack of assistive devices, are experiencing restrictions in participation. Approaching the assessment of equalization of opportunity by recognizing the link between a basic level of activity and subsequent participation can reduce some of the methodological challenges.

745. Disentangling the conceptual dimensions of basic activity limitations that result from impairment, from the more complex activities associated with participation provides the opportunity to determine the intervening mechanisms that facilitate or interfere with performance of tasks and organized activity. At the analysis stage, people who are identified with or without disabilities on the basis of their ability to perform basic activities can be compared in relation to their participation in organized activities (such as school and work). This comparison can assess the equalization of opportunities. The separation between activities and performance differentiates approaches for the purpose of monitoring functioning in the population and for the purpose of assessing equalization of opportunity. When assessing opportunity equalization, *the connection between the conceptual elements is made during analysis*, whereas for monitoring functioning *the connection is done during data collection*.

746. Within the framework of the ICF Model and its four major dimensions (body structure and function, activity, participation and environment), an *activity-oriented set of questions*, located at the simplest and most basic level, should be used to capture the basic activity elements required for a good measure of the risk of participation restrictions.

⁷² *World Programme of Action concerning Disabled Persons*, United Nations, New York, 1983.

747. The adoption of an activity-oriented approach is also used in the European Health Status Module developed by Eurostat within the European Statistical System. Although it has been designed for more extended data collection activities such as the European Health Interview Survey, it still can be used to identify questions to measure activity limitations in a census. This module also includes the Minimum European Health Module (MEHM),⁷³ a set of three general questions characterizing three different concepts of health (self-perceived health, chronic morbidity and activity limitations).

748. Given the complexity of disability definition and measurement, and, in certain cultures, the sensitivity attached to identifying a person as having a disability, it is recommended that several functional activity domains be defined whereby people can respond to questions about their difficulty performing those activities rather than directly enquiring whether or not they have a disability.

Essential domains

749. It is suggested that only those domains that have satisfied a set of selection criteria should be eligible for inclusion in a short set of questions recommended for use in censuses. Such criteria include: cross-population or cross-cultural comparability; suitability for self-reporting; and space on the census form. Other possible criteria might include the importance of the domain in terms of public health problems. Based on these criteria, four basic domains are considered to be essential domains. As noted in paragraph 734 these include 'walking', 'seeing', 'hearing' and 'cognition'. In addition, if space permits, two other domains have been identified for inclusion, 'self-care' and 'communication'. It is recommended that all six domains be operationalized if possible. The domains of walking, seeing and hearing are also included in the European Health Status Module.

750. *Walking* fulfils the criteria of cross-cultural applicability and space requirements for comparable data since walking is a good indicator of a central physical function and is a major cause of limitation in participation. It is also a basic area of activity functioning that can be self-reported.

751. While *seeing* also represents a public health problem, self-reporting of seeing limitation is more problematic, particularly when individuals use glasses to correct common visual impairments. Similar difficulties are associated with asking about *hearing* activity. The most direct way to deal with assistive devices like glasses and hearing aids without contributing to confusion over answering such questions is to ask the questions about difficulty hearing or seeing without any such devices or assistance.

752. However, devices, such as glasses, provide almost complete accommodation for large proportions of those with impaired functioning and the numbers with the impairment can be very high. It is often argued that asking about seeing without the use of glasses greatly increases the number of persons with apparent disabilities and makes the group too

⁷³ The following link refers to the methodological manual for the European Health Interview Survey (EHIS wave 2), which includes model questions and guidelines on the Minimum European Health Module (MEHM) (see pages 13 to 17): http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-13-018/EN/KS-RA-13-018-EN.PDF

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heterogeneous, that is, the group would include persons at very little risk of participation problems along with those at great risk. An alternative is to ask questions on difficulty seeing even *with* the use of glasses if they are usually worn and difficulty hearing *with* the use of hearing aids if these devices are used.

753. Of the four essential domains, *cognition* is the most difficult to operationalize. Cognition includes many functions such as remembering, concentrating, decision making, understanding spoken and written language, finding one's way or following a map, doing mathematical calculations, reading and thinking. Deciding on a cross-culturally similar function that would represent even one aspect of cognition is difficult. However, remembering and concentrating or making decisions would probably serve the cultural compatibility aspects the best. Reading and doing mathematical calculations or other learned capacities are very dependent on educational systems within a culture.

Additional domains

754. In addition to the four essential domains, two other have been identified for possible inclusion: 'self-care' and 'communication'. The *self-care* domain is intended identify persons who have some problems with taking care of themselves independently. Washing and dressing represent self-care tasks that occur on a daily basis and are considered to be basic activities.

755. The purpose of the *communication* domain is to identify persons who have some problems with talking, listening or understanding speech such that it contributes to difficulty in doing their daily activities. Two aspects of communication are considered: understanding others (receptive communication) and being understood by others (expressive communication). Communicating (understanding/been understood) refers to the exchange of information or ideas between two people through the use of language. They may use their voices for their exchange or make signs or write the information they want to exchange.

756. Beyond the six domains identified here, there are additional physical functioning domains that could be included in a set of census questions depending on the space available. Other domains that might be incorporated include upper body functioning of the arms, hands and fingers and psychological functioning. While identifying problems with psychological functioning in the population is a very important element of measuring disability for the stated objective, questions that attempt to represent mental/psychological functioning would run into difficulty because of the levels of stigmatization of such problems within a culture. This could jeopardize the whole set of questions.

Census questions

757. Due to the sensitivity of the topic, it is recommended that special attention should be paid in designing census questions to measure disability. The wording and the construct of questions greatly affect the precision in identifying the people with disabilities. The result can also be significantly influenced by the data collection method used (interview or self-

compilation). Ideally, each domain should be asked through a separate question.⁷⁴ The language used should be clear, unambiguous and simple. Negative terms should always be avoided. The disability questions should be addressed to each single household member aged 5 years and above and general questions on the presence of persons with disabilities in the household should be avoided. For children 2-4 years of age, only the domains seeing, hearing and walking would be considered suitable, while no questions are suitable for children less than 2 years of age. If necessary, a proxy respondent can be used to report for the family member who is incapacitated or temporarily absent. The important thing is to account for each family member individually rather than ask a blanket question. Scaled response categories can also improve the reporting of disability. The census questions on disability endorsed by the Washington Group include four response categories:

- (a) No – no difficulty;
- (b) Yes – some difficulty;
- (c) Yes – a lot of difficulty; and
- (d) Cannot do [function] at all

758. Disability prevalence is determined based on any response that is ‘a lot of difficulty’ or ‘cannot do at all’ for any of the domains.

759. The European Health Status Module (see paragraph 747) includes a set of standard questions for various domains and can be used as source to develop census questions in three of the four core domains (seeing, hearing, and walking). There is also a set of questions for use on national censuses for gathering information on the four essential domains.⁷⁵ The questions have been designed to provide comparable data cross-nationally for populations living in a great variety of cultures with varying economic resources. The objective is to identify persons with similar types and levels of limitations in functional activities regardless of nationality or culture. It is not the purpose of these questions to identify every person with a disability within every community. The questions may not meet all the needs for disability statistics, nor will it replicate a population evaluated across a wider range of domains that would be possible in other forms of data collection or in administrative data.

760. The information that results from measuring disability status is expected to:

- (a) represent the majority, but not all persons with limitation in basic activity functioning in any one country;
- (b) represent the most commonly occurring basic activity limitations within any country; and
- (c) capture persons with similar problems across countries.

761. The questions identify the population with functional limitations that have the potential to limit independent participation in society. The intended use of these data would

⁷⁴ When domains are combined such as asking a question about seeing OR hearing, respondents frequently are confused and think they need to have difficulty in both domains in order to answer yes. In addition, having the numbers with specific limitations is useful for both internal planning and for cross national comparisons.

⁷⁵ For more information see the Washington Group Web-site: http://www.cdc.gov/nchs/washington_group.htm

be to compare levels of participation in employment, education, or family life for those with disability versus those without to see if persons with disability have achieved social inclusion. In addition the data could be used to monitor prevalence trends for persons with limitations in the particular basic activity domains. It would not represent the total population with limitations nor would it necessarily represent the 'true' population with disability, which would require measuring limitation in all domains.

Use of the census to screen for disability and follow-up with other surveys

762. Countries that are planning specialized surveys on disability may want to use the census to develop a sampling frame for these surveys and include a screening instrument to identify persons who will be interviewed subsequently. The definitions and the instruments used for this purpose are very different from the ones used to assess equal opportunities. The main purpose of a screening is to be the most inclusive as possible in order to identify the largest group of people who could be further studied. The screening question should be designed so that false negatives (that is, persons who have disabilities but are not identified in the census as having disabilities) are minimized, while false positives (persons who are identified with disabilities in the census but in reality they do not have disabilities, as assessed in the largest instrument used in the follow-up survey) should be less of a concern.

763. Within the framework of the ICF, the census screening may include all of the three main dimensions of body structure and function, activity, and participation. This will allow for keeping a broad approach to the follow-up survey where the different aspects of disability can be better studied.

764. The same recommendations highlighted in paragraphs 757-761 should also be considered when a screening module is designed.

765. Before embarking on using the census to develop a frame for a follow-up survey, it is important that the legal implications of using personal census data for this purpose are fully considered. Respondents should be informed beforehand that the data may be used for follow-up studies, and national authorities responsible for ensuring the privacy rights of the population may need to be consulted in order to obtain their approval.

Chapter XIV. Household and family characteristics

Introduction

766. Household and family composition can be examined from several different points of view. In considering topics related to households it is important to be aware of the different concepts relating to households and families. These issues are explored in detail in this chapter. A number of census topics (such as car availability and amenities) focus on data at the household or family level rather than the individual level. As also noted in the 2010 Recommendations, in many countries the pattern of family and household formation is changing, and so it is important to examine the structural changes that are occurring.

Definitions

767. It is recommended that the place of usual residence is used as the basis of defining household membership (see paragraphs 392-393 and 396 concerning temporary absence). If only *de jure* information is available (for example from registers) on place of legal residence (that is, no information is available on place of *usual* residence) then that information can be used (alone or in combination with other information from other sources) provided that it is judged to reflect the usual residence situation sufficiently accurately.

The household concept

768. A *private household* is either:

- (a) A *one-person household* that is a person who lives alone in a separate housing unit or who occupies, as a lodger, a separate room (or rooms) of a housing unit but does not join with any of the other occupants of the housing unit to form part of a multi-person household as defined below; or
- (b) A *multi-person household* that is a group of two or more persons who combine to occupy the whole or part of a housing unit and to provide themselves with food and possibly other essentials for living. Members of the group may pool their incomes to a greater or lesser extent.

769. This concept of a private household is known as the *housekeeping concept* and does not assume that the number of private households is necessarily equal to the number of housing units. Within this concept, it is useful to distinguish between 'boarders' and 'lodgers' where relevant. *Boarders* take meals with the household and generally are allowed to use the household facilities. They are thus to be considered as members of the household as defined above. *Lodgers* on the other hand rent part of the housing unit for their exclusive use. They will belong to a different household even though they may share the same housing unit.

770. Some countries may be unable to collect data on households based on this housekeeping concept, for example where their census is register-based. Many such countries use a different concept – the *household-dwelling concept* – which considers all persons living in the same housing unit to be members of the same household, such that

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there is one household per occupied housing unit and the number of occupied housing units and the number of households occupying them are equal.

771. Whether a country uses the housekeeping concept or the household-dwelling concept of a household has generally little implication for the total number of private households recorded. However, differences can be large for certain household types, such as one-person households. Countries should specify in their census reports and/or relevant metadata which concept of private household they adopt.

772. An *institutional household* comprises persons whose need for shelter and subsistence are being provided by an institution. An institution is understood to be a legal body for the purpose of long-term habitation and provision of services to a group of persons. Institutions usually have common facilities shared by the occupants (baths, lounges, eating facilities, dormitories and so forth).

773. The great majority of institutional households fall under the following categories:

- (1.0) Residences for students
- (2.0) Hospitals, convalescent homes, establishments for the disabled, psychiatric institutions, old people's homes and nursing homes
- (3.0) Assisted living facilities and welfare institutions including those for the homeless
- (4.0) Military barracks
- (5.0) Correctional and penal institutions
- (6.0) Religious institutions
- (7.0) Worker dormitories

774. Members of an institutional household are those that have their place of usual residence (as defined in paragraph 392) at the institution. People who would otherwise be members of private households but who are living in an institution at the census reference time are considered to members of the institutional household if their actual or expected length of residence there exceeds one year.

775. Countries should endeavour to distinguish between the institutional population and persons who are part of private households located within the collective living quarters of the institution (as defined in paragraph 887(b)). For example, employees of the institution who live alone or with their family at the institution (or in housing units located outside the collective living quarters of the institution) should be treated as members of private households.

776. Prior to the census enumeration, countries should consider carrying out a living quarters validation exercise. A brief survey questionnaire can identify, among other things, the nature and functions of collective living quarters, the potential presence of private households, and whether services are offered to persons considered homeless (see paragraphs 779-782 below). Also, one main advantage of using such a survey is that it allows for the identification of multipurpose institutional households. Thus, parts of an institutional household may need to be classified differently.

777. There may be differences between countries in the ways in which the boundary between the population living in private households and the population living in institutional or other households is drawn. The definitions used should therefore be explained clearly in the census reports and metadata, and attention should be drawn to any differences between national practice and these recommendations.

778. There is an increasing amount of accommodation which is being specifically provided for the elderly, the disabled, and other special groups where the distinction between an institutional and a private household is not clear, in that meals can be taken communally or by each household with its own cooking facilities. It is suggested that if at least half the population living in such accommodation possess their own cooking facilities, then all persons should be treated as living in private households and, if possible, identified separately in the output.

Persons with no usual place of residence: the 'homeless'

779. There are some persons who do not usually live in either private or institutional households. These are often referred to as the 'homeless'. However, 'homelessness' is essentially a cultural definition based on concepts such as 'adequate housing', 'minimum community housing standard' or 'security of tenure', which can be implemented in different ways by different communities. For certain policy purposes, some persons living in institutions may be considered as 'homeless' persons, as can people who frequently stay temporarily with different households, without secure access to any one. As such, 'homelessness' is not a clearly defined characteristic for the purposes of international comparisons. Rather, distinct categories that are more precisely defined should be used;

780. For tabulations of 'homelessness' the following two categories can be considered:

- (1.0) Primary homeless (or roofless): This category includes persons living in the streets without a shelter that would fall within the scope of living quarters (see paragraph 872).
- (2.0) Secondary homeless (or houseless): This category includes persons with no place of usual residence who make use of various types of accommodations (including dwellings, shelters, institutions for the homeless or other living quarters) and have a roof over their heads at the census reference time. This category includes persons living in conventional dwellings but who report having no usual address on their census form. Such people are to be regarded as usually resident at the address at which they are enumerated (see paragraph 401(a)) and as part of the household at that address.

781. Only the first category – the 'primary homeless' – comprises people that are not usually included in either private or institutional households. As such, these need to be separately accounted for, although some countries may include them as a special category of the institutional population (depending on the method of their enumeration).

782. The second category – the 'secondary homeless' – are, by definition, found either in private or institutional households and are already accounted for. Still, some countries may for policy reasons, wish to separately identify such persons. This can only be specifically

done, however, by collecting information on those who, at their place of enumeration, report having no other usual place of residence. These definitions should be supported by a collection strategy or other means that ensure, for example, that certain dwellings be properly identified as shelters and not as conventional dwellings (see Chapter XV).

The family concept

783. A '*family nucleus*' is defined in the narrow sense as two or more persons who live in the same household and who are related as marital, registered, or consensual union (that is, cohabiting) partners of either opposite or same sex, or as parent and child. Thus a family comprises a couple without children, or a couple with one or more children, or a lone parent with one or more children.

784. The family concept as defined above limits relationships between children and adults to direct (first-degree) relationships, that is, between parents and children. In some countries, numbers of 'skip-generation households', that is, households consisting of grandparent(s) and one or more grandchild(ren) but where no inter-generational parent (that is the parent of those grandchildren) is present, are considerable. Therefore, countries may include such skip-generation households in their family definition. The relevant census report and/or metadata should clearly state whether or not skip-generation households are included in the family nucleus definition.

785. Within the context of the definition of family nucleus a '*child*' refers to a blood, step-, or adopted son or daughter (regardless of age or marital status) who has usual residence in the household of at least one of the parents, and who has no partner or own child(ren) living in the same household. Grandsons and granddaughters of at least one grandparent who have usual residence in the household but where there are no parents present may also be included. Foster children should not be included. A (grand)son or (grand)daughter who lives with a spouse, with a registered partner, with a consensual partner, or with one or more own children, is not considered to be a child. A child who alternates between two households (for instance after his or her parents have divorced or separated) should be considered to be a member the household (and hence the family within that household) where he or she spends the majority of the time. Where an equal amount of time is spent with both parents, the child should be considered to be a member of the household/family where he/she is present at the census reference time (see paragraph 406(c)).

786. The term '*couple*' should include married couples, registered couples, and couples who live in a consensual union (whether of the opposite or same sex). Two persons are considered to be partners in a consensual union when: they have usual residence in the same household, they are not married to, nor are in a registered/legal partnership with, each other, and they have a marriage-like relationship with each other (see paragraph 471).

787. A '*three-generation household*' consists of two or more separate family nuclei or one family nucleus and (an)other family member(s), containing at least three generations. The youngest two generations should always constitute one family nucleus. For example, a woman who is living in a household with her own child(ren) and her own parent(s) should be regarded as being in the same family nucleus as the child(ren) even if she is never married. Her own parents would then constitute a second family nucleus within the same household.

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788. The term '*reconstituted family*' where it is used in this chapter refers to a family consisting of a married, registered or cohabiting couple, with one or more children, where at least one child is the natural child of only one member of the couple. If the one partner subsequently adopts the natural child of the other partner, the resulting family ceases to be a reconstituted family.

789. Some family nuclei may live within institutional households, for example, elderly couples living in old age homes. However, the number is generally very small in most countries in the UNECE region and it is often difficult to identify them. The scope of the basic data to be compiled on family nuclei is therefore confined to family nuclei living in private households. If those living in institutional households are included, they should, if there are no disclosure issues, be shown separately.

790. Family nuclei are usually identified at the processing stage on the basis of marital status, sex, age, and relationship either to the reference member of the household or to other household members. In the case of multi-family households, however, these data are often not sufficient to provide a reliable basis for allocating persons to particular family nuclei. It is left to countries to decide whether family nuclei in these households should be distinguished by asking the respondent to list the members of each family nucleus in consecutive order, or in some other way.

791. Some countries may also wish to derive information on 'extended families' also. It is recommended that an '*extended family*' be defined for census purposes as a group of persons who live together in the same household, including one or more family nuclei and other persons who do not constitute a family nucleus as defined above but are related to each other or to any members of any family nuclei in the same household (to a specified degree) through blood, marriage or adoption. Data on extended families can have certain advantages for studying the economic relationships of families or kin as spending units, but they also have certain advantages for studying and classifying families from a demographic point of view. Countries that derive information on this type of family unit are encouraged to use the suggested classifications proposed for the non-core topics 'Extended family status' (see paragraphs 819-821) and 'Type of extended family' (paragraphs 832-833).

Household and family characteristics of persons

Relationships between household members (core topic)

792. Information should be collected for all persons living in private households on their relationship to other members of the household. Data on this topic are needed for use in

- (a) identifying family nuclei and private households of various types;
- (b) deriving the household status and the family status of household members.

