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ABSTRACT

This manual is designed to give the undergraduate an overview of the data collected by the Bureau of the Census and to provide students with some practice in utilizing these statistics. It emphasizes statistics on population and housing including socioeconomic characteristics of persons, families, households, neighborhoods, and governments. The other statistical programs of the Census Bureau are described very briefly. The first chapter contains an introduction to the nature of the data gathered by the Census Bureau, the guidelines of the Bureau, and its estimates of error. The second chapter describes the major censuses and other surveys conducted by the Bureau. Chapters three, four, and five provide illustrations of the uses of Census materials in undergraduate research. Specifically, chapter three is an introduction to simple techniques for the analysis of data. Chapters four and five are designed to give the student practice in using the techniques of chapter three through the use of case studies. (Author/JR)

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A Manual for Students

yllis G. Carter

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U.S. CENSUS DATA FOR POLITICAL AND SOCIAL RESEARCH: A MANUAL FOR STUDENTS

By

Phyllis G. Carter

Formerly of the U.S. Bureau of the Census

DIVISION OF EDUCATIONAL AFFAIRS
The American Political Science Association
Washington, D.C. 1976

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Preface

The Bureau of the Census of the United States collects more statistics than any other public or private agency in the country. All too frequently, however, its statistics are overlooked by social scientists, partly because they are unfamiliar with the range of materials available from the Bureau and partly because of an intellectual preference toward collecting their own data. In an era where research money is becoming scarcer, it is in the best interests of the student and the professional to familiarize themselves with the data of the Census Bureau which are plentiful, wide-ranging, accurate, and very inexpensive.

This pamphlet is an introduction to the statistics of the Bureau of the Census prepared for the undergraduate student. It emphasizes (a) statistics of population and housing including socio-economic characteristics of persons, families, households, and neighborhoods, and (b) statistics of governments. The other statistical programs of the Census Bureau are described very briefly. The first chapter contains an introduction to the nature of the data gathered by the Census Bureau, the guidelines of the Bureau, and its estimates of error. The second chapter describes the major censuses and other surveys conducted by the Bureau. Chapters Three, Four, Five, and Six provide illustrations of the uses of Census materials in undergraduate research. Chapter Three is a case study reproduced from a manual issued by the Legal Action Support Project; it is a good introduction to simple techniques for the analysis of data. There are no student exercises provided in this Chapter.

Chapters Four and Five are designed to give the student practice in using the techniques described in Chapter Three. They may be used as drills preparatory to the assignment of independent research projects. Thus, Chapter Four contains a number of relatively simple student exercises in the use of Census data. Tables from which conclusions are to be drawn are given with the exercises; no additional materials are required for the exercises in this Chapter. Chapter Five begins with a somewhat more complex case study. The exercises in the Chapter will require the use of at least one report in the HC(2) series, *Metropolitan Housing Characteristics*, and one report for the same standard metropolitan statistical area in the PHC(1) series, *Census Tracts*, from the 1970 Census. These two reports could be copied for classroom use, or put on library

reserve. Some teachers might prefer to have several sets of reports for several different metropolitan areas available for their students so that comparable case studies could be conducted.

None of the materials in Chapters Three through Five is particularly difficult; these are introductory materials suitable for beginning students. Similarly, because of the introductory nature of the text and exercises, this pamphlet would be as useful for introductory interdisciplinary courses in social science as for introductory classes in political science.

Finally, along with this *Manual for Students* there is a separately bound *Resource Guide* which provides a listing of many of the materials available from the U.S. Bureau of the Census along with their cost and other related information. The *Resource Guide* should be used in conjunction with the student pamphlet to help locate materials for independent student research.

Chapter 1. The Census Bureau and Its Statistics

The Bureau of the Census is a government agency charged with collecting information about the United States. Every ten years the Census Bureau conducts a Population and Housing Census, in the years ending in 0. In the interim years ending in 2 and 7 the Bureau conducts several Economic Censuses and a Census of Governments. A Census of Agriculture is compiled for the years ending in 4 and 9. In addition the Census Bureau conducts a great many annual, quarterly, monthly, weekly, and one-time only surveys to update some census figures.

The Census Bureau also compiles the foreign trade statistics of the United States. It prepares population estimates and projections. And the Census Bureau collects and processes many of the statistics that are analyzed and published by other agencies; for example, it collects data on unemployment for the Bureau of Labor Statistics, data on health for the National Institutes of Health Statistics, and data on jails, the police, and the judicial system for the Law Enforcement Assistances Administration.

The statistics gathered by the Bureau of the Census can have several advantages over statistics gleaned from other sources. First, the Bureau has established a reputation for trustworthiness; thus respondents are generally willing to give it accurate and confidential information. Second, the Bureau collects data throughout the country and from one generation to the next; consequently its statistics for different areas or different periods are more comparable (that is, apples can be compared with apples instead of oranges) than statistics collected by different unrelated agencies. Third, the Census Bureau's statistics are available to almost anyone who needs them; the printed reports are in most major libraries throughout the country and can be used there, or they can be purchased at a relatively low cost.

Nature of Census Bureau Statistics

The statistics that the Bureau of the Census collects are general purpose statistics; that is, they are expected to serve a general public need and to

be used for a wide variety of purposes by a large number of persons representing many different interests and fields.*

All of the statistics collected by the Census Bureau, including those collected for other agencies, are in the public domain. Almost always major survey results are issued in printed reports, either by the Census Bureau, or, if the survey was taken for another agency, by the sponsoring agency. If there is no printed report, the results are made available on computer tape, or special tabulations are made which are available for the cost of reproduction. Special tabulations may also be made, at the cost of preparation, for users who need more detailed statistics than are found in the printed reports, or who need them for other types of geographic areas. (The special tabulations and computer tapes available for public use are listed in the *Bureau of the Census Catalog.*)

In addition to the two principles that the statistics must serve a public need and that they must be available to the public, the Census Bureau adheres to the following guidelines: (1) the burden on the respondent must not be too great; (2) the survey must not arouse public resentment; (3) the data must be as accurate and complete as possible; and (4) the survey must not duplicate an acceptable survey done elsewhere, whether by a public or private agency. Thus, the Census Bureau attempts to assure that its activities will be considered by most members of the public to be a suitable expenditure of public money. The Bureau of the Census is acutely aware that the accuracy and completeness of the statistics it will gather tomorrow depend upon the willingness of the public to respond, and to respond honestly, to its requests for information.

Confidentiality of Information About Individuals

Information collected by the Census Bureau with regard to individual persons, households, housing units, farms, and firms is strictly confidential and may be used only for statistical purposes. By law (Title 13, U.S. Code) the Census Bureau cannot furnish anyone, including persons in other Federal agencies, with information from individual returns or issue any statistics which identify or disclose individual information. The protection of confidentiality extends to names and addresses. Thus, the Census Bureau cannot supply lists of persons or firms reporting to it.

There are three exceptions to this rule of confidentiality, one of which is of particular importance to political scientists: Information supplied by government employees about governmental functions is not confidential. The other exceptions are data on housing authorized by building permits and public contracts, which are provided by local building permit offices,

*The surveys must also be approved by the Office of Management and Budget in accordance with the Federal Reports Act.

and foreign trade data which are primarily reported on shippers' export declarations and customs entry forms. (But, confidential treatment of shippers' export declarations and customs entry forms is governed by other laws and regulations.)

Data Collected, and Statistics Derived from Them

The person using a printed report for the Census Bureau usually finds in the report itself the necessary explanations and definitions of the items of data which are presented in that report, and of the statistics derived from them.

In the reports of the census that used only one or two basic questionnaires to collect the census data (such as the Population and Housing Census and the Agriculture Census) the basic questionnaire, or the appropriate portion of it for the statistics in that report, is usually reproduced in the report. In the statistical reports of a census that required many different questionnaires, such as the Census of Manufacturers which use a different questionnaire for each industry, the questionnaires usually are not reproduced.*

When an item on a questionnaire is reproduced in the report, it provides the best information about the type of data *collected* for that item because it shows exactly what question the respondent was to answer. The researcher can thus judge how the respondent was most likely to interpret the question. Similarly, when the item on the questionnaire is shown, the definition that is provided in the printed report serves to inform the user about the way the answers are *classified*.** In other cases, a question is intended to screen out units that do not belong in the scope of the census, or, in other words, the question is essential to define the units that are in the scope of the census.*** There are also statistics in the reports that are

*For every national census a special report called a "Procedural History" is published. This report, which explains the methods and procedures of the census in considerable detail, includes reproductions of at least the basic questionnaires for each census.

**For example, item H9 on the housing portion of the 1970 Census questionnaire asks if the living quarters were "occupied without payment of rent." The definition given for this item in the Housing Census reports explains that all housing units that are not "owner occupied" are classified as "renter occupied," including those occupied without payment of cash rent.

***For example, in the housing portion of the 1970 Census, questionnaire item H2 is included because those respondents who report that they enter their living quarters "directly from the outside or through a common hall," and who also have complete kitchen facilities for exclusive use of the occupants, are classified as having a separate housing unit. The definition of "housing unit" explains this, and also explains how the definition is applied to vacant housing units.

derived from the answers to questions on the questionnaire although the questions are not directly about them.*

The computer tapes do not have the questionnaires and the definitions of the subject item included with the data as do the printed census reports. Primarily for the benefit of the person who may want to use the data on computer tape, the questionnaires used in the 1970 Census of Population and Housing and the Census of Governments—are reproduced in appendices A and B of the Resource Guide. For a complete definition of terms, the researcher must look in the printed reports—usually the statistical reports themselves, though for some censuses special guides to the data have been prepared which include definitions.

Geographic Areas

Census tabulations are always prepared in terms of specific geographic areas—whether the entire United States or a city block.

The person using a printed report from the Census Bureau finds in the report itself any necessary explanations and definitions of the geographic area for which statistics are given. In many reports, maps are also provided.

The small areas are referred to as building blocks. If the researcher wants statistics for areas that are not shown in the printed reports—hospital zones, for instance, or the area served by each bus stop—he may be able to use the statistics shown for very small areas as building blocks, summarizing them to obtain statistics on these special geographic areas. In fact, the printed reports that show data from the 1970 Census of Population and Housing by city block are published primarily to permit a user to combine these city block data into statistics for special areas.

In the case of the 1970 Population and Housing Census, data are available on computer tape for several types of geographic areas for which no statistics are published—for example, enumeration districts, and ZIP code areas. These are of more use to some users than the data in the

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*For example, statistics of "persons per room" in the 1970 Housing Census are obtained by dividing the number of persons in the housing unit—a figure obtained by counting the number of persons reported as members of the household on the population portion of the questionnaire—by the number of rooms in the unit as reported in item H4 on the housing portion of the questionnaire.

Another example is found in the 1972 Census of Governments report on public employment. The term "full-time equivalent employees"—a term used throughout the text and tables—is explained to be "a statistical measure which represents the total number of employees, discounted by applying average full-time earnings rates for the functions concerned . . . calculated by dividing the total payroll (full-time plus part-time) by the full-time payroll and multiplying the resultant quotient by the number of full-time employees."

printed reports, and they also permit combination of data into special geographic areas that are more useful to some users than those that can be formed from small areas shown in the printed reports.

If data for a great many areas are to be summarized, even though the appropriate geographic areas are given in the printed reports, the job may involve so much computation that it would be better to have it done from the data on computer tape.

Boundary Changes. A general problem to users interested in historical analysis of the census statistics is that boundaries change from time to time. Geographic areas of all sizes are affected, although smaller units are more vulnerable to change than larger units such as States and counties.

Boundaries of minor civil divisions such as townships (and their equivalents in some counties, "census county divisions") are altered by incorporation of new towns or in other ways. Records of such changes are kept by the Census Bureau and extensive footnotes on the changes that have occurred between Population and Housing Censuses are provided in the first series of population reports, the PC(1)-A series.

