Distr.: General
07 September 2022

English

Economic Commission for Europe

Conference of European Statisticians

Group of Experts on Population and Housing Censuses

Twenty-fourth Meeting
Geneva, Switzerland, 21-23 September 2022
Item 6 of the provisional agenda
The long-term future: censuses of the 2030 round and beyond

The future of population and housing censuses: prospects for the 2030 census round and beyond

Note by United Nations population fund (UNFPA)*

Summary

Census data present considerable advantages over sample-based surveys in terms of their potential for disaggregation by population characteristics and small geographic areas. However, to adapt to a changing global landscape and new information needs, countries have turned to, or are in the process of exploring, alternative approaches to generating population data, including register-based censuses and self-enumeration. Building on emerging lessons from the 2020 census round, this paper reflects on the prospects of population and housing censuses for the 2030 round and beyond, identifying opportunities and challenges of leveraging innovation to produce relevant and cost-effective population data. Population and housing censuses will continue to serve as one of the key pillars of integrated population data systems in the foreseeable future. Rather than a predetermined path towards a register-based census, the future of censuses is likely to require a variety of strategies to be crafted according to country-specific conditions.

NOTE: The views expressed in this paper are those of the authors and do not necessarily represent those of UNFPA.
NOTE: The designations employed in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

I.   Introduction

1.   Population and housing censuses are and continue to be the cornerstone of the demographic data infrastructure in most high-, middle- and low-income countries. The role of censuses is also central to the United Nations' 2030 Sustainable Development Agenda, providing population denominators to more than 100 SDG indicators, and with a specific SDG target (17.19.2) underscoring their importance. Due to their universality, census data present considerable advantages over sample-based surveys in terms of their potential for disaggregation by population characteristics and small geographic areas, making them a key tool to ensure everyone is counted, including the most vulnerable and marginalized groups.

2.   However, methods adopted for the collection of population data have significantly evolved over the past decades to adapt to a changing global landscape, reflect new information needs and take advantage of new data sources and technologies. In particular, the fitness-for-purpose of conventional population and housing censuses has been placed under scrutiny. On the one hand, the cost effectiveness of the census as a source of evidence for policy-making has been questioned in the light of pressing constraints on public finances, its infrequent periodicity (typically once in a decade) and the suboptimal utilization of the census data. On the other hand, concerns about the accuracy, relevance and coverage of census data are motivated by emerging difficulties of conventional enumeration (e.g. decreasing response rates in some countries); challenges in capturing new types of living arrangements and patterns of mobility, such as multiple residences, single-person households and student mobility (Coleman 2012); and the omission by design or systematic under-enumeration of some of the poorest and most vulnerable population groups—e.g. the homeless, people living in institutions, indigenous and nomadic populations, irregular migrants (Carr-Hill 2013). It is then unsurprising that a number of countries have turned to, or are in the process of exploring, alternative approaches to generating population data, including register-based censuses and self-enumeration. Lessons learnt from the Covid-19 pandemic may contribute to accelerate the transition to census approaches that do not require face-to-face interaction with respondents.

3.   While the two-century old notion of a universal population census may appear anachronistic[1] in the age of digitization, cloud solutions, artificial intelligence and citizen generated data, most countries, including some of the wealthiest and with strongest governance structures, retain their censuses and continue to invest in modernizing them. Why is it the case? What are the challenges of abandoning population censuses and relying exclusively on alternative sources of data? Is the use of technology for census modernization the answer to the fundamental questions about the utility and future of the census? And, ultimately, do population censuses retain their own place in the data revolution? Building on emerging lessons from the 2020 census round, this paper aims to provide a reflection on the prospects of population and housing censuses for the 2030 round and beyond, identifying opportunities and challenges of leveraging innovation to produce relevant and cost-effective population data.

