

The 2010 round of population and housing censuses (2005–2014)¹

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Abstract. In most countries, a population and housing census is the principal source of data on the number, distribution and characteristics of a population. They further provide information on the underlying phenomena of social and economic characteristics of the population within a country and may represent the primary data source for identifying certain social, demographic and economic exclusions and constraints for small geographical areas or sub-populations. Ideally every ten years, countries conduct a population and housing census – a complex exercise for every nation, that may require taking decisions on enumeration methods, emerging information technology, publicity, privacy and confidentiality, quality control, data collection, processing, analysis, imputation, data dissemination, archiving, evaluations of coverage and quality, etc. This article identifies the main characteristics of censuses and the challenges and successes faced by the countries under the 2010 World Program of Population and Housing Censuses of the United Nations (spanning the years 2005 to 2014) and highlights trends and considerations as planning has started for the 2020 World Program on Population and Housing Censuses; covering the years 2015 to 2024.

Keywords: Census, data collection, analysis, dissemination, population, information technologies

1. Introduction

The implementation of a population and housing census is a complex exercise for every nation. Conducting a census requires countries to make decisions regarding enumeration methods, emerging information technology, publicity, privacy and confidentiality, quality control, data collection, processing, analysis, imputation, data dissemination, archiving, evaluations of coverage and quality, etc. Further stages of the census include the compilation of all completed paper or electronic questionnaires, as well as, the processing, imputation and archiving of the data. However, the census is not finalized until the results are analyzed and dissem-

inated widely [1]. As recommended by the United Nations (UN), ideally a census should be completed once every ten years [2].

According to the UN's Principles and Recommendations for Population and Housing Censuses, the primary objective of a population and housing census is to provide a reliable basis for an accurate count of the population of a country at a specific point in time [2]. Compared to surveys or population registers, the unique advantage a population and housing census provides is the representation of the entire statistical universe of a country, down to the smallest geographical unit. Depending on the detail of the census questionnaire, this exercise can also provide data on the geographical distribution of the population, the basic demographic processes of fertility, mortality, migration and nuptiality, the income and labor market, and in some cases also the ethnic, racial and religious breakdown of the population. For intended purposes that require information at a certain disaggregation the census has no match.

¹Any views expressed in this paper are those of the authors and not necessarily those of the U.S. Census Bureau or the United Nations Population Fund.

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For decision- and policy-making the census proves to be a crucial planning tool, since it provides the principal source of information on the number and characteristics of the population and its housing. The census provides the basis for future planning. Based on its measures of fertility and mortality demographic trends can be projected into the future. With this information, policy makers can plan for the medical, educational and structural future of the country and its people.

2. Methodology

This analytical report is based on findings of the review of the 2010 World Program on Population and Housing Censuses and the Mid-Decade Assessment of the United Nations 2010 World Population and Housing Census Program, conducted by the United States Census Bureau [2] and three Needs Assessment Conferences organized by the United Nations Population Fund (UNFPA) as well as information from the United Nations Statistics Division. The article will also draw on some of the recommendations for the 2020 census round published by the United Nations Economic Commission for Europe (UNECE) Statistical Division and endorsed by the Conference of European Statisticians (CES) in June 2015. The universe of countries is different for each source of information [3].

In February 2010, at the 42nd session of the United Nations Statistical Commission, the Commission requested a review of the 2010 Population and Housing Census Program. This report was prepared by the United States Census Bureau and presented at the Statistical Commission from 28 February to 2 March 2012 [3]. The program review is based on a survey conducted by the United States Census Bureau and sent out by the United Nations Statistics Division (UNSD) to UN Member States [4]. Between June and August 2011, the UNSD sent questionnaires to the 192 Member State Members of the United Nations. By August 2012, 126 countries had participated in the survey (65.63 percent).

Questions referred to the sources of data and enumeration methods, challenges and successes in census-taking, methodologies other than the traditional census, new (information). The report aimed at 1) documenting the early to mid-decade lessons learned from the 2010 census round; and 2) identifying experiences for preparing the 2020 census round, in particular presenting recommendations for the United Nations Statistical Commission to consider moving towards the 2020 census round.

This paper summarizes the lessons learned from the 2010 round of population and housing censuses, and provides insight into the potential direction for the 2020 census round.

