An Approach to Maintain Reliable Statistics on Population

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August 2023

Introduction

Amongst the questions brought by the National Statistical Organisations (NSOs) participating to the *Project for the Regional Advancement of Statistics in the Caribbean* (PRASC), many were related to their Population Estimates Program (PEP). The main questions and requests came from Montserrat, Grenada and Belize. In order to fulfil these requests and provide the required technical assistance, meetings, training sessions, workshops, on-going conference calls and data exchanges were regularly held throughout the project. While most of the questions were primarily related to the difficulty of properly measuring the international migration movements, several other issues were revealed during the discussions.

In the Caribbean context, where censuses are held every 10 years and where international population movements are important and fluctuating with the economic conditions, it becomes essential for Caribbean NSOs to maintain good statistics on population. Without timely and reliable population estimates, the quality of socio-economic indicators such as vital rates, crime or labour statistics might quickly become questionable. Without reliable population estimates, the quality of the population projections produced by these NSOs might also be impacted as birth, death and migration rates are used as inputs. Finally, an increasing number of surveys, such as the important Labour Force Survey, now depend on the use of population estimates to calibrate their survey weights in order to reduce the variance of their estimates.

By discussing with the NSOs, several other issues came to the table. Methodological flaws were revealed, data governance and quality evaluation were also shown as lacunary. So, from questions related to international migration, work also had to be done on all the aspects of population estimates. This document aims at summarizing what was discussed during the meetings and at making general recommendations on how to solve these issues in order to help NSOs develop their respective PEP.

Methodology

Depending on the availability of data and resources, human and technical, there are different ways to estimate population stocks and flows (see Chapter 20 of *The Methods and Materials of Demography*). When possible, Caribbean NSOs should use the Cohort-Component method which is the method used by most NSOs around the world.

In short, the Cohort-Component method requires a base population (usually a census adjusted for coverage biases) to which is added an estimate of the population change measured through the use of administrative data such as vital statistics (births and deaths) and on international migration (exits and entries at the border).

While most NSOs have access to census and vital statistics, this is not always the case with information on entries and exits at the borders. Without such information on international migration, the quality of population estimates currently produced in the Caribbean region becomes questionable.

The use of census questions related to international migration was evaluated. While most NSOs have census questions on immigration, information on emigration is scarce. And as migration patterns evolve quickly with the economic context, census data might rapidly become obsolete. In order to use the census information for the measurement of international migration, more analytical work has to be done.

The use of the migration estimates produced by the Population Division of the United Nations could also be a possibility. However, the timeliness of the information is not optimal and, again, as international migration patterns evolves quickly, the relevancy of the information might not be adequate and, sometimes, may be misleading when migration patterns change abruptly.

The use of border statistics in order to measure the net population change through international migration was also assessed. As it is available in each Caribbean country, mainly for tourism statistics, the use of these administrative data for the purpose of population estimates has an important potential and should be looked at.

The Australia Bureau of Statistics (ABS) developed a method to measure international migration using such border statistics. This method is also used in New Zealand. The Caribbean NSOs should have a look at this method and evaluate how it could be adapted to their context as calculating net international migration from border statistics requires the manipulation of huge data sets and specific methodological expertise.

As most of the Caribbean countries have the same type of migration regulations and processes, one solution could be that the regional NSOs work together to build common standards and processing steps to measure international migration. Regional organizations, such as ECLAC, OECS, CARICOM or the Caribbean Migration Consultations, should play a leadership role in that matter. The use of optical reading of immigration cards should also ease the use of the data by reducing data manipulation.

It is to note that the Montserrat NSO has been using border statistics to measure its net international migration for many years now. By aggregating exits and entries of the resident population, the NSO is able to produce such estimates. The method is simpler than what is in use in Australia and could be implemented in other countries. However, data quality remains an important issue. For example, one

issue is the identification of "nationals" living in the Caribbeans from the "nationals" living abroad (in US or Canada for example). As population estimates should aim at measuring the population living in the Caribbean countries as their usual place of residence, migration of tourists and temporary residents has to be discarded. The burden of building proper migration statistics for the Caribbean region could be reduced if the countries of the region work together.