II. Trends of the 2020 census round

4.   COVID-19 has significantly impacted the schedule of the 2020 census round. Out of 139 censuses planned for 2020 or 2021, only 68 were conducted. Most of the remaining ones were postponed until 2022 or 2023. As of August 2022, fifteen countries have no confirmed dates for their 2020 round census, including some of the largest countries in Asia (India) and Africa (Ethiopia) and war-torn countries where census enumeration was not possible for two or more decades.

---

[1] This dilemma was aptly summarized by the title of one of the sessions of the discussion platform of the Statistical Journal of the International Association of Official Statistics - *Population censuses: are statistical dinosaurs able to adapt?*

5. Globally, traditional population censuses involving the enumeration of the entire population account for the large majority (158 out of 218, about 73 per cent) of all censuses conducted or planned in the 2020 round (figure I). However, this reflects significant geographic diversity. On the one hand, all countries in Africa and Latin America have been conducting traditional censuses. On the other, the transition towards using administrative data in censuses is well underway in Europe and parts of Asia. Twenty-six (26) countries have conducted (or planned) register-based censuses, primarily in Europe and the Middle-East, while additional 22 countries, including in Central and Eastern Asia have adopted a combined methodology for their censuses[2] - most of them for the first time in the 2020 census round. In the UNECE region, the percentage of UNECE countries conducting a traditional census has dropped from 64 per cent in 2010 to 44 per cent in 2020 (UNECE census wiki). For many countries a combined census has been a stepping stone to the realization of a registered based census (e.g. Türkiye in 2011). In its 2020 combined census, China collected for the first time the citizens' ID number, which was used for cross checking the census information with the household registration (hukou) system and the elimination of duplicate records (NBS, 2022).