The boundaries of enumeration districts are generally not comparable from census to census, because enumeration districts are created for administrative purposes and are based on population size. Comparability usually is only possible where block data are available to aggregate to the earlier enumeration district boundaries.

Timing and Timeliness of the Statistics

Statistics are a perishable commodity; the situations that they describe change after the data are collected, and may change very rapidly. Since, however, censuses are massive undertakings involving the collection and processing of many millions of pieces of information, there may be a considerable delay between the date the statistics are gathered and the date on which they are published. It is, of course, unfortunate that detailed data collected in 1970 must be used by government agencies, private industry, research organizations, and individuals, until the equivalent data from the 1980 Census becomes available between 1981 and 1983. Important policy decisions, frequently involving the distribution of large amounts of resources, are based on statistics which everyone knows are seriously dated.

To correct this situation, the most important summary data from the Population and Housing Census are updated by monthly, quarterly, or annual sample surveys, and the results are often published within a few weeks of the collection of the data. The usefulness of these surveys, however, is limited by the fact that they provide reliable estimates only for large areas—in some cases only for the nation as a whole, and in most cases only for the nation and its major geographic regions.

A major program launched a few years ago with the cooperation of State governments provides annual estimates of the total population of

counties within the States, but provides no information on the characteristics of the population.

The other censuses taken by the Census Bureau—Censuses of Governments, Agriculture, Manufacturing, Mining, Retail Trade, Wholesale Trade, Selected Service Industries, Construction, and Transportation—are quinquennial. The five-year interval between these censuses makes the data more timely, but these data too are updated by periodic surveys.

Accuracy of the Statistics

Every effort is made to make the Census Bureau statistics as accurate as possible for the purposes they are intended to serve while still issuing them as soon as possible after they are collected. There are errors, however.

For more than 25 years the Census Bureau has devoted a great deal of effort to developing measures of the error and of the sources of error in censuses and surveys. For approximately 25 years the Census Bureau has also been publicizing its estimates of the error in its statistics, and calling attention to the fact that there are known defects which should be taken into account in the interpretation of the statistics.

A. Population and Housing Statistics. In the case of the Decennial Population and Housing Census, it can almost be said that no expense or effort is spared to make the population counts accurate. These population counts might be slightly improved if, for example, the census budget were more than doubled and if four times as many interviewers could be recruited, but the results of Census Bureau tests make this uncertain.

In the case of items collected on a sample basis in the Decennial Census, some sampling error is accepted—but attempting to collect all of this information on a 100-percent basis would either (a) greatly increase the other types of error (such as followup interviewers' clerical errors in filling in the questionnaires), if it were attempted within the same time frame, or (b) it would greatly increase the time spent in collecting, checking, and processing the data, so that issuance of many of the census results would be delayed by years. It would also greatly increase the overall burden on respondents if all of them had to fill out a long questionnaire containing the questions that are now asked of only a sample. (And the samples of 20 percent, 15 percent, and 5 percent of all of the population and housing units in the United States, used in the 1970 Census, were *very* large samples.)

Despite these efforts to obtain complete counts, an estimated 5.3 million persons were not counted in the 1970 census. The rate of the undercount was approximately 2.5 percent, a slight improvement over the 1960 Census with its estimated 2.7 percent undercount, and a considerable improvement over the 1950 Census which was estimated to have missed 3.3 percent of the population.

This much undercount would not be considered serious for most purposes if it were thought to be uniform across the country and uniform

for the subgroups of the population. However, according to Census Bureau evaluation studies, the undercount is not evenly distributed. Negroes, males, young children, and young adults are most likely to have been missed. For example, it is believed that more than 12 percent of Negro males in the 20 to 49 year age group were not counted; the proportion of all Negroes missed (7.7%) far exceeded the number of Whites missed (1.9%).

Estimates of the 1970 population undercount are available only for the population of the Nation as a whole, by age, sex, and race. There are no estimates of undercoverage by income or any other population characteristic except the three mentioned above, nor is there any information available as to differences in the population coverage for rural and urban areas, or for other areas within the Nation.*

Although most public attention focuses on the undercounts, there are other types of errors in census statistics--for example, people who were reported at different ages than their true ages, and errors introduced in coding the responses. A series of studies was made during and after the 1970 Census to estimate the extent of various types of error in the census results. Reports on these studies have also been published.

B. Statistics of Governments and Other Statistics. Unlike the other censuses from which only statistical aggregates are published, data on *individual* governments are published as part of both census and survey reports from the government statistics program. As a result, major efforts are made by the Census Bureau to obtain verification or adjustment of any numbers submitted to it by other governmental units. A special difficulty in compiling statistics of governments is that the various governments use varying fiscal systems, and fiscal years that end in different months, so that comparison of the figures they use for their own purposes may be

*The release of estimates of census undercoverage for the United States as a whole has led to the question of whether the census figures for the United States as a whole should be adjusted to reflect the undercount. The Census Bureau does not plan to do so, for a number of reasons. For example, the figures on the undercount are estimates, subject to change if additional research provides further information.

There has also been a question, arising from concern about allocation of funds on the basis of undercounted population, as to whether the counts should be adjusted for areas within the United States. The Bureau staff considers that it does not have the techniques to make reliable estimates of the error in State and local population counts. Work is underway testing alternative methods of preparing estimates of undercounts by State, but they could not be as reliable as the national estimate, primarily because of the difficulty of estimating migration between States. (Figures on net migration into or out of States between censuses are based on the census counts themselves, and thus are not independent of the undercounts.)

misleading. Since statistics on governments are sometimes subject to political and economic controversy, the Bureau takes pains to provide particularly careful and detailed descriptions of reporting categories and to note carefully the limitations on the direct comparability of certain data for individual governments.

In the governments statistics program, and in other programs of the Census Bureau that deal with financial and economic measures of agriculture, manufacturing, retail and wholesale trade, etc., large units dominate the statistics and a large number of small units have very little effect on the statistics. For example, small farms enumerated in the 1969 Census of Agriculture—defined as those with less than $2,500 in total sales of agricultural products—constituted 37.8 percent of all farms but accounted for only 2.2 percent of the total value of agricultural production. In consequence, the Census Bureau concentrates its efforts on obtaining complete and accurate reports from the larger units. Similarly, by design, the annual surveys of governments have not required a response from every one of the smaller governmental units. Partly as a result of this, evaluation studies indicate, of course, that the percent of small units missed in these censuses is much larger than that for the large units. Other reasons that more small units are missed is that they are harder to find, it is more difficult to determine if a small unit that was counted in a previous census is still in existence, and it is more difficult to determine if a small unit falls within the scope of the census (partly because it may not keep the kinds of accounts needed to answer the question).

C. **Sampling Error.** The statistics collected in sample surveys, and the sample statistics collected in censuses, may vary from the figures that would be obtained from a 100-percent enumeration. For an explanation of sampling error see Chapter Five, pages 79-83.

D. **Presentation of Errors.** The Bureau of the Census has issued a technical report that defines standards for describing the limitations of its data; Technical Paper No. 32, *Standards for Discussion and Presentation of Errors in Data* (35p., GPO, $1.10).* The standards formalize and extend practices which the Bureau has been following for years in recognition of its responsibility for informing users of the important limitations of its data.

This publication includes discussion of: (1) Treatment of the limitations of the data in preparing analytical text; (2) Criteria used by the Census Bureau in withholding estimates and in releasing unpublished data of low reliability; (3) Sampling error, nonsampling error (such as errors in responses), and total error, and methods of computing the errors of derivative statistics that should be included in the text of reports.

*Single copies of Technical Paper No. 32 may be obtained on request from Statistical Research Division, U.S. Bureau of the Census, Washington, D.C. 20233.

Chapter 2. Census and Surveys. What Is Counted and How It Is Counted*

A. The Decennial Census of Population and Housing

Taking a Census of Population and Housing involves the same basic steps as any other statistical survey, but since the Decennial Census is much the largest statistical survey undertaken in the United States, the steps involve many more persons and much more time, cost, and material. Decisions made in the planning phase on questions to be asked in the Census may involve millions of dollars and months of clerical coding.

In the 1970 Census, the preparatory operations included, among many others:

1. Arranging for local post offices to check and correct about 40 million addresses from a commercial list of residences that received Post Office city delivery services, and conducting a field canvass to list more than seven million addresses in specific areas not covered by the commercial list.
2. Arranging for the printing, storage, and distribution to field offices of approximately 140 million questionnaires, and other printed material required for the enumeration.
3. Opening more than 400 temporary field offices, and recruiting and training some 185,000 temporary enumerators. (Supplies for the field offices included such things as 1.8 million paperboard cartons of various sizes, and more than a million pencils.)

Collecting the Data. A few days before Census Day—April 1, 1970—every household in the United States received a census questionnaire by mail. In the larger metropolitan areas of the Nation, containing about 60% of the total population of the United States, each householder was asked to fill in the required information for every member of the household and then to mail the completed questionnaire to the local census office.

*Additional information about any of the censuses and surveys described in this chapter and the resulting reports and other data products may be obtained from the Data User Services Division, Bureau of the Census, Washington, D.C. 20233.

Four out of five of these households received a short form containing only the questions asked about every person and housing unit in the country—age, sex, color or race, marital status, and relation to head of household, for each person, and 13 questions about the housing unit. These are referred to as the 100-percent, or complete count, questions.

One household in five received a long questionnaire that contained sample questions in addition to the 100-percent questions. Some sample questions appeared on all of the long questionnaires; these were 20-percent sample questions. One in four of the long questionnaires contained one set of additional sample questions, i.e. 5-percent sample questions. The other three of each four long questionnaires contained a different set of additional sample questions, the 15-percent sample questions.

The questionnaires mailed back to the census offices were checked there for completeness and consistency. Enumerators then telephoned or visited people whose returned questionnaires were incomplete or inconsistent, and visited every household that had not returned a questionnaire.

In the remainder of the Nation, enumerators visited every household. In these areas only the 100-percent questions were mailed in advance of the enumeration, and the householder was asked to complete the questionnaire and hold it until the enumerator called. The enumerators in these areas collected sample information from every fifth household on a long form.

In all parts of the country, enumerators visited vacant housing units and obtained information for the housing portions of the questionnaires, either by interviewing neighbors, landlords, or other persons who might know the answers to the questions, or by personal inspection.

Special procedures are always required for the enumeration of certain groups of the population. All persons who were staying in large hotels, tourist camps, or similar transient accommodations were enumerated on one night. (The reports of these transients were checked with the reports that had been made at their home addresses, and if the transients were not included in the questionnaires filled out at their homes, the information for them was added.) Another night was devoted to enumeration of persons found in missions, flophouses, city parks, and the like. There were special arrangements for the enumeration of persons overseas and persons living in such quarters as military installations, Indian reservations, vessels, institutions, and hospitals.

The first census field office to finish its work did so on the eighth of May, six weeks after the households received their questionnaires. The last closed September 25, five months after the householders received their questionnaires. (Obviously, some areas are harder to enumerate than others, for a variety of reasons including the socio-economic levels of the population and serious difficulty in finding anyone at home in some areas.)

Processing the Data. Speed in processing the Population Census returns is necessary because the law requires that the final count of inhabitants for each State be completed and forwarded to the President of the United States within eight months after Census Day. On the basis of these counts the apportionment of the House of Representatives is made among the States.

The responses to the 100-percent questions consisted entirely of filled-in circles which were machine readable, so that it was possible to process them very rapidly, and to prepare simple tabulations of 100-percent data at the same time the final counts were made.

For some of the sample information on the long questionnaires, one additional operation—coding—was needed. Coding was required because there were a great many possible answers to some of the sample questions, and there was not room for all of them to be printed on the questionnaire. The respondents therefore wrote in the answers to these questions, and coders manually assigned a code to each handwritten entry so that it could be read by the electronic equipment. This coding was by far the largest clerical operation of the Census, and the most time consuming.