793. In previous censuses, the selection of the one reference person in the household to whom all other household members report or designate their relationship was the recommended method for mapping household structures. When the household's reference person is chosen carefully, this method gives accurate information for most household types and family types. In certain cases, however, such as in multiple family households, this method will not always give the information that is required. Therefore, a more elaborative

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method has, more recently, been adopted by some countries, namely the household relationship matrix method. A household relationship matrix allows for the collection of all relationships between all household members. Countries should note that information collected via the matrix method may be only practicable for those adopting a traditional, questionnaire-based census. Information obtained from registers is unlikely to identify all such intra-household relationships.

794. Some countries have good experience with the household relationship matrix method in their censuses, while others have noted problems with this approach, due to its more complicated character. Therefore, it is recommended that countries consider the relationship matrix only as one possible method for mapping household structures. Pre-census tests of the relationship matrix are recommended to check the feasibility of the method. Where feasible, the relationship matrix method is the recommended approach. Otherwise, it is recommended that the relationship to the household's reference person only should be adopted. It is to be noted that the household relationship matrix, if necessary, may be limited to certain members of the household only, for example to the adult members, or to the children.

795. The classifications of type of relationship to (a) other/all household members (when the household relationship matrix is used), and (b) the reference person only, are given in paragraph 796 and paragraph 802, respectively.

Relationship matrix approach

796. In the event that the household relationship matrix method is used, the following classification of persons living in a private household by relationship to other household members is recommended. The classification is recommended at the one-digit level and optional at the two-digit level.

- (1.0) Other person's husband/wife/spouse
 - (1.1) Opposite sex partner
 - (2.2) Same-sex partner
- (2.0) Other person's registered partner
 - (2.1) Opposite sex registered partner
 - (2.2) Same-sex registered partner
- (3.0) Other person's partner in consensual union (cohabiting partner)
 - (3.1) Opposite-sex cohabiting partner
 - (3.2) Same-sex cohabiting partner
- (4.0) Other person's child
- (5.0) Other person's father or mother
- (6.0) Other person's other relative
- (7.0) Non-relative of other person
 - (7.1) Foster child

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(7.2) Boarder

(7.3) Other (including, for example, live-in domestic employee)

797. The term 'cohabiting partner' may be used as a synonym for people in a consensual union. The optional distinction between categories (3.1) 'Other person's opposite-sex cohabiting partner' and (3.2) 'Other person's same-sex cohabiting partner' should be considered by countries that wish to produce data on same-sex partnerships. Adding a specific category for same-sex partners distinct from the category for opposite-sex partners in this way allows for the collection of data on same-sex partnerships without having to rely on the information collected separately on sex to distinguish between opposite-sex and same-sex partnerships. It is suggested that a thorough testing programme (both cognitive and quantitative) be conducted prior to introducing such a sensitive topic on the census questionnaire.

798. Countries may wish to subdivide category (4.0) into children according to the different age groups. It is further suggested that employees, other than live-in domestic workers, who are members of the household (for instance nurses, farm workers) be included in category (7.3). Countries that use the household-dwelling concept may also need separate headings for sub-tenants and members of sub-tenants' households.

799. Countries that identify skip-generation families should use two additional categories, namely one for 'Other person's grandparent' and one for 'Other person's grandchild'.

Reference person approach

800. The selection of the one reference person only in a household to whom all other persons in the household report their relationship requires careful consideration. In the past the person considered to be the 'head' of the household was generally used as the reference person, but this concept is no longer considered appropriate in many countries. It has also sometimes been proposed that the person designated as the reference person should be the oldest person in the household or the one who contributes the most income. However, given that the primary purpose of the question is to assign family status and to assign individuals into families, both of these approaches have weaknesses. The automatic selection of the oldest person may be undesirable because in multi-generational households the broadest range of explicit kin relationships can be reported where the reference person is selected from the middle generation. Similarly, the selection of the person with the highest income may be a person who will not necessarily solicit the broadest range of explicit kin relationships. There is some evidence though to suggest that the following guidance for selection of the reference person will yield the most fruitful range of explicit kin relationships:

- (a) either the husband or the wife of a married couple living in the household (preferably from the middle generation in a multi-generational household);
- (b) either partner of a consensual union couple living in the household where there is no married couple present;
- (c) otherwise, the parent, where one parent lives with his or her sons or daughters of any age; or

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- (d) where none of the above conditions apply, any adult member of the household may be selected.

801. These criteria, although not strictly mutually exclusive, will be workable in most cases and are presented here to provide an example of how an adult member of the household could be selected with a view to facilitating the determination of family relationships. The considerations given here may also be appropriate for those countries who still wish to retain the concept of 'head of household'.

802. In order to facilitate identification of family nuclei and households, the following classification of persons living in a private household by relationship only to the household's reference person is recommended. The classification is recommended at the one-digit level and optional at the two-digit level.

- (1.0) Reference person
- (2.0) Reference person's spouse or registered partner
 - (2.1) Opposite sex spouse or registered partner
 - (2.2) Same-sex spouse or registered partner
- (3.0) Reference person's partner in consensual union (cohabiting partner)
 - (3.1) Opposite-sex partner
 - (3.2) Same-sex partner
- (4.0) Child of reference person and/or of husband/wife/ partner
 - (4.1) Child of reference person only
 - (4.2) Child of reference person's husband/wife/ partner
 - (4.3) Child of both
- (5.0) Husband/wife or cohabiting partner of child of reference person
- (6.0) Father or mother of reference person, of spouse, or of cohabiting partner of reference person
- (7.0) Other relative of reference person, of spouse, or of cohabiting partner of reference person
- (8.0) Non-relative of reference person of the household
 - (8.1) Foster child
 - (8.2) Boarder
 - (8.3) Other (including live-in domestic employee)

803. As for the relationship-matrix approach, countries that define a skip-generation family as family nucleus might wish to include the two additional categories referred to in paragraph 799 above.

804. Similarly, the optional distinction between categories (3.1) 'Opposite-sex cohabiting partner' and (3.2) 'Same-sex cohabiting partner' should be considered by countries that would like to collect data on same-sex partnerships.

805. The optional distinction between categories (4.1), (4.2) and (4.3) allows the identification of reconstituted families in private households provided that the reference person is a parent in the reconstituted family (see paragraph 788).

806. As has also been suggested in paragraph 798 in the context of the matrix approach, countries may wish to subdivide categories (4.1) to (4.3) by children according to different age groups. It is further suggested that employees who are live-in members of the household (for instance nurses, farm workers) be included in category (8.3). Countries, which use the household-dwelling concept, may also need separate headings for sub-tenants and members of sub-tenants' households.

Household and family status

807. For purposes of determining household and family status, and identifying how a person relates to other household or family members, persons may be classified according to their position within the household or family nucleus. Classifying persons according to household and family status has uses in social and demographic research and policy formulation. Census data can be presented according to both household and family status for a variety of purposes. Although status itself is based on information derived from responses to the item on relationship to the head or other reference member of the household and other items, the classification of persons by their household and family status represents a different approach from the traditional one of classifying household members solely according to their relationship to the head or reference person.

Household status (derived core topic)

808. Information should be derived for all persons on their status or position in the household and for people in private households whether they are living alone, in a nuclear family household or living with others.

809. The following classification of the population by household status is recommended:

- (1.0) Person in a private household
 - (1.1) Person in a nuclear family household
 - (1.1.1) Husband/male spouse or registered partner
 - (1.1.2) Wife/female spouse or registered partner
 - (1.1.3) Male partner in a consensual union
 - (1.1.4) Female partner in a consensual union
 - (1.1.5) Lone father
 - (1.1.6) Lone mother
 - (1.1.7) Child under 25 years of age
 - (1.1.8) Son/daughter aged 25 or older
 - (1.1.9) Other persons not member of the nuclear family, but in a nuclear family household

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- (1.2) Person in other private households
 - (1.2.1) Living alone
 - (1.2.2) Living with relatives
 - (1.2.3) Living with non-relatives
 - (1.2.4) Living with relatives and non-relatives
- (2.0) Person not in a private household
 - (2.1) Person in institutional household
 - (2.2) Primary homeless person
 - (2.3) Other

810. This classification is recommended at the three-digit level. Depending on national legislation and data needs, countries may include the oldest partner of a registered (marital) same-sex couple in category (1.1.1), and the youngest partner in category (1.1.2) in order to clearly distinguish partners of the same sex.

811. Countries that identify skip-generation families should use two additional categories under (1.1), namely one for 'grandparent' and one for 'grandchild'.

812. It should be noted that information on household status can be used to derive what is commonly known as *de facto* marital status, for example, whether a person who is not legally married, lives together with a partner in a consensual union, or whether a person who is legally married, lives without a partner (see paragraphs 469-471), with the understanding that a number of married people may be cohabiting with someone other than their legal spouse.

Family status (derived core topic)

813. Information should be derived for all persons on their family status. Family status is measured in terms of partner, lone parent or child.

814. The following classification of the population living in families is recommended:

- (1.0) Partner
 - (1.1) Husband in a married couple / registered union
 - (1.2) Wife in a married couple / registered union
 - (1.3) Male partner in a consensual union
 - (1.4) Female partner in a consensual union
- (2.0) Lone parent
 - (2.1) Lone father
 - (2.2) Lone mother
- (3.0) Child
 - (3.1) Child aged under 25

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(3.1.1) Child of both partners

(3.1.2) Child of male partner only

(3.1.3) Child of female partner only

(3.1.4) Child of lone father

(3.1.5) Child of lone mother

(3.2.) Son/daughter aged 25 or over

(3.2.1) Son/daughter of both partners

(3.2.2) Son/daughter of male partner only

(3.2.3) Son/daughter of female partner only

(3.2.4) Son/daughter of lone father

(3.2.5) Son/daughter of lone mother

815. This classification is recommended at the two-digit level. Further detail on the age of the youngest child may be identified by adding, for instance categories for youngest child aged 'under 18', '18-24', '25-29', and '30 or over'.

816. As in the case noted in paragraph 810 above, depending on national legislation and data needs, countries may include the oldest partner of a registered (marital) same-sex couple in category (1.1), and the youngest partner in category (1.2), in order to clearly distinguish partners of the same sex.

817. Countries that identify skip-generation families should use three additional categories, namely: (3.3) 'grandchild aged under 25'; (3.4) 'grandson/granddaughter aged 25 or over'; and (4.0) 'grandparent'.

818. The classification of children in reconstituted families requires special attention. These children should be classified according to the relationship with both parents. If the child has been adopted by the new partner, he/she should be classified in (3.1.1) or (3.2.1), and the family should not be considered a reconstituted family (unless not all children have been adopted by the new partner) (see paragraph 788). If not, he/she belongs to (3.1.2), (3.1.3), (3.2.2) or (3.2.3).

Extended family status (derived non-core topic)

819. It is suggested that countries interested in deriving data on extended families classify persons in private households by extended family status.

820. The following classification, on the basis of their relationship to the reference person of the household is recommended:

(1.0) Extended family reference person

(2.0) Husband/wife/spouse, registered partner, or cohabiting partner of reference person

(3.0) Child of reference person

(4.0) Other relative of reference person

(5.0) Not member of an extended family

821. Some countries may also wish to subdivide category (4.0) by type of relationship to meet specific requirements.

Characteristics of family nuclei

Type of family nucleus (derived core topic)

822. The family nucleus is defined in paragraph 783. Family nuclei should be classified by type.

823. The following classification of family nuclei by type is recommended:

- (1.0) Husband-wife family, not reconstituted family
 - (1.1) Without resident children
 - (1.2) With at least one resident child under 25
 - (1.3) Youngest resident son/daughter 25 or older
- (2.0) Cohabiting couple, not reconstituted family
 - (2.1) Without resident children
 - (2.2) With at least one resident child under 25
 - (2.3) Youngest resident son/daughter 25 or older
- (3.0) Lone father
 - (3.1) With at least one resident child under 25
 - (3.2) Youngest resident son/daughter 25 or older
- (4.0) Lone mother
 - (4.1) With at least one resident child under 25
 - (4.2) Youngest resident son/daughter 25 or older
- (5.0) Reconstituted family
 - (5.1) With at least one resident child under 25
 - (5.2) Youngest resident son/daughter 25 or older

824. This classification is recommended at the two-digit level. However, those countries that do not wish to distinguish reconstituted families as a separate type of family nucleus should consider an abbreviated version the classification, where categories (1.0) 'Husband-wife family' and (2.0) 'Cohabiting couple' would also include reconstituted families, and where the last category should be (5.0) 'Other type of family nucleus', without further subdivision. Depending on national legislation and data needs, countries may also include registered (marital) same-sex couple in category (1.0).

825. Countries that identify skip-generation families should use an additional category, namely (6.0) 'Skip-generation family'.

826. It is suggested that countries that wish to subdivide the classification by age of female partner (for couple families) and/or by age of parent (for lone parent families) do so by using at least the following age groups: 'below 35'; '35 to 54'; and '55 and over'. These age groups are suggested because they are the significant groupings to use in family life-cycle constructions. Additional sub-divisions showing the age of children is encouraged.

Type of reconstituted family (derived non-core topic)

827. A reconstituted family is defined in paragraph 788. Reconstituted families may or may not have one or more children that are common to both partners, in addition to at least one child that is non-common. Information should be collected on type of reconstituted family by number of non-common and common children.

828. The following classification of reconstituted families is recommended:

- (1.0) Reconstituted family, one non-common child
 - (1.1) And no common children
 - (1.2) And one common child
 - (1.3) And two or more common children
- (2.0) Reconstituted family, two non-common children
 - (2.1) And no common children
 - (2.2) And one common child
 - (2.3) And two or more common children
- (3.0) Reconstituted family, three non-common children
 - (3.1) And no common children
 - (3.2) And one common child
 - (3.3) And two or more common children
- (4.0) Reconstituted family, four or more non-common children
 - (4.1) And no common children
 - (4.2) And one common child
 - (4.3) And two or more common children

829. Some countries may wish to add further detail on the family status of the couple (married or cohabiting), on the age of the children, and/or whether the children are solely the woman's children, solely the man's children, or children from an earlier liaison of both the man and the woman.

830. The identification of reconstituted families requires careful attention. Several approaches have been used in previous censuses and these are described below.

- (a) *Household relationship matrix*: A reconstituted family can be identified provided that each child in the household can specify his/her relationship to each adult so that he/she can be classified in one of the following three distinct categories:

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(1.0) Child of both the adult person and his/her spouse/partner

(2.0) Child of the adult person only

(3.0) Not the child of the adult person

In category (1.0) it is assumed that the spouse/partner of the adult person is a member of the same private household.

(b) *The partial household relationship matrix:* The household relationship matrix as described under (a) covers the relationships between all members of the household. For the purpose of identifying a reconstituted family it is sufficient to use only part of that matrix, namely that part that asks all children information on their relationship to all adults in the household, as specified by categories (1.0) to (3.0) above.

(c) *Relationship to the reference person of the household:* In those cases where the reference person is a parent in a reconstituted family, that family can be identified when relationship to reference person includes the following three categories:

(1.0) Child of both the reference person and his/her spouse/partner

(2.0) Child of reference person only

(3.0) Child of the reference person's spouse/partner only

However, this approach will not cover reconstituted families in those cases where the reference person is not a parent in the reconstituted family.

(d) Birth dates: Countries with a register-based census should identify reconstituted families on the basis of children's birth dates. More particularly, a matching between birth dates of all natural children ever-born to each adult household member on the one hand, and the birth dates of all children present in the household on the other, will facilitate identification of reconstituted families.

831. It is recommended that countries with a register-based census use the fourth approach for the purpose of identifying reconstituted families. Other countries should use the first or the second approach, provided that the household relationship matrix method is feasible. Otherwise, the third approach can be used, provided that the reference person is chosen carefully.

Type of extended family (derived non-core topic)

832. Extended families are defined in paragraph 791. Some countries may also wish to derive data by type of extended family.

833. The following classification is recommended:

(1.0) One-couple extended families

(1.1) One couple with other relatives only

(1.2) One couple with children and other relatives

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- (2.0) Two-couple extended families
 - (2.1) Two couples only
 - (2.2) Two couples with children but no other relatives
 - (2.2.1) Two couples both with children
 - (2.2.2) One couple with children, one without
 - (2.3) Two couples with other relatives only
 - (2.4) Two couples with children and other relatives
 - (2.4.1) Both couples with children and other relatives
 - (2.4.2) One couple with children, one without, and other relatives
- (3.0) All other extended families

Size of family nucleus (derived core topic)

834. Family nuclei (as defined in paragraph 783) should be classified by size according to
- (a) the total number of resident members of the family, and
 - (b) the total number of resident children in the family.

Characteristics of private households

Type of private household (derived core topic)

835. Private households are defined in paragraph 768. Information on different types of private households should be collected.

836. The following classification of private households by type is recommended at the three-digit level:

- (1.0) Non-family households
 - (1.1) One-person households
 - (1.2) Multi-person households
- (2.0) One-family households
 - (2.1) Husband-wife couples without resident children
 - (2.1.1) Without other persons
 - (2.1.2) With other persons
 - (2.2) Husband-wife couples with at least one resident child under 25
 - (2.2.1) Without other persons
 - (2.2.2) With other persons

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- (2.3) Husband-wife couples, youngest resident son/daughter 25 or older
 - (2.3.1) Without other persons
 - (2.3.2) With other persons
- (2.4) Cohabiting couples without resident children
 - (2.4.1) Without other persons
 - (2.4.2) With other persons
- (2.5) Cohabiting couples with at least one resident child under 25
 - (2.5.1) Without other persons
 - (2.5.2) With other persons
- (2.6) Cohabiting couples, youngest resident son/daughter 25 or older
 - (2.6.1) Without other persons
 - (2.6.2) With other persons
- (2.7) Lone fathers with at least one resident child under 25
 - (2.7.1) Without other persons
 - (2.7.2) With other persons
- (2.8) Lone fathers, youngest resident son/daughter 25 or older
 - (2.8.1) Without other persons
 - (2.8.2) With other persons
- (2.9) Lone mothers with at least one resident child under 25
 - (2.9.1) Without other persons
 - (2.9.2) With other persons
- (2.10) Lone mothers, youngest resident son/daughter 25 or older
 - (2.10.1) Without other persons
 - (2.10.2) With other persons
- (3.0) Two or more-family households

837. Depending on national legislation and data needs, countries may include legally registered- and same-sex married couple in categories (2.1)-(2.3).

838. Countries that wish to identify skip-generation families should use one or more additional categories under (2.0) to do this.

Other household classifications (derived non-core topic)

839. The family-based classification recommended in paragraph 836 above involves expensive and time-consuming processing; it is therefore, in some countries, only derived

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for a sample of households and this limits its use. In earlier censuses, some countries used a supplementary classification of private households by type on the basis of the age and sex structure and size of household that could be derived easily and quickly on a 100 per cent basis at an early stage of the census processing, and which could therefore be used down to the small area level. These countries found that these types of classifications complemented each other, and that the classification of private households by type, on the basis of age structure and size of household, had produced useful and interesting results. In view of this, the following classification is suggested on an optional basis, as a complement to the classification recommended above:

- (1.0) One adult under legal retirement age without children
- (2.0) One adult at or over legal retirement age without children
- (3.0) Two adults both under legal retirement age without children
- (4.0) Two adults one or both at or over legal retirement age without children
- (5.0) One adult with one or more children
 - (5.1) Adult female with one or more children
 - (5.2) Adult male with one or more children
- (6.0) Two adults with one child
- (7.0) Two adults with two children
- (8.0) Two adults with three children
- (9.0) Two adults with four or more children
- (10.0) Three or more adults with one or more children
- (11.0) Three or more adults without children

840. Countries in which individuals have the legal right to retire during a specific age span (for instance, between ages 63 and 68) should use the highest legal retirement age (68 in this case) in categories (1.0) to (4.0).

