

addition, the website contains an online database tool, the STATcompiler, that allows users to build customized tables for hundreds of indicators based on DHS surveys in more than 60 countries.

**See also:** *Anthropometry; Data Assessment; Demographic Surveys, History and Methodology of; World Fertility Survey.*

#### INTERNET RESOURCE

*Demographic and Health Surveys.* 2003. <<http://www.measuredhs.com>>.

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## DEMOGRAPHIC SURVEILLANCE SYSTEMS

Collecting information on population dynamics in a defined geographic area is a practice that is as old as demography itself. Parish records and civil registers provided information that was used in the earliest attempts to characterize mortality and population dynamics. The earliest known calculations of mortality rates were based on civil registers for a segment of London.

Fertility models have been based on archival registers that are similar to contemporary surveillance systems. The first model life tables were based on population register mortality regimes.

In the twentieth century the role of population observatories expanded from description to investigation. Early studies focused on epidemiological questions (e.g., Goldberger et al. 1920). After World War II, controlled trials were used for the demographic evaluation of health experiments (e.g., Ferebee and Mount 1962) and research stations were created where vital registration in defined geographic areas was applied to estimate demographic characteristics and carry out an expanding range of epidemiological, social policy, and demographic studies. By the 1960s the health and population research role of those research stations and population laboratories was recognized as an area of scientific specialization within the field of demography. The term *demographic surveillance system* (DSS) came to be used to

connote the technologies associated with the continuous monitoring of births, deaths, and migration in a defined population over time.

### Descriptive Demography and Health Interventions

At the beginning of the twenty-first century approximately 50 DSS health and population research centers were in operation around the world. Although some surveillance systems were established for the purpose of descriptive demography, the aim of most contemporary applications is to evaluate the impact of health interventions. Well-established demographic surveillance systems can provide concomitant support for multiple social, demographic, and economic investigations. Some are sites for pharmaceutical trials. In the year 2002, 28 DSS research centers were participants in the INDEPTH Network, an international organization that disseminates DSS information.

### Survey Designs

The early era of population registration occurred in settings that were closed to migration. Such settings no longer exist. Surveillance systems in modern populations have to deal with migration. Establishing surveillance requires a baseline census to describe the initial population of a site by age and sex and selected other characteristics. Two contrasting strategies then are employed to update the baseline census data:

1. The *individual observation approach* records the timing and incidence of all births, deaths, and migration in and out of study areas so that the risk of events at the individual level can be defined precisely at any point in time. Migration is defined in terms of an individual's arrival at or departure from a surveillance observation unit such as the extended family, a nuclear household, or a dwelling unit over a specified period of time. Definitions of migration specify the length of time that must elapse before migration is registered as an event. Recording and managing such information represent most of the task load of individual observation systems. Most continuous demographic surveillance systems incorporate procedures for recording marital events, causes of death, and status in a household structure defined by headship or

by spousal, parental, and familial relationships.

2. The *population observation model* registers births and deaths and employs repeat censuses to estimate populations at risk of these events over time. Studies conducted by the British Medical Research Council in Gambia and in eastern and southern Africa used this approach (e.g., Greenwood et al. 1990). Dual registration systems were used to adjust coverage errors in population laboratories. This approach has been useful in descriptive demography and studies that employ area units of analysis. Health interventions consigned to clusters of households, for example, can be evaluated by monitoring births and deaths over time, enumerating cluster populations at the baseline and at the end of the project period, and estimating cluster populations over the study period. This approach obviates the need to monitor individual migration continuously or to link event data with individual census registers, thus simplifying data management processes and reducing the complexity of field operations in comparison to individual surveillance approaches.

Despite the advantages of the aggregate population observation approach, most demographic surveillance systems that have been established since the 1990s have utilized continuous individual registration designs. This practice can be explained in part by the advent of low-cost computer technologies that overcome many of the limitations of the individual surveillance approach (e.g., MacLeod et al. 1996) and the emergence of health technologies that require individual-level trials.

Individual observation expands the range of social, demographic, and health research that can be conducted in conjunction with surveillance. In the individual continuous observation approach, any cross-sectional study that records demographic surveillance identification numbers eventually permits a longitudinal study of demographic processes. A few well-designed surveillance sites have produced several thousand scientific publications (e.g., Behar et al. 1968; Scrimshaw et al. 1968; D'Souza 1984; Menken and Phillips 1990). The longest-running and best-known DSS is Matlab, in Bangladesh.

### Cohort and Panel Studies

Cohort and panel studies are alternatives to the DSS approach for longitudinal health research. Cohort studies observe a specified subgroup in a population over time and are closed to the addition of study individuals as time progresses. Panel research involves interviewing an open cohort of individuals over time. Cohort and panel designs are appropriate when a single longitudinal study is designed to answer a specific research question about a segment of a population. However, launching a succession of cohort and panel studies in a specific population is more costly than DSS approaches because each new panel or cohort study requires a new enumeration, new field procedures, and the repeated development of specialized computer systems.

### Limitations

The comprehensiveness of a DSS's demographic coverage represents the principal limitation. The required scale of the data collection imposes limits on the range of information that can be compiled about other topics. Sample cohort and survey studies sometimes are conducted in conjunction with DSS operations to expand the range of information available for longitudinal research. Cluster-sampling techniques are sometimes used to reduce the quantity of data collected and lower the costs. Surveillance is costly if field management and computing procedures are not well developed because errors can multiply over time and constrain analyses. The representativeness of DSS data sometimes is questioned both because the localities chosen for surveillance operations are likely to be unrepresentative of wider populations and because the presence of researchers and associated program activities may influence the behaviors that are observed.

**See also:** *Demographic Surveys, History and Methodology of; Longitudinal Demographic Surveys; Population Registers.*

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## DEMOGRAPHIC SURVEYS, HISTORY AND METHODOLOGY OF

Demographic surveys are surveys that wholly or primarily collect information on population characteristics and on the causes and consequences of population change. In addition, demographic surveys can be a name given to surveys that contain mostly demographic information although they also contain information of a non-demographic nature.

### Historical Overview of Population Surveys

Population censuses attempt to measure characteristics of the total population of a country or territory through the *full* enumeration of all persons and relevant events. Surveys have emerged as alternatives to census taking with the development of statistical sampling techniques that permit interviewing only a part of the population of interest to obtain estimates that are valid for the population as a whole.

Population surveys have a long history, including the 1086 Domesday survey in England. This survey, as well as most other early surveys, was a social survey dealing with living conditions and poverty. Many of these studies were carried out in the eighteenth and nineteenth centuries, but none was based on true probability sampling methods. The first study that employed probabilistic sampling was a 1913 study by A. L. Bowley on the living conditions of the working classes in five English cities. Survey research in the demographic field only came into wide usage in the mid-1900s.

Demographic surveys are often taken in conjunction with a census. This was done for the first time in 1940, in the United States. The items covered in the census were significantly increased for 5 percent of the census population, making it possible to collect extensive additional information without in-