Once coded, all information was fed into computers. The computers, in addition to turning the responses from the questionnaires into statistical tabulations, also checked each questionnaire record to see if answers were missing or if one answer was inconsistent with another. For example, if wage or salary income was not reported for a white male farm laborer, aged 39, who worked 25 weeks in the preceding year, the computer assigned to him the income of the last person answering that description in the same area. Then it reported on a "diary" tape that it had allocated income for that person. This diary tape was reviewed by staff members to see if the number of allocations for a district was excessive and if corrective action was needed for that district.

After the computer edited the data, it summarized the information for each item, entered the totals for each group on magnetic tape, and calculated percentages and averages as the computer program directed.

The computer also checked the reasonableness of some of the figures. For example, when it calculated the total number of World War II veterans in an area, it compared that total with the number of adult males, then checked to see if the ratio was within the limit of acceptability stored in the computer. If it was not—if the number of veterans was only 5 percent of the number of adult males, for example—the computer printed out the results for a staff check.

When the computer worked with sample data it had to do one more operation—weight the data. Generally this meant counting each person in the 20-percent sample, for example, as five instead of one, because the sample covered one household in five, but sometimes a slightly different weight had to be given to make the total from the sample exactly equal the 100-percent total.

The final step in data processing is translating the results (which appeared on the tape as magnetized dots) into a printed document. Much of this was done for the 1970 Census by electronically controlled type-setting equipment at the Government Printing Office. Other pages were prepared on a high-speed printer which is an auxiliary to the computer system in the Census Bureau. Some were typed.

Reviewing the Tables. Despite the Bureau's efforts to prevent errors, some do appear in the prepared tables. This is not surprising, because these tables are the result of many operations—enumerating, coding, transferring to tape, editing, tabulating, and printing—in which errors can occur. To detect these errors, Bureau staff members familiar with the various subjects reviewed the tables to see if they showed the usual relationships, and compared the figures with those from previous censuses or other data. Any questionable figures were investigated, and if necessary, corrective action was taken.

B. Other Population and Housing Statistics

Current Population Statistics. A national sample survey, the monthly Current Population Survey, provides the data for most of the current reports on population characteristics.

The primary objective of the Current Population Survey is to provide monthly official government statistics on employment and unemployment; these statistics are published by the Bureau of Labor Statistics.

Other information is collected in the Current Population Survey, usually once per year, and published by the Census Bureau in *Current Population Reports*. The information relates to mobility, educational attainment, school enrollment, marital and family status, household and family characteristics, fertility, individual and family income, the black population, persons of Spanish origin, the population in poverty, the farm population, and the population by metropolitan-nonmetropolitan residence. Data on other subjects are also collected in the Current Population Survey, for other agencies.

The basic records collected each March since 1968 in an Annual Demographic Supplement to the Current Population Survey are available on computer tape, with the identifying information for persons and families removed. In addition to various family and household characteristics, data include age, sex, race, ethnic origin, income and work experience during the previous calendar year. Detailed occupation and industry codes as well as hours and weeks worked or reason for unemployment are also included.

Another tape file contains the basic individual records, with identifying information removed, from the Voters' Supplement to the November 1972 Current Population Survey, for persons 18 years old and over. The data concentrate on the voting statuses of persons in 1972, whether they

voted and the reasons for failure to vote, as well as pertinent demographic and socio-economic data.

The tapes are available through the Customer Services Branch, Data User Services Division, Bureau of the Census, Washington, D.C. 20233.

Special Censuses. For local areas such as cities, counties, or States wanting intercensal counts of their population, the Bureau conducts a program of special censuses. These censuses, taken at the request and expense of the local government, usually provide information only on household relationship, age, sex, and race. Demand for these special censuses naturally is heaviest in the mid-decade period between Decennial Censuses.

Population Estimates and Projections. There is a well established program of population estimates and projections covering national, state, and local areas with results published in *Current Population Reports.* In general, population estimates are available for States and local areas, and those for States are also available by age groups. National projections are published periodically, as required. Estimates and projections of other demographic factors, such as households, families, marriages, and school enrollment, are also provided for the nation.

In 1967, the Bureau initiated a program involving a cooperative Federal-State effort in the development, preparation, and publication of population estimates for small areas. In this program the Bureau works with the States in the development of standards and procedures, and the States prepare the estimates for areas such as counties and metropolitan areas. Many States have adopted the standardized methods recommended by the Bureau of the Census, and have prepared estimates based on these methods.

Current Housing Statistics Programs. The housing statistics program includes a number of active current programs and special contract projects, in addition to the census. An Annual Housing Survey was begun in 1973 in cooperation with the U.S. Department of Housing and Urban Development. This survey provides data on the physical condition of housing units—including such household problems as leaky roofs and basements, broken steps, etc.—and on the dependability and repair of their facilities, the environment of the neighborhoods in which they are located, and previous residences of recent movers and reasons for the move, as well as some data on other characteristics of the housing units. Statistics are available for the nation as a whole, urban and rural, and for 60 standard metropolitan statistical areas (SMSA's).

A Housing Vacancy Survey based on a sample of the Current Population Survey provides quarterly information on vacancies by regions and combined SMSA's.

Numerous special surveys of housing and housing facilities and equipment have been conducted for Federal, State, and city agencies and for private agencies.

C. Statistics on Governments

The Census Bureau's governmental statistical programs are concerned primarily with the organization, finances, and employment of State and local governments. These governments are large in number (c. 78,300), complex in structural patterns, and extremely varied in authorities and responsibilities. In fiscal year 1972-73, for example, their annual expenditure amounted to $205 billion, and they had an outstanding debt of $188.5 billion. State and local governments had more than 11.4 million employees, as compared with 2.8 million Federal civilian employees.

The first Census of Governments was taken as part of the 1850 Decennial Census. Censuses of Governments were taken approximately every 10 years thereafter through 1942. The next was in 1957, and since then Censuses of Governments have been taken at five-year intervals for the years ending in 2 and 7.

The 1972 Census was conducted in four phases corresponding to the following subject fields: (1) governmental organization; (2) taxable property values; (3) governmental employment, (4) governmental finance.

Phase I. Governmental Organization. In 1971 the Census Bureau—using a mail survey—updated its list of local governments last published in 1967. This list supplies statistics on the numbers, characteristics and fiscal years of the different types of local governments, as well as a text description of the various types of local governments legally authorized in each State and of the types of governmental entities that are recognized as dependent agencies rather than separate governmental units.

Phase II. Taxable Property Values. The second major phase of the 1972 census dealt with valuations for general property taxation as of 1971.* Several sets of data were provided from this project, including statistics on assessed valuations—by State and county and by major individual cities—and sales ratio findings from a sample survey of real estate sales recorded during a six-month period in 1971.

Data for Phase Ii were collected by a combination of a mail canvass and field enumeration, supplemented in some cases by data in various forms from assessing jurisdictions.

Phase III. Governmental Employment. The third major phase of the 1972 Census dealt with public employment and payrolls as of October

*The taxing of real property is not the direct responsibility of the Federal Government, but for the last 15 years the Census Bureau's compilations have been the only source of statistics displaying comparable national data on assessed valuations.

1972. This survey covered all State agencies and all local governments in the Nation.

The findings include the number of employees and payroll amounts by function and by type of government, and statistics on retirement coverage and certain other fringe benefits available to public employees. Results were published for the Nation as a whole, by States, counties, and metropolitan areas, and also individually for major units of government.

Phase III was conducted primarily by a mail canvass. Some data were compiled in the field by Census Bureau staff, however, to assure complete coverage and to supplement some data received by mail.

Phase IV. Governmental Finances. The fourth major phase of the 1972 Census related to taxes and other revenues, expenditures by function and by character, indebtedness and debt transactions, and holdings of cash and securities. The information was gathered from all units of government, including the Federal government, for fiscal years that ended between July 1, 1971 and June 30, 1972. Findings were published by the type of government—Federal, State, and local including counties, standard metropolitan statistical areas, cities, townships, school districts and special districts.

Other Governmental Statistics. Annual publications of State, city, and county statistics include data on general finances, public employment, tax collections, etc. There are also a number of special one-time publications on such subjects as expenditures and employment for the criminal justice statistics and for environmental quality control, and assessments of data needs for other types of governmental functions.

D. Economic Statistics

Several Economic Censuses—Manufactures, Mineral Industries, Retail Trade, Wholesale Trade, Service Industries (hotels, auto repair shops, etc.), Construction, and Transportation—are conducted concurrently every five years for the years ending in 2 and 7. The statistics from these censuses are published separately, but in the Bureau's Enterprise Statistics Program the census records of those establishments under common ownership or control are regrouped in order to show various economic characteristics of the owning or controlling firms, and published in that form. A Census of Agriculture is taken for the years ending in 4 and 9, and statistics are collected regularly on foreign trade.

These economic statistics are collected in two ways—by mail questionnaires (with telephone followup) and, for smaller establishments in the economic censuses, by the use of the records of other Federal agencies, principally the Internal Revenue Service and the Social Security Administration. This considerably decreases the amount of paperwork required of the reporting firms and reduces the cost of the censuses as well. In the

1972 Economic Censuses, for example, data were gathered by mail from 2.5 million larger firms, and from administrative records for 3 million smaller companies which otherwise would have had to report separately for the censuses. The Census Bureau treats other agencies' records with the same concern for confidentiality of information about the individual establishments as it does its own questionnaires.

1. Manufactures and Mineral Industries. The Censuses of Manufactures and Mineral Industries cover virtually every measurable aspect of industrial activity and structure, including employment, payrolls, man-hours, production, capital expenditures and inventories, and the quantity and value of materials consumed and products shipped by manufacturers. The most recent Census of Manufactures, for 1972, like its predecessors, enumerated the establishments engaged in manufacturing activities in the United States. The 1972 Census of Mineral Industries enumerated the industries primarily engaged in the extraction of minerals in the United States. In both of these censuses, the results are presented in a series of reports on (1) industries, (2) geographic areas, and (3) subjects, e.g., employment size of the establishment, type of organization, and so forth.

Annual Survey of Manufactures. The Annual Survey of Manufactures provides key measures of manufacturing activity for intercensal years. The data are collected from a sample consisting of about 68,000 establishments. Most of the survey estimates are computed by the "differene" method. For each data item, the amount of change from the base year to the current year is computed. This amount is then multiplied by the reciprocal of the establishment's probability of selection. The resulting weighted measures of change are summed, providing an estimate of the net change between the base year and the current year for the item to be published.

Current Industrial Reports. Approximately 100 individual surveys are included in the Current Industrial Reports program. Some are monthly, some are quarterly, and about half are annual.

A few of the surveys are probability samples. About half of the others are complete-universe surveys. The remainder cover only establishments above some specified size; the output of small establishments is estimated on the basis of movements of the larger firms reporting in the survey.

With two important exceptions, each report relates to a specific industrial or commodity group, e.g., "Metal Cans" (M34D), or "Selected Industrial Air Pollution Control Equipment" (MA35J). The two exceptions, which cover the industrial sector as a whole, are two monthly series: Series M-3, "Manufacturers' Shipments, Inventories, and Orders," and Series M-4A, "Manufacturers' Export Sales and Orders"; these data are widely used as indicators of both current and expected economic activity.

2. Retail Trade, Wholesale Trade, and Selected Service Industries. Every shop and other outlet for the sale of goods is included in the Censuses of

Retail and Wholesale Trade. The Census of Selected Service Industries is defined as covering hotels and motels; personal, business, and repair services; amusement and recreation services; law firms; architectural and engineering firms. Related surveys of travel agencies, public warehousing, and truck and bus carriers not subject to economic regulation by the Interstate Commerce Commission are also conducted. Publications resulting from these economic census programs include basic information on the number of establishments, their sales and/or receipts, annual payrolls, first quarter payrolls, and number of employees. There are a number of other major census tabulations, including, for example, sales or retail trade by merchandise line for each type of business.