Generational composition of private households (derived non-core topic)

841. In addition to deriving data on type of private household, some countries may also wish to derive information on the generational composition of private households, particularly in cases where the practice of living together in multi-generational households is considered to be sufficiently widespread or important. As an example of a 'multi-generational' household, a definition of a 'three-generation' household is given in paragraph 787.

Size of private household (derived core topic)

842. Private households should be classified by size according to the total number of resident members in the household.

843. No classification by size is specifically recommended, but it is suggested that countries should ensure that households containing 1-5 persons should each be separately identified, and that thereafter the size categories should reflect the particular national circumstances and user requirements (and, of course, any constraints imposed by statistical disclosure control measures).

Single or shared occupancy (non-core topic)

844. 'Shared occupancy' refers to when two or more households (as defined in paragraph 768) occupy with same housing unit. Countries that carry out a traditional census and use the housekeeping unit concept for defining households may wish to collect information on this topic directly through the census questionnaire, while others may prefer to derive the information from the non-core housing topic 'Occupancy by number of private households' (see paragraph 917).

845. The following classification of private households living in conventional dwellings and other housing units by single or shared occupancy is suggested for countries using the housekeeping unit concept of households:

- (1.0) Households living alone in a housing unit
- (2.0) Households sharing a housing unit with one or more other households

846. Category (2.0) may be sub-divided to distinguish households sharing with one, two, or three or more other households. This category may also be sub-divided, where feasible, to distinguish households which are voluntarily sharing a dwelling and those which are doing so involuntarily. This classification will not apply to countries that use the household dwelling concept of households (see paragraph 770), since all would appear in category (1.0) of the classification. (See also paragraph 778 on accommodations for the elderly or the disabled with common facilities).

Tenure status of households (core topic)

847. This topic refers to the arrangements under which a private household occupies all or part of a housing unit.

848. Private households should be classified by tenure status as follows:

- (1.0) Households of which a member is the owner of the housing unit
- (2.0) Households of which a member is a tenant of all or part of the housing unit
 - (2.1) Households of which a member is a main tenant of all or part of the housing unit
 - (2.2) Households of which a member is a sub-tenant of an owner occupier or main tenant
- (3.0) Households occupying all or part of a housing unit under other form of tenure

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849. This classification is recommended at the one digit level and optional at the two-digit level.

850. In view of the diversity of legal arrangements internationally, countries should describe fully in their census report or relevant metadata the coverage of each of the categories in the above classification. These descriptions should specify, where applicable, the treatment of households which:

- (a) live in housing units as members of different types of housing cooperatives;
- (b) live in housing units rented from an employer under the terms of the contract of employment of one of the household members; and
- (c) live in housing units provided free of charge by an employer of one of the household members or by some other person or body.

851. Some countries may wish to extend the recommended classification to distinguish these or other groups of households that are of interest for national purposes. Households that are in the process of paying off a mortgage on the housing unit in which they live, or are purchasing their housing unit over time under other financial arrangements, should be classed as (1.0) in the classification.

Rent and other housing costs (non-core topic)

852. Rent is the amount to be paid in respect of a specified period for the space occupied by a household including, in some cases, local rates and ground rent. Payments for the use of furniture, heating, electricity, gas and water and for the provision of special services like washing, cooking, etc., should be excluded.

853. With regard to the costs of heating and hot water, the practices differ in different countries. In some countries the heating and/or hot water are normally included in the rent, in other countries they are not, while still in some other countries both practices can exist in parallel. It is important, therefore, that countries which include this topic in their census clearly define whether the heating and/or hot water are included in the rent or not. The recommendation would be to exclude heating and hot water expenditures from the rent. The ideal solution would be to produce the rent information separately without heating and hot water expenditures and to report the expenditures for heating, hot water (and electricity if applicable) separately.

854. Nominal rent paid may not correctly reflect the real rates. For instance, an individual housing allowance determined on the basis of a means test and paid by housing authorities directly to the landlord should be included in the rent; and if a public sector landlord on the basis of a means test charges a rebated rent, the full rent should be recorded. It may also be possible to collect information on, for example, whether the tenant is a relative or an employee of the landlord, or whether he performs any function or office as part of his rent, etc., in order to appraise the actual rent paid.

855. If this topic is included in the census, it may be desirable (and less sensitive) to obtain information on the range within which the rent paid falls rather than on the exact amount paid.

856. In addition to the amount of rent paid by renting households, it may be useful to collect information on the housing costs of each household. Such costs could include, for example, information on monthly mortgage payments, the provision of utility services, and local taxes if these are not available from the information collected from the housing topics (see Chapter XV).

Durable consumer goods possessed by the household (non-core topic)

857. With the purpose of obtaining some qualitative indicators on the households' levels of living, a question on durable goods in the possession of the household might be included. Examples of durable goods that could be considered include: washing machines, refrigerators, deep-freezers, ovens/microwave ovens, televisions, fax machines and personal computers. Alternatively, consideration could also be given to the household's accessibility to durable consumer goods rather than their possession.

Number of cars available for the use of the household (non-core topic)

858. It is suggested that this topic should cover the number of cars and vans available for use by members of the household, including any car and van provided by an employer if available for use by the household, but excluding vans used solely for carrying goods.

859. The following classification is recommended:

- (1.0) No car
- (2.0) One car
- (3.0) Two or more cars

Availability of car parking (non-core topic)

860. It is recommended that this topic should cover the availability of car parking facilities for use by the members of the household. Such facilities should be restricted, for census purposes, to the physical space reserved for the exclusive use of the household, either owned or rented by one or more household members, or for which some other written or oral agreement exists between the owner of the physical space and the household member(s).

861. The following classification is recommended:

- (1.0) No car parking available
- (2.0) Car parking for one car available
- (3.0) Car parking for two or more cars available
- (4.0) Not applicable

Telephone and Internet connection (non-core topic)

862. Telephone and Internet connections reflect a household's ability to communicate with the rest of society using technology.

863. The following telephone classification is recommended:

- (1.0) Only telephone(s) fixed in the housing unit (land line)
- (2.0) Only mobile (cellular) telephone(s)
- (3.0) Both (1.0) and (2.0) are available
- (4.0) No telephone available to members of the household

864. The following classification for access to the Internet within the household is suggested:

- (1.0) Broadband Internet access fixed in the housing unit
- (2.0) Other Internet access fixed in the housing unit
- (3.0) Access through a mobile device
- (4.0) More than one mode of access
- (5.0) No Internet access in the housing unit

865. It should be noted that not all the categories in this classification are mutually exclusive.

PART THREE: HOUSING TOPICS

Chapter XV. Housing characteristics

Introduction

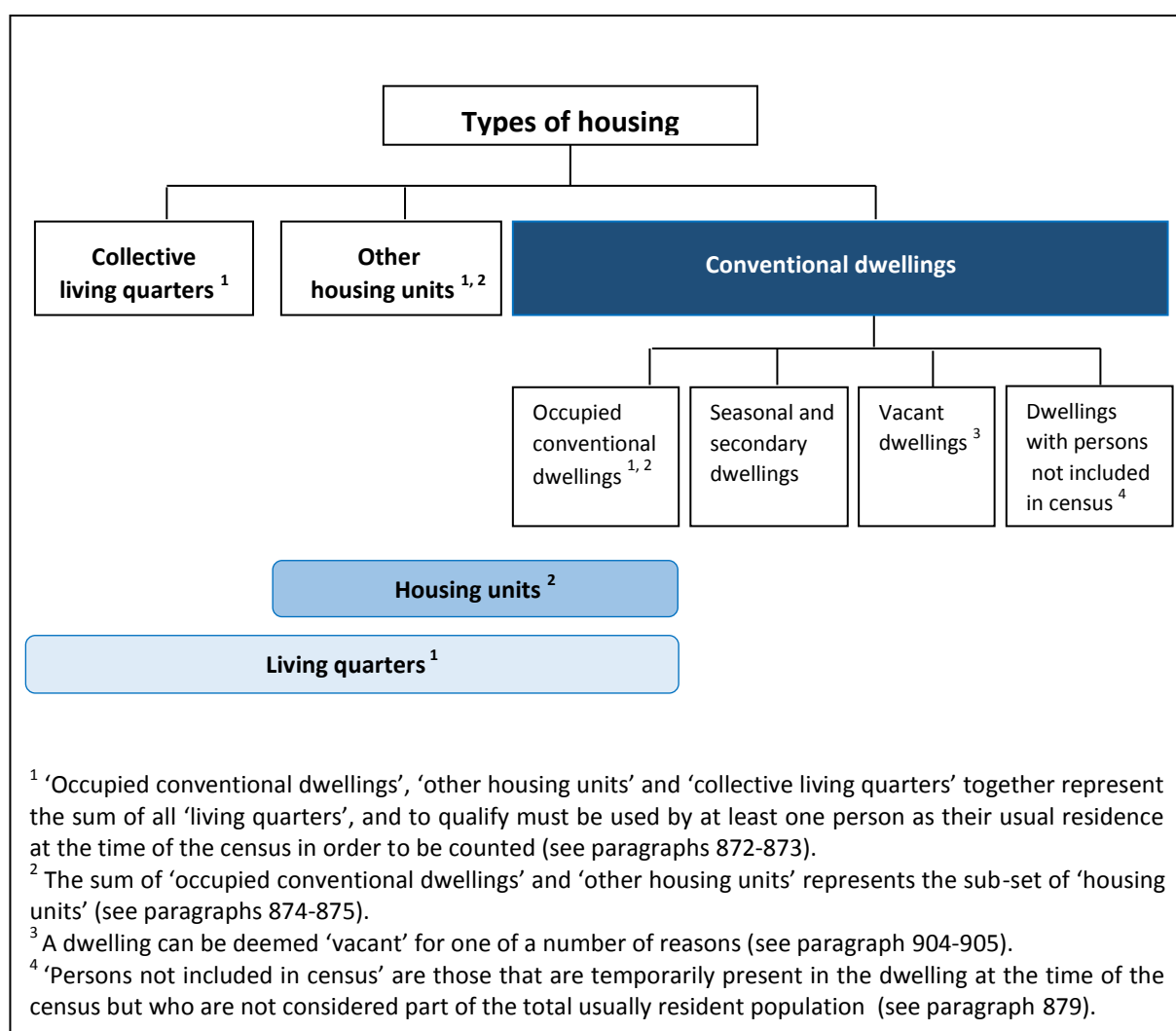
866. This chapter focuses on housing topics and on the relationship between the population and the living quarters. Housing topics can be defined as the characteristics of housing units and buildings on which information is usually collected in a housing census (whether or not this is carried out at the same time as the population census). It should be noted, however, that some topics that can be related to the housing unit (for example the core topic of 'tenure status' and the non-core topics of 'single or shared occupancy', and 'rent') have been included among the characteristics of private households in Chapter XIV since the principle unit of enumeration for these topics is generally the household.

867. For the housing topics presented in this chapter the main unit of enumeration is the 'conventional dwelling', but some characteristics refer to other types of housing unit. An exception is the topic 'housing arrangements' which describes the relationship between the resident population and their living quarters, and which, therefore, refers to individuals. Chart 7 below shows the several types of housing unit to which one or more of the characteristics refer. These are defined in paragraphs 872-887 below.

868. The 'building' in which a dwelling is located is regarded as an indirect but important unit of enumeration for housing censuses since the information concerning the building (such as building type, material of construction of external walls and certain other characteristics) is required to describe properly the living quarters located within the building. In a housing census, the questions on building characteristics are normally framed in terms of the building in which the (sets of) living quarters being enumerated are located, and the information is recorded for each of the housing units or other sets of living quarters located within it.

869. Not all the topics recommended in this chapter are relevant for all types of housing. Table 3 shows for each type of housing, whether the topic is core or non-core and whether or information can be collected in the census for that type of housing. The reasons for not applying a particular topic to a particular housing type vary. For some housing types the topic is not relevant. In other cases the topic may be difficult or impracticable to include in a census. This is particularly so for those dwellings that are vacant at the census reference time. Finally, the topic may not be appropriate or necessary for particular types of housing arrangements, such as the collection of information on household amenities in collective living quarters.

Chart 7 Different types of housing



Definitions

Buildings

870. A 'building' is defined within this context as any independent structure containing one or more dwellings, rooms or other spaces, covered by a roof and enclosed within external walls or dividing walls which extend from the foundations to the roof, whether designed for residential or for agricultural, commercial, industrial or cultural purposes or for the provision of services. Thus a building may be a detached house, apartment building, factory, shop, warehouse, garage, barn, etc.

871. The building containing conventional dwellings as defined below is an important unit since information on type of building and period of construction is required to describe the dwellings within the building and for formulating housing programmes.

Living quarters

872. 'Living quarters' are those housing types that are the usual residences of one or more persons. They are structurally separate and independent places of abode that:

- (a) have been constructed, built, converted or arranged for human habitation, provided that they are not, at the census reference time, being used for other purposes and that they are occupied at the census reference time; or
- (b) though not intended for habitation, were in use for such a purpose at the census reference time.

873. The concept of 'living quarters' is qualified by the definitions of the main categories into which they are divided, namely:

- (1.0) Occupied conventional dwellings
- (2.0) Other housing units – such as a hut, cabin, shack, caravan, houseboat, barn, mill, cave or other shelter used for human habitation at the census reference time
- (3.0) Collective living quarters – a hotel, institution, camp, etc.

Table 3 Summary table on housing topics

Topic	Enum. units ²	Types of Housing and Housing Arrangements				
		Primary homeless ¹	Collective living quarters	Other housing units	Occupied conventional dwellings	Seasonal and secondary dwellings, vacant dwellings, dwellings with persons not included in census
					(CONVENTIONAL DWELLINGS)	
			(HOUSING UNITS)			
		(LIVING QUARTERS)				
Type of living quarters	LQ	●	Core	Core	Core	●
Housing arrangements	I	Core	Core	Core	Core	●
Occupancy status of conventional dwellings	D	●	●	●	Core	Core
Characteristics of secondary, seasonal and vacant dwellings	D	●	●	●	●	Non-core
Type of ownership	D	●	●	●	Core	o
Occupancy by number of private households	HU	●	●	Non-core	Non-core	●
Number of occupants	LQ	●	Core	Core	Core	●
Useful floor space and/or number of rooms	HU	●	●	Core	Core	o
Density standard	HU	●	●	Core	Core	●
Type of rooms	HU	●	●	Non-core	Non-core	o
Water supply system	HU	●	●	Core	Core	o
Toilet facilities	HU	●	●	Core	Core	o
Bathing facilities	HU	●	●	Core	Core	o
Hot water	HU	●	●	Non-core	Non-core	o
Sewage disposal	HU	●	●	Non-core	Non-core	o
Kitchen	HU	●	●	Non-core	Non-core	o
Type of heating	HU	●	●	Core	Core	o
Main type of energy used for heating	HU	●	●	Non-core	Non-core	o
Availability of electricity	HU	●	●	Non-core	Non-core	o
Availability of piped gas	HU	●	●	Non-core	Non-core	o
Availability of air-conditioning	HU	●	●	Non-core	Non-core	o
Accessibility to dwelling	HU	●	●	Non-core	Non-core	o
Position of dwellings within the building	HU	●	●	●	Non-core	o
Type of building	D	●	●	●	Core	o
Number of floors in building	D	●	●	●	Non-core	o
Lift	D	●	●	●	Non-core	o
Period of construction	D	●	●	●	Core	o
Materials of the building	D	●	●	●	Non-core	o
State of repair of building	D	●	●	●	Non-core	o

● Not measured or not applicable in the census.

o May be difficult to measure in a census. Some countries may collect or have available this information. Information on seasonal and secondary dwellings and the information on vacant dwellings concerning all the characteristics should be shown separately.

¹ Including all persons who are not usual residents in any living quarter category (see paragraph 899)

² Enumeration units: I=Individuals; LQ=Living Quarters; HU=Housing Units; D=Dwellings.

Housing units

874. A 'housing unit' is a separate and independent place of abode intended for habitation by a single household, or one not intended for habitation but used as a usual residence by a household at the census reference time. This includes 'occupied conventional dwellings' and 'other housing units' as defined below.

875. For the purpose of international comparability, it is recommended that information should be collected on 'occupied conventional dwellings' and (where possible) 'other housing units', and presented separately.

Conventional dwellings

876. 'Conventional dwellings' are structurally separate and independent premises, which are designed for permanent human habitation at a fixed location and are not used wholly for non-residential purposes at the census reference time. A conventional dwelling consists of a room or suite of rooms and its accessories (for example lobbies, corridors) in a permanent building or structurally separated part thereof. It need not necessarily have a bathroom or toilet available for the exclusive use of its occupants.

877. A dwelling is *separate* if it is surrounded by walls and covered by a roof so that a person, or a group of persons, can isolate themselves from other persons for the purposes of sleeping, preparing and taking meals, or protecting themselves from the hazards of climate and environment. It is *independent* when it has direct access from the street or from a public or communal staircase, passage, gallery or grounds. That is, when the occupants can enter and leave without passing through another household's accommodation.

878. A 'permanent building' is a building that was constructed to be structurally stable for at least 15 years. Some countries may prefer to define permanence in terms of the method of construction or in terms of the building materials used. Detached rooms that are used for habitation and which are clearly designed to be used as part of the dwelling (for example a room or rooms above a detached garage) should be included as part of the building.

879. Conventional dwellings can be classified as being: occupied; of seasonal or secondary use; vacant; or having only persons who are not included in the census present:

- (a) A conventional dwelling is classified as an 'occupied conventional dwelling' if it is a usual residence of one or more persons regardless of temporary absences at the census reference time such as holidays or stay in a hospital. An 'occupant' of a conventional dwelling is a person who has usual residence in the dwelling.
- (b) A conventional dwelling which is 'reserved for secondary or seasonal use' is classified as such even if the dwelling is temporarily occupied at the census reference time by persons who are usually resident in another dwelling (an example is given in paragraph 907).
- (c) A conventional dwelling is defined as being 'vacant' if it is unoccupied because it is either for sale or rent, abandoned, due for demolition, or newly built and not yet occupied.

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- (d) A conventional dwelling is defined as a 'dwelling with persons not included in census' if it is (temporarily) occupied only by persons who are not included in the census such as visitors, short-term migrants, foreign military, naval and diplomatic personnel and their families.

880. All conventional dwellings should be counted for census purposes whether or not they are occupied (that is, have at least one usual resident) – although many of the topics apply only to *occupied* conventional dwellings.

881. Because of their importance, conventional dwellings are further classified by occupancy and type of building. However, countries may also wish to sub-divide occupied conventional dwellings using the core housing infrastructure (presence of a kitchen, water supply, toilet, bathing and heating facilities) in order to identify how basic the housing is.

Other housing units

882. 'Other housing units' are those that do not come fully within the category of a conventional dwelling either because they are mobile, semi-permanent or improvised, or are not designed for human habitation, but which are nevertheless used at the census reference time as the usual residence of one or more persons who are members of one or more private households.

