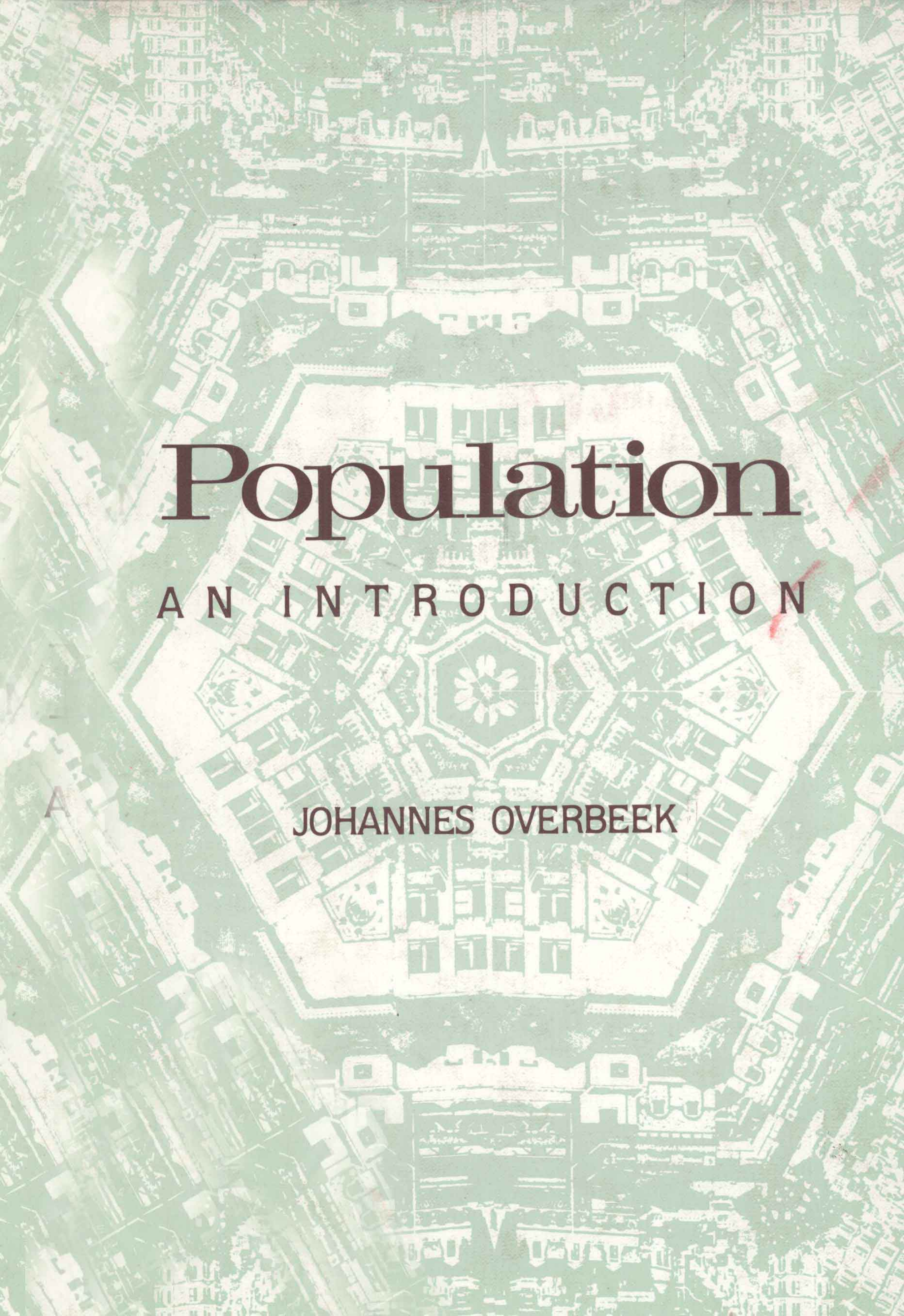


Population

AN INTRODUCTION

JOHANNES OVERBEEK

Population

AN INTRODUCTION

JOHANNES OVERBEEK
University of Maine at Orono

HBJ

HARCOURT BRACE JOVANOVICH, INC.
New York San Diego Chicago San Francisco Atlanta
London Sydney Toronto

ISBN: 0-15-543488-8

Library of Congress Catalog Card Number: 82-81687

Printed in the United States of America

Preface

Human populations have been investigated for centuries, yet it is only in recent years that demography—the systematic study of population—has come into full bloom. Changes in population affect us all. Increased immigration may change the kind of neighborhood in which we live. The aging of a population may affect tax rates and social security systems. The increasing youthfulness of populations in less developed countries may make economic development more difficult to achieve. *Population: An Introduction* examines these and other major issues of the study of population through its presentation of the principles of formal demography and the socioeconomic causes and consequences of population change.