Figure I
Countries by type of census
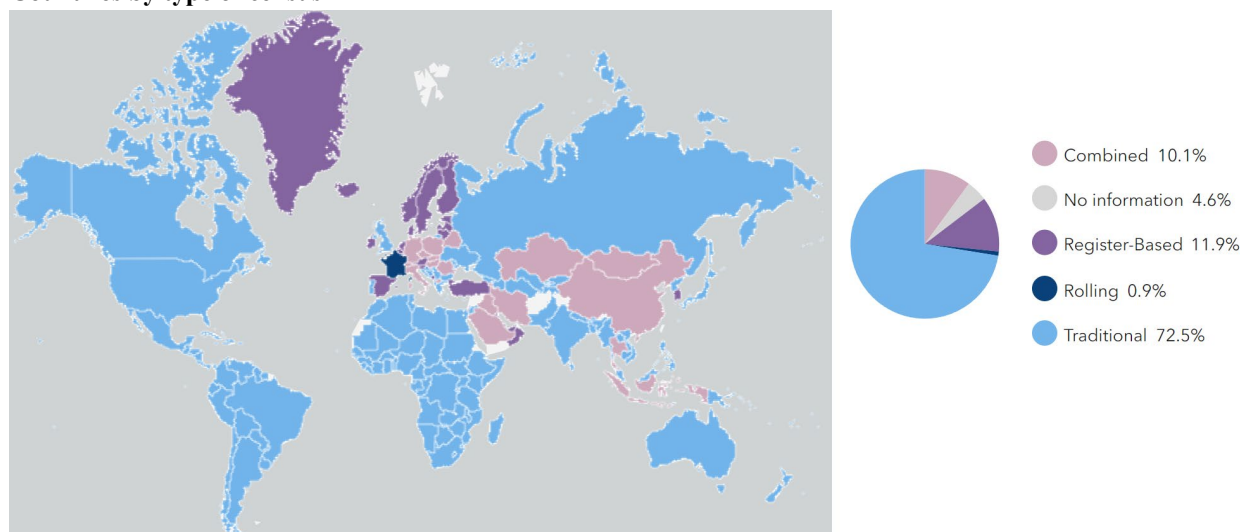
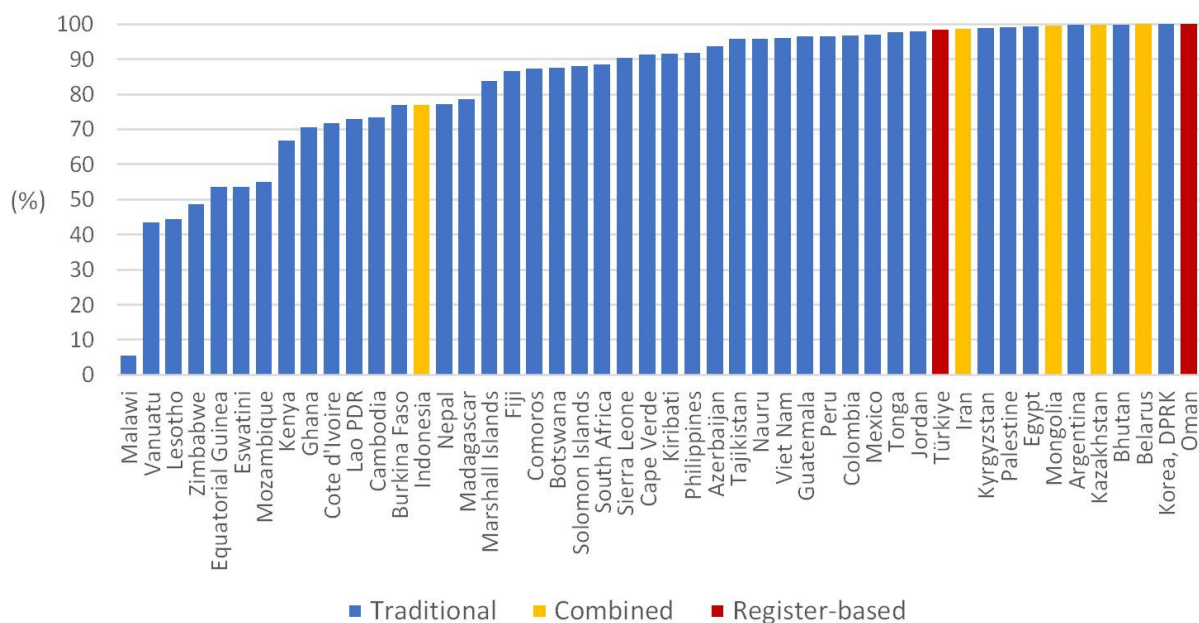Source: UNFPA Global Census Tracker (as of July 2022)

6. The transition to a combined or fully register based census requires the availability of a well-established and comprehensive set of administrative registers and accompanying institutional and legal frameworks to support access to and use of administrative data for census purposes. Figure II shows the relationship between the type of census and the coverage of birth registration for UNFPA program countries that have conducted the 2020 round census. Unsurprisingly, virtually all countries conducting a combined or register-based census have universal or nearly universal birth registration coverage. In Indonesia, incomplete population register data were used to improve and speed up the household pre-listing (UN-ESCAP, 2022).

7. Countries conducting traditional censuses are also investing in the modernization of planning, enumeration, and analysis methodologies to achieve cost efficiencies and improve timeliness and quality of the data. Data collection techniques have evolved with the use of hand-

---

[2] In a 'register-based census' there is no direct collection of data from the population. Administrative data held in various registers (for example, a population register, building or address register, social security register, tax records) replaces a traditional enumeration. A 'combined census' blends the use of administrative data with the collection of a reduced set of data from a field enumeration of the population, typically to derive specific variables that are not readily available from any administrative source.

held devices (tablets, smartphones) and digital systems for self-enumeration. This is reflected in figure III, showing that in the 2020 census round less than 1 in 10 countries have been using traditional paper forms (PAPI) as the main method of enumeration. Computer Assisted Personal Interviewing (CAPI) has been the most frequently used enumeration method (45 per cent of all countries conducting census enumeration). To maximize the completeness of coverage, CAPI has also been adopted in combination with other methods of enumeration (i.e. 17 per cent used mixed methods), most notably online self-enumeration. In particular, mixed methods are the dominant approach for enumeration in combined censuses.