883. The definitions applicable to the several types of 'other housing units' are set out below:

- (a) A 'mobile housing unit' is any type of living accommodation which has been made to be transported (such as a tent) or which is a moving unit (such as a ship, yacht, boat, barge or caravan) and which is both designed for human habitation and is occupied at the census reference time, that is, it is somebody's usual residence. Individual components of nomad or other travelling people encampments should be included in this category rather than being classified as collective living quarters (see paragraph 887). Passenger quarters, such as in passenger ships, railroad cars and aircraft, should not be considered as 'other housing units' and the persons who happen to be travelling in them at the census reference time should not be counted as living in such vehicles.
- (b) A 'semi-permanent housing unit' is an independent structure such as a hut or a cabin which has been constructed with locally available crude materials such as wooden planks, sun-dried bricks, straw or any similar vegetable materials for the purpose of habitation by one private household and which is used as the usual residence of at least one person at the census reference time. Such units are not expected to maintain their durability for as long a period of time as a conventional dwelling.
- (c) 'Other housing units designed for habitation' (sometimes referred to as 'improvised housing units') comprise independent, makeshift shelters or structures such as shacks and shanties, which have been built from unconventional or waste materials, which, though they may be regarded as

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being unfit for human habitation, are used as the usual residence of at least one person at the census reference time.

- (d) 'Other housing units not designed for habitation' comprise premises in permanent or semi-permanent buildings such as stables, barns, mills, garages, warehouses, offices, etc. which have not been built, rebuilt, converted or arranged for human habitation but are, nevertheless, used by one or more private households as their usual residence at the census reference time. This category also includes natural shelters such as caves, which are used by one or more private households as their usual residence at the census reference time.

884. 'Improvised housing units' and 'other housing units not designed for habitation' may also be summarised under the concept of 'informal housing'.

885. Premises not initially designed or constructed for human habitation but which have been converted for the purpose of habitation by a private household and which fulfil the requirements of a conventional dwelling should not be included in this category, but, instead, classified as conventional dwellings.

Collective living quarters

886. 'Collective living quarters' comprise premises which are designed for habitation by large groups of individuals or several households and which are used as the usual residence of at least one person at the census reference time.

887. The definitions applicable to the several types of 'collective living quarters' are set out below:

- (a) A 'hotel' is a separate and independent set of premises comprising all or part of a permanent building or set of buildings which by the way it has been built, rebuilt or converted is designed to provide accommodation on a fee basis and which is used as the usual residence of at least one person at the census reference time. Motels, inns, boarding houses, pensions, rooming houses and other lodging houses are included in this category. If the accommodation that is occupied by a private household residing in a hotel or similar establishment fulfils the requirements of a conventional dwelling, it should be classified as such. Otherwise it should be classified as part of the collective living quarters.
- (b) An 'institution' is a separate and independent set of premises comprising all or part of a permanent building or set of buildings which by the way it has been built, rebuilt or converted is designed for habitation by a large group of persons who are subject to a common authority or regime or bound by a common objective or personal interest, and which is used as the usual residence of at least one person at the census reference time. Such collective living quarters usually have certain shared common facilities such as cooking and toilet facilities, baths, lounge rooms or dormitories. This category includes premises such as nurses' hostels, student residences, hospitals, sanatoria and convalescent homes, welfare institutions, monasteries, convents, military and police barracks, prisons and reformatories.

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- (c) A 'camp' is a separate and independent set of premises comprising all or part of a semi-permanent or temporary structure or set of structures which by the way it has been built, rebuilt or converted is designed for the temporary accommodation of groups of persons with common activities or interests, and which is used as the usual residence of at least one person at the census reference time. Such collective living quarters usually have certain common shared facilities such as cooking and toilet facilities, baths, lounge rooms or dormitories. This category includes military camps, refugee camps and camps for housing workers employed by agriculture, logging, mining, construction or other enterprises.
- (d) 'Other' types of collective living quarters may be identified as those that do not conveniently fall within any of the categories (a)-(c) above. These may include traditional or urban kibbutzim, some old age communities, or other types of communal establishments that meet the broad definition of collective living quarters given above.

888. Housing units located within the grounds or building containing a hotel, institution or camp should be separately identified and counted as dwellings, if they fulfil the requirements of a conventional dwelling.

Housing topics

Characteristics of living quarters, housing units and conventional dwellings

889. The majority of topics in this chapter refer to characteristics and amenities of housing units, which include occupied conventional dwellings and other housing units. A few topics refer to characteristics of living quarters, which include housing units and collective living quarters, and one topic refers to the housing arrangements of both individuals and household (see Table 3).

890. For some of the topics, countries may also wish to collect information on those conventional dwellings that are reserved for seasonal and secondary use, but which, at the census reference time are vacant or which are occupied with residents not included in census, in addition to occupied conventional dwellings. It may be difficult to obtain information on these dwellings as, in many cases, they may not appear on mailing lists of conventional dwellings or, as these dwellings are not (permanently) occupied, there may be no one present at census time. Where information is collected, however, the same classifications described in this chapter, or simplified modifications, are recommended.

891. Information on some of the characteristics of housing units could also be obtained for collective living quarters. However, given the nature of collective living quarters, in some cases the information may not be collected and presented in the same way as for housing units. For instance, with regard to toilet or bathing facilities, the relevant information may relate to how many people use on average the same facility.

892. Priority should always be given to obtaining information on occupied conventional dwellings, which should be presented separately from other types of housing (including

other housing units, seasonal and secondary dwellings, vacant dwellings, dwellings with residents not included in census and collective living quarters). In this way it would be possible to assess the quality of life associated with the different types of housing. If information is obtained on collective living quarters, where possible it should be presented separately for the different categories of collective living quarters described in paragraph 887.

Type of living quarters (core topic)

893. Living quarters are defined in paragraph 872. Type of living quarters relate to occupied conventional dwellings, other housing units and collective living quarters.

894. It is recommended that living quarters be classified by type as follows:

- (1.0) Occupied conventional dwellings
- (2.0) Other housing units
 - (2.1) Mobile units
 - (2.2) Semi-permanent units
 - (2.3) Informal housing units
 - (2.3.1) Designed for habitation
 - (2.3.1) Not designed for habitation
- (3.0) Collective living quarters
 - (3.1) Hotels, rooming houses and other lodging houses
 - (3.2) Institutions
 - (3.3) Camps
 - (3.4) Other collective living quarters

895. This classification is recommended at the one-digit level but optional at the two- and three-digit level.

896. All occupied conventional dwellings and other housing units must be in use by at least one person as their usual residence at the census reference time in order to be counted as part of living quarters.

897. Since institutions can be of several different types, countries may sub-divide category (3.2) in the above classification to present detailed data on different categories of institutions. Within this context, consideration could be given to the categories of institutional households presented in paragraph 773 in the chapter on household and family characteristics and/or to the institutions listed in paragraph 887(b) above. Countries may also wish to sub-divide category (2.3) in the above classification to present data on improvised housing units ('other units designed for habitation') and other housing units not designed for habitation as is referred to in paragraphs 883(c) and (d).

Housing arrangements (derived core topic)

898. Housing arrangements cover the whole population and refers to the type of housing where a person is a usual resident at the census reference time. This covers all persons who are usual residents in different types of living quarters (including those who are primary homeless persons as defined in paragraph 780).

899. The concept of 'housing arrangement' ensures that the whole population is classified according to all the units counted in the housing census, including the consideration of those who are primary homeless persons (the 'roofless') living without any form of shelter (779-782).

900. The following classification by housing arrangement is recommended:

- (1.0) Occupants (that is persons with a usual residence) living in a conventional dwelling
- (2.0) Occupants (that is persons with a usual residence) living in another housing unit – such as a hut, cabin, shack, caravan, houseboat, or a barn, mill, cave or other shelter used for human habitation at the census reference time
- (3.0) Occupants (that is persons with a usual residence) living in a collective living quarter – a hotel, institution, camp, etc.
- (4.0) Primary homeless persons (that is persons who are not usual residents in any living quarter category)

901. This classification is considered at the level of individuals.

902. The number of occupants in the first three categories is the number of persons who usually reside in the living quarters, including persons who may be temporarily absent at the census reference time, but excluding people temporarily present at the census that usually live elsewhere (see paragraph 392 in the chapter on Population bases for the definition of 'place of usual residence'). As the type of living arrangements under categories (2.0) and (3.0) may vary across the UNECE region, countries may wish to sub-divide these categories (see paragraphs 893-897).

Occupancy status of conventional dwellings (core topic)

903. Occupancy status refers to whether or not a conventional dwelling is the place of usual residence of one or more persons.

904. Dwellings which are the usual residence of one or more persons are classified as being occupied whether or not the occupants are temporarily absent at the census reference time. Conventional dwellings which are not the place of usual residence of any person can be classified as being vacant, in seasonal/secondary use (whether or not being temporarily occupied by persons who are usually resident in another dwelling at the census reference time, see also paragraph 907) or temporarily occupied by persons not included in the census (see paragraph 402 in the chapter on population bases).

905. The following classification is therefore recommended:

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- (1.0) Conventional dwellings which are the usual residence of one or more persons at the census reference time (occupied dwellings)
- (2.0) Conventional dwellings which are not the usual residence of any person at the census reference time
 - (2.1) Dwellings reserved for seasonal or secondary use
 - (2.2.) Vacant dwellings
 - (2.2.1) Vacant for sale
 - (2.2.2) Vacant for rent
 - (2.2.3) Vacant for demolition
 - (2.2.4) Other vacant or not known
 - (2.3) Dwellings occupied by persons not included in the census

906. The classification is recommended at the one- and two-digit level but optional at the three-digit level. Categories (2.2.1) and (2.2.2) may be further sub-divided to show the length of time the dwelling has remained unoccupied – as an indication of the situation in the housing market in the area concerned, though it is recognised that this information may be difficult to collect in a census. Information on category (2.2.3) may also be difficult to collect. Moreover, it is arguable that dwellings that can be identified as being in the process of being demolished can justifiably be classified as ‘conventional dwellings’ in accordance with the definition in paragraph 876. They should certainly not be regarded as being part of the available housing stock.

907. Dwellings that are used during the working week only by persons who are usually resident in another dwelling at their family home should be considered as part of (2.0) ‘Conventional dwellings which are not the usual residence of any person at the census reference time’ because the persons using the dwelling are not usual residents of the dwelling.

Characteristics of dwellings with no occupants at the time of census (non-core topic)

908. This topic relates to those characteristics for which information might be collected on seasonal/secondary dwellings, vacant dwellings, and dwellings with persons not included in the census (see paragraph 402). The range of characteristics to be included will depend on the individual requirements of countries and the enumeration methodology adopted.

909. The majority of topics in this chapter relate to occupied conventional dwellings. However, there may be interest in collecting information on, at least, some of the main characteristics of *all* conventional dwellings. In the core topic ‘Occupancy status of conventional dwellings’ (paragraph 903-907 above) the number is obtained of all conventional dwellings, including seasonal, secondary and vacant dwellings, and those and with occupants that are not included in census. However, in addition to the total numbers, some countries may also wish to collect information on other characteristics in order to be

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able to produce more detail on the total housing stock. Such characteristics might include for example:

- (a) number of rooms and/or useful floor space (see paragraphs 921-928 below);
- (b) amenities, such as water supply system (paragraph 937), toilet facilities (paragraph 942), bathing facilities (paragraph 946), type of sewage disposal system (paragraph 953), and kitchen (paragraph 955); or
- (c) type of building (paragraph 980), position of dwelling within the building (paragraph 974), and number of floors in the building (paragraph 984);

using the same classifications, or simplified modifications, described in the corresponding paragraphs below. This information should be reported separately from the information on occupied conventional dwellings.

910. In addition to those dwellings that are fit for habitation year round, countries may also wish to collect similar information on premises that are not designed to be used throughout the year (such as mountain huts and primitive cabins). If countries collect such information it should ensure that it is not included in the data on conventional dwellings as such premises are not considered to be part of the potentially available housing stock.

911. The metadata must make the concepts underlying the collection of the information clear. The main approach should be that the information on secondary and seasonal dwellings covers those dwellings that are at the disposal of one household on at least an annual basis. For other circumstances, double counting, which may occur, for example, where there is joint ownership of a secondary dwelling by two or more households, should be avoided.

Type of ownership (core topic)

912. This topic refers to the type of ownership of dwelling as distinct from the land on which the dwelling stands.

913. The topic 'type of ownership' should not be confused with the household characteristic of 'tenure status' (see paragraphs 847-848) as it relates to status of the dwelling as distinct from that of the household.

914. The following classification of dwellings by type of ownership is recommended:

- (1.0) Owner-occupied dwellings
- (2.0) In co-operative ownership
- (3.0) Rented dwellings
 - (3.1) In private ownership
 - (3.2) Owned by the local or central government and/or by non-profit organisations
 - (3.3) Mixed ownership
- (4.0) Other types of ownership

915. This classification is recommended for occupied conventional dwelling at the one-digit level but optional at the two-digit level.

916. If any sub-divisions of category (1.0) or (2.0) are distinguished for national purposes, the types of ownership included in each of the sub-divisions should be clearly described in the census report(s).

Occupancy by number of private households (derived non-core topic)

917. This topic relates to the occupancy of all housing units in terms of the number of occupying households. It is only relevant for countries which use the 'housekeeping unit' concept of the private household (see paragraphs 768-769)

918. The following classification of housing units by single or shared occupancy is recommended:

- (1.0) Housing units occupied by a single household
- (2.0) Housing units occupied by two households
- (3.0) Housing units occupied by three or more households

Number of occupants (core topic)

919. The number of occupants of a living quarter is the number of people for whom the living quarter is the usual residence.

920. A classification of the total number of living quarters according to the type (occupied conventional dwellings, other housing units and collective living quarters) and the number of occupants should be adopted (for example, dwellings with one person, two persons, etc.). The average number of occupants per each type of living quarter should also be derived.

Useful floor space and/or number of rooms of housing units (core topic)

921. 'Useful floor space' is defined as *"the floor space measured inside the outer walls, excluding non-habitable cellars and attics and, in multi-dwelling buildings, all common spaces"*.⁷⁶ Alternatively, countries may prefer to adopt another concept of living floor space, defined as "the total floor space of rooms within the dwelling" where the concept of a 'room' is as defined in paragraph 925 below. If this concept is used it should clearly be defined in the census report(s) and/or relevant metadata to avoid confusion in international comparisons.

922. Information concerning useful floor space should be collected for all housing units, and particularly for occupied conventional dwellings, so that the density standard using this

⁷⁶ Programme of Current Housing and Building Statistics for Countries in the UNECE Region (Statistical Standards and Studies No. 43).

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indicator can be calculated (see paragraphs 929-933 below). Countries should also report the average useful floor space per housing unit.

923. The following classification of housing units by area of floor space is recommended:

- (1.0) Under 30 square metres
- (2.0) 30 and less than 40 square metres
- (3.0) 40 and less than 50 square metres
- (4.0) 50 and less than 60 square metres
- (5.0) 60 and less than 80 square metres
- (6.0) 80 and less than 100 square metres
- (7.0) 100 and less than 120 square metres
- (8.0) 120 and less than 150 square metres
- (9.0) 150 square metres and over

924. Alternatively, or in addition, countries should report the total number of rooms and the average number of rooms per housing unit.

925. A 'room' is defined as *"a space in a housing unit enclosed by walls reaching from the floor to the ceiling or roof covering, at least to a height of 2 metres above the ground, of a size large enough to hold a bed for an adult (4 square metres at least) and at least 2 metres high over the major area of the ceiling"*. Thus, normal bedrooms, dining rooms, living rooms, habitable cellars and attics, servants' rooms, kitchens and other separate spaces used or intended for habitation all count as rooms if they correspond to the definition above. A kitchenette (that is, a kitchen of less than 4 square metres), verandas, utility rooms (for example boiler rooms, laundry rooms) and lobbies do not count as rooms; nor do bathrooms and toilets (even if they are more than 4 square metres). Rooms without windows, for example cellars below ground – however large – should not generally be counted, unless they are functionally used for domestic purposes – which might include large lobbies with writing tables or internal bedrooms with no windows for example.

926. The following classification of number of rooms is recommended:

- (1.0) One room
- (2.0) Two rooms
- (3.0) Three rooms
- (4.0) Four rooms
- (5.0) Five rooms
- (6.0) Six rooms
- (7.0) Seven rooms
- (8.0) Eight rooms
- (9.0) Nine rooms or more

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927. Classification by number of rooms – so that the density standard (as classified in paragraph 932 below) can be calculated – is recommended for occupied conventional dwellings and optional for other housing units.

928. Rooms used only for business and professional purposes should preferably be counted separately as it is desirable to include them when calculating the number of rooms in a housing unit but to exclude them when calculating, for instance, the number of persons per room. Each country should indicate in its census report(s) and/or relevant metadata how such rooms have been treated. At the lower quality end of dwellings, which constitute 'other housing units', there may be difficulties in defining rooms and useful floor space. Countries should then note the number of 'other housing units' for which information could not be collected. These housing units are to be excluded from housing density standards. Information on useful floor space and number of rooms for conventional dwellings should always be reported separately.

Density standard (derived core topic)

929. If possible, useful floor space should be used in preference to the number of rooms, since useful floor space in square metres divided by the number of occupants in a housing unit is generally regarded as a better measure of density standard than the number of rooms divided by the number of occupants in a housing unit because rooms vary in size. However, in some countries the householder may not know, with any degree of accuracy, the size of the useful floor space. For comparative purposes, therefore, it is better that countries collect both the number of rooms per occupant and the useful floor space in square metres per occupant where possible.

930. Overcrowding indicators can be calculated using a cross-tabulation of the number of occupants in housing units (that is, housing units with one person, two persons, etc as described in paragraphs 919-920 above), and the housing units classified by number of rooms (that is, one-room housing units, two-room housing units, etc.) or by number of bedrooms (see paragraphs 935-936 below. In addition, the average useful floor space per occupant can be calculated separately for housing units with one person, housing units with two persons and so on.

931. The following classification of useful floor space per occupant is recommended:

- (1.0) Under 10 square metres per occupant
- (2.0) 10 and less than 15 square metres per occupant
- (3.0) 15 and less than 20 square metres per occupant
- (4.0) 20 and less than 30 square metres per occupant
- (5.0) 30 and less than 40 square metres per occupant
- (6.0) 40 and less than 60 square metres per occupant
- (7.0) 60 and less than 80 square metres per occupant
- (8.0) 80 square metres and over per occupant

932. The following classification for number of rooms per occupant is recommended:

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- (1.0) Less than 0.5 room per occupant
- (2.0) 0.5 and less than 1.0 room per occupant
- (3.0) 1.0 and less than 1.25 rooms per occupant
- (4.0) 1.25 and less than 1.5 rooms per occupant
- (5.0) 1.5 and less than 2 rooms per occupant
- (6.0) 2 and less than 2.5 rooms per occupant
- (7.0) 2.5 and less than 3 rooms per occupant
- (8.0) 3 or more rooms per occupant

933. If the information is collected for other housing units or for collective living quarters, it should be shown separately from that for conventional dwellings.

Type of rooms (non-core topic)

934. Some countries may wish to provide more specific information on overcrowding within housing units by providing information on the number of certain types of rooms within housing units.

935. Some countries consider that the number of bedrooms provides a more accurate indicator of overcrowding, especially where overcrowding is defined by an algorithm derived from the number of bedrooms and the age, sex and relationships of members within the household. However, for such purposes, a room that is used as household living space should not be included as a bedroom.

936. The count of the following categories of rooms for housing units is suggested:

- (1.0) Reception and living rooms
- (2.0) Bedrooms

Water supply system (core topic)

937. Countries should collect information on water supply systems for all housing units but should report it separately for occupied conventional dwellings.

938. The following classification of occupied conventional dwellings and other housing units by type of water supply system is recommended:

- (1.0) Piped water in the housing unit
 - (1.1) From a community scheme
 - (1.2) From a private source
- (2.0) No piped water in the housing unit
 - (2.1) Piped water available within the building but outside the housing unit
 - (2.1.1) From a community scheme

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(2.1.2) From a private source

(2.2) Piped water available outside the building

(2.2.1) From a community scheme

(2.2.2) From a private source

(2.3) No piped water available

939. This classification is recommended at the one-digit level and optional at the two and three-digit levels.

940. A community scheme is one, which is subject to inspection and control by public authorities. A public body generally operates such schemes but in some cases they are operated by a co-operative or a private enterprise.

