Chapter

Introductory Chapter: Demographic Analysis

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1. Understanding demographic analysis

Demography is typically defined as the study of human populations and the changes in their quantity associated with migration, fertility, and mortality. The term demography comes from Greek word and means "describing people." Thus, this discipline deals with the characteristics of the population, taking into account features such as, sex ratio, age structure, composition, spatial distribution, and population density. In addition, sometimes a distinction is made between "formal demography" or "demographic analysis," which includes the statistical analysis of population parameters and their dynamics, and "population studies," that is, the analysis of the causes and effects of changes in the structure of the population in a broader context and in connection with other phenomena and processes [1, 2].

Demography uses databases of public statistics, including national administrative data on births, deaths, registered marriages, divorces, diseases, employment, as well as data from censuses. An example could be the "Demographic Yearbook System" [3] of the United Nations Statistics Division that has been developed since 1948. In addition, the demography attempts to develop predictions of the future population size (e.g., "World Population Prospects" [4]), which can then be applied by various public policy areas, including, for example, social policy, health policy, labor market policy, pension policy, and tax policy [5, 6]. Censuses organized by governmental centers (e.g., the United States Census Bureau [7] or the national statistical offices) became the first type of social survey conducted regularly due to the diversity of uses of the collected demographic data. It should be remembered that the statistics of the natural movement of the population usually need to be supplemented with knowledge coming from sociology, economics, and political science concerning, among other things, motivations, value systems, goals, and preferences of various groups of the population [8]. For example, without linking demographic and non-demographic variables, it may be challenging to understand fertility and migration behavior. Non-demographic variables concern, for example, the level of education, family structure, languages used at home, ethnic group, place of birth, stages of life, sources of household income, professional status, and position in the labor market.

2. Basic variables and research techniques

The term "demographic analysis" is usually related to forms of statistical analysis that are primarily based on mathematical and statistical techniques used on data from population censuses as well as population change surveys and systems [9, 10]. Demographic analysis is aimed at finding out the course of individual demographic phenomena in a given territory and in a specific period of time. For example,

group analyses are possible in which the behavior of a given group is tracked over a period of time. Such a cross-sectional analysis involves the study of many cohorts at a specific point in time or over a period of time; most often, it is a year. Periodic analyses of events typical for a given time period are also possible. Longitudinal (cohort) analysis concerns events that occurred in one generation throughout the life of that generation. It may be retrospective, that is, after the end of the cohort or prospective, if it concerns forecasting the phenomenon in the future. In the case of both types of analyses, the key feature is age, which differentiates population movement. Hence, descriptions of demographic processes based on age patterns, such as life tables, life expectancy, fertility rate, or net reproduction rate, are considered fundamental.

In addition, the variables used in the demographic analysis are as follows: cross-sectional, when data are collected at a fixed point in time from selected units; time series, when data are collected from one unit at a time; resources, such as population, the number of women, newlyweds, or households; and streams, such as events taking place in these communities, such as births and deaths [11]. The demographic analysis also takes into account absolute values, such as the number of deaths and the number of births, as well as relative values, that is, measures of intensity called ratios, such as the death rate and the fertility rate. The coefficients are the relations: the resource to resources, such as the share of the urban population in the total population; stream to stream, such as a number of births versus deaths; and stream to resource, such as divorce rate and migration rate. Summing up, demographic analysis usually includes the determination of the purpose and scope of the research, the selection of measures of the phenomenon under study, the observation and measurement of this phenomenon, as well as the identification of its structural features. For this purpose, the researched variables are categorized, appropriate measurement scales are created, and often the numerical value of the measure is decomposed and standardized. Depending on the aim of the study, quantitative relationships between the variables are also established, and comparisons between different populations are made, or time series are created [12, 13].

An important issue is the interpretation of the results of the demographic analysis. Economic effects and historical effects should be taken into account [11]. It is possible that the intensity of a given phenomenon in a given unit of time reflects common behavior in a given population that occurred under the influence of circumstances such as wars, economic crises, or ethnic conflicts. On the other hand, it is possible to strongly differentiate life experiences resulting from belonging to a specific age group and specific stages of the individual life course in different conditions. For example, the current generation of youth may have a better socioeconomic position than the generation of its predecessors of the same age.

Moreover, there is a need to interpret demographic phenomena and theoretical scales are created, for example, the scale of the advancement of the aging process or the scale of urbanization [13]. There are also constructed balances of population phenomena used to estimate the level of selected population phenomena, for example, population size between censuses. In addition to censuses, techniques for collecting demographic data are used, such as regional, national, and international surveys based on random samples using standardized direct, telephone, or mail interviews with randomly selected respondents (e.g., "Generations and Gender Survey" [14]). Panel surveys are also carried out, during which questions are returned to the same respondents in successive "waves," carried out every few years (e.g., "Survey of Health, Ageing and Retirement in Europe" [15]). This type of research allows capturing the stability or dynamics of changes in behavior and attitudes, for example, regarding the functioning of households, the history of procreation, and intergenerational relations in families.

3. Key uses of demographic analysis

Demography is often viewed as applied science. The collected and processed data on the population are widely used both among public entities (e.g., national, regional, and local administration) and private actors (e.g., commercial companies as well as non-profit and non-governmental organizations). It is difficult to imagine modern management of, for example, health care, education, and transport without knowledge of the population structure or making investment decisions without knowing the specifics of the local labor market. Demographers not only analyze trends but also often create recommendations regarding, among other things, family policy and migration policy [1, 5, 6]. In addition, from a business perspective, demographic data have a fundamental application in marketing as well as managing the production and sale of new products and services.

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