Program Abstracts/Algorithms

BALANCE: A FORTRAN IV program for computing the demographic "balancing equation" on a computer terminal

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In beginning sociology and demography courses, a formula used to introduce the student to the relationship among the three basic demographic processes and population growth is the demographic "balancing equation."

The formula is:

$$P_2 - P_1 = (B - D) + (M_i - M_o)$$

where P_2 = the census count for the later census, P_1 = the census count for the earlier census, B = births during the interval between P_2 and P_1 , D = deaths during the interval between P_2 and P_1 , M_i = in-migration during the interval between P_2 and P_1 , and M_o = out-migration during the interval between P_2 and P_1 .

The equation takes a number of forms and correspondingly has numerous applications. For instance, the equation is useful in estimating the "net error" (E) in demographic statistics. If it is discovered in the equation above that the right-hand side differs from the left by a certain amount (E), with knowledge concerning the accuracy of the various components, it is possible to determine whether the error in the data is attributable to primarily one or two components. Other uses of the equation involve: projecting a population to a future date by making assumptions regarding future births, deaths, and migration; estimating in a given area the net migration (i.e., in-migration minus out-migration) that has taken place; or finally, determining the occurrences of births or deaths in a given population (Bogue, 1969; Shryock, Siegel, et al, 1971).

Input. The investigator is given a listing of all equation components and requested to indicate which component is unknown. The basic data for BALANCE are the population figures for each component.

Output. The answer to the selected component is printed out along with the specific form of the equation used.

Computer. The program is now being used on an IBM 360/75 with teletypewriter remote facilities.

Availability. A listing of the program may be obtained without charge by contacting the author at: Department of Sociology, Bowling Green State University, Bowling Green, Ohio 43403.

REFERENCES

- Bogue, D. J. *Principles of demography*. New York: Wiley, 1969.
Shryock, H. S., Siegel, J. S., et al. *The methods and materials of demography*. U.S. Bureau of the Census. Washington, D.C.: U.S. Government Printing Office, 1971. Pp. 6-7.

PYRAMID: A program designed to construct population pyramids on a computer terminal

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An effective demographic method of graphically portraying the age-sex composition of a population is called the population pyramid. Normally using single-year or 5-year age groups, the design of the pyramid gives the investigator a detailed view of the age-sex structure of a population by representing age groups with horizontal bars, from the youngest to the oldest, placed in order from bottom to top. Left of the center vertical axis are the bars for the males, with bars for the females on the right-hand side of the pyramid. The length of each bar represents the percentage of males or females in each age group to the total population (Shryock, Siegel, et al, 1971).

Input. The investigator is requested to indicate first whether the population data are by single-year or 5-year age groups, and second, the uppermost age to which the pyramid is to be built. The basic data are the population counts for each age-sex group.

Output. Along with the basic form of the pyramid described above, the age and corresponding percent of total population for each group is printed out.

Computer and Language. The program, written in FORTRAN IV, is now being used on an IBM 360/75 with teletypewriter remote facilities.

Limitations. Only single-year and 5-year age groupings of ages may be used and any one individual age-sex group may not exceed 12% of the total population.

Availability. A listing of the program may be obtained without charge by contacting the author at: Department of Sociology, Bowling Green State University, Bowling Green, Ohio 43403.

REFERENCE

- Shryock, H. S., Siegel, J. S., et al. *The methods and materials of demography*. U.S. Bureau of the Census. Washington, D.C.: U.S. Government Printing Office, 1971. Pp. 236-243.