941. It is recognised that some countries, where the proportion of dwellings equipped with piped water is very high, almost 100 per cent nationally, may not feel that the collection of such information in the census is justified in comparison with other more relevant or discriminating topics.

Toilet facilities (core topic)

942. Countries should collect information on toilet facilities for all housing units but should report it separately for occupied conventional dwellings.

943. The following classification of occupied conventional dwellings and other housing units by type of toilet facilities is recommended:

(1.0) Flush toilet in the housing unit

(2.0) No flush toilet in the housing unit

(2.1) Toilet of other type in the housing unit

(2.2) Flush toilet available within the building but outside the housing unit

(2.2.1) Private (that is, for the exclusive use of the occupants of the housing unit)

(2.2.2) Shared (that is, shared with occupants of another housing unit)

(2.3) Flush toilet available outside the building

(2.3.1) Private

(2.3.2) Shared

(2.4) Toilet of other type within the building but outside the housing unit

(2.4.1) Private

(2.4.2) Shared

(2.5) Toilet of other type outside the building

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(2.5.1) Private

(2.5.2) Shared

944. This classification is recommended at the one-digit level and optional at the two and three-digit levels.

945. As is the case with water supply system, it is recognised that some countries, where the proportion of dwellings equipped with a flush toilet is very high, almost 100 per cent nationally, may not feel that the collection of such information in the census is justified in comparison with other more relevant or discriminating topics.

Bathing facilities (core topic)

946. All countries should collect information report on bathing facilities for all housing units, but should report it separately for occupied conventional dwellings.

947. It is recommended that the following classification of bathing facilities be used:

(1.0) Fixed bath or shower in the housing unit

(2.0) No fixed bath or shower in the housing unit

(2.1) Fixed bath or shower available within the building but outside the housing unit

(2.1.1) Private

(2.1.2) Shared

(2.2) Fixed bath or shower available outside the building

(2.2.1) Private

(2.2.2) Shared

(2.3) No fixed bath or shower available

948. This classification is recommended at the one-digit level and optional at the two and three-digit levels. A fixed bath or shower is one, which has fixed connections to both a water supply and a waste pipe leading outside the building.

949. Some countries in which the use of a sauna is commonplace may wish to identify such use, either inside or outside the housing unit, separately from other bathing facilities.

950. Again, it is recognised that some countries, where the proportion of dwellings with bathing facilities is very high, almost 100 per cent nationally, may not feel that the collection of such information in the census is justified in comparison with other more relevant or discriminating topics.

Hot water (non-core topic)

951. Information should be given separately on the availability of hot water within occupied conventional dwellings and, depending on the availability of information, within other housing units. Each country should define the concept of 'hot water'.

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952. A classification similar to that given for the availability of bathing facilities would be appropriate.

- (1.0) Hot water tap in the housing unit
- (2.0) No hot water tap in the housing unit
 - (2.1) Hot water tap available within the building but outside the housing unit
 - (2.2) Hot water tap available outside the building
 - (2.3) No hot water tap available

Type of sewage disposal system (non-core topic)

953. It is preferable that countries collect information on the type of sewage disposal system in all housing units but report it separately for occupied conventional dwellings. It is recommended that countries that use the building as a unit of data collection, should report on the type of sewage disposal system to which the building is connected, and to assign this information to the housing unit.

954. The following classification of occupied conventional dwellings and of other housing units by type of sewage disposal system is recommended:

- (1.0) Wastewater empties into a piped system connected to a public sewage disposal plant
- (2.0) Wastewater empties into a piped system connected to a private sewage disposal plant (for example a septic tank built for a single housing unit or a small group of dwellings)
- (3.0) All other arrangements (for example wastewater empties into an open ditch, a pit, a cesspool, a river, the sea, etc.)
- (4.0) No sewage disposal system

Kitchen (non-core topic)

955. It is suggested that where occupied conventional dwellings and other housing units are classified by number of rooms they should also be classified by availability of a kitchen. A kitchen is defined as a room (or part of a room) of at least 4 square metres or two metres wide that has been designed and equipped for the preparation of the principal meals and is used for that purpose, irrespective of whether it is also used for eating, sleeping or living.

956. The kitchen is counted as a 'room' in these recommendations (see paragraph 925). Since certain countries apply different practices in this respect, it is important to be able to count the number of rooms both with the kitchen included and excluded. This will make international comparisons possible.

957. The definition of a kitchen adopted for the census should be given in detail in the relevant census report and/or metadata, and attention should be drawn to any deviations from the general definition given above. In particular, countries should indicate how they

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have classified dwellings in which meals are prepared in a room that is also used for other activities.

958. The following classification of dwellings by availability of a kitchen is recommended:

- (1.0) With a kitchen
- (2.0) With a kitchenette (that is a separate space with less than 4 square metres or two metres width of floor space)
- (3.0) Without a kitchen or kitchenette
- (4.0) Cooking facilities are provided in another type of room

Type of heating (core topic)

959. Countries should report separately the type of heating in occupied conventional dwellings and other housing unit.

960. The following classification of occupied conventional dwellings and of other housing units by type of heating is recommended:

- (1.0) Central heating
 - (1.1) Central heating from an installation in the building or in the housing unit
 - (1.2) Central heating from a community heating centre
- (2.0) No central heating
 - (2.1) Heating facilities or equipment available in the occupied conventional dwelling/other housing unit
 - (2.1.1) Stove
 - (2.1.2) Fireplace
 - (2.1.3) Portable electric heater
 - (2.1.4) Other
 - (2.2) No heating at all

961. This classification is recommended at the one-digit level and optional at the two-digit level.

962. A housing unit is considered as centrally heated if heating is provided either from a community heating centre or from an installation built in the building or in the housing unit, established for heating purposes, without regard to the source of energy. Some countries may wish to include additional sub-categories in this classification so as to obtain information that can be used for energy planning (see also the following non-core topic on 'main type of energy used for heating').

Main type of energy used for heating (non-core topic)

963. In addition to the core topic type of heating, some countries may also wish to collect information on the main type of energy used for heating purposes. If this information is available it should be reported separately for occupied conventional dwellings and other housing units.

964. The following classification of occupied conventional dwellings and of other housing units by main type of energy used for heating purposes is recommended:

- (1.0) Solid fuels
 - (1.1) Coal, lignite and products of coal and lignite
 - (1.2) Wood and other renewable wood-based products
 - (1.3) Other
- (2.0) Oil
- (3.0) Gaseous fuels
 - (3.1) Natural gas
 - (3.2) Other (including liquefied gases)
- (4.0) Electricity
- (5.0) Other types of energy used
 - (5.1) Solar energy
 - (5.2) Wind energy
 - (5.3) Geothermal energy
 - (5.4) Other

965. Countries should indicate in the census report(s) and/or relevant metadata how the main type of energy was selected in a housing unit where two types of energy were equally used for heating purposes.

Electricity (non-core topic)

966. Countries collecting information on the availability of electricity within the housing unit should report it separately for occupied conventional dwellings and other housing units.

967. The following classification of occupied conventional dwellings and of other housing units by the availability of electricity is recommended:

- (1.0) Electricity available in the housing unit
- (2.0) No electricity available in the housing unit

Piped gas (non-core topic)

968. Piped gas should be defined as natural or manufactured gas which is distributed by pipeline, and the consumption of which is recorded by gas meters. Countries collecting information on the availability of piped gas should report it separately for occupied conventional dwellings and other housing units.

969. A classification similar to that suggested for availability of electricity would be appropriate.

- (1.0) Piped gas available in the housing unit
 - (1.1) For both heating and cooking purposes
 - (1.2) For heating purposes only
 - (1.3) For cooking purposes only
- (2.0) No piped gas available in the housing unit

Air-conditioning (non-core topic)

970. Some countries may wish to record air-conditioning as a housing quality measure, but the use and importance of this topic as a housing measure may vary across countries. If this information is collected it should be reported separately for occupied conventional dwellings and other housing units.

971. The following classification of air-conditioning is recommended:

- (1.0) Air-conditioning available in the housing unit
 - (1.1) Central air-conditioning from an installation in the building or in the housing unit
 - (1.2) Independent air-conditioning unit(s) available in the housing unit
- (2.0) No air-conditioning available in the housing unit

Accessibility to dwelling (non-core topic)

972. Some countries may want to collect information on the accessibility to dwellings, in particular with reference to accessibility by persons with disabilities. Countries collecting this information should report it separately for occupied conventional dwellings and other housing units.

973. The following classification of accessibility to the front door of the dwelling is recommended, based on the presence of ramps, steps, and lifts:

- (1.0) Access with no steps or ramp
- (2.0) Access by ramp
- (3.0) Access by disabled stair lift
- (4.0) Access using lift only (though the building may have staircases as well)

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(5.0) Access by using only steps

(6.0) Access only by using both lift and steps

Note that these categories are not mutually exclusive.

Position of dwelling in the building (non-core topic)

974. Some countries may want to collect information on the position of dwellings within the building. This information can be used as an indicator of accessibility to dwellings, possibly in conjunction with the non-core topic accessibility to dwelling. Countries collecting this information should report it separately for occupied conventional dwellings.

975. The following classification of dwellings by position in the building is recommended:

(1.0) Dwellings on one floor only

(1.1) Dwelling on the ground floor of the building or lower (below ground level)

(1.2) Dwelling on the first or second floor of the building

(1.3) Dwelling on the third or fourth floor of the building

(1.4) Dwelling on the fifth floor of the building or higher

(2.0) Dwellings on two or more floors

(2.1) Dwelling on the ground floor of the building or lower (below ground level)

(2.2) Dwelling on the first or second floor of the building

(2.3) Dwelling on the third or fourth floor of the building

(2.4) Dwelling on the fifth floor of the building or higher

976. The sub-categories of (2.0) "Dwellings with two or more floors" each refer to the lowest floor of the dwelling with two or more floors.

Characteristics of buildings containing dwellings

977. The building containing conventional dwellings is an important unit since information on building characteristics such as type of building and period of construction is required to describe the dwellings within the building and for formulating housing programmes. The topics included in this section refer to occupied conventional dwellings as primary unit of enumeration. The main interest is to report on the characteristics of occupied conventional dwellings. The idea is not to describe the characteristics of buildings per se, but instead to count the number of dwellings in buildings with different characteristics.

978. The definition of building is given in paragraph 870.

979. Countries may wish to collect characteristics of buildings for other housing units than occupied conventional dwellings, such as collective living quarters, or for all conventional dwellings. If they do so, they should report the information separately for occupied conventional dwellings.

Dwellings by type of building (core topic)

980. Dwellings may be classified by type of building where they are placed.

981. The following classification for dwellings by type of building is recommended at the one-, two- and three-digit level.

(1.0) Residential buildings

(1.1) Detached house (houses not attached to any other buildings)

(1.1.1) Detached houses with one dwelling

(1.1.2) Detached houses with two dwellings (with one above the other)

(1.2) Semi-detached house (two attached dwellings)

(1.3) Row (or terraced) house (at least three attached or connected dwellings each with separate access to the outside)

(1.4) Apartment buildings

(1.4.1) Apartment buildings with three to nine dwellings

(1.4.2) Apartment buildings with 10 or more dwellings

(1.5) Other residential buildings

(2.0) Non-residential buildings

982. For some purposes, it might be useful to classify the buildings by the number of dwellings that they contain. The following classification is recommended at the one- and two-digit level:

(1.0) Conventional dwellings in residential buildings

(1.1) Conventional dwellings in residential buildings with one dwelling

(1.2) Conventional dwellings in residential buildings with two dwellings

(1.3) Conventional dwellings in residential buildings with three or more dwellings

(2.0) Conventional dwellings in non-residential buildings

983. If no information on the classification under paragraph 981 is available, the breakdown of buildings by the number of dwellings a building contains might be obtained by direct enumeration.

Dwellings by number of floors in the building (non-core topic)

984. This topic refers to the number dwellings in a building analysed by the number of floors of the building, where the number of floors is counted from the ground floor of the building upwards (and is irrespective of the number of floors of the dwelling).

985. The following classification of the number of floors in a building is recommended:

- (1.0) 1 floor
- (2.0) 2 floors
- (3.0) 3 floors
- (4.0) 4 floors
- (5.0) 5-9 floors
- (6.0) 10-19 floors
- (7.0) 20 floors or more

Lift (non-core topic)

986. It is suggested that information on the presence of a working lift/elevator in multi-storey buildings might be collected. Countries collecting this information for all housing units should report it separately for occupied conventional dwellings. The information should not be limited to just the presence of a lift, but it should report if the lift is operational for most of the time and is subject to regular maintenance. It could also be useful to collect information on the size of the lift (relevant for use, for example, by the handicapped persons and ambulance services), and if the lift goes to the ground floor.

987. Some countries may also want to collect information on the availability of a working lift with reference to individual dwellings in a building. In this case, information should be collected on whether or not the lift stops on the same floor as the dwelling.

Dwellings by period of construction of building (core topic)

988. Period of construction is measured in terms of the date when the building was completed.

989. It should be noted that the date in which a particular dwelling was constructed may not necessarily be the same as that in which the construction of the building itself was completed. The following classification of dwellings by the period in which the construction of the building containing them was completed is recommended:

- (1.0) Before 1919
- (2.0) 1919 – 1945
- (3.0) 1946 – 1960
- (4.0) 1961 – 1970
- (5.0) 1971 – 1980
- (6.0) 1981 – 1990
- (7.0) 1991 – 2000
- (8.0) 2001 – 2010
- (9.0) 2011 – 2015

(10.0) 2016 or later

(10.1) 2016

(10.2) 2017

(10.3) 2018

(10.4) 2019

(10.5) 2020

(10.6) 2021

990. This classification is recommended at the one-digit level, and optional at the two-digit level.

991. Dwellings in buildings, which have undergone thorough reconstruction since they were originally built, may be classified to the period in which the building was originally constructed or to the period of latest reconstruction according to national requirements. Each country should indicate in its census report(s) and/or metadata how such dwellings have been classified.

Dwellings by materials of which specific parts of the building are constructed (non-core topic)

992. Information on the materials of which specific parts of buildings containing dwellings are constructed may be used, in conjunction with data on other topics (such as period of construction) for assessing the quality of dwellings. Some countries may wish to collect data on the materials of which the outer walls, the roof, the floors, etc. are constructed for this and other purposes.

993. The following classification of dwellings by the main structural material of which the outer walls of the building containing them are constructed is suggested:

(1.0) Wood

(2.0) Unburnt clay (may be omitted by countries where this is not important)

(3.0) Burnt clay (bricks, blocks, panels, etc.), stone, concrete (in situ cast concrete, blocks, panels, etc.), or steel frame

(4.0) Prefabricated units – generally factory constructed and brought to the site and erected

(5.0) Other material (to be specified)

(6.0) Mixed materials (that is a combination of building materials)

Dwellings by state of repair of the building (non-core topic)

994. This topic refers to whether the building is in need for repair and the kind of repair needed.

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995. The recommended classification of dwellings according to the state of repair of the building is suggested:

- (1.0) Repair not needed
- (2.0) In need of repair
 - (2.1) Minor repair
 - (2.2) Moderate repair
 - (2.3) Serious repair
- (3.0) Irreparable

996. 'Minor repair' refers mostly to the regular maintenance of the building and its components, such as fixing a cracked window or inoperative lock, or removing graffiti from the front wall and so forth.

997. 'Moderate repair' refers to correcting more substantial defects such as gutters missing on the roof (where they are normally used), large areas of broken plaster and stairways with no secure hand railing.

998. 'Serious repairs' are needed to remedy more serious structural defects of the building such as missing covering material (for example, shingles, tiles), cracks and holes in the exterior walls, and missing stairways.

999. 'Irreparable' refers to buildings that are beyond repair, that is, because of the seriousness of the structural defects it is deemed more appropriate or necessary to demolish them rather than to undertake repairs. This usually refers to buildings with only the frame left standing, without complete external walls and/or roof, windows, doors, etc.

ANNEXES

Annex I: List of proposed core and non-core topics for the 2020 round of population and housing censuses, CES countries

<u>CORE TOPICS</u>	<u>NON-CORE TOPICS</u>
<u>Population to be enumerated</u>	
Location of place of usual residence (para. 410)	

<u>Geographic characteristics</u>	
<i>Locality (derived)</i> (para. 412)	<i>Population grid (derived)</i> (para. 428)
Location of living quarters (para. 421)	<i>Degree of urbanization (derived)</i> (para. 434)
<i>Urban and rural areas (derived)</i> (para. 422)	Location of school, college or university (para. 446)
Location of place of work (para. 440)	Mode of transport to work (or to place of education) (para. 447)
	Distance travelled to work (or to place of education) and time taken (para. 451)

<u>Demographic characteristics</u>	
Sex (para. 454)	Total number and sex of children born alive (para. 475)
Age (para. 457)	Date(s) of legal marriage(s) of ever married women: (i) first marriage and (ii) current marriage (para. 478)
Legal marital status (para. 460)	Date(s) of the beginning of the consensual union(s) of women having ever been in consensual union: (i) first consensual union and (ii) current consensual union (para. 480)
De facto marital status (para. 469)	

Annex I

<u>CORE TOPICS</u>	<u>NON-CORE TOPICS</u>
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<u>Economic characteristics</u>	
Labour force status (para. 496)	Institutional sector (para. 548)
Occupation (para. 528)	Type of place of work (para. 552)
Industry (branch of economic activity) (para. 532)	Number of persons working in the local unit of the establishment (para. 554)
Status in employment (para. 536)	Hours usually worked (para. 557)
	Duration of job search (para. 561)
	Persons in own-use production of goods (para. 564)
	Main source of livelihood (para. 570)
	Household income (para. 578)
	<i>Socio economic group (derived)</i> (para. 583)

<u>Agriculture</u>	
	Own-account agriculture production (household level) (para. 593)
	Characteristics of all agricultural jobs during the last year (individual level) (para. 597)

<u>Educational characteristics</u>	
Educational attainment (para. 602)	Educational qualifications (para. 611)
	Field of education and training (para. 613)
	School attendance (para. 619)
	Literacy (para. 625)
	Computer literacy (para. 630)

Annex I

<u>CORE TOPICS</u>	<u>NON-CORE TOPICS</u>
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<u>Migration</u>	
Country of birth (para. 648)	Country of birth of parents (para. 652)
Country of citizenship (para. 655)	Citizenship acquisition (para. 660)
Ever resided abroad and year of arrival in the country (para. 662)	Country of previous usual residence abroad (para. 666)
Place of birth (para. 678)	Total duration of residence in the country (para. 669)
Previous place of usual residence and date of arrival in the current place (para. 682)	Reason for migration (para. 670)
	<i>Population with refugee background (derived)</i> (para. 672)
	Place of usual residence five years prior to the census (para. 688)
	<i>Internally Displaced Persons (IDPs) (derived)</i> (para. 689)

<u>Ethno-cultural characteristics</u>	
	Ethnicity (para. 700)
	Religion (para. 713)
	Language (para. 723)

<u>Disability</u>	
	Disability status (para. 733)

Annex I

<u>CORE TOPICS</u>	<u>NON-CORE TOPICS</u>
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<u>Household and family characteristics</u>	
Relationships between household members (para. 792)	<i>Extended family status (derived)</i> (para. 819)
<i>Household status (derived)</i> (para. 808)	<i>Type of reconstituted family (derived)</i> (para. 827)
<i>Family status (derived)</i> (para. 813)	<i>Type of extended family (derived)</i> (para. 832)
<i>Type of family nucleus (derived)</i> (para. 822)	<i>Other household classifications (derived)</i> (para. 839)
<i>Size of family nucleus (derived)</i> (para. 834)	<i>Generational composition of private households (derived)</i> (para. 841)
<i>Type of private household (derived)</i> (para. 835)	Single or shared occupancy (para. 844)
<i>Size of private household (derived)</i> (para. 842)	Rent and other housing costs (para. 852)
Tenure status of households (para. 847)	Durable consumer goods possessed by the household (para. 857)
	Number of cars available for the use of the household (para. 858)
	Availability of car parking (para. 860)
	Telephone and Internet connection (para. 862)

Annex I

<u>CORE TOPICS</u>	<u>NON-CORE TOPICS</u>
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<u>Housing characteristics⁷⁷</u>	
Type of living quarters (para. 893)	Characteristics of dwellings with no occupants at the time of census (para. 908)
Housing arrangements (para. 898)	Occupancy by number of private households (para. 917)
Occupancy status of conventional dwellings (para. 903)	Type of rooms (para. 934)
Type of ownership (para. 912)	Hot water (para. 951)
Number of occupants (para. 919)	Type of sewage disposal system (para. 953)
Useful floor space and/or number of rooms of housing units (para. 921)	Kitchen (para. 955)
<i>Density standard (derived)</i> (para. 929)	Main type of energy used for heating (para. 963)
Water supply system (para. 937)	Electricity (para. 966)
Toilet facilities (para. 942)	Piped gas (para. 968)
Bathing facilities (para. 946)	Air-conditioning (para. 970)
Type of heating (para. 959)	Accessibility to dwelling (para. 972)
Dwellings by type of building (para. 980)	Position of dwelling in the building (para. 974)
Dwellings by period of construction of building (para. 988)	Dwellings by number of floors in the building (para. 984)
	Lift (para. 986)
	Dwellings by materials of which specific parts of the building are constructed (para. 992)
	Dwellings by state of repair of the building (para. 994)

⁷⁷ See paragraph 869 and Table 3 to determine whether the topic is core, non-core or not recommended for different types of housing.