Figure II
Percentage of children under age 5 registered by the civil registration system by type of 2020 round census, selected countries*

Note (*): UNFPA Program Countries which completed the 2020 round census as of July 2022
Source: UNICEF birth registration data and UNFPA Global Census Tracker (as of July 2022)

Figure III
Countries conducting traditional or combined censuses by method of enumeration
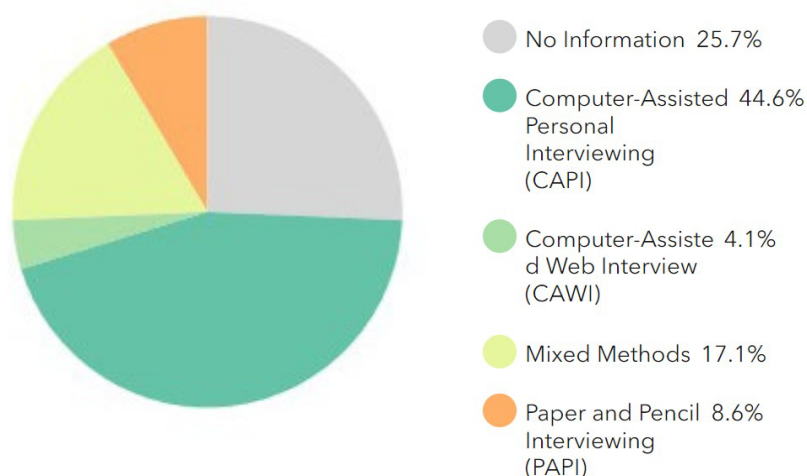
Source: UNFPA Global Census Tracker (as of July 2022)

8.   At regional level, 27 out of 44 ECE countries conducting traditional or combined censuses of the 2020 round have been relying on internet responses as one of the approaches of field-based enumerations, while others are exploring this possibility (UNECE census wiki). About 1 in 3 Asia-Pacific countries introduced or increased the use of alternative data collection methods (CAWI, CATI or self-enumeration with paper questionnaire) to address the limitations imposed by Covid-19 on face-to-face field enumerations (UN-ESCAP, 2022). In China, respondents were able to fill in and submit the census questionnaires by scanning a QR code, with more than 30 million households completing enumeration through self-administered online reporting (NBS, 2022). In Iran's 2016 census, half of the population (48.5 per cent) was enumerated through an online questionnaire—while the planning for a register-based census in 2026 is well underway (SCI, 2022). The investment required to digitize the data collection is commonly regarded as generating significant improvements in census processes and data quality. For example, the adoption of the CAPI system in Malawi's 2018 census reportedly resulted in greatly improved timeliness of the census results as well as lower per capita census costs (Kunyaka et al., 2020).

9.   The geospatial revolution has also transformed census processes through the adoption of satellite imagery for cartographic mapping, increasingly sophisticated algorithms for building footprint analysis and enumeration area delineation, dashboards for real time monitoring of census operations, geospatial techniques in the analysis of census data, and modeling approaches to estimate populations in hard-to-reach areas. Multifold examples of other innovations are modernizing census processes across regions. Cloud solutions for the transmission of census data and real-time monitoring of census enumeration are being adopted, including for large scale census operations. In Mexico, for example, the OPERA system allowed for the generation, analysis and monitoring of indicators of coverage, speed and productivity, as well as the transfer of databases encrypted with advanced algorithms (Orozco et al., 2020). China, in turn, pioneered the use of big data in its 2020 census by utilizing electricity meters and mobile phones to locate empty households and the population whose current residence could not be determined, respectively (NBS, 2022). In countries where a universal enumeration is not possible because of inaccessibility or insecurity of some areas, advances in the availability of detailed satellite imagery, geo-positioning tools for field surveys, statistical methods and computational power have enabled the development of geospatial statistical models that can estimate population

distributions at fine spatial scales. Colombia (DANE, 2022) and Burkina Faso (INSD, 2022) provide excellent examples of application of this approach as part of their 2020-round censuses.