This book is intended mainly for students of sociology, economics, and geography. It emphasizes the minimum of technical competency in formal demography necessary to unravel population-related problems. For students who have not taken a course in statistics, Chapter 2, "Analytics," describes the basic statistical concepts and techniques needed to read and understand the graphs, charts, and tables that present demographic data.

Other features include a generous treatment of migration in three chapters, including the theory of migration (Chapter 8), international migration (Chapter 9), and internal migration (Chapter 10). Chapter 9 focuses on increased immigration as a source of American population growth, and Chapter 10 examines the redistribution of the American population, as evidenced in particular in the growth of the sunbelt. Chapter 12, "The Socioeconomic Effects of Population Change," contrasts the growth of an aging population in the Western nations to the explosion of a younger population in the developing countries. In Chapter 12 and throughout the book, data are drawn from Europe, Canada, and the Third World, as well as from the United States.

Both the University of Guelph in Canada and the University of Maine at Orono were instrumental in encouraging and indirectly sponsoring this book. Their facilities were generously provided, and for these I am grateful. Colleagues Bill Soule, Tom Duchesneau, and Dave Prescott contributed comments and suggestions so gracefully that I felt greatly encouraged. To Faye Welock and Donna Rog thanks are due for dedicated secretarial service. Lastly I would like to thank my wife, Chantal, for being the kind of person who makes a book like this possible.

J. O.

Contents

1

The Nature of Population Study

Demography is destiny. Between 1946 and 1961 a bumper crop of almost seventy million children was born—by far the largest generation in American history. Today they constitute almost one-third of the American population. Their problems are the nation's problems. In the 1950s they transformed the United States into a child-oriented society of new schools, suburbs, and station wagons. In the 1960s they rocked the nation with their troubled youth. By the 1970s and early 1980s they were facing the problems of finding work and shelter. Hereafter they will reach their peak spending years. When, after the year 2010, they begin to retire, because of their numbers alone they will once again pose unprecedented problems for the nation. The baby boom will be long remembered in American history, if only as a magnificent illustration of the fact that almost all socioeconomic issues have a demographic component.

POPULATIONS

Populations are the subject matter of demography and population analysis. There are basically two kinds of populations. A *demographic population* consists of a number of people inhabiting a geographic area that may be a nation, a province, a county, a city, and the like. But in statistical theory the concept of a *statistical population* is used to signify the total collection or complete set of persons, objects, or events, in which the researcher is interested. The term *universe* is also used to designate a statistical population. A statistical population, then, comprises the entire group of observations under study, and is a totality of individuals or things that have a common characteristic. If the researcher is interested in the marital status of female college students at the University of Maine, his or her statistical population would consist of those students. But the term *statistical population* does not necessarily refer to a collection of human beings or living organisms. If the researcher is interested in the annual sales of supermarkets in a given area, then the yearly sales of those supermarkets constitute the population. All the factories in a particular region could likewise make up a statistical population.

SAMPLES

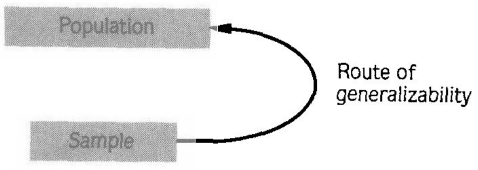
Any portion drawn from a demographic population or any part of a statistical population is known as a *sample.* The sample is any subset of persons, objects or items selected from the population. A good sample faithfully represents the population from which it is drawn. Samples allow the researcher to work with relatively small quantities, thus making possible economies of time and resources. The informatiòn obtained from a representative sample can then be generalized in terms of the larger population or universe. If, for instance, researchers want to know how many people in San Francisco contribute to the Humane Society, they might interview only a sample of 2,000 people instead of the entire population. Figure 1–1 illustrates the relationship of samples to populations they represent.

FORMAL DEMOGRAPHY AND POPULATION ANALYSIS

It has been customary to differentiate between formal demography and population analysis. *Formal demography* refers to the statistical description and analysis of human populations; it aims at statistical measurement of a given population and its evolution. Population statistics have a logic

FIGURE 1-1

Relationship of a Sample to Its Population



of their own: if a population grows, it may be because the number of births exceeds the number of deaths, or because the number of immigrants exceeds the number of emigrants. Demographers, therefore, study not only the current state of a population but also its evolution, and sometimes they predict its future course. The numerical portrayal of a human population is like a photograph, whereas the study of changes taking place over time is like a movie. The formal demographer is interested in both kinds of analysis. Formal demography is essentially a quantitative discipline; numbers and measurement are its very basis.