As it will be discussed later, access to the data alone is not the solution. Thorough quality evaluation, elaboration of clear standards and processes are also mandatory for the good use of using border statistics for population estimates purposes. Collaboration between NSOs and border control authorities is important and valuable in addressing these concerns. This collaboration would surely benefit all agencies.

Other more complex methods, such as the use of stable populations, could have been studied but would have required extensive demographic expertise and were excluded. The chapter 22 of *The Methods and Materials of Demography* gives good examples on how these methods should be applied for demographic analysis and population estimates.

Software

There are no specific tools to calculate population estimates. As is the case elsewhere in the world, each Caribbean NSO calculates its population estimates with its own tool. In the Caribbean region, most NSOs are using Microsoft Excel. Between 2016 and 2019, a documented system of EXCEL files was elaborated jointly with the Montserrat NSO. A user guide was also written. The Montserrat NSO staff was trained and the system is still in use.

In 2019, a meeting with OECS was organized in order to lead further development of the system with the objective of training other OECS countries and promote a common way of producing population estimates. As the meeting occurred in St. Lucia, representatives of the country's NSO were present at the meeting and were trained. Unfortunately, the project was halted by the pandemic.

One alternative to the use of EXCEL would be the use of public population projections software such as DAPPS (Demographic Analysis & Population Projections Software), a software produced by the US Census Bureau[1]. Indeed, DAPPS could also be used as a tool to produce population estimates which can be regarded as population projections for the very short-term. As DAPPS is well documented and still supported by the US Census Bureau, this could be an interesting alternative to EXCEL when calculating population estimates.

Data Governance

A good data governance is also key to the success of an efficient PEP. The Caribbean NSOs often do not own/manage the data (vital statistics, border statistics, school enrolment, etc.) required for the

[1] While population estimates can be considered as the calculation of the size or distribution of a population or another characteristic of the population for the present or past, a projection describes these characteristics in the future. As they often both rely on the cohort-component approach, their calculations might become quite similar similar factsheet4-eandp.pdf (census.gov).

calculation of population estimates and must then rely on the collaboration of other ministries or agencies. In the Caribbean region, vital statistics are often managed by the Ministry of Health and border statistics by the national Tourism Agencies. A close collaboration between all these agencies would inevitably be beneficial for any national statistical system.

To produce timely population estimates in a systematic fashion, an efficient PEP requires a regular and stable supply of data. In that sense, Caribbean NSOs should develop formal service-level agreements (SLAs) with other governmental agencies in order for the suppliers to understand the importance of reliable population statistics for the country and the importance of their data to help the NSOs achieving this feat.

As it is the case in the Caribbean area, and elsewhere in the world, governmental organizations do not always communicate sufficiently. Such approaches of liaison are desirable both at senior executive and working levels of the organizations. Common planning, regular meetings and written agreements are good ways to ensure the regular supply of information. A way to establish a good relationship is to develop "win-win" situations in which the supplier also benefits from sending its data to another organization. For example, in exchange of receiving the border statistics in a regular fashion, NSOs could create tabulations, or provide quality evaluations of the data.

Quality Evaluation

But even if the data comes in a regular and timely fashion, this does not mean that the information is ready to be used for the purpose of calculating population estimates. Data, either Census or administrative data, should not be used before having been through a thorough quality evaluation.

A flawed census, or flawed administrative data, will inevitably produce population estimates of uncertain quality. For example, Census data should not be used as is when calculating population estimates (or for any other uses) if quality assessment shows uncorrected coverage biases. In this regard, Statistics Canada conducts coverage studies (undercoverage and overcoverage studies) after each census and its PEP uses adjusted census counts as the base population for its population estimates. These adjusted counts differ from the published Census counts and these differences are explained throughout several notes and a proper documentation. Several countries, such as Australia and New Zealand, do the same.

Census coverage error should always be assessed. This is important both for the census itself and for use in the base population for the PEP. This refers to persons missed due to nonresponse as well as persons missed or overcovered for any other reason. Ideally this is done via a post-enumeration survey conducted shortly after the conclusion of data collection work. (As these are technically complex and challenging to do well, planning needs to start well in advance.) Even in the absence of a post-enumeration survey, there are means to at least partially assess coverage.