10.   A key factor enhancing the feasibility and cost effectiveness of census modernisation has been the transfer of knowledge, skills and equipment between countries through a proliferation of regional initiatives (UNFPA, 2021), the benefits of which were reported for example by Malawi (Kunyaka et al. 2020) and Palestine (Awad and Abu Harb 2020). Partnerships with academic institutions have been highly instrumental to the development of capacity in 'hybrid' census methodologies.

III.   Financial sustainability of traditional censuses

11.   Against the backdrop of limited public sector budgets and increasing demand for public services, in many countries the high cost of traditional population censuses has been increasingly difficult to justify. According to a recent survey conducted by the UN Statistics Division, the lack of financial resources is one of the top three challenges experienced by statistical agencies in the 2020 census round (UNSD, 2020). Uncertainty and delays in the mobilization of census funds often affect the schedule of census preparation and impose compromises in the execution of census activities. NSOs are often faced with funding gaps in key census activities until very late in the implementation schedule, as reported for Malawi's census (Kanyuka et al., 2020). In particular, the large workforce that needs to be temporarily deployed for a full field-based enumeration accounts for the largest share of census costs—typically about 40 per cent (Stukel, 2008). On the other hand, dissemination activities are most likely to be curtailed due to funding gaps.

12.   Dependence on foreign donors makes the financial viability of census projects additionally vulnerable to cutbacks in international development assistance. This is especially the case for African countries, only some of which can count on national investments to cover the entire census budget[3]. Analyses of resource flow for overseas development assistance suggest that international support for censuses and surveys has been stagnant, while funding to administrative data systems has doubled between 2011 and 2019 (PARIS21, 2021).

IV.   Prospects for the 2030 census round and beyond

13.   While many countries are still grappling with the delays of their 2020 round censuses, in other countries preparations for the next census round are already underway. For those countries which had to postpone their censuses due to the impact of the Covid-19 pandemic, one of the key questions to be considered will be whether to revert to the periodicity of the previous census cycle or plan the next census according to a new 10-year interval. On the other hand, countries which conducted their census enumeration while severely impacted by the pandemic may need to assess the representativeness and comparability of census results, and feed any adjustment required by the users into the planning of the next round. At a more fundamental level, the postponements (and cancellations) due to the pandemic may prompt or accelerate a reflection around the fitness for purpose of the fieldwork-based approach to census enumeration and the availability of alternatives that can generate more regular population data.

14.   In the medium term, cost-cutting pressures on census agencies are likely to continue. On the one hand, the global cost of conducting traditional censuses will continue to increase driven by population growth: out of 0.7 billion people who will be added to the world population over the decade 2020-30, over 600 million will live in low income and lower-middle income

---

[3] Eleven (11) out of 22 countries reporting to rely on international donor support for half or more of their 2010 round census budget were in Africa (Stukel 2008).

countries[4] where field-based enumerations will continue to be the main method of data collection. On the other hand, economic damage from the war in Ukraine has negatively affected the prospects for economic recovery after the Covid-19 induced crisis, with foreseeable impacts in terms of government budgets, commodity and energy prices (IMF, 2022). As a result, the volume of financial flows for overseas development assistance, typically allocated as a share of national economic outputs, may also suffer. Lessons learnt from the previous census rounds warn us that the progress towards expanding the global coverage of population censuses is not linear nor incremental. As such, in a funding landscape further characterized by donor fatigue and multiple competing priorities - including growing humanitarian needs - ensuring that the benefits of conducting a census are well understood will be more important than ever to establish the political support for the 2030 census round.