Current Programs. *Current Business Reports* based on sample surveys are issued weekly, monthly, quarterly, seasonally, and annually. For *retail trade*, one report provides estimated weekly retail sales for selected major kinds of businesses. A more detailed report is issued monthly showing national and geographical area estimates, by kind of business, and by the dollar volume of retail sales; it also shows trends in selected metropolitan areas, and national estimates of end-of-month accounts receivable held by retailers. Annual retail trade reports are also issued. For *wholesale trade* there are monthly reports providing estimates of dollar volume of merchant wholesalers' sales and inventories. For *selected services* there are monthly reports containing estimated receipts of establishments by major kind of business.

3. Construction Industries. The Census of Construction Industries covers construction establishments in the United States operating as general contractors and also special trade contractors such as carpenters, painters, electrical contractors and so forth. The 1972 estimates are based upon a probability sample of about 167,000 construction establishments. The statistics are presented by industry and by State and cover such areas as employment, payrolls, receipts, and payments for materials.

Current Surveys. Monthly reports, based on sample surveys, provide statistics on housing starts, sales, housing under construction and completions. There are also monthly reports on the value of all new construction put in place, construction prices, public construction contract awards, and new housing units for which building permits were issued. Quarterly reports show expenditures for alterations and repairs to residential properties.

4. Transportation Census. The Census of Transportation was initiated in 1963, and taken again in 1967 and 1972, to fill in some statistical gaps in the data of the governmental and nongovernmental agencies and organizations that regulate or promote transportation. It is quite unlike any of the other censuses in that it consists of three independent surveys based on probability samples.

The first data gap which this census was designed to fill involved the Nation's inventory and use of private trucks and trucks for rent. The total number of trucks was known from registrations, but little information was available about their characteristics such as body type, size, and use. Basic data for the census are obtained by asking owners of a probability sample of vehicles for supplementary information not obtainable from truck registrations. This is the Truck Inventory and Use Survey.

The second data gap related to passenger travel and the characteristics of trips and travelers. There was also need for statistics concerning the relationship between travel and socio-economic factors. Basic data are obtained in the National Travel Survey, in which a probability sample of households are asked to report selected facts concerning their trips.

Information about the flow of commodities from producing areas to markets or distribution points was a third area in which there were few statistics. The Commodity Transportation Survey designed to fill this gap has been the major project in the Census of Transportation since its inception. Data are drawn from a probability sample of bills of lading (or other papers) in the files of a sample of manufacturing establishments.*

5. Census of Agriculture. The latest Census of Agriculture, for the year 1974, was conducted in 1975. The farm (or ranch) is the unit of enumeration, and the person who actually operated the farm (whether owner, tenant, manager, or sharecropper) filled out the census questionnaire and returned it by mail to the Census Bureau. The Census of Agriculture provides data, by county, concerning land use, crop and livestock production, inventories of livestock and farm equipment, agricultural practices, expenditures, and value of sales for places classified as farms. Selected items of general information are given for all farms, and more detailed data for the larger farms which, for the 1969 and 1974 censuses, were those with sales of $2,500 or more.

There also are Censuses of Irrigation and Drainage taken in connection with the Censuses of Agriculture for years ending in 9. A Census of Horticultural Specialties and a sample Survey of Farm Finance were taken for 1970. A Farm Enterprise Survey was conducted for 1971; this was a simple survey of the farm operators who had reported in the 1969 Census of Agriculture, asking for more detailed information about the particular type of agricultural operation reported as the major source of farm income—for example, raising cotton, or poultry.

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*A fourth gap in transportation information related to the bus and truck industry. In the 1963 census this was filled by the Bus and Truck Carrier Survey. However, for subsequent censuses this project was incorporated into the Census of Selected Service Industries because of its basic similarity to the statistical programs for other services industries.

Current Statistics. The only current statistical survey conducted by the Bureau of the Census in the field of agriculture is a survey of cotton ginnings and production; it is conducted at specified dates during the cotton ginning season. Most current agricultural statistics are collected and published by the U.S. Department of Agriculture.

6. Foreign Trade. The foreign trade statistics program is one of the oldest statistical programs of the United States. Data on foreign trade for 1790-1820 were published as part of the American State Papers. Annual volumes of *Foreign Commerce and Navigation of the United States* were issued for the years 1821-1965.

Other annual reports are now published, along with a number of monthly reports, to provide detailed statistics on various aspects of foreign trade for different groups of users. About 1,000 pages of double and triple-column printed pages—plus thousands of pages of tables in the form of computer printouts—are made available to the public each month. The three basic summary monthly publications are: *Highlights of United States Export and Import Trade* (FT 990), *U.S. Exports—Schedule B Commodity by Country* (FT 410), and *U.S. Foreign Trade-Imports-Commodity by Country* (FT 135).

The data are obtained from copies of export and import documents filed with Customs Offices in 350 ports in the United States. Each month more than half a million export documents and more than a quarter of a million import documents are received. For low-value shipments, special sampling and estimating techniques are used in the processing operations.

7. County Business Patterns. A series of annual reports, *County Business Patterns*—one for each State and the District of Columbia, and a national summary—provides statistics on employment and payrolls for establishments grouped according to industries or groups of industries.

E. General Statistical Compendia

1. Statistical Abstract of the United States. The *Statistical Abstract of the United States*, which has been published annually since 1878, is the nearest equivalent to a comprehensive national yearbook issued by the Federal government. It presents statistics from the publications and records of governmental, private, and international agencies. It is the standard summary of statistics on the social, political, and economic organization of the United States.

In the *Statistical Abstract* emphasis is given to national data, but many tables present data for regions, individual states, and outlying areas of the United States. Statistics for cities or other relatively small geographical units appear in only a few instances. (A related publication, *State and*

Metropolitan Area Data Book, is planned for 1977 and probably will be prepared biennially after that.)

A particularly valuable feature of the *Statistical Abstract* is that the footnotes to the tables and bibliographies at the end of the volume provide a guide to almost all of the major sources of statistics in the Nation.

The Abstract (U.S. Government Printing Office, $8.00 for the 1975 paperback edition) is designed as a single volume suitable for easy desk use. In response to pressures to include more State data, more small-area data, more detail on particular subjects, and more historical data, a series of supplements has evolved; they are described below.

2. Congressional District Data Book. The *Congressional District Data Book* can be very useful to political scientists. The latest complete edition, the *Congressional District Data Book: 93rd Congress* (U.S. Government Printing Office, 567 p., $12.70 clothbound), presents more than 300 items of information from the 1970 Census and from recent election statistics for each district of the 93rd Congress. Selected population characteristics are also shown for each place with 10,000 or more inhabitants within each congressional district.

Three separate reports have been issued for three States that changed their congressional districts prior to the 1974 elections: CDD 94-1, Congressional District Data, 94th Congress: Texas (39 p., $1.00); CDD 94-2, Congressional District Data, 94th Congress: California (59 p., $1.25); CDD 94-3, Congressional District Data, 94th Congress: New York (47 p., $1.20). For other States, the reports issued for the 93rd Congress remain valid for the 94th Congress.

In the *Congressional District Data Book* there are maps showing the congressional districts, counties, and selected cities for each State. There are also detailed inset maps, when necessary, for counties that are split by congressional district boundary lines.

There is some variation in the number of population items shown for each State depending on the numerical significance of the item for a particular State. For example, for Alabama no data are given on "mother tongue other than English," whereas for Kentucky data are shown in this category for the number of persons in each congressional district whose mother tongue was German.

Both the *Congressional District Data Book: 93rd Congress* and the three later State reports include definitions and explanations of the statistics. The volume for the 93rd Congress also includes a brief review of the history of congressional apportionment and congressional districts.

3. County and City Data Book. The *County and City Data Book* is another very useful compendium of statistical data, presenting in one volume a variety of statistical information for counties, standard metropolitan statistical areas (SMSA's), urbanized areas, cities and unincorporated places of 25,000 inhabitants or more. The items selected are those for

which the statistics represent generally useful summary measures and are available in comparable form for all counties or for all cities.

In addition to statistics derived from the latest Censuses of Population, Housing, Governments, Retail Trade, Wholesale Trade, Selected Service Industries, Manufactures, Mineral Industries, and Agriculture, statistics from a number of governmental and private agencies are included—for example, the Board of Governors of the Federal Reserve System, and the Governmental Affairs Institute.

The *County and City Data Book* appears at approximately five-year intervals. Editions of the book alternate in emphasis on the Population and Housing Census and the Economic Censuses.

The latest edition is the *County and City Data Book, 1972* (U.S. Government Printing Office, 1,076 p., $18.65 clothbound).* For each county or county equivalent, approximately 200 statistical items are presented; comparable totals are shown for States, Census divisions and regions, standard Federal administrative regions, and the United States. For each SMSA a corresponding selection of items is given, except that items for mineral industries and agriculture are omitted. For each incorporated city with 25,000 inhabitants or more in 1970, almost 150 items are presented. For each urbanized area and for unincorporated places of 25,000 inhabitants or more in 1970, approximately 100 items of information are shown.

Descriptive text, maps, and source notes are included to help the user interpret the data shown. The publications cited as sources usually contain additional statistical detail and more comprehensive definitions and concepts than are presented in this volume.

4. Historical Statistics of the United States. *Historical Statistics of the United States, Colonial Times to 1970* was issued in 1976. It contains more than 12,500 data time series, mostly annual, which provide a statistical history of the U.S.

Aids in updating the series beyond the most recent issue of *Historical Statistics* appear in the *Statistical Abstract.* An Appendix in each issue of the *Statistical Abstract* is an index to tables in the Abstract that present current figures for series in the *Historical Statistics.* Also, headnotes to the tables in the Abstract specify the series in *Historical Statistics* to which the current series may be linked.

The data in *Historical Statistics* are almost entirely for annual or census periods, and for the United States as a whole.

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*Tapes and punchcards containing the statistics included in the last five editions are available for purchase; for further information write to the Customer Services Branch, Data User Services Division, Bureau of the Census, Washington, D.C. 20233.

5. Pocket Data Book, U.S.A. The *Pocket Data Book*, usually issued biennially, is a pocket-size, popularized abbreviated version of the *Statistical Abstract*, distinguished by the use of numerous charts and narrative text. It costs less than the *Statistical Abstract*, and it is handy for some general uses. The latest edition is the *Pocket Data Book, USA 1973* (U.S. Government Printing Office, 353 p., $2.80). A new edition is coming out in 1976.

Chapter 3. A Case Study: The Relationship Between Poverty and Race in New York City

(Reprinted from: *Sources and Uses of Social and Economic Data: A Manual for Lawyers.** Legal Action Support Project. Washington, D.C., 1974).

The Problem

This case study derives from research assistance given to Legal Services attorneys who brought suit against the United States and a large private rental organization in New York City. The suit concerned the rights of welfare recipients to obtain housing in the private sector.

The rental organization, managing more than 20,000 apartments, had reached an agreement with the U.S. Government (resulting from a previous suit) which allowed the rental organization to refuse to rent to any applicant whose weekly income was less than 90 percent of the monthly rent of the apartment in question. This created an effective prohibition against welfare recipients occupying these rental units. The legal attack centered on the constitutionality of those income requirements. While the right of the landlord to protect his investments was recognized, it was contended that he may not do this in a manner that results in unreasonable and arbitrary discrimination against nonwhites.

One part of the research requested in this case was information on the relationship between race and poverty in the city. This was to support the contention that actions such as this, harmful to poverty or low-income groups, would be of a racially discriminatory nature.

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*This manual is a product of the Legal Action Support Project, a social science back-up center for the Legal Services Program funded by the Office of Legal Services.

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Specification of Information Needs

The first problem to solve was deciding which racial categories, poverty measures, units of analysis and geographic areas to employ, keeping in mind that the most likely source of data would be the 1970 Census of Population.

Racial categories. In the context of New York City it was decided to distinguish three "racial" groups which are present in sizeable numbers: whites, Blacks and Puerto Ricans. Puerto Ricans, while not considered by ethnographers to be separate race, are an important minority group with distinct characteristics and are popularly identified as a "race." They were, therefore, considered a racial group for purposes of our analysis.