From 2009 to 2011, the UNFPA organized Needs Assessment Conferences for Census Analysis [6], bringing together 197 representatives of National Statistical Offices (NSOs), Planning Ministries and Population Planning Units, universities and research organizations from 72 countries, as well as representatives of international organizations and/or donor countries active in funding or technically supporting the censuses. In these discussion fora, challenges faced by countries conducting their census, with particular focus on the analysis of their 2012 census results were identified.

The UNSD provides “knowledge and information on census taking, as well as [...] an up-to-date account of national census taking activities and of provision of support to countries in the implementation of the census round. The website also provides information on national, regional and international activities related to the 2010 World Program.” [7] While the UNSD provides information on 228 countries and areas in the world, the program review conducted, included only the 192 Member States to the United Nations.

3. The 2010 round of population and housing census

In 2005, the UN Statistical Commission in its 36th session agreed on the 2010 round of population and housing census, spanning the period 2005 to 2014. The UN Economic and Social Council (ECOSOC) approved this program through the adoption of resolution 2005/13 [8]. The 2010 World Population and Housing Census Program aimed at, 1) agreeing on international principles and recommendations to conduct a census, 2) facilitating countries’ efforts in conducting a census at least once during the period 2005–2014 and 3) assisting countries in the dissemination of census results in a timely fashion.

3.1. Implementation

In the 2010 census round, as of 31 December 2014, 214 countries or areas conducted at least one census, including countries that base their detailed population statistics on population registers, administrative records, sample surveys or other sources or a combination of those sources. Twenty-one countries or areas

did not conduct a population and housing census during the 2010 round [9].

Figure 1 provides information on the distribution of census conducts between 2005 and 2014. Postponements in census taking had as a consequence that the peak in census enumeration shifted from 2010 to 2011. The single year with the greatest number of censuses was 2011, when 60 countries or areas conducted a population census.

As of 31 December 2014, it was estimated that 6,391,500,187 persons (93 per cent of the estimated world population) had been enumerated. "At the end of 2005, an estimated 5.5 per cent of the world's population had been enumerated. At the end of 2009 this proportion increased to 21 per cent. The single year with the highest number of persons enumerated was 2010, when 43 countries or areas (including China) with a population of over 2.5 billion (37 per cent of the world population) conducted a census. [...] At the end of the census round in 2014, about 93% of the world population have been enumerated." [9]

Based on the program review of the US Census Bureau [3], major changes have occurred in census taking. The statistical environment, including the technologies for data collection, processing, analysis and dissemination, is rapidly changing and evolving. The need for accurate and timely data is high on the agenda of policy and decision-makers, to enable them to administer policies and programs and to monitor the progress made.

4. New methods in census taking

A general observation in the review of the 2010 census round was that, an increasing number of countries use full or partial integration of administrative registers and other techniques for data collection. Innovative approaches have improved the planning and implementation of field operations and the overall quality of the census conduct, including its speed and accuracy. However, the application of new methodologies may vary from country to country. While some countries rely on national capacities for enumeration, others outsource data collection to external service providers.

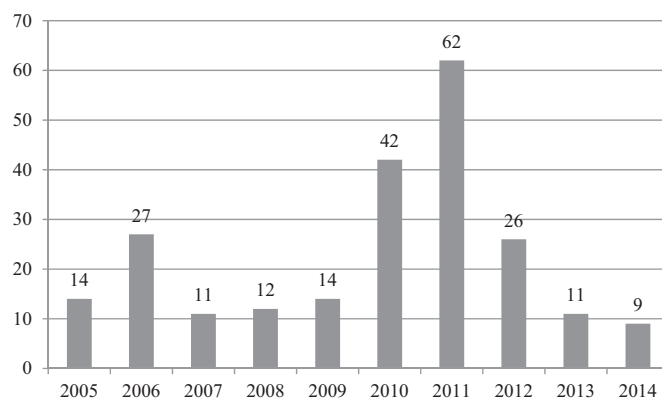
Halfway through the 2010 census round, the US Census Bureau conducted a survey interviewing their 192 Member States on sources of data and enumeration methods, challenges and successes in census-taking, methodologies other than the traditional census, new information technologies and data dissemination. The final number of responding countries was 126.

The traditional census with full field enumeration has been identified as the main source of census data for 105 countries. But, while only a few countries used direct enumeration for data collection, the majority of countries integrated other sources of data into their field enumeration for the generation of census results. The most common sources of data to replace or supplement census data coming from field enumeration are population registers, administrative records or sample surveys. Registers, administrative records, and sample surveys have been used by many countries, primarily in Europe to either replace field enumeration or to supplement data collected directly by enumerators. Twelve countries used administrative registers as a main source of census data.

