

Summary

Population structure and growth is viewed as resulting from the influence of a number of parameters, including natality (birth rates), mortality (death rates), age structure, immigration, emigration. In most cases natality, mortality and age structure are the most important elements.

Natality determines the number of new individuals introduced into the population. Mortality determines the number of individuals lost from the population. Age structure determines the number of reproducing individuals in the population as well as the number of reproducing individuals that will be present in the next generation.

Demographers and population biologists are extremely interested in the dynamics of population growth and structure. A number of methods have been developed to present the vital statistics of populations. One of these is the life table. The life table is a key summary tool for assessing and comparing mortality conditions prevailing in populations. This is a table that presents data on the age specific mortality and survivorship of a population and can be used to compare populations under different circumstances.

The basic summary measure of mortality from the life table, the expectation of life at birth, is widely understood by the general public and trends in life expectancy are closely monitored as the principal measure of changes in a population's health status. The construction of a life table requires reliable data on a population's mortality rates, by age and sex. The most reliable source of such data is a functioning vital registration system where all deaths are registered.

Deaths at each age are related to the size of the population in that age group, usually estimated from population censuses, or continuous registration of all births, deaths and migrations. The resulting age-sex-specific death rates are then used to calculate a life table. However, life tables contain a lot of information and can be difficult to interpret directly. One solution is to graph the data in the form of a survivorship curve. Survivorship curves allow for quick visual assessments of differences in age specific mortality between populations.

Mortality not only offsets the effects of natality in terms of overall population size, but it can also have an effect on age structure. During the last century humans (particularly in developed nations) have undergone marked advances in technology. How have these changes affected our mortality rates and what implications do they have for human population growth? We will construct life tables and survivorship curves and then use these data to look for changes in age-specific mortality between decades.

Life tables are basically lists of mortality, survivorship, and life expectancy figures categorized by age class. They are frequently used by life insurance companies as a means of setting premiums. Life tables are often used by population biologists to characterize population dynamics.

Ideally, life tables should be constructed from a long historical series of mortality data from vital registration where the deaths and population of the de jure (or defacto) population-at-risk are entirely covered by the system. In order to compute life tables for a given year (i.e. 1999) for which vital registration of deaths is not yet available for administrative reasons, short term projections are required from the latest available year. This will require an adequate time series of data, with at least 15-20 years of mortality statistics.

The principal method used for the construction of abridged life tables are:

1. Reed-Merrell method

2. Grevilles method
3. King's method

The basic criteria used in selecting countries for the time-series analysis, are availability of historical data (1) of good quality as judged by the internal consistency of the data as well as proportion of the population covered, (2) with no more than 5 year gap in the most recent period, and (3) with at least 10 observations to allow for a more robust projection.

There are two principal forms of the life table:

1. The Cohort life table
2. The Period life table

The cohort (or generation) life table records the actual mortality experience of a particular group of individuals from the birth of its first member to the death of its last member. Such data are hard to come-by, hence the cohort or generation life table is of limited practical interest.

The period (or current) life table is constructed from the conditions of mortality obtaining during a single year or a given period of years using the experience of a synthetic cohort. It thus provides a cross sectional view of the mortality and survival experience of a given population during a single year, and is therefore, a more useful tool for mortality analysis.