Poverty measures. We chose to employ both a multifactor definition of poverty and the principal component of this definition, income in dollars. Since the income requirements at issue in the case focused on total income in dollars, the measure deemed most appropriate to the attorneys' information needs was total income from earnings (wages, salary, self-employment) and other sources (e.g., retirement benefits, public assistance or welfare, interest and dividends). In addition, it was decided that data on the *poverty status* (as measured by the *Poverty Index* currently in use by the Federal government) of the three racial categories were also relevant. The poverty index is based on total income but takes into consideration other factors such as family size, number of children and farm and nonfarm residence and therefore provides a more refined measure of relative economic well-being than total income alone.

Units of analysis. The unit of analysis is simply that social unit about which we want to collect data. It can be countries, States, cities, families, individual persons, etc. In this case we knew Census data would be available for families, all persons, unrelated individuals and households. We decided to limit ourselves to data on families and persons.

Geographic area. The geographic area in question was, of course, New York City. However, Census data are available for a number of different geographical areas, all of which could broadly be called "New York City." For example, in addition to the city itself and its component counties (or boroughs), data are available for the New York Standard Metropolitan Statistical Area (SMSA), the New York urbanized area and the New York-Northeastern New Jersey Standard Consolidated Area. We chose to employ data only for New York City proper, and in some instances, for its component counties (or boroughs): Bronx (Borough of the Bronx), Kings (Borough of Brooklyn), New York (Borough of Manhattan), Queens (Borough of Queens) and Richmond (Borough of Staten Island).

Having made these decisions we determined that the specific question we wanted to answer was:

> To what extent are Black and Puerto Rican individuals and families in New York City more likely than whites to fall into low-income categories and to be classified as being below the

poverty level (as measured by the Federal government's poverty index)?

The Search for Data

Once the research problem was refined, in the larger context of the general legal issues, the search for data could begin. This search, as most others we have conducted, was limited in certain ways by the time, money and personnel available. We knew that the major source of available data would be the 1970 Census of Population since it had asked questions about the items of information in which we were interested. However, an effort was made to collect some information from *secondary sources* which dealt with the poverty-race issue on a national basis.

Numerous secondary sources were consulted, one of which, the *Statistical Abstract of the United States*, contained several tables dealing with the relevant data items. A modified version of one of these tables is presented in the following "method" to illustrate the kinds of data that were available for the nation as a whole.

Table 1, on the following page, illustrates the essential features of a good statistical table. Tables are designed to present large amounts of data in a compact form. A good statistical table should not only be easy to read but should contain enough information to be meaningful in and of itself. Using Table 1 as an example, the following features of a complete table should be noted:

1. *A table number* that serves to distinguish it from all other tables in a series (e.g., Table 1).
2. *A clear, concise and descriptive title* which mentions at least the major variables in the table.
3. *Definitions of all terms* that are open to alternative interpretation (*headnote and footnote* in Table 1).
4. *Reference to the source of data:* In the example we see that the table was taken from a secondary source, the *Statistical Abstract of the United States*, and what the original source was.

Statistical tables should be studied carefully; otherwise they may be misinterpreted or important information may be overlooked. The interpretation or "reading" of tables can be facilitated by systematically going through the following steps:

1. *Read the title carefully.* A good title will tell you what the table is all about. The title of Table 1, for example, indicates that the table tells

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*This is largely based on an adaptation of W. A. Wallis and H. V. Roberts, *Statistics: A New Approach* (Glencoe: The Free Press, 1956), pp. 270-274, in L. Broom and P. Selznick, *Sociology* (4th ed.; New York: Harper and Row, 1968), pp. 10-12.

TABLE 1

Percentage of Persons Below the Poverty Level, by Type of Residence, Age and Race: United States, 1969 (Persons as of March 1970)

Excludes inmates of institutions, members of the Armed Forces living in barracks and unrelated individuals under 14 years of age. Poverty levels, as defined by the Social Security Administration, center around the Department of Agriculture's Economy Food Plan and reflect the differing consumption requirements of families based on their size and composition, age of members and farm-nonfarm residence.

Age and Race	United States	Metropolitan Areas[a]			Nonmetropolitan Areas
		Total	Central Cities	Suburban Rings	
All races	12.2	9.5	13.4	6.3	17.1
Under 22 years	13.8	13.8	11.1	6.9	18.7
22-64 years	8.2	6.2	8.8	4.2	12.1
65 years and over	25.3	20.2	22.9	17.1	33.3
White	9.5	7.3	10.2	5.4	13.5
Under 22 years	9.8	7.7	11.7	5.5	13.5
22-64 years	6.5	4.8	6.6	3.6	9.6
65 years and over	23.3	18.8	20.9	16.5	30.5
Negro	32.3	24.4	24.7	23.2	51.5
Under 22 years	37.6	29.5	30.1	27.6	55.9
22-64 years	23.2	16.9	17.2	16.0	41.5
65 years and over	50.2	38.9	38.6	40.6	65.7

[a] *Metropolitan Areas.* The entire territory of the United States has been classified by the Office of Management and Budget as (a) metropolitan, or "inside Standard Metropolitan Statistical Areas" (SMSA's), and (b) non-metropolitan, or "outside SMSA's." An SMSA is a county or group of contiguous counties (except in New England) which contains at least one central city of 50,000 inhabitants or more or "twin cities" with a combined population of at least 50,000. Other contiguous counties are included in an SMSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city. In New England, towns and cities are used in defining SMSA's. Central cities are those named in the titles of the areas.

Secondary Source: U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States,* 1971, July 1971, page 324.

Original Data Source: U.S. Department of Commerce, Bureau of the Census, *Current Population Reports,* Series P-60, Nos. 68 and 76, and unpublished data.

about the *percentages* of persons,* in various categories defined by their place of residence, age and race, who are below the poverty level. It also indicates that the data are for the United States as a whole and that they are for 1969.

2. *Read the headnotes and footnotes carefully.* Details essential to understanding the table but too complex to include in the table title are

*While it is not unusual for all the entries in a table to consist solely of percentages, it is more common to find real numbers, or numbers (counts, totals, subtotals) *and* percentages.

usually provided in headnotes and footnotes. In Table 1 the headnote explains the table is concerned with persons resident in the United States as of March 1970 who were not inmates of institutions, members of the armed forces living in barracks or unrelated individuals under 14 years of age. It also gives a brief explanation of the term "poverty level." The footnote provides a definition of *metropolitan areas.* In some respects the notes in Table 1 are not as detailed as they might be; definitions of all types of residence covered in the table could have been included as well as a clear definition of *unrelated individuals.*

3. *Note the source.* Is the original source of data likely to be reliable? In this case the original source is the Bureau of the Census and the secondary source is a Census publication, the *Statistical Abstract of the United States.* Data from the Bureau of the Census are generally of high quality and the user of the table may place considerable confidence in the findings reported. If the source is not given for a table or if one is not mentioned in the accompanying text one should use the data with caution, or, preferably, not at all.

4. *Examine the column and row headings.* In Table 1, the headings down the left side (often referred to as *stubs*) indicate that the rows break the population into groupings involving two races (white, Negro) and three age categories (under 22 years, 22-64 years, 65 years and over). The headings across the top of the table show that the data are summarized for the entire United States and then broken down into selected areas: metropolitan areas (including total, central cities and suburban rings) and nonmetropolitan areas. Once you understand the headings for the rows and columns you will be in a position to make sense of the figures in the table. For example, the figure 65.7 in the bottom right cell of the table indicates that 65.7 percent of all Blacks, aged 65 years and over, living outside metropolitan areas in March 1970, were classified as being below the poverty level on the basis of their 1969 income.

5. *Look at the overall percentage.* The percentage of *all* persons in the United States as of March 1970 who were below the poverty level in 1969 is shown, in the upper left cell, as 12.2 percent.

6. *See what variability there is.* Pick out the lowest and highest percentages reported. The lowest is 3.6 percent, the highest is 65.7 percent. There is clearly great variation in the percentage below poverty level among the 24 basic groups into which the total population is divided. (two races, three age classes, four residence categories).

The first six steps are preliminaries. They set the stage for reading a table to answer the questions that interest you. The way you read a table from this point on depends on what you want to know. A table as complex as Table 1 provides answers to a variety of questions, e.g., questions about the relationships between poverty and type of community, age and race, respectively.

7. *Look for the figures in the table that answer the question or questions in which you are interested.* As noted earlier, Table 1 was

presented to provide a frame of reference for the data relating to the association between race and poverty in New York City. Of particular interest, then, is the extent to which they are related in central cities throughout the United States. Are Blacks in central cities more likely than whites to be below the poverty level? To answer this question, one should look at the percentages under "Central Cities" and compare those for Blacks and whites: 24.7 percent *versus* 10.2 percent. The answer, then, is a clear-cut "yes."

In addition, in all three age categories presented in Table 1, the percentage of Blacks in central cities who were classified as being below the poverty level was considerably higher than the percentage of central city whites so classified: 30.1 percent versus 11.7 percent for persons under 22 years of age, 17.2 percent versus 6.6 percent of persons aged 22-64 years and 38.6 percent versus 20.9 percent for persons 65 years and over. Thus, while we can see that the incidence of poverty among Blacks is substantially higher than it is among whites in all age categories, we may then want to ask: In what age groups are the differences in the incidence of poverty the greatest? To answer this question, we must look at the differences in percentages for each age group, so that the effects of age, or variations associated with age, are "controlled." Thus, "controlling for age," we find the following percentages of persons below the poverty line and the differences between racial groups in each of the three age categories:

	AGE		
	Under 22	22-64	65 and over
Negro	30.1	17.2	38.6
White	11.7	6.6	20.9
Negro-White Differences	18.4	10.6	17.7

These figures show that *in each age group* the percentage of Negroes in poverty is larger than the percentage of whites. The differences are *greater* among the young and among the old. (That the difference in percentages between the two racial groups is smaller in the 22-64 age category may reflect the fact that this is working age and that employment is one of the factors which reduces the racial difference.)

In similar fashion we could control for type of community or type of community and age simultaneously. This process would show that, while more Blacks than whites in every type of community and in every age group are poor, the differences are greater in some sub-populations than in others. And we could continue to refine the analysis, adding more and more variables, in the effort to explain why more Blacks are poor (although at some point we would have to shift from the analysis of tables like the above to more sophisticated statistical techniques). One of the things we would discover in the process is that no single factor will explain the difference and, therefore, no single factor is the cause of poverty,

whether among Blacks or any other group. The point may be generalized, and is worth bearing in mind: No cross-tabulation of social data is likely to reveal an absolute causal relationship; in the interpretation of tables like the one above, we are therefore limited to statements about the association between two variables, or among three or more variables.*

Analyzing Census Data

Our next step was to turn to the primary source: the 1970 Census of Population. The series PC(1)-C reports, *General Social and Economic Characteristics*, contain data on income of families and individuals, as well as on the numbers of families and persons below the poverty level, for States, counties, SMSA's, urbanized areas and places of 2,500 inhabitants or more. Pertinent data from the New York volume are reproduced on the following three pages. The first page is a part of Table 89, which presents income data for places of 50,000 or more. The second page is from Table 94, which includes ". . . Income in 1969 of the Negro Population for Areas and Places: 1970." The third, from Table 100, presents the same data as Table 94, but for the Puerto Rican population. Each table has a column headed "New York City" and a large number of data items dealing with the income of families, unrelated individuals and total persons.

The excerpts from the three Census tables contain a considerable amount of data information in such unrefined form that it is difficult to discern any patterns or relationships. Therefore, we had to decide which items of data were relevant and how to present them in readable form.