Annex II: The fundamental principles of official statistics in the context of population and housing censuses

Introduction

1. The need for a set of principles governing official statistics became apparent at the end of the 1980s when countries in Central Europe began to change from centrally planned economies to market-oriented democracies. It was essential to ensure that national statistical systems in such countries would be able to produce appropriate and reliable data that adhered to certain professional and scientific standards. Towards this end, the Conference of European Statisticians developed and adopted the Fundamental Principles of Official Statistics in 1992.⁷⁸ Statisticians in other parts of the world soon realized that the principles were of much wider, global significance. Following an international consultation process, a milestone in the history of international statistics was reached when the United Nations Statistical Commission at its Special Session of 11-15 April 1994⁷⁹ adopted the very same set of principles — with a revised preamble — as the United Nations Fundamental Principles of Official Statistics. The principles have been endorsed also by the United National General Assembly during its 68th session on 23 January 2014. This was an historic recognition of their importance as basic framework for official statistics at the global level.

2. At its forty-second session in 2011, the Statistical Commission discussed the Fundamental Principles of Official Statistics and acknowledged that the Principles were still as relevant today as they had been in the past and that no revision of the ten principles themselves was necessary. The Commission recommended, however, that a 'Friends of the Chair' group revise and update the preamble of the Fundamental Principles in order to take into account new developments since the time when the Principles were first formulated. At its forty-fourth session in 2013, the Statistical Commission adopted the revised preamble.

The ten principles

3. The ten principles are:

- (1) Official statistics provide an indispensable element in the information system of a democratic society, serving the government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honour citizens' entitlement to public information.
- (2) To retain trust in official statistics, the statistical agencies need to decide, according to strictly professional considerations including scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data.

⁷⁸ Economic Commission for Europe, Report of the 8th meeting, 15 April 1992.

⁷⁹ The Statistical Commission adopted a revised preamble for the Fundamental Principles at its forty-fourth session in 2013.

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- (3) To facilitate a correct interpretation of the data, the statistical agencies are to present information according to scientific standards on the sources, methods and procedures of the statistics.
- (4) The statistical agencies are entitled to comment on erroneous interpretation and misuse of statistics.
- (5) Data for statistical purposes may be drawn from all types of sources, be they statistical surveys or administrative records. Statistical agencies are to choose the source with regard to quality, timeliness, costs and the burden on respondents.
- (6) Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes.
- (7) The laws, regulations and measures under which the statistical systems operate are to be made public.
- (8) Coordination among statistical agencies within countries is essential to achieve consistency and efficiency in the statistical system.
- (9) The use by statistical agencies in each country of international concepts, classifications and methods promotes the consistency and efficiency of statistical systems at all official levels.
- (10) Bilateral and multilateral cooperation in statistics contributes to the improvement of systems of official statistics in all countries.

4. These fundamental principles have been incorporated into the standards, principles, definitions, legal frameworks, and Codes of Practice of the majority of national and international statistical systems.

5. Enshrining principles in law is very instrumental, but not sufficient in itself. These principles have to be translated into institutional governance structures, public assurances, and guidelines for staff. Processes must be established by which decisions, especially in borderline cases, are taken in such a way that they build up a set of consistent case-laws within the statistical system or at least within the NSI. These guidelines for ethical and professional behaviour should be interpreted by staff, through training and implementation, as part of their everyday data collection, processing, and dissemination work. The senior statisticians in NSIs should give a model of behaviour to all other staff in this respect, and contribute to promoting the ethical foundations of official statistics with all stakeholders, the media, and the public.

6. These principles are a formulation of the professional and ethical standards that are necessary to ensure credibility in the results of official statistics by all users, and to ensure the integrity of the national institutions that act as producers of official statistics. They are meant to be applicable to all subject areas of official statistics, to all national producers of official statistics, and for all the processes that are involved in producing and disseminating official statistics. They should be the yardsticks for the national legislation that defines the institutional framework of official statistics, and for the behaviour of all staff involved in these processes. Many countries have developed a general statistics law that meets these

criteria, and have elaborated them in their national context in the form of a public-facing Code of Practice.

7. The notion of a national statistical system is used here as the sum of all public bodies that are producers of official statistics in the sense defined by the relevant national legislation. The eighth principle asks that these producers do not act in isolation, but are coordinated. In addition, the statistical system should include any coordinating or advisory bodies for official statistics foreseen by the statistical legislation or set up on the basis of this legislation.

8. In the case of public bodies other than the NSI (or statistical offices at regional or local level) acting as producers of official statistics, the fundamental principles of official statistics imply that statistical tasks are subject to the statistical legislation, and that they are clearly separated in the organisation chart from other tasks assigned to this department, ministry or agency. The notion of producer of official statistics (and of the statistical system) does not necessarily include therefore an entire ministry, department or agency, but only those organisational sub-units that have regular tasks as producers of official statistics in the above sense. Where such sub-units are led by a named senior responsible statistician this adds further to statistical governance control and greater public reassurance. All government units other than producers defined in this way are considered as potential users of official statistics. This clarification is important because the notion of professional independence refers to this boundary in terms of decisions to be made within the statistical system. Also, the exchange of data subject to statistical confidentiality should not be extended to government units other than the statistical producers in the above definition or research institutions.

9. Population and housing statistics are some of the most publicly visible activities of national official statistics, in particular where there is direct data collection such as in the Census in most countries, and therefore adherence to these principles is of particular importance. NSIs must ensure that population censuses, both in reality and in the perception of users and respondents, are in line with these principles, so that the credibility not only of the census, but of the entire NSI and the whole statistical system are not compromised. It is therefore recommended that any specific legislation on the population census in countries where a general statistics law with explicit recognition of the fundamental principles is in force, explicitly acknowledges the applicability of these principles for the census.

Privacy and confidentiality

10. In the context of a population census, the most important principle for the population as the provider of the information is the interference with personal privacy at the time of data collection (when there is direct data collection), and the subsequent confidential use of their individual information. The fifth principle refers to the selection of sources in consideration of the burden on respondents. Deciding the balance between the public good value of a statistic and the private life intrusion of the data collection is one of the most difficult tasks facing a statistics office. In the context of a census, where a response to the inquiry may be mandatory, it is likely that the national parliament must debate that balance and enshrine the outcome in legislation. Where a member of the public is to be compelled by the state to reveal matters that are private to them, an unambiguous mandate

for such collection is of the essence, especially if refusal to supply such information on demand could result in legal sanctions against the individual.

11. When private and personal information is obtained under compulsion, it is all the more important to guarantee its confidentiality. The sixth principle refers to the use by statistical authorities of individual data, whether they refer to natural or legal persons,⁸⁰ to be strictly confidential and used exclusively for statistical purposes. When collecting individual data from respondents through surveys or censuses, statistical producers must state this pledge, which in most countries is enshrined in national legislation, very prominently in order to persuade respondents to participate and to provide correct information. The term 'statistical purposes'⁸¹ in this context excludes the use of such information for any decisions by a government or public sector authority (including courts) targeted at an individual unit. Thus, it eliminates the possible perception of respondents that the individual information they provide in good faith about themselves could be used against them. Secondly, the principle ensures that the statistical producers are seen to take seriously the concern of respondents about the privacy of the information they provide.

12. The clearest way for statistical producers to comply with this principle is the so-called 'one-way' principle for individual data referring directly or indirectly to protected units. Statistical producers can receive such data, but, with the two possible exceptions mentioned below, should never release or make accessible such data. The one-way principle should apply to all individual data, irrespective of the source (census, survey, or administrative source). Survey and administrative data should be covered by the same statistical confidentiality provisions, or separate provisions with equivalent effect, in all stages of collection, processing, and dissemination, from the moment they are handed over to a statistical producer.

13. Statistical legislation may prescribe two exceptions to the ban on statistical authorities making protected individual information partially accessible: the exchange of individual information between statistical producers bound by the same or equivalent laws, policies and Code of Practice; and the granting of access to microdata files with individual data, under certain conditions, to approved researchers. The first exception has to be strictly limited to purposes of official statistics, and the second exception to tabulation/analysis by approved researchers in a controlled environment.⁸² Because of the ban on non-statistical use of microdata, the use of the first exception is especially delicate if the statistical producer at the receiving end is a division of a larger government unit whose main task is the non-statistical use of data, as a minimum, the national statistical legislation has to be fully applicable to the statistical producer in order to make such a statistical producer eligible to receive confidential census microdata from the NSI. Most effective are legislative protections

⁸⁰ The protection of the statistical unit 'natural person' is not effective if the 'household' is not also protected. Dwellings or buildings are not protected unless there is an indirect risk of disclosure for a person.

⁸¹ The term 'statistical purpose' should not be interpreted as allowing the use of individual information for tables. Statistical purposes also cover the matching of individual information with other sources of official statistics.

⁸² Both exceptions may be limited to national partners, or extend to cover statistical departments of supra- and international organisations in the first case, or researchers abroad or being part of an international research network in the second case. National legislations and practices differ in this respect.

that travel with the data, meaning the non-disclosure and statistical purposes only protections apply wherever the data are being processed.

14. It is of overriding importance that NSIs are perceived as completely trustworthy with respect to confidentiality. For this reason, requests for release of individual data for non-statistical purposes should always be refused. If, on the basis of legislation in areas other than official statistics, such an access for non-statistical purposes is lawful (for example, in the case of data originating in administrative sources, or in the case of a dual-purpose census) such access should be provided by other appropriate government authorities, and not by NSIs.

15. The sixth principle implies not only the exclusion of disclosure by direct identification of units (through names, addresses, or generally available reference numbers), but also by indirect identification (through a combination of characteristics, or as part of a narrowly defined small aggregate). It also implies strict security rules for handling questionnaires and stored individual data. The recommendations in the context of a population census are presented in more detail in the chapter on technology.

Integrity

16. In the context of the population census, integrity is the strict adherence to all Fundamental Principles of Official Statistics throughout the various stages of the census operations by all institutions and persons involved. The task of any NSI is to set the standards of integrity and to make sure that these standards are observed by its regular staff, its temporary staff especially recruited for the census, and staff of any other (public or private) organisation to which certain parts of the operations may be assigned or sub-contracted.

17. Population and housing censuses are an integral part of the system of official statistics in each country. They are therefore expected to encompass the fundamental principles of official statistics. The seventh principle, in particular, states that *“the laws, regulations and measure under which the statistical systems operate are to be made public”*. This implies that the legal basis is of fundamental importance for the census.

18. Some considerations on integrity aspects related to the relationship between the NSI and respondents are presented in paragraphs 47-48 below.

Professional independence

19. The delimitation of professional independence for a statistical authority is important. This is especially so for an operation like a population census, where the NSI is dependent on government budgets (at national, regional and local level, plus international donors where applicable) and a mandate for data collection from the national legislature. The Fundamental Principles assist in deciding the matters that fall into the responsibility of the professional statistician. The Principles require the selection of data sources, statistical methods, and processing procedures to be decisions of professional statisticians, only. These are important matters in the context of a Census, and professional independent decisions by statisticians should therefore be subject to scrutiny. However, for professional independence to be meaningful the scrutiny should be carried out by an independent

statistical standards authority or by the national legislature — and not by Ministerial government.

20. In terms of processes, professional independence means that, while a variety of stakeholders, especially major users, will be consulted about professional issues, the decisions in the scope of professional independence will be taken entirely within the system of official statistics and not by Ministerial government or any political body. ‘Within the statistical system’ can mean by the head of the NSI, with possible involvement, for major issues, of an advisory board like a statistical standards authority that is set up by the relevant legislation on official statistics, or of a body composed of all or some producers of the national statistical system. In the case of population census, the census law may provide for a special census committee to play a role in such decisions. Whatever the form of decision-making mechanisms within the statistical system of a country, it is crucial that the relevant law enshrines very clearly that all bodies involved are subject to the fundamental principles (which preferably are also enshrined in a general statistics law). Decisions that are necessarily beyond the scope of those that can legitimately be taken by professionally independent government statisticians should be made by the national legislator, after debating proposals made to the legislator by the national statistics office. Other than some residual responsibilities, such as presenting material for debate in the legislature and providing assurances to the legislature about the adequacy of budget for the proposal(s) made to the legislature, etc., there is no substantial role for Ministerial government in census taking. The primary function of Ministerial government is to respond, as a key user of statistics, to the NSI’s consultations on statistical needs.

21. The importance of professional integrity in census statistics is so high that the head of the NSI should decide on the allocation of overall resources for official statistics between subject areas, with only the total budget decided at the political level as part of the budgetary process). Where this is not achieved, it is all the more essential that visible professional independence, free from any Ministerial government influence, decides:

- (a) the design of data collection instruments for official statistics with respect to coverage, questionnaires and the terminology used therein, selection of respondent units (in the case of non-exhaustive coverage). This extends to the design of pilot surveys and post-enumeration surveys;
- (b) the choice of administrative sources to be used in the preparation of the census, or (as in the case of register-based censuses) in the implementation phase;
- (c) the follow-up of non-response in the case of primary data collection, or the verification process of administrative data by the persons concerned and the respective follow-up of non-response in this approach;
- (d) the choice of methods and strategies for editing raw data (from primary data collection or from administrative sources), for imputing missing information or for correcting erroneous information, for classifying open-ended questions, and for combining various sources in the best possible ways (either at unit or aggregate level);

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- (e) the choice of the aggregates to be compiled from the census to be disseminated as results of official statistics, including the terminology used for these aggregates and the ways of compiling them;
- (f) the ways in which these results are disseminated in full respect of the relevant fundamental principles, including the timing of the release;
- (g) the standards, methods and processes of quality control for the various steps of the operation, and the decisions whether certain aggregates cannot be released because of insufficient quality;
- (h) the ways in which census data are used for improving other outputs or activities of official statistics (benchmarking of time series, use as sampling frame); and
- (i) the way in which edited unit level data from the census are organised, documented and stored to facilitate additional tabulation on request according to specifications of individual users (statistical services) and for any later use in official statistics (analytical studies).

22. Two general qualifications concerning the input of professional statistical advice to the decisions of the legislature are worth making. The first issue is linked to another fundamental principle: the issue of response burden in primary data collection (the fifth principle). This includes response obligations, the consideration whether certain questions, especially in the context of a census, may be considered as too much of an intrusion into privacy, and the issue of penalties for respondents who refuse to comply with response obligations. The second issue is about the division of work and the allocation of responsibilities between the various players and bodies of the statistical system of a country for the various parts of a statistical programme in a country, assuming that all of them are subject to the statistical legislation. For a basic operation like the census that is exclusively for statistical purposes, the overall responsibility is normally allocated with the NSI as the major producer of official statistics and coordinator of the statistical system, even though certain elements may be assigned to other players in the statistical system.

23. In the context of a traditional population census, the details that will be enshrined by law and secondary legislation based on this law are often of a more detailed character than for other primary data collections for official statistics such as sample surveys. There is therefore a certain risk of Ministerial government getting involved in decisions that are listed above as being the core of professional independence. In order to prevent the involvement of Ministerial government in the preparation of detail of legal text proposals, the primary and secondary legislation for censuses should not go beyond listing the characteristics to be covered by the census in a general way, leaving the exact wording of questions in the questionnaire to the statistical system. Legal texts about census should not contain an exhaustive list of tables as outputs, but if any specification of the output at legal level is considered to be unavoidable, it should be in general terms, leaving the exact definitions and the methods of aggregation entirely to the statistical system. The most important aspects of output specification in legal terms refer to impartiality and possibly timeliness.

24. For the choices to be made under professional independence, the responsible players within the statistical system “need to decide according to strictly professional considerations, including scientific principles and professional ethics” (the second principle),

so that the results of official statistics are as reliable a picture of the characteristics of a society as possible. In most cases, such decisions are not made in a void; there is a recognised stock of international and national professional standards and good professional practices of official statistics for many of the decisions listed above; they can and in most cases should be considered as a valid option at national level, not only because they facilitate international comparisons, but mainly because they offer an impartial and professionally sound solution about methodological issues.

25. A specific problem of professional independence in the context of a census may arise from the pressure from certain ministries and outside interest groups to see certain characteristics included. This should be avoided by ensuring ministries are visibly included in the NSI's consultations on characteristics for the census. The NSI should publish consultation responses and explain how those responses have assisted the NSI in its decisions. No other form of 'pressure' is acceptable and should be reported to the national statistical standards authority or the national parliament.

Impartiality

26. Impartiality is an important consideration for all phases of the statistical production and dissemination process. It implies, among others, the use of factual and stable terminology for the results to be disseminated, the use of understandable, non-offensive terminology in questionnaires, and the avoidance/correction of any biasing factors in collecting, processing and presenting results, such as the complete omission of certain groups of the population. The most important aspect, however, is the impartiality in making results of official statistics available to all users.

27. Impartiality in dissemination has several aspects; all results declared as official results have to be publicly accessible, and the dissemination of these results has to be simultaneous for all users, including government users, at dates determined by the statistical system, and not by Ministerial government. Therefore, it is good practice for NSIs to have an advance release calendar. The advance release calendar may be a rolling one, where the release dates become gradually more precise over time. Results may be released as provisional and final in order to be timely, but the principle of impartiality in dissemination must be respected in all cases.

28. As with other issues within professional independence, the selection of results and the choice of the dates of release have to be based on professional considerations. Once checked for quality and consistency, results should be released as soon as possible. Concerns that certain results may be unwelcome or untimely from the point of view of the government or other important stakeholders should never be taken into account, whether these concerns are expressed explicitly or as second-guessing on the part of statisticians. This would be an infringement of the fundamental principles.

