

Health Information System Strengthening: Standards and Best Practices for Data Sources

MODULE 7:

Population Censuses



This module is one of 12 HIS data source modules in *Health Information System Strengthening: Standards and Best Practices for Data Sources*. The full series of modules (available at <https://www.measureevaluation.org/resources/publications/tr-17-225>) is intended to provide health authorities and other health information stakeholders with a reference guide that, along with other sources, can help align the HIS data sources with international standards and best practices.

Type of Data Generated: Population Exposed to Health Risks and Interventions

Description

A population census, often combined with a housing census, is usually conducted by the national statistics office every 10 years. It consists of an individual enumeration of the entire population, with the objective of providing an accurate count of the population at a fixed point in time. It is the most logistically complicated and expensive data collection operation that a country can undertake (UN, 2014a). Several countries in Europe conduct an “administrative census,” in which they obtain a count of the population from a complete population registry instead of, or sometimes in addition to, a traditional enumeration (Valente, 2010).

The results from the enumeration constitute a base population, comprising counts of persons for each precisely delineated administrative unit, or enumeration area, without omissions or overlaps of land or population. The base population usually refers to the “usual resident population count” that includes all usual residents at the time of the enumeration, as well as their age, sex, occupation, and basic living standards. The list of enumeration areas, with their corresponding population count, serves as the baseline for intercensal estimates and projections and also a sampling frame for selecting survey samples.

The UN recommends that a population census include 31 core topics, and the two topics of greatest interest for computing health indicators are “demographic and social characteristics” and “fertility and mortality” (UN, 2014a).

Population Estimates and Projections

Intercensal estimates are annual estimates of the mean population by age and sex for the years between censuses. They provide important denominator information to calculate time series for many health-related and other indicators. Demographers calculate intercensal estimates using a standard demographic method called the cohort component method. This method takes into account natural population change and net migration. The cohort component method starts with the base population and every year thereafter takes the resident population at mid-year of the previous year and advances the population by one year of age. That is, births during the year prior to July 1 are added to the population, deaths during the same period are removed, and the number of net migrants is accounted for.

The intercensal estimates from the cohort component method are only as accurate as the base population count and the input information on births, deaths, and migrants. Direct demographic estimates require information on the number of births and deaths by age and sex from the CRVS system after any adjustments for under coverage have been made. These numbers are supplemented by the number of net migrants, which, at the subnational level, is often the most important and most difficult population component to measure (Jarabi, n.d.). If the numbers of demographic events are not readily available, indirect techniques can be used to estimate fertility, mortality, and migration inputs.

Population projections are similar to intercensal estimates but are used to inform future planning and resource allocation and for target setting. They are also calculated using the cohort component method, but, unlike estimates, projections are calculated using assumptions about future trends of fertility, mortality, and migration rather than the actual levels.

A number of valuable resources are available to analyze and use census data. MEASURE Evaluation’s online course, Cohort Component Population Projection Method, presents a straightforward approach to this method, requiring minimal demographic information (MEASURE Evaluation, n.d.). The International Union for the Scientific Study of Population provides Internet-based tools with step-by-step instructions for a variety of demographic estimation techniques, all downloadable from its website (International Union on the Scientific

Study of Population, 2013). The International Programs Center of the U.S. Census Bureau provides a suite of pre-programmed Microsoft Excel sheets for basic demographic analysis of census data, including data on age structure, mortality, fertility, migration, geographic distribution of the population, urbanization, and population projections (U.S. Census Bureau, 2013a; U.S. Census Bureau, 2013b). In addition, a number of older resources from the United Nations are still relevant, especially for guidance on indirect computations of demographic indicators from census data (UN, 1955, pp. 184–199; UN, 1983; UN, 2004).

Small Area Population Estimates

For official purposes, population-based health statistics should be produced for national and subnational administrative divisions as long as population estimates can provide accurate denominator data to calculate them. However, national statistics offices usually do not provide official estimates and projections for areas below the national or provincial level because precise data on births, deaths, and migration are not usually available for small administrative areas (Rayer, 2015).¹⁶ In addition, health catchment areas are often different from official administrative boundaries, so it may be meaningful for the health sector to produce indicators for planning and operational purposes using local estimates of the catchment population. Both official statistics and operational statistics are valid to serve their respective purposes.

Types of Indicators

The most basic indicators derived from a census are the counts, in absolute numbers, of usual residents. Decision makers need this information for planning future service delivery and resource allocation, especially because aging populations are causing priorities to shift in the health system.

In addition to population counts, census data are a fundamental source of health information in two ways. First, they provide denominator data for a number of indicators presented in other HIS data source modules. Second, the intercensal estimates are used to calculate key fertility and mortality indicators. For example, indicators related to the basic tabulations from core census topics are as follows:

- Total population by age, sex, locality, and other background characteristics
- Median age of population
- Crude birth rate
- Total fertility rate (children ever born)
- Sex ratio at birth
- Crude death rate
- Childhood mortality
- Age- and sex-specific death rates
- Life expectancy at any age

Alternative Data Sources

Population-based surveys can provide periodic indicators on mortality and fertility.

¹⁶ See Swanson (2008) for information on regression-based techniques that can be used to estimate small area populations, such as the Ratio-Correlation Method.

Standards

Data collection and processing. The UN Statistics Division developed and maintains a compendium of standards on conducting a census (UN, 2014a). It includes recommendations for planning and operationalizing the population and household enumerations, and it presents important concepts and definitions that should be applied consistently in a country's integrated program for data collection and analysis. It also provides a detailed set of tabulations that maximize information collected on core census topics.

Data confidentiality. Although the census enumeration is mandated by a national law and obliges every resident to respond, Principle 6 of the UN Fundamental Principles of Official Statistics resolves that personal data collected are to be kept strictly confidential and used for statistical purposes only (UN, 2014b).

Age standardization. Fertility, mortality, and other health-related indicators require age-specific population estimates in their denominators. However, because population age structures differ across areas and change over time, they need to be normalized to reliably monitor progress or compare levels nationally or internationally. Indicators can be made directly comparable by applying standard population weights using a standard (or reference) population. Any standard population can be used, such as the international WHO standard population (Ahmad, et al., 2001) or other regional reference population. Naing (2000) provides useful instructions on how and why to apply age-standardization methods.

Best Practices

- Census legislation has provisions for ensuring **data security and confidentiality**, in accordance with the UN Fundamental Principles of Official Statistics.
- The census is designed using UN-recommended **population census topics** and the published results include UN-recommended **tabulations**.
- Updated **population estimates and projections** are calculated at a minimum for the national level and the first official subdivision level. Health information officers make estimates available to health managers at every level.
- Indicator metadata for mortality and fertility indicators stipulate the **use of official population estimates** in the denominators.
- **Social and demographic indicators from the census are compared** to comparable measures from household surveys to help ascertain data quality of both sources.
- **Numbers of births and deaths are compared** to comparable numbers from the CRVS system, at the national and subnational levels, to help determine completeness of the CRVS.
- To control for different population age structures, **a standardized population is applied** when comparing fertility, mortality, or other health indicators over time, or when comparing levels across subnational areas or internationally.

References: Module 7

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