The essential preliminary, as noted above, was to examine each table very carefully. The title of Table 89 informed us that the data concern the 1969 income of families, unrelated individuals and persons for areas and places, which are then defined in the column headings, so that we knew we were dealing with places of 50,000 or more population. The headnote refers to the text for a definition of the sample and indicates that the symbols are explained in the text. Of the three *major* row headings, we were interested only in the first: Income of Families and Unrelated Individuals. The minor headings indicated that two basic kinds of data are presented for each city: (1) *counts* of individuals and families with certain income characteristics (e.g., number of families with total family income between $7,000 and $7,999) and (2) *derived figures*—percentages, means and medians. Since it may well make a crucial difference in the interpretation of the data, it is essential to find out exactly what the terms in the headings mean by consulting the text or the footnotes. For instance, in Appendix B of the New York PC(1)-C report we found that "a family

*A good, simple discussion of the problem of causality is contained in: Stephen Cole, *The Sociological Method* (Chicago: Markham Publishing Company, 1972), Chapter 4 (paperback).

[Data based on sample, see text. For minimum base for derived figures (percent, median, etc.) and meaning of symbols, see text]

Standard Metropolitan Statistical Areas Places of 50,000 or More (or Central Cities) Urban Balance Urbanized Areas Places of 50,000 or More	Standard metropolitan statistical areas—Con.							
	New York							
	Total	Levittown (U)	Mount Vernon	New Rochelle	New York	White Plains	Yonkers	Urban balance
INCOME OF FAMILIES AND UNRELATED INDIVIDUALS								
Families								
Total	2 978 425	15 360	19 306	19 804	2 056 943	12 828	56 147	741 441
Less than $1 000	83 834	184	459	348	71 385	183	1 040	9 484
$1 000 to $1 999	67 464	163	346	282	55 934	206	966	8 849
$2 000 to $2 999	107 174	106	519	443	91 375	220	1 541	11 835
$3 000 to $3 999	121 634	112	673	528	103 277	280	1 467	13 871
$4 000 to $4 999	126 613	169	751	650	107 040	371	1 383	14 692
$5 000 to $5 999	148 115	276	951	730	123 679	457	1 919	18 382
$6 000 to $6 999	157 577	304	1 062	876	128 236	606	2 219	22 160
$7 000 to $7 999	168 124	541	1 109	915	131 193	533	2 835	28 481
$8 000 to $8 999	176 177	811	1 185	936	132 751	604	3 144	34 081
$9 000 to $9 999	171 456	1 083	1 431	1 010	124 027	573	3 529	37 410
$10 000 to $11 999	360 846	2 698	2 400	2 144	243 781	1 485	7 580	95 492
$12 000 to $14 999	413 059	3 416	2 893	2 637	261 341	1 713	8 931	129 941
$15 000 to $24 999	622 508	4 622	3 985	4 574	361 542	3 338	14 698	218 634
$25 000 to $49 999	198 535	815	1 338	2 879	99 641	1 693	4 257	82 876
$50 000 or more	47 289	62	204	852	24 241	566	638	19 279
Median income	$10 870	$13 083	$10 973	$13 183	$9 682	$13 569	$12 151	$13 811
Mean income	$13 062	$13 939	$12 820	$17 305	$11 629	$17 452	$13 933	$16 361
Mean income per family member	$3 788	$3 337	$3 838	$5 112	$3 507	$5 279	$4 191	$4 357
Index of income concentration	0 386	0 251	0 369	0 489	0 385	0 440	0 344	0 360
Families with female head	429 004	1 057	3 091	2 313	354 735	1 703	6 146	56 761
Mean income	$7 233	$8 630	$7 812	$8 861	$6 891	$9 061	$9 236	$8 915
Unrelated individuals								
Total	1 118 494	1 115	7 462	7 440	986 566	4 908	16 442	150 381
Less than $1 000	184 884	195	1 206	1 871	145 028	853	2 788	30 433
$1 000 to $1 999	190 099	173	1 341	1 035	157 025	888	2 758	24 951
$2 000 to $2 999	126 179	109	852	731	104 219	627	1 878	17 106
$3 000 to $3 999	100 342	17	810	824	83 220	580	1 205	12 459
$4 000 to $4 999	99 332	39	540	429	75 218	546	1 170	10 521
$5 000 to $5 999	91 125	88	561	414	77 845	678	1 199	9 611
$6 000 to $6 999	80 577	65	579	356	68 862	542	1 089	8 314
$7 000 to $7 999	71 042	81	381	323	60 975	455	1 010	7 235
$8 000 to $8 999	56 323	51	308	295	48 559	327	736	5 721
$9 000 to $9 999	39 668	43	199	277	33 885	286	539	4 160
$10 000 to $11 999	59 087	48	308	283	49 483	449	779	7 088
$12 000 to $14 999	40 696	53	147	254	33 087	366	634	5 745
$15 000 to $24 999	40 095	33	155	241	33 267	454	469	5 082
$25 000 to $49 999	14 405	-	39	103	12 231	35	188	1 635
$50 000 or more	4 743	-	5	4	3 662	14	50	449
Median income	$3 923	$4 290	$3 403	$3 101	$4 050	$4 919	$3 703	$3 225
Mean income	$5 413	$5 053	$4 414	$4 694	$5 484	$6 137	$5 206	$5 040
Index of income concentration	0 503	0 463	0 476	0 565	0 493	0 482	0 495	0 536
Female unrelated individuals	715 483	734	4 963	5 174	582 798	4 726	11 026	98 580
Mean income	$4 549	$3 935	$3 758	$3 971	$4 615	$5 226	$4 421	$4 231
All families and unrelated individuals	4 135 119	16 475	26 769	27 244	3 043 509	19 728	72 589	891 822
Median income	$8 700	$12 659	$8 812	$10 288	$7 679	$10 257	$10 462	$12 312
Mean income	$10 526	$13 337	$10 477	$13 861	$9 645	$13 495	$11 956	$14 618
TYPE OF INCOME OF FAMILIES AND UNRELATED INDIVIDUALS								
All families	2 978 425	15 360	19 306	19 804	2 056 943	12 828	56 147	741 441
With wage or salary income	2 528 633	14 695	17 166	17 302	1 720 747	11 232	49 434	669 266
Mean wage or salary income	$12 085	$13 173	$11 227	$14 547	$10 993	$14 249	$12 701	$14 619
With nonfarm self-employment income	293 507	1 295	2 004	3 406	177 293	2 221	6 257	95 166
Mean nonfarm self-employment income	$11 588	$7 823	$10 364	$14 660	$10 155	$15 315	$10 806	$13 004
With farm self-employment income	6 140	24	31	60	1 108	14	119	1 936
Mean farm self-employment income	$6 329				$5 313			$7 762
With Social Security income	588 786	2 090	4 080	4 064	429 399	2 751	11 886	124 220
Mean Social Security income	$1 704	$1 560	$1 602	$1 695	$1 707	$1 729	$1 729	$1 686
With public assistance or public welfare income	235 212	398	1 095	657	198 697	360	2 204	20 652
Mean public assistance or public welfare income	$2 567	$1 326	$1 725	$1 430	$2 114	$1 472	$1 646	$1 741
With other income	1 139 243	5 642	7 189	9 564	720 134	6 693	25 050	342 070
Mean other income	$2 902	$1 158	$2 333	$3 438	$2 885	$3 288	$2 382	$2 915
All unrelated individuals	1 188 494	1 115	7 462	7 440	986 566	4 908	16 442	150 381
With wage or salary income	719 731	704	4 393	4 330	599 236	4 791	9 366	90 372
Mean wage or salary income	$6 318	$6 379	$5 140	$5 487	$6 466	$6 507	$5 965	$5 490
With nonfarm self-employment income	48 244	37	210	303	41 370	224	452	4 928
Mean nonfarm self-employment income	$7 202		$7 194	$5 908	$7 224	$4 985	$8 101	$7 138
With farm self-employment income	1 316				1 022	10	17	207
Mean farm self-employment income	$5 611				$4 958			$8 355
With Social Security income	329 642	248	2 491	1 967	268 319	1 788	5 626	45 080
Mean Social Security income	$1 184	$1 217	$1 137	$1 112	$1 187	$1 232	$1 177	$1 176
With public assistance or public welfare income	83 738	41	512	206	75 839	199	585	5 908
Mean public assistance or public welfare income	$1 369		$1 133	$1 338	$1 320	$1 124	$974	$1 245
With other income	193 572	375	2 402	2 400	318 868	2 785	6 438	55 291
Mean other income	$2 672	$1 679	$2 267	$2 880	$2 545	$2 727	$2 873	$2 983
Per capita income of persons	$3 922	$3 355	$3 871	$5 029	$3 736	$5 349	$4 255	$4 316

Table 94. **Industry, Last Occupation of the Experienced Unemployed, and Income in 1969 of the Negro Population for Areas and Places: 1970**—Continued

[Data based on sample, see text. For minimum base for derived figures (percent, median, etc.) and meaning of symbols, see text]

Standard Metropolitan Statistical Areas / Places of 50,000 or More (or Central Cities) / Urban Balance / Urbanized Areas / Places of 50,000 or More