Regarding enumeration techniques, 94 of all responding countries used face-to-face interviewing with a paper questionnaire. Forty-two per cent of these applied this method as their only technique for collecting data. More and more countries use various methods for field enumeration. Thirty countries applied a paper questionnaire for self-enumeration.

The application of the telephone, CATI (Computer Assisted Telephone Interviews) and the Internet for enumeration has increased. Thirty-three of the countries interviewed made use of partial data collection using the Internet, while 14 countries used telephone interviews.

Investigations regarding the use of other methodologies for data collection, including administrative registers as primary or supplementary source or a rolling census resulted in findings that show for full field enumeration, over 31 percent of the countries using this method supplemented field results with administrative registers or pre-existing administrative records. Twenty seven percent relied on annual or other regularly conducted sample surveys to supplement their census data. While 16 countries conducted ad hoc sample surveys for data collection, 9 countries combined census data with pre-existing administrative records. Only 1 country, France, conducted a rolling census. Still, 11 countries responded to apply other methodologies for census taking, including a combination of population registers and field enumeration, statistical registers, administrative sources in combination with the Internet, telephone and field enumeration. Some countries reported to use administrative registers in the case of item non-response and administrative records to enumerate populations in prisons and detention centres etc. Some countries utilized address lists created with corresponding administrative and commercial data sources.



Source: United Nations Department of Economic and Social Affairs: Statistics Division (2010)

Fig. 1. Number of countries conducting a census in the 2010 round.

The benefits resulting from the use of new methodologies included timeliness, low costs and improved data quality. Key disadvantages refer to decreased content and predetermined data definitions by the data source instead of census definitions. For example, data categories from an administrative register are defined by the responsible government department and may be different to the ones used by the NSO.

4.1. New information technologies

Based on the results of the 2010 program review, 64 per cent of all countries made use of Geographic Information Systems (GIS) in support of census activities. Regarding refined scanning technologies, 49 per cent of the countries that submitted responses to the questionnaire utilized computer-assisted coding, 42 per cent optical character recognition (OCR) and 33 per cent optical mark recognition (OMR). Other scanning methods were reported by 38 per cent of all countries.

New information technologies (IT) for data collection included the Internet (43 per cent), laptops (24 per cent), hand-held or tablet computers (10 per cent). The majority of countries that were still using paper questionnaires in the 2010 census round reported an interest in the use of hand-held digital devices, laptops or the Internet for the 2020 round. New IT significantly impacted how censuses were conducted. Countries reported the benefits of automated technologies included time-savings (62 percent) and improving the data quality (57 percent).

The implementation of new information technologies, however, brings along short-term and long-term costs and benefits. The introduction of emerging IT, in-

cluding equipment, has a non-avoidable start-up cost, both financially and logistically. Equipment needs to be purchased and installed and technological systems need to be adapted. NSO staff needs to be trained in these new ways. Some countries might fear privacy and confidentiality concerns as well as non-response. However, despite the risks, census response rates remained the same or even increased.

Figure 2 displays the perceived risks and challenges associated with the use new information technologies. Respondents reported increased cost as the greatest risk associated with automated technologies, and negative public perception and decreased coverage as the lowest risks reported. Countries responded that the greatest obstacles faced with using technology were staff resources/expertise, financial resources, and reengineering/infrastructure. The least obstacles faced with the use of new information technology are data dissemination and stakeholder privacy and confidentiality concerns [10].

It is of utmost important, to carefully review the format and content of the census questionnaire to determine if a change in the use of IT is necessary and possible. With limited expertise and budget constraints, different options should be considered to define the adequate level of technology for the census.

4.2. Census topics

The number of topics that can be investigated and the level of detail that can be provided during in-depth analyses of census data depend on the number of topics covered in a census. The choice of census topics is guided primarily by national needs, time constraints, and suitability of the issues, their comparabil-