15.   The trend of moving away from field-based enumerations towards combined and full register-based censuses will no doubt continue in the 2030 round in Europe and other high-income countries, as already anticipated by a number of statistical agencies (UNECE, 2020). The integration of administrative data into census processes can also be expected to advance in the Asia-Pacific and Latin America, where several countries have made significant progress in strengthening civil and vital registrations and have taken steps to establish population registers (ESCAP, 2022). The transition towards register-based methodologies clearly shows that the population census is in a state of flux, with the 2030 round playing an important role in shaping its future.

16.   However, it would be premature to assume that the traditional census is in a "state of global decline" (Kukutai et al., 2015). It can be anticipated that in the 2030 census round the majority of countries will continue to undertake a field-based census, albeit with a combination of data collection modalities and leveraging administrative and other data sources to strengthen census processes. The experience of some of the most advanced statistical systems shows that establishing a functional set of registers fit for the purpose of replacing a traditional census can take many years, requiring a high initial capital investment and degree of interagency collaboration and public compliance (Coleman, 2012). In particular, the reliance on administrative data without proper quality control procedures can lead to reduced quality of the census outputs. In low-income countries lacking fully-fledged administrative data infrastructures, the preconditions for a full transition to register based methodologies are unlikely to be met for the foreseeable future. In these contexts, the integration of geospatial and statistical methods and adoption of alternative methods of census enumeration may represent the most viable solutions to produce more accurate, timely and cost-effective census data. Yet, these promising approaches are not exempt from constraints, demonstrated for example by the low response rates typically encountered with online/self-enumeration methodologies. The increasing demand for geospatially enabled statistical data currently exceeds the capacity of many national and regional institutions (UN-GGIM, 2022).

17.   The census has also a function to retain in the establishment of register-based statistical systems. The population census can be used to assess the quality of civil registration systems (and vice versa). Many countries have included in their censuses questions on whether births and deaths reported for the members of the household have been registered. Similar questions can be adopted with reference to marriage. The cross-classification of this information with individual and household socio-economic characteristics allows analysts to identify the determinants of under-registration, e.g. any association with household-level poverty, low educational attainment or language barrier or gaps in seemingly complete civil registration systems with reference to specific groups which may partly escape administrative processes. Censuses may also include questions on the self-reported reasons for not registering a civil event (e.g. because of cost, distance, lack of awareness of registration requirements and procedures, etc.). In some cases, the census has been used for the establishment of population registers. In India for example, the

---

[4] According to the medium variant projection of the UN Population Division's World Population Prospects, 2022 Revision.

information collected in the house-listing phase of the 2010 PHC was used to establish the Nation Population Register, and updated in 2015 (Venkataramanan, 2019).

18.   Ultimately, it is possible to envisage that the development of new techniques for modernizing traditional censuses and improving their cost-effectiveness, and the replacement of field-based enumeration with a combined and, eventually, fully register-based system, will continue to develop as mutually reinforcing, rather than mutually exclusive, approaches to the generation of demographic data. While the notion of a census as a process of door-to-door data collection needs to be reconsidered (Baffour et al., 2013), population and housing censuses will continue to serve as one of the key pillars of integrated population data systems in the foreseeable future. Rather than a predetermined path towards a register-based census, the future of censuses is likely to require a variety of strategies to be crafted according to country-specific conditions.

References

Awad O. and Abu Harb S. (2020). "Palestinian Census 2017 – Harnessing the Modernization Initiative". *Statistical Journal of the IAOS*, 36: 77-81. DOI 10.3233/SJI-190515

Baffour B., King T. and Valente P. (2013). "The Modern Census: Evolution, Examples and Evaluation". *International Statistical Review / Revue Internationale de Statistique*, 81(3): 407-425.

Carr-Hill (2013). "Missing Millions and Measuring Development Progress". *World Development*, 46: 30-44.