Standard metropolitan statistical areas—Con. — New York

	Total	Levittown (U)	Mount Vernon	New Rochelle	New York	White Plains	Yonkers	Urban balance
INDUSTRY								
Total employed, 16 years old and over	671 845	15	11 321	4 736	584 858	3 365	4 799	56 314
Agriculture, forestry, and fisheries	2 966	5	65	15	1 734	9	34	771
Mining	364	-	6	-	310	4	3	61
Construction	20 750	-	317	25	17 400	85	171	2 412
Manufacturing	116 511	-	2 176	629	101 444	406	1 230	10 228
Furniture and lumber and wood products	2 980	-	52	-	2 726	11	12	171
Primary metal industries	2 590	-	72	56	2 102	12	57	286
Fabricated metal industries (including not specified metal)	5 439	-	64	41	4 680	24	46	576
Machinery, including electrical	12 632	-	497	172	9 565	63	254	2 088
Transportation equipment	5 844	-	165	39	3 630	78	166	1 676
Other durable goods	19 061	-	456	142	16 637	75	163	1 567
Food and kindred products	5 767	-	152	36	4 915	37	60	439
Textiles and fabricated textile products	24 537	-	174	32	23 501		54	714
Printing, publishing, and allied industries	10 712	-	142	61	9 508	69	147	783
Other nondurable goods (incl. not specified mfg. indus.)	26 949	-	407	97	24 180	39	271	1 928
Trucking service and warehousing	15 214	-	159	58	9 214	30	119	625
Other transportation	34 350	-	235	87	32 196	29	83	1 696
Communications, utilities, and sanitary services	33 618	-	634	229	29 852	167	257	2 403
Wholesale trade	21 485	-	338	173	19 354	95	133	1 346
Food, bakery, and dairy stores	9 188	-	157	37	8 398	38	42	646
Eating and drinking places	14 121	-	130	87	12 961	82	70	729
Other retail trade	51 777	-	1 143	351	45 521	307	437	3 754
Finance, insurance, and real estate	53 272	-	544	282	50 658	180	179	1 393
Business and repair services	33 058	-	497	111	30 079	142	200	1 874
Private households	30 661	-	684	908	21 369	498	274	6 815
Other personal services	26 500	-	994	348	31 894	222	246	2 632
Entertainment and recreation services	6 445	-	61	132	5 445	42	26	751
Hospitals	60 452	10	612	261	52 405	442	304	6 249
Educational and kindred services	32 720	-	535	292	27 267	207	268	3 870
Other professional and related services	55 617	-	1 161	362	48 121	270	485	3 011
Public administration	47 342	-	671	280	42 436	138	242	3 448
LAST OCCUPATION OF EXPERIENCED UNEMPLOYED								
Male, 16 years old and over	17 601	-	179	92	16 819	43	139	1 819
Professional, technical, and managerial workers	1 178	-	19		1 075		17	60
Sales workers	460		17		472			16
Clerical and kindred workers	2 680	-	10	9	2 606		3	36
Craftsmen, foremen, and kindred workers	2 722		22	11	2 486	8	75	153
Operatives, including transport	4 579		32	23	4 120	11	33	325
Laborers, except farm	2 561		34	21	2 151	13	50	265
Farm workers	126			4	89			20
Service workers, including private household	2 864		25	30	2 616	11	8	122
Female, 16 years old and over	13 392	-	199	64	12 230	31	187	843
Professional, technical, and managerial workers	868		24	5	761	7	6	53
Sales workers	583		5		499		9	54
Clerical and kindred workers	3 556		53	25	3 385		14	163
Operatives, including transport	3 701		34	10	3 582		33	201
Other blue collar workers	294		11		640		-	37
Farm workers	27				4		-	18
Service workers, except private household	2 518		36	5	1 807	3	11	151
Private household workers	1 291		21	14	1 134	14	24	146
INCOME OF FAMILIES, UNRELATED INDIVIDUALS, AND PERSONS								
All families	440 232	5	4 299	2 453	394 984	1 646	3 184	29 944
Less than $1,000	26 540	-	244	80	24 328	29	218	1 528
$1,000 to $1,999	16 682	-	173	68	15 382	68	142	746
$2,000 to $2,999	27 238	-	290	129	25 416	54	177	1 076
$3,000 to $3,999	31 141	-	311	107	28 728	64	229	1 578
$4,000 to $4,999	32 517	-	349	147	30 019	114	203	1 547
$5,000 to $5,999	37 641	-	502	154	34 674	125	252	1 798
$6,000 to $6,999	37 440	-	469	185	34 181	184	219	2 060
$7,000 to $7,999	34 844	-	470	179	31 420	121	290	2 178
$8,000 to $8,999	30 763	-	382	167	27 738	90	171	2 087
$9,000 to $9,999	26 663	5	490	138	23 647	108	223	1 946
$10,000 to $11,999	44 302	-	770	262	38 902	301	289	3 578
$12,000 to $14,999	43 641	-	795	295	37 788	163	329	4 090
$15,000 to $24,999	43 918	-	889	351	37 127	177	378	4 875
$25,000 to $49,999	5 919	-	157	122	4 684	42	84	821
$50,000 or more	984		8	18	869	-	-	84
Median income	$7 313		$8 994	$8 875	$7 150	$8 644	$7 524	$9 192
Mean income	$8 349		$9 704	$10 749	$8 171	$9 407	$8 595	$10 129
Families with female head	139 754	-	1 759	706	128 115	540	961	7 270
Mean income	$5 442		$6 277	$6 188	$5 410	$6 817	$6 983	$5 712
All families and unrelated individuals	654 754	5	6 139	4 009	584 462	2 798	4 629	46 879
Median income	$5 850		$6 707	$5 759	$5 811	$5 939	$5 941	$6 350
Mean income	$6 882		$7 658	$7 737	$6 801	$6 958	$7 078	$7 689
All unrelated individuals	214 522	-	2 840	1 556	189 558	1 152	1 445	16 935
Median income	$3 373		$3 180	$2 400	$3 449	$2 818	$3 318	$2 888
Mean income	$3 888		$3 763	$2 988	$3 947	$3 450	$3 735	$3 373
Female unrelated individuals	121 336	-	1 682	1 076	105 130	811	930	11 224
Mean income	$3 304		$2 955	$2 579	$3 338	$2 225	$3 718	$2 927
Per capita income of persons	$2 411		$2 785	$2 928	$2 407	$2 737	$2 518	$2 414
TYPE OF INCOME OF FAMILIES								
All families	440 232	5	4 299	2 458	394 984	1 646	3 184	29 944
With wage or salary income	341 894	5	3 479	2 228	321 518	1 533	2 871	26 730
Mean wage or salary income	$8 718		$9 616	$10 172	$8 580	$8 963	$8 912	$10 064
With nonfarm self-employment income	17 474	-	278	176	16 891	110	191	1 708
Mean nonfarm self-employment income	$5 737		$5 621	$9 118	$5 622	$5 073	$5 309	$6 578
With farm self-employment income	686	-	-	-	573	-	3	84
Mean farm self-employment income	$5 993		-		$6 577	-		
With Social Security income	53 494	-	933	507	47 652	311	485	3 264
Mean Social Security income	$1 608		$1 373	$1 347	$1 621	$1 216	$1 575	$1 580
With public assistance or public welfare income	88 342	-	772	284	81 902	172	608	4 275
Mean public assistance or public welfare income	$2 252		$1 816	$1 741	$2 239	$1 591	$1 736	$2 306
With other income	57 690	-	1 117	548	50 742	308	507	4 218
Mean other income	$2 302	-	$2 034	$1 718	$2 368	$1 733	$1 420	$1 850

[1]Includes persons who last worked more than 10 years ago, not shown separately.

consists of a household head and one or more other persons living in the same household who are related to the head by blood, marriage, or adoption; all persons in a household who are related to the head are regarded as members of his (her) family." Thus, the Census definition does not conform to the conventional definition—husband, wife and unmarried children; it is broad enough to include, for example, a man living with his grandmother.

Tables 94 and 100, for the Negro and Puerto Rican populations, also contain data on the distribution of family income, but here we found that for certain cities there were dots and dashes instead of numbers. According to the text, a dash signifies zero and the ellipsis (three dots) means "not applicable," that the base is too small to derive statistics from or that the data were suppressed to protect individual anonymity.

Constructing Derivative Tables

Since the PC(1)-C tables contained a great deal of information irrelevant to our purpose (investigation of the relationship between poverty and race in New York City), since the relevant data were contained in three separate tables and since data for white families as such were not shown alone, it was necessary to construct a new set of derivative tables. This was done as follows:

The first step was to consolidate the figures on the numbers of families at 15 different levels of total family income from the three tables into the array of data shown on the following page. However, this was not entirely satisfactory, since there were no separate figures for the non-Puerto Rican white families. To overcome this deficiency, we subtracted the sum of Black and Puerto Rican families, at each income level, from the total number of families (at the same level) to find the number of white families.* (This was on the assumption that, once Blacks and Puerto Ricans were subtracted from the total, the overwhelming bulk of the remaining families would be white, and that the number of families of other races, e.g., Chinese, counted as white, would be negligible.) This procedure produced the "preliminary table" shown on the following page, which combines selected data from the three Census tables and adds previously "concealed" information on white families.

Nevertheless, the data at this state were not readily comprehensible. For example, it was very hard to see exactly how the 51,979 white families in the $3,000-3,999 income category compare to the 28,728 Black families in the same category. Obviously, the number of white families at this income level is a smaller proportion of all white families

*Editor's Note: This procedure is somewhat misleading, since Black (a racial category) and Puerto Rican birth or parentage (an ethnic category) are not mutually exclusive. In New York State, 6.7% of all Puerto Ricans (58,104 out of 872,471) classified themselves as Black.

Income of Families and Unrelated Individuals

Income Level	Families		
	Total	Black	Puerto Rican
Less than $1,000	71,385	24,328	16,136
$ 1,000 to $ 1,999	55,934	15,382	9,677
$ 2,000 to $ 2,999	91,375	25,416	17,508
$ 3,000 to $ 3,999	103,277	28,728	22,570
$ 4,000 to $ 4,999	107,040	30,019	21,745
$ 5,000 to $ 5,999	123,679	34,674	22,089
$ 6,000 to $ 6,999	128,236	34,181	19,068
$ 7,000 to $ 7,999	131,193	31,420	15,381
$ 8,000 to $ 8,999	132,751	27,738	12,688
$ 9,000 to $ 9,999	124,027	23,647	9,027
$10,000 to $11,999	243,281	38,902	14,435
$12,000 to $14,999	261,341	37,788	11,361
$15,000 to $24,999	361,542	37,127	7,943
$25,000 to $49,999	99,641	4,686	878
$50,000 or more	24,241	868	170
Total	2,058,943	394,904	200,676

Preliminary Table

Income Level	Families			
	Total	White	Black	Puerto Rican
Less than $1,000	71,385	30,921	24,328	16,136
$ 1,000 to $ 1,999	55,934	30,875	15,382	9,677
$ 2,000 to $ 2,999	91,375	48,451	25,416	17,508
$ 3,000 to $ 3,999	103,277	51,979	28,728	22,570
$ 4,000 to $ 4,999	107,040	55,276	30,019	21,745
$ 5,000 to $ 5,999	123,679	66,916	34,674	22,089
$ 6,000 to $ 6,999	128,236	74,987	34,181	19,068
$ 7,000 to $ 7,999	131,193	84,392	31,420	15,381
$ 8,000 to $ 8,999	132,751	92,325	27,738	12,688
$ 9,000 to $ 9,999	124,027	91,353	23,647	9,027
$10,000 to $11,999	243,281	189,944	38,902	14,435
$12,000 to $14,999	261,341	212,192	37,788	11,361
$15,000 to $24,999	361,542	316,472	37,127	7,943
$25,000 to $49,999	99,641	97,077	4,686	878
$50,000 or more	24,241	23,203	868	170
Total	2,058,943	1,463,363	394,904	200,676

than the 28,728 Black families are of the total number of Black families, but the degree of disproportion is not immediately evident. If the number of families of each race had been identical, the absolute numbers at any income level could have been compared directly. Since that was not the case (and rarely is), we had to compute a set of percentages to facilitate comparisons among the three racial groups.

Percentaging is simply a matter of converting a set of subtotals into hundredths of the total. If this is done for two or more sets of subtotals, then the resulting percentage distributions will have a common base—100. When the columns in a table have been percentaged, the figures (percentages) in any given row may be *directly* compared.

How to compute a percentage. To compute, for example, the percentage of white families in the lowest income group in the table above, we simply divide the number of white families in that group by the total number of white families and multiply by 100:*

$$\frac{30,921}{1,463,363} = .021 \times 100 = 2.1\%$$

In which direction should percentages be computed? With respect to tables such as those we have been considering, it is possible to compute percentages based on either column totals or row totals. Whether we percentage one way or the other depends on the kinds of comparisons we want to make. If we wanted to compare the percentages of the several racial groups in each of the 15 income categories, we would sum the rows and compute percentages based on the row totals. This would permit quantitative statements to the effect that there are disproportionately more white than Black or Puerto Rican families at higher income levels and disproportionately fewer white families at lower income levels. But this would answer an entirely different question from the one before us.

The question we had to address was, how do the different racial groups compare in terms of income distribution. Therefore, the proper procedure was to compute the percentages on the column total for each race, so that we would know what percentage of each race was in each income group. Briefly, the idea was to percentage the *columns* in order to compare percentages within *rows*. The resulting figures are given in the table on the following page.

This table very clearly reveals the relationship between race and income much more clearly than does the preliminary table above. For instance, the percentages of Puerto Rican families in the seven lowest income groups are larger than those of Black families, and the percentages of Black families are larger than those of white families. At the six highest income levels, the situation is precisely reversed.

There are at least two ways in which Table 2 might be further simplified. First, all of the real numbers, except for the column totals, could be deleted; they can always be recomputed from the percentages and the column totals. Second, the number of rows could be reduced by a process known as "collapsing."

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*An excellent discussion of percentaging is given in Hans Zeisel, *Say It With Figures* (5th ed.; New York: Harper and Row, 1968).