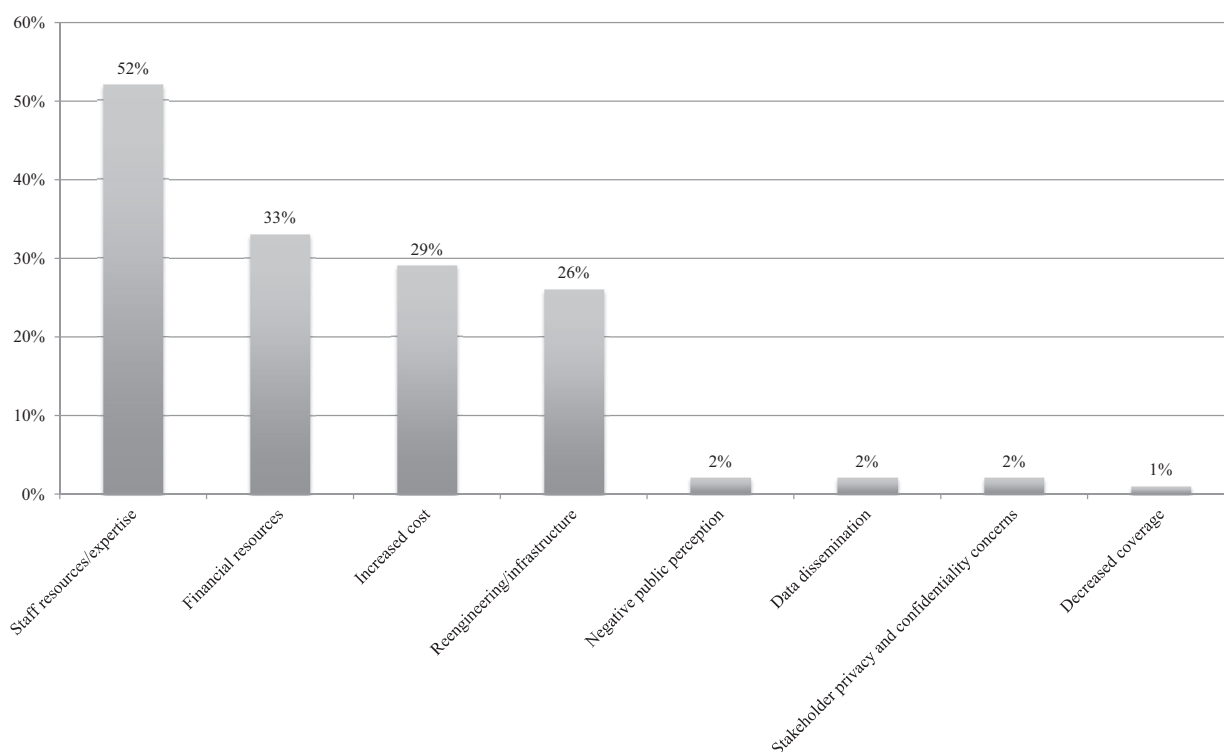


Fig. 2. Risks and challenges associated with the use of new information technologies. Source: United Nations Department of Economic and Social Affairs: Statistics Division (2010).

ity and available resources. The *“Principles and Recommendations for Population and Housing Censuses, Revision 2”* provided a list of topics to be investigated in population censuses of recommended topics, which should be considered as recommendations, rather than rules.

As part of the 2010 World Program on Population and Housing Censuses, the UNSD analyzed questionnaires used in 79 population censuses according to the core and additional topics covered in the questions [11]. Censuses often comply fully with the global recommendations for the type of information that needs to be collected during population and housing censuses. However, depending on their specific contexts, they often include more details in order to capture specific country situations. For instance, regarding demographic and social characteristics, the only information collected by all interviewed countries refers to age and sex of the respondent. 75 countries included a question on marital status, 41 on religion, 37 on language, 45 on ethnicity and only 11 countries included a question on indigenous people (Fig. 3).

The inclusion of a new census topic requires careful planning, additional costs and the ability and willingness of the population to provide information on the

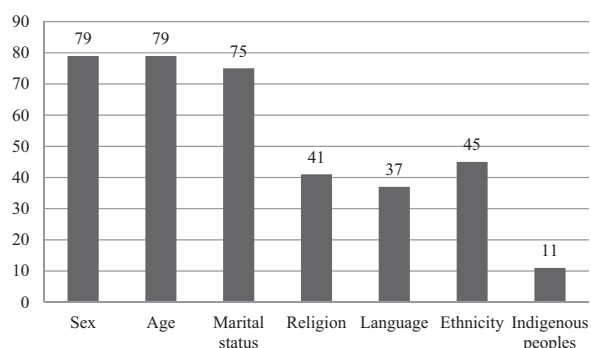


Fig. 3. Demographic and social characteristics in census questionnaires. Source: United Nations Department of Economic and Social Affairs: Statistics Division (2010).

new issue. For the program review survey, countries described how the inclusion of new topics was determined. Requests from data users (78 per cent) and pertinent or evolving issues in the country were the key determinants for adding new census topics in 78 per cent and 64 per cent of the countries, respectively. Another 57 per cent of countries mentioned trends in society while 52 per cent based their decision on consultations with other international statistical agencies.