Caribbean NSOs should devote more resources for data quality evaluation, either for Census or any other sources of information used when producing statistics. Data are often used as is with few or even no quality assessment and this directly impacts the quality of the produced information and may lead to erroneous use and decision making. Published statistical information and data should be accompanied by notes describing their quality and the statistical methods used. When appropriate potential issues with the use of the data should be indicated in cautionary notes.

During the course of the PRASC project, several training sessions were given on data quality evaluation. For example, we looked at the use of vital statistics and school enrolment data to evaluate the Census coverage at young ages. The use of historical series, such as vital rates series, should be maintained to evaluate the new yearly information coming in. As each set of data is not perfect, users should always understand why inconsistencies exist between the different sources of information at stake before using them. The chapter 7 of *The Methods and Materials of Demography* gives good examples on how demographic methods, such as the calculations of simple rates, should be considered.

Everywhere in the world, the use of administrative data for statistical purposes is increasing and this is the case also for the calculation of population estimates. These new sets of data are not only used for evaluation purposes but also for the development of new methods. For example, Canada uses income tax information to measure its internal migration. Caribbean NSOs should also look at its different administrative data (fiscal data, administration of social programs, etc.) to support the calculation and evaluation of its population estimates as for any other statistics.

Resources and Staff

As it is the case for any other specialized subject, calculating population estimates or projections is very specific and requires proper theoretical and technical expertise. To have a secure and stable PEP, each NSO should have at least one trained population analyst. Again, a collaboration between the University of the West Indies Master of Demography Program and the regional organizations (OECS, CARICOM, etc.) should be established to make sure that the curriculum of this Demography Program answers the needs (theory, concepts, software, etc.) of the NSOs of the region in relation to population estimates and projections.

Summary

During the course of the PRASC project, StatCan had the opportunity to meet several participating NSOs and discuss issues related to their Population Estimates Program (PEP). Mainly due to insufficient resources, very few of the participating NSOs were in a position to produce timely population estimates on a regular basis. As population estimates are the backbone of any socio-economic statistical system, participating NSOs should consider the building of stable PEPs as a priority for the years to come. This will only be possible if all the regional organizations and NSOs collaborate and work together to establish the required training programs, common standards and best practices. Caricom could be the leader of this.

Appendix 1 - Useful Links

Swanson, David & Siegel, Jacob. (2004). The Methods and Materials of Demography, 2nd Edition.

Demographic Analysis & Population Projection System (DAPPS) Software (census.gov)

US Census Bureau Workshops (census.gov)

Principles and Recommendations for Population and Housing Censuses, Revision 3 | United Nations iLibrary (un-ilibrary.org)

Free Movement in the Caribbean: Economic and Security Dimensions | IOM Publications Platform

World Migration Report 2022 | IOM Publications Platform

ECLAC - Caribbean | Economic Commission for Latin America and the Caribbean (cepal.org)

Master of Demography | SPSW (uwi.edu)

Statistics Canada Census Technical Report: Coverage (statcan.gc.ca)

Population and Family Estimation Methods at Statistics Canada (statcan.gc.ca)

Evaluation of alternative data sources for population estimates | Stats NZ

Migration, Australia methodology, 2018-19 financial year | Australian Bureau of Statistics (abs.gov.au)

UNFPA Technical Guidance: Post Enumeration Surveys in Population and Housing Censuses, 2019

UNSD Post Enumeration Surveys Operational guidelines Technical report, 2010

Appendix 2 – PRASC Main Activities related to Population Estimates Program

- April 2016, Workshop #1 with Montserrat
- March 2017, Workshop #2 with Montserrat
- Mars 2018, Workshop #3 with Montserrat
- December 2019, Workshop with OECS and St. Lucia representatives
- 2017-2021 on-going discussions with Belize (international migration, general methodology, use of DAPPS)
- 2018-2020 on-going discussion with Grenada (international migration)