While formal demography limits itself to the study of such subjects as the size and composition of a population, as well as its fertility and mortality, *population analysis* leaves the realm of statistical measurement and seeks to explain the determinants and consequences of observed population trends. Population analysis is therefore related to all the social sciences and is by definition interdisciplinary. The population analyst may attempt to examine the impact of fast population growth on economic development, or investigate the determinants of a decline in fertility, which may be social, economic, psychological, and so on. Population study uses the data of formal demography, but relates them to the other social sciences. Hauser and Duncan have argued that population study transcends formal demography, devoting itself to the relationships between population changes and social, economic, political, geographical, and psychological variables.[1]

At present not everybody wholeheartedly accepts the above-mentioned distinction between formal demography and population analysis. In his presidential address at the annual meeting of the Population Association of America in 1979, social demographer C. B. Nam maintained that although this widely accepted distinction has proved its usefulness, it could also be said to have "unwittingly contributed to professional schizophrenia and marginality."[2] According to Nam (and the author agrees), the narrow

[1] P. M. Hauser and O. D. Duncan, "Overview and Conclusions," in P. M. Hauser and O. D. Duncan, *The Study of Population* (Chicago: University of Chicago Press, 1964), pp. 2–3.
[2] C. B. Nam, "The Progress of Demography as a Scientific Discipline," *Demography* 16 November 1979): 487.

view of "demography" should be abandoned. Demography as a discipline should be understood to include the study of the internal dynamics of populations as well as "the broader societal determinants and consequences" of those dynamics. According to Nam, "understanding and explaining population phenomena is what demography is all about."[3] But the demographic profession has not as yet accepted this more complete and integrated definition.

CONCEPTS FOR REVIEW

Demographic population
Statistical population
Universe
Sample
Formal demography
Population analysis

QUESTIONS FOR DISCUSSION

1. Analyze the differences between a demographic population and a statistical population.
2. What is meant by the statement "formal demography is essentially a quantitative discipline"?
3. Describe the difference between formal demography and population analysis.

BIBLIOGRAPHY

Hauser, P. M., and O. D. Duncan. *The Study of Population.* Chicago: University of Chicago Press, 1964.
Nam, C. B. "The Progress of Demography as a Scientific Discipline." *Demography* 16 (November 1979).
Thompson, W. S., and D. T. Lewis. *Population Problems.* 5th ed. New York: McGraw-Hill, 1965.

[3]Nam, pp. 488, 491.

2

Analytics

The purpose of this chapter is to familiarize you with some of the basic quantitative principles underlying much of the demographic research that follows. Most of these raw materials belong to the domain of *descriptive statistics,* which can be defined as procedures for collecting, summarizing, presenting, and describing facts and data; as such, it is concerned largely with summary calculations, tabular and graphical displays. Statistics can also be useful in generalizing from past experience: *inferential statistics* seeks to make inferences (statements or conclusions) from collected data. Usually such generalizations are made about a population by investigating only a portion of it referred to as a sample. In this book, however, inferential statistics will concern us very little.

Many people find quantitative thinking difficult and approach statistics with prejudice. Such need not be the case. This chapter is designed to help you understand much of the statistical reasoning behind elementary formal demography. It provides the clay without which the bricks cannot be made. Little mathematics is required for a good understanding of the basic concepts introduced here.

DEMOGRAPHIC RESEARCH IN ACTION

When we start an investigation, say, of the number of children under 15 years of age per married mother in a Hawaiian village, we must first define the units to be investigated. The elementary units, subjects, or individuals are the married mothers of children under 15. For each case or subject (each married mother) a selected *characteristic* (her fertility) is observed. As we note the selected characteristic—the number of children under 15—we can group our observations (the mothers) in different *classes* or *categories.* All married mothers with 2 children are a class. Those with 3 children are another class, and so on. Here we are using the measured quantity—the number of children under 15—as a measure of fertility or reproductive performance; we have constructed a *fertility index.* In all likelihood this characteristic will not have the same value for all mothers. A specific trait or characteristic such as fertility, income, level of education, age, racial origin, or marital status which varies among people is called a *variable.*

VARIABLES

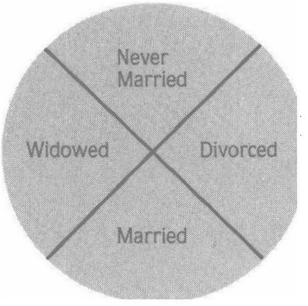
A variable can take on a range of values. A single variable is usually symbolized by the letter X. Two variables are often symbolized by the letters X and Y. Variables have three properties: (1) they are traits of objects or persons, (2) they are observable, (3) they differ from observation to observation.