Census data that have been produced at a great cost need to be disseminated widely so the census conduct will hit its objective.

4.3. *Census data dissemination*

In the report on the 2010 World Program on Population and Housing Censuses the U.S. Census Bureau identified primary methods of census data dissemination, ranging from traditional paper publications, CDs, DVDs, static web pages, to dynamic online databases and maps. Paper publications are still the single most fashion to disseminate census results. 54 countries reported to use paper publications as their primary method of data dissemination.

63 countries used paper publications as their primary method for data dissemination, 34 countries use static web pages (html, pdf, etc.) and only 17 countries used interactive online databases, such as CensusInfo. Other methods for census data dissemination included CD-ROMs and DVDs, static web pages, paper publications, interactive online databases and mapping tools. The majority of countries consulted with data users on adequate dissemination tools for census results.

4.4. *The cost of a census*

Comparing the cost of censuses worldwide deals with at least three challenges: 1) the lack of a quality component, 2) underreporting of census costs and 3) terminology. Both, a traditional census with enumerators that go from door to door conducting interviews by using paper questionnaires as well as a multi-mode census are today still called a 'traditional census'. This terminology is not longer accurate, since the term 'traditional' should only be applied to censuses that employ enumerators going from door to door. Once other devices, such as the Internet, laptops, hand-held devices, mail-out/mail-back functions etc. are used to conduct the census, one should not refrain from calling these methods a 'traditional census'. It is recommended to either change the name of methodologies or to break out other methods from traditional census methods. Thus, the cost structures are very different and are not easily comparable.

Reliable comparability between national census costs is difficult to achieve given the different scenarios countries face for conducting the census in the first place. Well-defined components could provide insight into the consistency of the census conduct, and thus derive the total cost. The U.S. Census Bureau proposed in

the report on the 2010 round of censuses to "use gross domestic product (GDP) or per capita income as a measure of economic and educational status of a country. The higher these measures, the greater the probability that there are more expectations from the population regarding a census and census-taking, such as pressure to provide response options, qualifications of the enumerators and the availability of data dissemination tools. Another factor with enormous impact on the cost of a census is whether the country already has (and has therefore paid for) a national population register that can serve as a source of information."

A reliable comparison of cost would have to consider the expected quality of the census coverage and the accuracy of the count. High expectations for accuracy increase the quality cost of the census conduct. For countries that use the census count to determine the representation of the government and the distribution of funds, the census has to be extremely accurate. Another factor in determining the cost of a census is the actual size of a country, its terrain and the number of languages spoken by its population. All these factors add to the cost of the census implementation.

While obtaining exact information on the cost of the census conduct poses serious challenges, learning from countries on the cost of individual components of the census could provide useful information on which methods, techniques and processes to avoid, in order of keeping the cost low.

5. **Challenges faced in the 2010 census round**

Based on identified lessons learnt at the Needs Assessment Conferences [12] organized by the United Nations Population Fund and information from the UNSD the major challenges faced by countries in the 2010 census round included a lack of financial resources, political and social instability, lack of technical expertise, problems and types of errors associated with the adoption of new IT, increased privacy concerns and pressure for faster release of results. These challenges were confirmed by the U.S. Census Bureau's report on the 2010 round of censuses. 71 per cent of all countries and areas interviewed described the census cost as their principal challenge. Further challenges refer to the timely conduct of the census, assurances of data quality, decrease in response rates, public perceptions and privacy concerns (Fig. 4) [10].