Coleman D. (2012). "The twilight of the census". *Population and Development Review:* 38 (supplement): 334-351. Available at:
http://www.popcouncil.org/pdfs/PDRSupplements/Vol38_PopPublicPolicy/Coleman_pp334-351.pdf

DANE (2022). "Harnessing the predictive power of community workshops, geospatial data, and Bayesian statistics to address census omission in remote areas of Colombia". Presentation for UNFPA's Webinar on Modelled Population Estimates, 4th May 2022.

IMF (2022). World Economic Outlook April 2022. Washington, DC : International Monetary Fund. Available at: https://www.imf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022

INSD (2022). "Expérience du Burkina Faso en matière de modélisation des effectifs de population : Recensement de la population 2019". Presentation for UNFPA's Webinar on Modelled Population Estimates, 4th May 2022.

Kanyuka et al. (2020). "Malawi population and housing census technological trajectory: Unpacking 2018 experience". *Statistical Journal of the IAOS*, 36: 57-65. DOI 10.3233/SJI-190587

Kukutai, T., Thompson V. & Mcmillan, R. (2015). "Whither the census? Continuity and change in census methodologies worldwide, 1985-2014". *Journal of Population Research*, 32(1): 3-22. DOI:10.1007/s12546-014-9139-z

NBS (2022). "Practice of 2020 Population Census and the Current Situation of China's Population". Presentation for the Briefing Session on Population Trends for the UN Agencies in China, Shanghai 6th July 2022.

Orozco, E.V., Campos S.N. and Campos I.S. (2020). "Use of new technologies for the 2020 population and housing census round". *Statistical Journal of the IAOS*, 36: 83-88. DOI 10.3233/SJI-190527

PARIS21 (2021). *Partner Report on Support to Statistics 2021*. Paris: OECD. Available at: http://paris21.org/press202

Statistical Center of Iran - SCI (2022). "Population and Housing Censuses in the I.R. of Iran". Presentation for the Workshop on Transitioning to a Register-based Census in I.R. Iran, Tehran, 13-15 June 2022.

Stukel D. (2008). Projected Census Dates, Funding Requirements and Sources, and Technical Assistance Needs for the 2010 Round of Population and Housing Censuses. New York: UN Statistics Division.

UNECE (2020). *New Frontiers for Censuses Beyond 2020*. Geneva: UNECE. Available at: https://unece.org/statistics/publications/new-frontiers-censuses-beyond-2020

UNESCAP (2022). *Emerging trends in census approaches in Asia and the Pacific (with country examples)*. Bangkok: ESCAP. Available at: https://www.unescap.org/kp/2022/emerging-trends-census-approaches-asia-and-pacific-country-examples

UNFPA (2021). *South-South Cooperation as a Mode of Engagement: Innovative Programme Solutions*. New York: UNFPA Inter-Country Cooperation Office. Available at: https://www.unfpa.org/publications/south-south-cooperation-mode-engagement

UN-GGIM (2022). "Integration of geospatial, statistical and other related information". Report for the 12th Session of the Committee of Experts on Global Geospatial Information Management, New York, 3–5 August 2022. Available at: https://ggim.un.org/meetings/GGIM-committee/12th-Session/documents/E_C.20_2022_12-2207814E.pdf

UNSD (2013). *Overview of National Experiences for Population and Housing Censuses of The 2010 Round*. Available at: https://unstats.un.org/unsd/demographic-social/census/documents/UNSD/overview.pdf

UNSD (2020). "Report on the results of the UNSD survey on 2020 round population and housing censuses". Background document for the Fifty-first session of the Statistical Commission, 3-6 March 2020. Available at: https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Survey-E.pdf

Venkataramanan K. (2019). "Explained: What connects the NPR, NRIC and Census?" The Hindu, 22 December 2019, available at: https://www.thehindu.com/news/national/what-connects-the-npr-nric-and-census/article61602475.ece