Scales

To record the variable, we use *scales. Scaling* consists of placing the values of a variable on a scale, which may or may not be numerical. In our type of society, for example, the variable "age" is normally scaled in years. Once we have a scale, we can record the values of a variable (fertility, age, and so on), a process called *measurement.* We now observe the degree in which the variable varies and obtain information about it. That information, often numerical, consists of *data.* A plural Latin word meaning facts or figures, data are the end result of measurement and the starting point of statistical analysis. Once data have been gathered, the next step is to present them in tabular or graphic form. In measuring variables, four important types of scales are common.

FIGURE 2–1

A Nominal Scale Representing Marital Status

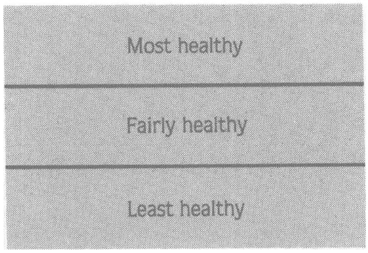


Nominal Scales. Nominal measurement is *categorization*—the most elementary form of measurement. It results from a classification of objects into categories on the basis of attributes such as sex, race, religion, and so on. Suppose we are observing the sex of immigrants. If any observation is assigned the value "male," it means that the subject simply falls into this category, and not that he has more or less of the attribute in question. All the males will be classified in the category "male" and all the females in the category "female." Usually classes have categorical names, but sometimes, as for manipulation by computer, numbers can be used instead. Thus we can give the class "male" the number 1 and the class "female" the number 2. Such numbers, however, are mere labels and do not permit arithmetical operations. Other numbers so used—to identify rather than to measure—can include those designating highways, hockey players, social security cards, houses on a street, and so on. Figure 2–1, a circle graph, shows a nominal scale of marital status.

Ordinal Scales. In some cases the observations can be ordered so as to indicate that one observation represents more of a given variable than another. Ordinal scales rank individuals in terms of some quality such as health, prestige, beauty, or academic achievement (Figure 2–2). The ranks—that is, the numbers used for identification—do not indicate how much more or less of the property each observation has, but only that they have "more" or "less." If in a beauty contest there are three winners to whom the numbers 1, 2, and 3 are assigned, we imply only that 1 has more of the variable "beauty" than 2, while 2 is prettier than 3. Other examples would be a list of preferred states of destination of foreign immigrants, or a hierarchy of social classes. When the social scientists measure social class

FIGURE 2–2

An Ordinal Scale Representing Health



on an ordinal scale, it enables them to speak in terms of "higher than" and "lower than," but never to answer how much higher or lower.

Interval Scales. Observations on such scales are recorded numerically. The numbers not only order the observations but also convey meaningful information with regard to the distance or degree of difference between all observations.

Interval numbers have magnitudes, for they are based on a common unit of measurement; therefore, the distance from one integer (whole number) to its adjacent integer is equal to the distance from any other integer to its adjacent integer. The distance between 3 and 4 is the same as that between 8 and 9. Arithmetical operations are now possible. We can add a number to or subtract a number from each of the values and still maintain the essential properties of the scale. However, we do not know where true zero is on the scale, so we cannot make multiplicative statements about it. The Fahrenheit thermometer is an interval scale (Figure 2–3). There are equal units along the scale, but zero on the thermometer does not signify an absence of all heat. If the temperature rises from 40°F in the morning to 80°F in the afternoon, we cannot say that there is twice as much temperature in the afternoon as in the morning.[1]

Ratio Scales. In addition to the properties of the interval scale, the ratio scale has an absolute zero point that represents an absence of the measured quality. This is the most sophisticated level of measurement.

[1] In the early eighteenth century Gabriel Daniel Fahrenheit, a German instrument maker, invented a thermometer consisting of a column of mercury in glass. In devising a scale for this thermometer, Fahrenheit defined it in terms of the lowest temperature he could obtain by mixing common salt and ice. He chose this point as his zero point. The freezing point of pure water was measured as 32°. Normal body temperature was 98.6° on his scale, while 212° registered when pure water boiled. The range between the freezing and boiling points was 180°.