29. Dissemination is the part of official statistics where attempts to undermine strict adherence to integrity are most likely. Therefore, it is very important that the NSI has acquired a reputation for being strict in this respect in all areas of official statistics, so that there is no room for deviation from an established standard in the particular case of the population census. If there is not a clear history in this respect, the population census, through its high public profile, is an excellent opportunity to build up and promote a new

standard of integrity to be applicable throughout official statistics during and after the census. A solution is to issue census results to Parliament, followed immediately by release of the same material to the public. This arrangement would make pressure from Ministerial government for privileged access an abuse of Parliamentary procedure.

30. Advance information to certain government departments is sometimes given under embargo, but this practice should be minimised, scrutinised, and the arrangements made public. The purpose of this advance information is that key users in the government can prepare themselves for confronting questions of the media with respect to policy implications of these results. It is not to invite them to comment on the way the NSI disseminates the results. Therefore, this advance information, if used at all, has to be limited in time (not exceeding one day), because the greater the time, the greater the risk of a breach of the embargo, or of attempts to interfere with the dissemination by the NSI.

31. An often neglected, but essential part of both professional independence and impartiality is the choice of terminology for the results to be disseminated. Decisions about this terminology should be made entirely within the statistical system (that is they should not be imposed from outside), and they need to demonstrate impartiality. There should therefore be a limit to the use of catchwords or the language of advocacy for certain policies, in releases by official statisticians.

32. Countries may differ in their practice about what impartiality implies for the provision of explanatory comments together with the release of new results. The minimum is to add the definitions and other technical explanations about the coverage and accuracy of the results, so that at least expert users can receive guidance on the correct use. In view of the dissemination to the media and the public at large, this may not be sufficient, especially for benchmark results such as the census. Explanations need to be added that help media, and through them the public, to help them to understand the most significant elements of this new information, and to transform the quantitative information into everyday language that can be easily understood and put into relation to other, non-statistical, information, but without coming into conflict with impartiality. As a minimum, it is the duty of NSIs to distinguish, in quantitative terms, between those parts in developments/differences that are due to changes in methodology when they occur, and those that correspond to 'real' changes or differences.

33. The selection of the most important elements among the many aspects of the new census results for the so-called 'story-telling'⁸³ is not always easy, but marked differences over time, across geographies (both within and between countries), and between population groups are certainly a first promising approach. The message for the media and the public is certainly enriched by comments that allow pointing to causal factors of a development or of differences between groups and areas that show up in the results; but in order not to be in conflict with impartiality, comments of this nature made by official statisticians have to be backed by facts and should never be policy-prescriptive. The Data Quality Assessment Framework (DQAF) of the IMF⁸⁴ insists that "products of statistical agencies/units are clearly identified as such", or, in other words, that comments by other units than the NSI, whether they contain policy-prescriptive comments or not, are clearly separated from NSI products

⁸³ UNECE: <http://www.unece.org/stats/documents/writing/>

⁸⁴ <http://www.imf.org/external/np/sta/dsbb/2003/eng/dqaf.htm>

and releases. The art of adding relevant comments to statistical releases is gained with experience and feedback from users, and should be based on a general policy of the NSI applicable to all areas. The principle of impartiality has to avoid any bias or partisan jargon. The risk of biasing the information is especially present when using charts or maps, where the first impression is the prevailing one for most non-expert users.

34. Whereas the strict application of the principle of simultaneous dissemination to all users is standard for economic statistics, it is sometimes less strictly applied in demographic and social statistics. There is no professional reason why such a difference between subject areas should persist. One argument is that, because of the low periodicity of certain results in demographic and social statistics, these results need to be discussed and verified with the assistance of outside experts before they are released. However, quality management is an integral part of statistical processes whatever the subject area and the periodicity, and where quality management includes the assistance of outside experts, statistical producers have to make sure that no leakage to ministries or interest groups can arise as by-product of the quality assurance process. This risk is minimised when the necessary expertise for quality control is within the statistical office, or at least within the national statistical system.

35. A special problem in the context of impartiality arises from the use of aggregate census results for 'allocation purposes'. This covers uses such as the allocation of seats in the Parliament or other bodies proportional to the benchmark population, or the funding of local governments from the national budget on the basis of statistical parameters, such as the benchmark population. It also covers schemes where funding is tied to eligibility criteria for local or regional entities, one of them being a population (or population ratio) threshold. When the benchmark is renewed through a new census round, fears that the outcome would be unfavourable to one body or another, or be inequitable, may be presented to the NSI in order to influence its choice of methods. If these issues are presented in consultation as issues relevant to NSI decisions this may be acceptable, but in any other circumstance it is not. It risks introducing biases and deviations from good professional practice and standards, and in doing so, the principle of impartiality of official statistics would be violated, since the choice of methods should not be influenced by such considerations (nor by considerations of how the country's ranking in an international league table would be influenced).

36. An answer to these concerns that is fully compatible with integrity considerations is to clarify the responsibilities of official statisticians, and those responsible for the allocation processes, in the light of the fundamental principles. It is the decision of the latter, and not of official statisticians, to define statistical parameters (and certain subjective weights to aggregate them) as key for their decisions on allocation or eligibility. However, their choice is not constrained by the results of official statistics published by the NSI; other options may be a subset of the official overall results (that is excluding certain components), or 'adding in' some other elements that are measured separately (provided that sufficiently reliable statistics are available for these elements). The NSI would certainly be able to compile any key according to user specification. However, this should not replace the officially released benchmark result as defined by statisticians, but rather be an additional product with its own status. The distinction between the two is that the NSI bears the full responsibility for the official results, whereas for the user-specified concept, the NSI is only responsible for the accuracy of the information. The responsibility for the concept and the terminology lies with users outside the statistical system.

Institutional safeguards for the NSI following from professional independence and impartiality

37. Confidentiality, professional independence and impartiality are the key ingredients for the integrity of the NSI and the whole statistical system from the point of view of users and respondents. It is not sufficient that these principles are mentioned in laws. They have to be associated by institutional and organisational safeguards for the NSI and its head. For building and maintaining trust in the eyes of the media, the public, all users, and respondents alike, both the existence (and respect) of these safeguards and the clear implementation of all fundamental principles in everyday practice by the NSI are essential.

38. First and foremost, the NSI has to be free of non-statistical assignments that may create conflict of interests with its core task of producing unbiased statistics about relevant phenomena in the society, or with its obligation to use individual data exclusively for statistical purposes. Any such assignments would prevent the NSI from being perceived as impartial, and would risk in being equated with an advocacy instrument for government policies.

39. Secondly, it is essential that there is no official or unofficial clearance process involving government bodies outside the statistical system for the release of results, for whatever area of official statistics including the census. NSIs must have the right to communicate directly with the media in order to fulfil their dissemination function, without being forced to channel their messages through intermediate government bodies.

40. Thirdly, as a corollary of professional independence, the head of the NSI has the full responsibility for the professional quality of the results, for the integrity of the whole chain of processes leading to these results and for the strict application of the confidentiality rules for individual data. The process of selecting and appointing the head of the NSI and other senior staff, and the legal and other means of protecting the head against any interference from government or pressure from other interest groups in matters falling under professional independence, or affecting impartiality or confidentiality, is crucial for the integrity, and the perception of integrity, of official statistics.

41. In the context of the census, a special organisational issue with implication for integrity may arise through the involvement of government bodies in the data collection process of traditional censuses that are not considered part of the statistical system, notably bodies at local and regional level. Such bodies may have responsibilities other than official statistics that have the potential to create conflicts of interest. It is therefore important that, in addition to stipulating in the law that they are fully subject to the fundamental principles, notably for confidentiality, for all activities in the context of the census, methods to check their compliance are set up and implemented as part of the quality control processes. In view of the eligibility (or non-eligibility) criteria, local administrations may also be tempted to influence the overall results for their area in order to increase (or reduce) the prospects of falling under a certain government scheme (for example introducing bilingual administration if the linguistic minority reaches a certain percentage of the total population). In such cases, special organisational measures that ensure checks and balances at local level may have to be set up on a mandatory basis through the census legislation in addition to the quality control measures of the NSI.

42. In the case where certain parts of activities of official statistics are outsourced to private operators (which can be a cost-effective solution for a large and infrequent operation like the census), the respective contracts should specify the obligations of the contractors in the same way as if the same activity were carried out within the NSI. Any data processed by such contractors must be used by a private contractor only within the terms of the contract, excluding any other purposes, be they statistical or other. The census law should prescribe that penalty provisions are applicable also to staff from such contractors working for the census in the case of violations, for example of confidentiality provisions. It is in the interest of private contractors to respect these contract terms, as failure to do so would jeopardise future contract from the NSI.

43. Any form of delegation of parts of the census activity to either public or private organisations does not in any way diminish the full responsibility of the NSI for the integrity of the whole process from the beginning to the end, and for the official results.

Transparency

44. The principle of transparency (the third principle) is a necessary counterpart to professional independence. It ensures that official statisticians are fully accountable to the community of users, respondents and taxpayers for their decisions under the umbrella of professional independence. All methods used in the production and dissemination process should be made transparent, so that critical users can question the choices made and ask for reasons. The IMF DQAF asks that for major changes in methodologies advance notice be given before results are disseminated. All dissemination of results must be accompanied by detailed information on sources and methods, which should be accessible to anybody. If results do not reach predefined quality levels, they should be marked accordingly, or not released at all, with the reasons explained publicly, and the background material for this decision being open to scrutiny. Any quality assessment of census operations, or parts of it, should also be publicly accessible.

45. If the principle of transparency seems to impose a burden on NSIs, it is necessary to prevent and counter any accusation of unaccountable 'black box' behaviour, which is frequently the first step in accusing statisticians to give in to interference or pressure aimed at shaping results in a certain direction. Transparency is necessary in today's official statistics, since even in the case of exhaustive operations like censuses results are no longer compiled exclusively as frequency counts, sums or averages, but as a complex and iterative sequence of algorithms including components of 'estimation' based on editing, imputing, extrapolating and combining different sources. Transparency is also the prerequisite of making use of the fourth principle, which entitles all statistical producers to comment on erroneous interpretation and misuse of statistics by a third party (including government users of statistics). The decision on when to make use of this right comes under professional independence, and lies with statisticians without the need for approval from outside the statistical system.

46. Another element of transparency is the seventh principle, by which *"the laws, regulations and measures under which the statistical system operate are to be made public"*. Censuses have a particularly voluminous range of regulations, instructions and manuals, given the large number of staff used for most types of censuses, especially traditional ones.

Such material should be available to anybody either on request, or made generally accessible through the web.

Relationship to respondents

47. According to the fifth principle, burden on respondents is a mandatory consideration for all decisions regarding the choice between primary and secondary data collection, and the design of primary data collection. The way this principle is applied in reality is, together with the confidentiality pledge, the essence of the integrity aspect for the relationship between the NSI and respondents. This is especially relevant for a primary data collection in the form of a traditional census where all persons in a country are subject to a response obligation.

48. The elements of integrity in the relationship to respondents are:

- (a) a selection of questions, strictly based on relevance and the proven inadequacy of less burdensome forms of data collection such as sample surveys;
- (b) a serious effort of testing questionnaires in various local environments through pilot surveys, and of drawing the necessary conclusions by dropping problematic items from the census and directing users towards other forms of data collection;
- (c) a well-designed publicity campaign, starting well ahead of the census date;
- (d) dissemination of clear information to each household, at the latest when the data are collected, about the purposes of the census, the legal basis, the use of the data and the public authorities that have access to individual data, the confidentiality measures, the obligations for respondents and the possible consequences of non-compliance, combined with information where and how additional information about the census can be obtained;
- (e) a way of contacting households and persons at the time of data collection that is proportionate, non-intrusive, and takes into account the sensitivities of special population groups. This implies that field staff is well instructed and trained, and selected so as not to increase resistance from respondents; and
- (f) a carefully designed stepwise policy of reminder/re-contact, and a clearly stated policy when to make use of penalty provisions for non-compliance and for starting an infringement procedure.

Annex III: Quality management programme implementation

Introduction

1. As described in the chapter on quality management, quality must be managed in an integrated fashion within the broader context of undertaking the entire census programme. Census management will require input and support from all functional areas and it is within this context that trade-offs necessary to ensure an appropriate balance between quality and concerns of cost, response burden and other factors will be made. There needs to be adequate staff with people able to speak with expertise and authority while being sensitive to the need to weigh competing pressures regarding dimensions of quality and other factors to reach a consensus. Those responsible for each aspect of census work must be equipped with appropriate expertise. Each of them will need to develop and implement strategies addressing many aspects of quality. In doing so they must be sensitive not only to their own quality requirements but also to their interactions with quality requirements of others. Strategies to facilitate the necessary information sharing and joint consideration of cross-cutting quality issues are vital.

2. Quality requirements need to receive appropriate attention during design, implementation and assessment. Subject matter experts will bring knowledge of content, client needs, relevance and coherence. Statistical methodologists bring their expertise on statistical methods and data quality trade-offs, especially with respect to accuracy, timeliness and cost. Operations experts bring experience in operational methods, and concerns for practicality, efficiency, field staff, respondents and operational quality control. The systems experts bring knowledge of technology standards and tools that will help facilitate achievement of quality, particularly in the timeliness and accuracy dimensions. In collaboration with subject matter experts, dissemination experts will bring a focus to accessibility and interpretability.

3. This annex provides further guidance about implementing a quality management programme, building on the ideas that were introduced in Chapter IV on quality management. Firstly, the six dimension of quality are taken in turn, with a description of how the five components of the quality management framework might apply to each. Later sections then provide further detail on:

- (a) operational quality control,
- (b) questionnaire design,
- (c) management of coverage error,
- (d) systems development, and
- (e) census evaluation.

4. As a reminder, the six dimensions of quality are:

- (1) relevance,
- (2) accuracy,
- (3) timeliness,
- (4) accessibility,

- (5) interpretability, and
- (6) coherence.

and the five components of the quality management framework are:

- (1) setting quality targets,
- (2) quality design,
- (3) operational quality control,
- (4) quality assurance and improvement, and
- (5) quality evaluation and reporting.

Managing relevance

5. As noted in Chapter IV, the programmes and outputs of an NSI must reflect the country's most important information needs. Relevance for the census must therefore be managed within this broader context. At the stage of *setting quality targets* it is necessary to discuss how much change in the questionnaire (or the information to be taken from registers) will be contemplated. In cases of severe budget restrictions, some countries have agreed to a policy of minimal change or no change to minimize testing requirements and quality risks. Clearly, this impacts the relevance of the final statistics, but having such discussions at the outset, with stakeholders, is essential.

6. At the stage of *quality design*, relevance is managed through processes to assess the relevance of previous census content and to identify new or emerging information gaps that may be appropriately filled via the census. Major processes to achieve this can be described as client and stakeholder feedback mechanisms and programme review and data analysis. Information from these processes can then be used to ensure the relevance of census content and outputs.

7. Important feedback mechanisms might include: consultations with key government departments and agencies; advice from professional advisory committees in major subject matter areas; user feedback and market research; ad hoc consultations with interested groups; and liaison with statistical offices from other countries.

8. While the primary purpose of data analysis is to advance understanding of phenomena, it also provides feedback on the adequacy and completeness of the data used in the analysis. By identifying questions the census data cannot answer it can pinpoint gaps and weaknesses. This must be taken in the context of the analytic potential of other data holdings of the NSI. There is a reduced focus on relevance during *Operational quality control* and *Quality assurance and improvement*, but the emphasis increases again for *Quality evaluation and reporting*, when the published outputs can be reviewed to consider how well they met the originally stated information needs.

Managing accuracy

9. Management of accuracy requires attention during all five steps in the quality management framework. Firstly, when *setting quality targets*, as described in Chapter IV,

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accuracy targets should be set as these will fundamentally affect the census costs and design.

10. During *quality design*, parameters and decisions will have a direct impact on accuracy. This includes the design of later components of the quality management framework. The accuracy achieved will depend on the explicit methods put in place for operational quality control and quality assurance and improvement. If these processes are not built in from the outset, including the required data collection processes and feedback loops, it will be much more challenging for them to be implemented effectively.

11. A number of key aspects of design should be considered in every census to ensure that accuracy concerns are given appropriate attention:

- (a) explicit consideration of overall trade-offs between accuracy, cost, timeliness and respondent burden during the design phase;
- (b) adequate justification for each question asked and appropriate pre-testing of questions and questionnaires in each mode of collection, while also ensuring that the set of questions is sufficient to meet requirements;
- (c) assessment of the coverage of the target population. This relates to the adequacy of the geographic infrastructure upon which collection and dissemination geography will be based. It may also relate to the adequacy of address lists to be used in areas where mail out of census questionnaires takes place;
- (d) proper consideration of sampling and estimation options. For example, sampling could be used at the collection stage through the use of short and long form questionnaires in order to reduce respondent burden and collection costs. Alternatively, sampling could be introduced after collection, by processing only a sample of records, at least for a subset of characteristics, in order to produce more timely results or to control processing costs. In either case, careful consideration should be given to the size and design of the sample and to the weighting and other estimation procedures needed;
- (e) adequate measures in place for facilitating and encouraging accurate response, following up non-response and dealing with missing data;
- (f) proper consideration of the need for operational quality control;
- (g) appropriate quality assurance for the final statistics.

12. While individual programme managers may have considerable flexibility in implementing specific practices and methods, this should be done in an integrated fashion within the overall management of census quality.

13. A good design will always contain protection against implementation errors through, for example: adequate selection and training of staff; suitable supervisory structures; carefully written and tested procedures and systems; and operational quality control procedures.

14. Mechanisms for *operational quality control* should be built into all processes as part of the design. Information is needed to monitor and correct problems arising during implementation. This requires a timely information system that provides managers with the

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information they need to adjust or correct problems while work is in progress. There is an overlap here with *quality assurance and improvement* and *quality evaluation and reporting* as much of the information collected during operational quality control is also needed to assess whether the design was carried out as planned, and to identify problem areas and lessons learned from operations in order to aid design for future censuses.

15. Some examples of activities that could be undertaken to manage and monitor accuracy during implementation and operations are:

- (a) regular reporting and analysis of response rates and completion rates during collection;
- (b) monitoring non-response follow-up rates;
- (c) monitoring interviewer feedback;
- (d) monitoring coverage checks and controls;
- (e) monitoring of edit failure rates and the progress of corrective actions;
- (f) monitoring of results of quality control procedures during collection and processing;
- (g) monitoring of expenditures against progress; and
- (h) development, implementation and monitoring of contingency plans.

16. Where applicable, the activities outlined in paragraph 15 above should be at different geographic levels or aggregations that are useful for each level of management, including those suitable for supervising and correcting the actions of groups or individuals involved.

17. Accuracy is multidimensional. Indicators may touch on many aspects of census collection, processing and estimation. Primary areas of assessment include the following:

- (a) assessment of coverage error, both under-coverage and over-coverage. In most countries this is done via a post-enumeration coverage survey and using dual system estimation methods. Comparisons with official population estimates, typically projections from the previous census, are often also used as an assessment tool;
- (b) non-response rates and imputation rates;
- (c) data capture error rates, coding error rates;
- (d) measures of sampling error, where applicable; and
- (e) any other serious accuracy or consistency problems with the results. This relates closely to coherence and allows for the possibility that problems were experienced with a particular aspect of the census resulting in a need for caution in using results.

18. Further advice on management of accuracy through management of coverage error and through operational quality control is provided later in this annex.