Based on reports of the Needs Assessment Conferences for Census Analysis organized by UNFPA, the

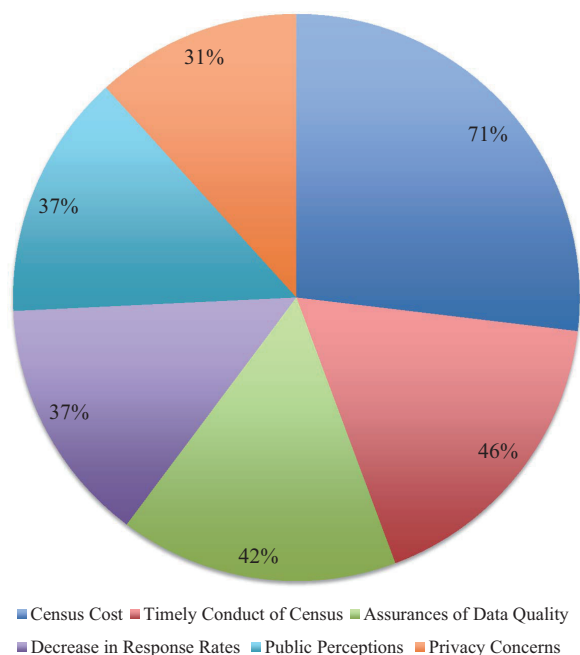


Fig. 4. Principal challenges in 2010 census round. Source: United Nations Department of Economic and Social Affairs: Statistics Division (2010).

selection of media for publicity and advocacy, in particular, the selection of partners within a large number of players was identified as a major challenge. Also, given the fact that not all localities in a country receive media, outreach resulted to be problematic. Besides the goal to mobilize resources, advocacy and publicity for the census aims at facilitating the collection of accurate data and information on demographic and socio-economic characteristics of the population by encouraging all communities and individuals to support and participate in the census process, particularly during the enumeration phase. It is the role of the NSO to set up a publicity and advocacy campaign with a detailed program to lay the groundwork.

Despite the recognition of the value of a census for development planning, some developing countries could not participate in the 2010 census round, mostly due to insufficient funding [12]. If funding cannot be secured for the entire census conduct quality and timeliness cannot be ensured and the analysis and dissemination will be compromised, therefore delaying and reducing the value of the census to users. Resource mobilization strategies need to be integrated at an early stage and planned properly. These strategies should serve a wide audience of users including national government organizations, the private sector, academic institutions, the media and local administrative [13].

6. Successes in the 2010 census round

A clear success of the 2010 census round was the increased number of countries that scheduled a census during this round. The UNSD states that there are only twenty one countries that do not have a census scheduled as of 31 December 2014, a count that stood at 25 in the 2000 census round. In 2000, these countries either did not conduct a census or no information was available for them.

Methodological or technical successes vary from country to country. “The implementations of new technologies, staying within budget, meeting deadlines and maintaining data quality, were most frequently cited census successes in the 2010 round. For some countries, just being able to do a census was a major achievement. Other countries are seeking alternative methods of census-taking, noting privacy, falling response rates or costs as a motivator for using a new method or new methods.” [3]

7. Discussion

As we entered the period of the 2020 round of world censuses (covering the years 2015–2024), a critical point has been reached to determine the future direction of census-taking worldwide. Technologies and census methodology are rapidly changing. Many of the countries that were still using paper questionnaires in the 2010 census round will be using hand-held digital devices, laptops or the Internet for the next round in 2020.

Advantages of these IT include the improvements in data quality and timeliness, the reduction of the costs of fieldwork, data collection, processing, analysis and data dissemination.

In most countries of the world, population and housing censuses continue to be the principal source of data on national population dynamics, providing insight into the social and economic characteristics of the population within a country. Summarizing one can say that countries in the 2010 census round collected census data using a variety of data sources and/or collection methods, reflecting their national realities and needs. The use of new methods results in a more complex census conduct, with the need for innovation regarding the use of IT. The majority of countries exploited some form of information technology, or at least planned to do so in future.

This article identified the main characteristics of census conducts of the 2010 round and the major chal-

Challenges and successes countries experienced. Summarizing one can say that the trend in the 2010 census round shifted toward multi-mode census taking, with countries using a variety of data sources and/or collection methods. While advantages of the application of new methodologies included timeliness, lower costs and improved data quality, the disadvantages included higher complexity, decreased content and pre-determined data definitions.

8. Conclusion

Population and housing censuses are crucial for the generation of meaningful data and information for development planning, programming and governance. Periodic censuses are one of the principal sources of data necessary for the monitoring of population issues as well as socio-economic and environmental trends, policies and programs [8].

Documentation on the 2010 census round needs to be considered to define recommendations for the 2020 World Program on Population and Housing Censuses and to ensure proper and timely planning. Rapidly changing technology, evolving census methodologies, privacy concerns and increasing needs for more timely data, in many countries of the world will significantly affect the approach to census-taking during the 2020 round of population and housing censuses.

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