Managing timeliness

19. Planned timeliness is a decision to be made when *setting quality standards*, refined if necessary during *quality design*, if resources or practicalities indicate that the ideal timeframes are not achievable. There are often important trade-offs to be made with accuracy and relevance. More timely information may be more relevant but less accurate. So, although timeliness is important it is not an unconditional objective. Many of the factors described under accuracy apply equally here. Timeliness is also directly affected by fundamental time requirements to collect and process census data giving an adequate allowance for *operational quality control* and *quality assurance and improvement*. It might be tempting to aim for challenging timeframes for outputs at the early stages in census preparations, but these should be tempered by the experience gained from any *quality evaluation* of previous census operations.

20. Major information releases should have publication dates announced well in advance. This helps users plan and provides internal discipline in working within set time frames.

21. For customized/commissioned information retrieval services, the appropriate timeliness measure is the elapsed time between the receipt of a clear request and the delivery of the information product to the client. Service standards should be in place for such services and announced beforehand.

Managing accessibility

22. Census information must be readily accessible to users. Statistical information that users are unaware of, cannot locate, are unable to access, or cannot afford to purchase is of no value to them. In most statistical offices, corporate-wide dissemination policies and delivery systems will determine most aspects of accessibility. Decisions about output dissemination methods and policies are often made late in the census process, as the focus is often on the challenges of data collection and processing. This can lead to later time and resource pressures, to the detriment of accessibility. Explicitly setting aims and policies when *setting quality targets* for the other dimensions of quality can help reduce this impact, as it enables costs and development timescales to be better estimated during *quality design*.

23. In determining information product definition and design, managers should take careful account of client demands. Market research and client liaison will help determine these. The proposed aims and output designs, having been defined, can then be discussed with users, with appropriate modifications, in a controlled way. Whilst not strictly *operational quality control* or *quality assurance and improvement* as defined in Chapter IV, there are nonetheless parallels to these components in such discussions.

24. In today's world the Internet has the potential to play a role as the primary dissemination vehicle. It should include not only the data released but also information about the data (metadata) such as data quality statements and descriptions of the concepts, definitions and methods used. Use should also be made of appropriate links to the NSI's corporate dissemination vehicles.

25. Finally, as part of *quality evaluation*, client feedback should be monitored on the content of the output products and on the mode of dissemination with a view to future improvements.

26. The information needs of the analytic community present some particular requirements. Analysts often need access to microdata records to facilitate specific analyses. This presents special challenges in order to continue to respect the requirements for the maintenance of the confidentiality of census data. A number of means could be used to address these needs. Public use microdata files, typically a sample of census records that have been pre-screened to protect confidentiality can be valuable for analysts. Custom retrieval services where specific analyses, designed by external analysts, can be conducted by staff of the statistical office may meet the needs of some analysts.

Managing interpretability

27. Managing interpretability is primarily concerned with providing metadata. Information needed by users to understand census information falls under three broad headings: the concepts, definitions and classifications that underlie the data; the methods used to collect and process the data; and measures of data quality. The first of these also relates to coherence.

28. A further aid to users is the interpretation of census information as it is released. Commentary on the primary messages that the data contains can assist users in initial understanding of the information. As with accessibility, interpretability can be addressed in *all five components* of the quality management framework.

Managing coherence

29. Coherence is multidimensional. Objectives for coherence of census data include:

- (a) coherence of census data within itself;
- (b) coherence with data and information from prior censuses;
- (c) coherence with other statistical information available from the statistical office on the same or related phenomena; and
- (d) coherence with information from censuses of other countries.

30. Aims for coherence should be set when *setting quality standards* as these will drive decisions during *quality design*. For example, there will be trade-offs to be made about the degree with which to standardise across programmes within NSIs and, for international standards, between countries. Subsequent decisions during quality design will need to be made about the development and use of standard frameworks, concepts, variables, classifications and nomenclature for all subject matters that are measured.

31. The census must ensure that the process of measurement does not introduce inconsistency between its data and that from other sources. Managers of other statistical programmes are, of course, equally responsible for this aspect of coherence.

32. There is usually less of an emphasis on coherence during *operational quality control*, but the emphasis increases again during *quality assurance and improvement* when the

emerging census results can be compared with other available sources (whether published statistics or administrative data, for example). This can highlight differences in interpretation of definitions between statistical outputs, or, indeed, errors in either the census or other surveys. Although this is more correctly concerned with managing accuracy, there is an overlap with managing coherence when issues of definition and their interpretation arise.

33. After publication of census results, analysis of those data that focuses on the comparison and integration of information between the census and other sources will give insights to inform *quality evaluation and reporting* and the degree to which quality has been achieved in coherence. The census data should be analysed for domains and aggregations, both large and small that are considered important. Such analysis should consider totals, distributions, relations between variables or sets of variables, relations between domains, growth rates, etc. as appropriate. Comparisons should be made to data from prior censuses and to comparable survey data.

Operational quality control

Census activities requiring operational quality control

34. A number of census processes involve massive operations, either manual or automated. Examples of such operations include dwelling listing operations, preparation of maps, printing of census materials, enumeration procedures, data capture and editing and coding (both manual and automated). Specific operational quality control procedures are particularly relevant and important for each of these.

35. Dwelling listing operations are commonly conducted by enumerators prior to, or as, questionnaires are dropped off at dwellings. It is particularly important at this stage to minimize both under-coverage and over-coverage of dwellings. To that end, enumerators' procedures should include quality checks to ensure the quality of their work. As well, supervisors should have planned spot checks as listing work starts, and planned quality control procedures to be applied as work is completed.

36. When census questionnaires are delivered, it is usually done on the basis of a list of addresses extracted from an address register. Address register maintenance itself will involve several steps of quality management. Nonetheless, prior to its use, the address list should be validated to confirm that each dwelling exists and is included with correct address and geo-coding information, and that no non-dwellings are included. Allowance should be made for dwellings under construction that may be completed prior to the census. If not done via administrative sources, this validation requires a large operation in the field and is subject to errors. Since this work must be parcelled out to individual employees in batches, acceptance sampling quality control procedures will be appropriate. Again, spot-checking and close communications with supervisors will be important quality assurance steps.

37. Enumeration, whether by interviewing or by collecting completed questionnaires from the dwellings on the list, is similar. Usually one enumerator is responsible for all work in an enumeration area and will be required to implement a number of quality checks on their own work. Further acceptance sampling procedures, implemented by supervisors, will ensure the quality of various aspects of the enumerators' work.

38. Data processing is one of the crucial steps by which raw census data are converted into a complete edited and coded master file useable for tabulations. In some of these processes the data are being transformed (for example data capture, coding) while in others the data are being corrected (for example edit and imputation). New errors can occur in any of these operations.

Operational quality control methods

39. Clearly a census operational quality control regime comprises a wide variety of mechanisms and processes acting at various levels throughout the census programme. An important technique applicable in many census operations is statistical quality control. It primarily addresses accuracy, although depending on the operation it may also address other elements of quality. What follows is a very brief outline of quality control basics. For a complete explanation of these methods, the reader should refer to a standard text or reference such as Duncan (1986), Hald (1981) or Schilling (1982).⁸⁵

40. The success of any operational quality control programme depends on laying down quality standards or requirements; determining appropriate verification techniques; measuring quality; and providing for timely feedback from the results of the programme so that effective corrective action may be taken.

41. Sample verification, complete (or 100 per cent) verification, or spot checks are the usual quality control techniques adopted in censuses.

42. Verification can be dependent or independent. In dependent verification, a verifier assesses the work of a census worker by examining that work. However, the verifier may be influenced by the results obtained in the initial operation. In independent verification a job is verified independently by a verifier without reference to the original work. The original results and those of the verifier are compared; if the results agree then the work is considered correct; if not, a third, often expert, verifier may resolve the difference.

43. Complete verification theoretically assures a complete check of the work in an operation. However, verifying all items can be time consuming and very costly. In many operations, complete verification is only used as the operation is starting up. Once it is shown that the quality is meeting the required standard, sample verification procedures may be implemented. Usually, this transition is managed on an employee-by-employee basis.

44. Sample verification reduces the cost and can yield results almost as reliable as 100 per cent verification. More experienced and skilled staff often do verification. To be effective the sample must be selected on a scientific basis using probability sampling. It should be designed on the basis of the expected or observed error rates of workers, the outgoing quality to be achieved, the cost of the operation in question, and the cost of operating the quality control plan. It should be adaptable to adjustment as the quality of work may change. For example, as outgoing quality improves then a reduced rate of quality control sampling may be suitable. Two types of sampling procedures are commonly used: acceptance sampling and continuous sampling.

⁸⁵ Duncan, A.J. 1986. *Quality Control and Industrial Statistics*. Fifth edition. R.D. Irwin Inc., Illinois. Hald, A. 1981. *Statistical Theory of Sampling Inspection by Attributes*. Academic Press, New York. Schilling, for example 1982. *Acceptance Sampling in Quality Control*. Marcel Dekker, New York.

45. Acceptance sampling is a quality control technique that establishes a sample design and decision rules to determine which batches are acceptable or unacceptable, and is usually used in jobs like manual editing, coding, and key entry data capture where work is assembled in lots or batches. Each batch is either accepted or rejected on the basis of the verification of a sample chosen from the batch based on probability methods. The sampling plan is designed so as to provide an outgoing error rate below a certain value, called the average outgoing quality limit.

46. When work is continuous and it may not be possible to group the output into batches for verification, a continuous sampling plan or process control approach may be used. This method is applicable to processes which are fairly predictable in terms of their outputs and which consistently produce output that meets the quality standard — the process is then ‘in control’. Statistical process control is a methodology to ensure that such processes stay in control and to provide feedback for corrective action when ‘not in control’. Census operations where this may be applicable include: the printing of forms; automated data capture via intelligent character recognition (ICR) or optical mark recognition (OMR); and the scanning of forms for ICR/OMR.

47. Automated data capture, repair and coding systems both increase greatly, and introduce a different set of risks to, data quality compared with traditional census processing approaches. If not properly monitored and managed, data quality problems can remain undetected until late in the process when cost and timing constraints limit the options for any corrective activity. Some methods of measuring data quality from data capture processes, such as substitution rates or measures of key entry errors, are, on their own, inadequate as these forms of monitoring simply measure the overall incidence of errors but not the significance of the errors. Indeed, this approach could lead to considerable extra expenditure for the correction of trivial errors that lead to no appreciable gain in quality. For this reason, data quality should be measured at the topic response level rather than at the individual character/numeral level. This should be done in two ways: independently processing a sample of records using manual processes and comparing the results for each of the records with those obtained through the automated systems; and by comparing, in aggregate, the overall data for an area with the expected results based on other information for that area (for example from the previous census or other data sources).

48. This process should be undertaken continuously during data processing with a focus on the early detection of quality problems and an understanding of any systems or processes that have contributed to these. The amount of error that is acceptable, and the degree of intervention and systems or process changes undertaken, will depend on the assessment by the census agency of the overall fitness of purpose of the output and the overall cost and timeliness impacts. This will vary from topic to topic. For example, it is to be expected that there would be a greater focus on the quality of key demographic variables compared with other data items collected on the census form.

Questionnaire design

49. The design of the census questionnaire(s) takes into account the statistical requirements of the data users, administrative requirements of the census, the requirements for data processing, as well as the characteristics of the population. Because censuses often involve multiple collection methods, testing must be performed to ensure

that questionnaires will work properly for all applicable methods. The questionnaire should include elements aimed at ensuring accurate coverage of the population (for example who to include, who not to include, where to be enumerated). Qualitative testing is required to check these issues and should cover an adequate variety of situations encountered in the population. In terms of content, quality management approaches for a census are similar to those for a sample-based survey. Qualitative tests and cognitive interviews should be planned to ensure that questions are clear and properly understood not only by the general population but also by any special groups to whom certain questions are targeted or for whom there are particular issues of concern (for example, the elderly, persons living alone, or those with language difficulties).

50. With the advent of new technologies, introducing web-based questionnaires can provide options not available to their printed counterparts. These options can ensure greater quality in terms of question response and coverage. Checks on such serve as opportunities for detecting inconsistencies and presenting them to respondents for correction or confirmation. The design and presentation of a web-based questionnaire to the respondent will differ from the paper version. This means that special care must be taken to minimize any potential mode effects arising from differences between the paper and electronic versions of the questionnaire. Hence, this should be an important topic to be considered in the testing programme for the questionnaire.

51. A particular challenge in questionnaire design is to ensure that it is respondent friendly, or in the cases of electronic questionnaires, it is fully accessible, while at the same time, meeting requirements for the subsequent processing steps, especially for data capture and coding operations. The testing programme should also ensure that these features are thoroughly tested prior to questionnaire finalization.

52. All of these factors should be tested on a small scale (qualitative testing) and then on a large one with a significant number of respondents. A large-scale test can detect a variety of potential issues that qualitative testing cannot. Such tests also make it possible to compare different design and format possibilities via split sample designs. The large-scale test also facilitates assessing how well the questionnaire fits into other census operations (for example collection, data input, coding).

Management of coverage error

53. Coverage is a critical element of accuracy. It has a direct influence on the quality of population counts and an indirect impact on the quality of all other data produced by the census. Thus the coverage concerns should be taken into consideration in the design and implementation of most census activities. Enumeration area boundaries should be carefully defined and mapped to ensure that no area is omitted or included twice. Instructions and training on dwelling coverage for staff engaged in dwelling listing and enumeration should be clear, explicit and easy to understand. The target population must be well defined and related instructions and questions for both interviewers and respondents need to be carefully developed and thoroughly tested.

54. Clarity and simplicity of instructions concerning place of residence for enumeration is vital to help ensure people are enumerated exactly once and at the correct location. This is particularly important in minimizing over-coverage. Questionnaires should include guidance

or questions to assist with situations where it may be unclear whether certain persons should be included or not. Special procedures should be developed for difficult to enumerate population groups (for example remote areas, collectives or group quarters, persons with literacy or language difficulties). Processing procedures should be developed with a view to minimizing the risk of erroneously cancelling, losing or artificially creating households. A well-crafted publicity campaign can play an important role in promoting census awareness and response, thus helping minimizing coverage error.

55. All of these steps, along with appropriate training, supervisory checks and quality control during operations will help minimize coverage error. Nonetheless some coverage error is unavoidable. Hence it is important to measure, analyse and report on coverage error. This is best done via an independent post-enumeration survey of a sample of census areas or via a Reverse Record Check methodology. Results of coverage studies provide an important evaluation of the current census and can also provide valuable guidance for the next census. Results in conjunction with the census counts themselves are a critical input for population estimation programmes. Analysis of census results vis-à-vis demographic projections of the population from the previous census can also be informative.

Systems development

56. Systems development is a cross-cutting topic which can have a major impact on quality. In particular, the related dimensions of quality are accuracy, timeliness and accessibility. A modern census makes use of numerous automated systems to operate, manage and control a range of activities from the field staff payroll to data capture, edit and imputation, coding, dissemination and others. This pervasive influence makes it very important that an integrated view be taken in the design of the overall architecture as well as the individual design and implementation of systems.

57. A standard methodology for systems development should be implemented and should include steps such as:

- (a) overall system architecture design,
- (b) design and analysis of individual systems,
- (c) programming or building of systems,
- (d) functional testing of components and then of systems,
- (e) testing of interfaces between systems,
- (f) volume testing and user acceptance testing,
- (g) system delivery and implementation, and
- (h) evaluation.

58. This should be done within a configuration management approach to:

- (a) manage change,
- (b) accommodate the re-use of standards and best practices,
- (c) ensure that all requirements remain clear and valid,

- (d) communicate each of these to developers and users promptly and precisely, and
- (e) ensure that results conform to requirements.

59. Specifications should be well written and carefully analysed to produce functional requirements. A standardized approach for change management is required. Ensuring the interoperability of different systems that can communicate with each other is particularly important. At each stage, the performance should be evaluated, and outputs should be checked to conform to requirements. Many of the systems developed for a census will be used by numerous key entry, coding, editing and other clerical staff. Consequently it is very important that user interfaces be carefully designed and thoroughly tested. More generally, a well-developed standardized testing strategy should be applied throughout in an integrated fashion.

Methods of census evaluation

60. Given the importance of the accuracy of census statistics, and the budgets involved, it is common for census programmes to undertake extensive evaluation of the census process. Census coverage and content evaluation are a particular focus of such exercises, but they often also cover wider issues such as the effectiveness of publicity campaigns, project management or contract management.

Coverage evaluation

61. As noted in the Chapter IV, in some countries the evaluation of census coverage forms an integral part of the census quality assurance and improvement component of the quality management framework, and feeds directly into the published census results. In other countries, it is a separate exercise, with the results used to adjust the published census results when producing subsequent population estimates.

62. Both gross and net error must be taken into account in developing the overall evaluation plan. Gross coverage error in a census is defined as the total of all persons omitted, duplicated, or erroneously enumerated. Net coverage error takes into account the underestimates due to omissions and the overestimates due to duplications and erroneous inclusions. When omissions exceed the sum of duplications and erroneous inclusions, a net undercount is said to exist; otherwise, a net over-count results. Similarly, both gross and net content errors have to be considered in the evaluation design.

63. The choice of coverage evaluation methods to be used depends upon the evaluation objectives, and the method of undertaking the census (that is, whether based on field work or population registers). Common methods (that can be applied to both field and register based censuses) include:

- (a) post-enumeration surveys;
- (b) comparisons of results with other data sources including previous censuses, current household surveys, and/or administrative records; and
- (c) ethnographic and social network methods to study the effects of mobility on census coverage or to measure census coverage of specific sub-populations.

64. For register-based censuses, it is also possible to compare data from a past traditional census with register data from the same time. Data linkage at the individual level can enable estimation of both under and over coverage and longitudinal databases would enable such estimates to be carried forward.

Content evaluation

65. Common methods for content evaluation include:

- (a) post-census surveys designed to measure error in specific census questions;
- (b) record-checking, in which individual census records are matched against alternative sources and specific data items are checked for accuracy;
- (c) quality control techniques such as internal consistency checks;
- (d) surveys to determine customer satisfaction with data collection instruments or questionnaire assistance; and
- (e) focus group interviews to learn how or why respondents behave in a certain way.

Designing an evaluation programme

66. The following basic recommendations can be applied to any evaluation programme:

- (a) Begin planning the evaluation programme early in the census cycle. Early planning and design of a structured evaluation programme allows appropriate consideration and accommodation of evaluation and experiment needs during the census design.
- (b) Decide the high-level scope and focus of research programmes before developing research proposals. Define general selection guidelines or criteria, select research topics, and identify high-level research questions before designing the evaluations and experiments. Identify areas to meet the needs of external data users and internal census planners and set evaluation priorities accordingly.
- (c) Develop study plans for each evaluation and experiment. These project-level plans then become the designated baseline documentation for achieving programme research goals.
- (d) Develop a standardized Change Control Plan, which describes a protocol to initiate a change process. Recommendations for change (including the reasons for the change and critical implications) are submitted to a Change Control Board which then assesses implications of the change and approves or disapproves it.
- (e) Develop a milestone schedule for planning, designing, and implementing the research programme. Include in the milestone schedule dates for issuing results of the operational assessments, evaluations, and experiments. Changes to the schedule should also go through the Change Control process.

Annex III

- (f) Anticipate delays or the need to cancel some planned evaluations. During a census, staff may become overburdened with either too much evaluation work or too much of a combination of evaluation and production work. Attrition of project managers is often inevitable and can also be a reason to delay or cancel evaluations.
 - (g) Explore ways to incorporate real-time evaluations during the course of the census.
 - (h) Develop a Risk Management Plan which identifies potential risk events and their probability of occurring, provides measures of potential impact, offers strategies for dealing with risks if they occur, and identifies the area(s) responsible for addressing each risk event. The Risk Management Plan should be a dynamic document where risks can be modified as needed.
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