TABLE 2

Income of Families in 1969 in New York City

	Families							
	Total		White[a]		Black		Puerto Rican	
Income Level	N	%	N	%	N	%	N	%
Less than $1,000	71,385	3.5	30,921	2.1	24,328	6.2	16,136	8.0
$ 1,000 to $ 1,999	55,934	2.7	30,875	2.1	15,382	3.9	9,677	4.8
$ 2,000 to $ 2,999	91,375	4.4	48,451	3.3	25,416	6.4	17,508	8.7
$ 3,000 to $ 3,999	103,277	5.0	51,979	3.6	28,728	7.3	22,570	11.3
$ 4,000 to $ 4,999	107,040	5.2	55,276	3.8	30,019	7.6	21,745	10.8
$ 5,000 to $ 5,999	123,679	6.0	66,916	4.6	34,674	8.8	22,089	11.0
$ 6,000 to $ 6,999	128,236	6.2	74,987	5.1	34,181	8.6	19,068	9.5
$ 7,000 to $ 7,999	131,193	6.4	84,392	5.8	31,420	8.0	15,381	7.7
$ 8,000 to $ 8,999	132,751	6.5	92,325	6.3	27,738	7.0	12,688	6.3
$ 9,000 to $ 9,999	124,027	6.0	91,353	6.2	23,647	6.0	9,027	4.5
$10,000 to $11,999	243,281	11.8	189,944	13.0	38,902	9.8	14,435	7.2
$12,000 to $14,999	261,341	12.7	212,192	14.5	37,788	9.6	11,361	5.7
$15,000 to $24,999	361,542	17.6	316,472	21.6	37,127	9.4	7,943	4.0
$25,000 to $49,999	99,641	4.8	94,077	6.4	4,686	1.2	878	0.4
$50,000 or more	24,241	1.2	23,203	1.6	868	0.2	170	0.1
Total	2,058,943	100.0%	1,463,363	100.0%	394,904	100.0%	200,676	100.0%

[a]Figures for white families were obtained by subtracting Black and Puerto Rican family totals from totals for all families. See text for further discussion.

Source: U.S. Department of Commerce, Bureau of the Census, *General Social and Economic Characteristics, New York State*, Report PC(1)-C34.

To make a complex table such as 2 more compact and readily comprehensible, one may combine adjacent rows or columns of figures. Generally, this would be done only where the categories of data are ordered on some kind of continuum, or where "collapsing" would otherwise make sense. Table 2 could be collapsed by combining the Black and Puerto Rican columns, which would leave us with "white" and "other"—two columns instead of three. But in the present context, combining income categories was more to the point. We therefore collapsed the 15 into five. This was done somewhat arbitrarily, although we chose one cutting point ($3,999) to approximate the poverty line and defined the next two intervals so that each would have a range of income equal to the first. Defining unequal intervals is acceptable, but it is not appropriate to alternate between larger and smaller ones; if they are to vary in size, the difference should be progressively larger or smaller in one or both directions. In no case should a table be collapsed in a manner which would distort the general pattern of the original, detailed table.

Table 3 below is the collapsed version of Table 2. It shows, with greater clarity than the more detailed version, the same relationship between income and race. It is possible, of course, to continue this process, even to the point where each variable is dichotomized. Table 4 represents the ultimate reduction of these data. Note that the relationship between race and income is still preserved and that it is now sharper and more dramatically expressed. Whether such extreme reduction is advisable is a matter of judgment. Social scientists frequently present their data in similarly collapsed form in the body of a report, while including the corresponding detailed tables in appendices.

TABLE 3

Percentages of New York City Families in Grouped 1969 Income Categories, by Race[a]

	Families			
Income Level	**Total**	**White**	**Black**	**Puerto Rican**
0 to $3,999	15.6	11.1	23.8	32.8
$ 4,000 to $ 7,999	23.8	19.3	33.0	39.0
$ 8,000 to 11,999	24.3	25.5	22.8	18.0
$12,000 to $24,999	30.3	36.1	19.0	9.7
$25,000 or more	6.0	8.0	1.4	0.5
Total	100.0%	100.0%	100.0%	100.0%
(N)	(2,058,943)	(1,463,363)	(394,904)	(200,676)

[a]*Source:* Table 2 above.

TABLE 4

Percentages of New York City Families in Grouped 1969 Income Categories, by Race[a]

	Families	
Family Income	White	Black and Puerto Rican
0 to $7,999	30.4	61.8
$8,000 or more	69.6	38.2
Total %	100.0	100.0

[a]*Source:* Tables 2 and 3, above.

The Use of Simple Statistics

Up to this point, the only *statistic* we have discussed is the percentage. The distinction implied here is that between the various *derived* measures called statistics and the actual numbers (counts, etc.) upon which they are based. We will now explore the use of other statistical measures which conveniently summarize and clarify raw data, and then examine their application to the Census data on income for New York City counties.

The Use of Measures of Central Tendency

Certain sets of data can be represented, more or less adequately, by statistical "averages," or, more accurately, *measures of central tendency.* The three most commonly used are the *mean,* the *median* and the *mode.* Each of these is a way of expressing the central value or "weight" of a set of figures in the form of a single number. The advantages are that large amounts of data can thereby be reduced to a single indicator and that comparisons among different sets of data are made easier. The three measures are not always equally appropriate and equally useful. On the other hand, they sometimes coincide in representing a particular distribution, although each one tells a different story. It is always necessary that the data to be represented are given in standard, invariable units, such as dollars, years (of age), inches and so on.

The simplest measure of central tendency to define is the mode. It is the value which occurs most frequently in the set. (Occasionally, there is more than one mode.) For a very fast approximation, the mode *may* be useful; no calculation is required—only inspection of the distribution.

The (arithmetic) mean is close in definition to one of the common connotations of "average." It is the balance point, or fulcrum, of a set of

*Most texts on statistics discuss these measures, their uses and limitations. See, for example, Robert Weiss, *Statistics in Social Research: An Introduction* (New York: John Wiley and Sons, 1968), Chap. 6.

values—not the *number* of values (which would define the median), but the sum of values on either side. Its chief limitation is that it can seriously misrepresent a set of figures when only a few are unusually small or large, that is, have extreme values. The mean is calculated by adding the values and dividing the total by the number of values.

The median is that value at the middle of an *ordered* set of values (arranged from high to low); half the values lie above and half below this measure. If there happens to be an even number of values, the median is the number half way between the *two* middle values in the ordered set. Since it is not affected by extreme values, the median is a good alternative to the mean when they are present.

Following is an array of wage rates for ten hypothetical workers, together with the three measures of central tendency representing it:

Worker	Wage Rate	
A	$2.25	
B	2.30	
C	2.30	Mode = $2.30
D	2.30	
E	2.35	
F	2.45	← Median = $2.40
G	2.50	
H	2.50	
I	3.45	← Mean = $2.66
J	4.20	

The measures are quite disparate and not equally representative of the array. The mode here is rather misleading; the mean is atypically high because of the two extreme values: $3.45 and $4.20. Clearly, the median is the best choice.

Continuing now with the discussion of race and income in New York, our next step was to see whether the general pattern observed for the city as a whole held for the five constituent counties. For this purpose we used the mean and median income measures derived from Tables 124, 128 and 133 of the PC(1)-C report. The medians for each race in each of five counties were extracted from these tables and combined to form Table 5, shown below. Examining these figures we see that they are substantially higher for white families than for Black and Puerto Rican families in all five counties. The last line, the New York City Total, is perhaps most striking. For the city as a whole, 1969 median family income for whites was $11,097, for Black families, $7,150 and for Puerto Rican families, $5,575. This means, for example, that half of the white families had incomes below $11,097, but that half of the Puerto Rican families were under $5,575. Moreover, in every county median income is lower among Puerto Ricans and Blacks.

As mentioned earlier, means tend to be distorted by the presence of extreme values. This effect is usually marked where income figures are

TABLE 5

1969 Median Family Income in New York City Counties, by Race

Counties	Families[a]			
	Total	White	Black	Puerto Rican
Bronx	$ 8,308	$10,224	$6,859	$5,578
Kings	8,859	10,304	6,772	5,251
New York	8,983	11,936	6,550	5,543
Queens	11,555	11,784	9,850	8,870
Richmond	11,894	12,072	8,269	8,669
Total	$ 9,682	$11,097	$7,150	$5,575

[a]The medians for Total, Black and Puerto Rican family income are taken directly from the Census tables listed above; those for white families were calculated from data from the same tables.

Source: U.S. Department of Commerce, Bureau of the Census, *General Social and Economic Characteristics, New York State,* Report PC(1)-C34, Tables 89, 94, 100, 124, 128 and 133.

concerned. But since this is *generally* true, it is still possible to compare mean incomes among groups. Table 6 presents mean family income by race and by county. One of the things it shows is that mean white family income for New York City as a whole ($13,299) is 64 percent higher than mean Black family income ($8,171) and 110 percent higher than mean Puerto Rican family income ($6,360). There is a good deal of variation among counties within each racial group, but even the *highest* mean family income figures for Blacks and Puerto Ricans (Queens County) are substantially below the *lowest* white mean family income (Bronx County).

TABLE 6

1969 Mean Family Income in New York City Counties, by Race

Counties	Families			
	Total	White[a]	Black	Puerto Rican
Bronx	$ 9,635	$11,515	$7,786	$6,462
Kings	10,181	11,598	7,731	5,915
New York	14,242	18,512	7,479	6,209
Queens	13,003	13,508	10,770	9,551
Richmond	12,934	13,132	9,539	9,086
N.Y.C. Total	$11,639	$13,299	$8,171	$6,360

[a]Figures for white families were derived by subtracting aggregate Black and Puerto Ricah income from aggregate income for all families and dividing the resulting total by the number of white families.

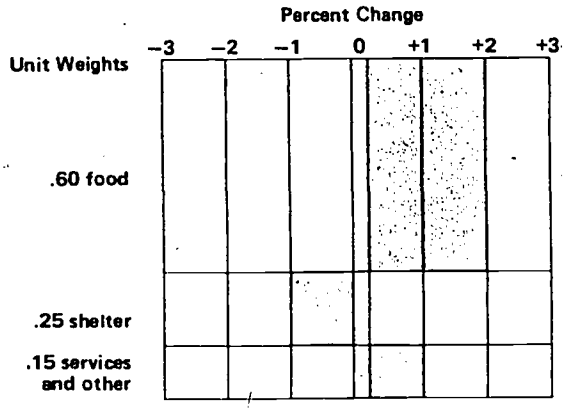
Source: U.S. Department of Commerce, Bureau of the Census, *General Social and Economic Characteristics, New York State,* Report PC(1)-C34, Tables 89, 94, 100, 124, 128 and 133.

We indicated above how large amounts of data can be represented in single figures by the use of measures of central tendency, principally the mean and the median. These statistics are most useful for reducing *uniform* data, but if the object is to reduce several *different* data items (e.g., income, education and occupation) to a single summary figure, then these techniques are not applicable. For the latter purpose, social scientists have developed techniques of index construction:

The Use of Indices in Statistical Tables

The term "index" is a broad one which covers a large number of measures, including ratings, rankings, quotients and scales. They have in common that they summarize multidimensional phenomena. The Cost of Living Index measures changes in the prices of goods and services; the Intelligence Quotient is a measure of varieties of intelligence; there are indices of political orientation, of housing quality, and so on. A simplified diagram of the Cost of Living Index is shown below.* This index measures the change in price of various groups of goods and services. Some items are more important than others in an average family's budget, and therefore their change in price will be given more *weight* in determining the overall index:

Schematic Structure of the Cost-of-Living Index



food has a weight of .60, for example. Thus, if average food prices go up two percent, prices of services (and other) go up one percent and shelter costs go down one percent, the total index would be calculated as follows:

*Hans Zeisel, *Say It With Figures* (5th ed., rev.; New York: Harper and Row, 1968), p. 77.

Item	Weight	X	% Change	=	Weighted % Change
Food	.60	X	+2%	=	+1.20%
Shelter	.25	X	−1%	=	−0.25%
Services	.15	X	+1%	=	+0.15%
			Total		1.10%

The average price changes for different groups of goods and services, weighted by their relative importance, is 1.10%. The Cost of Living Index actually "averages" the change in prices of hundreds of goods and services, but this demonstrates two main features common to many indices: they combine a number of items into a single figure and they reflect the relative importance of various items through a system of weights.

The PC(1)-C report contains three sets of data on poverty level based on indices and presented for families, unrelated individuals, persons and households. An illustrative excerpt is reproduced below. To understand the indices, it is necessary to read the relevant definitions quoted here from the report:*

"*The poverty definition.* The poverty statistics presented in this report are based on a definition originated by the Social Security Administration in 1964 and subsequently modified by a Federal Interagency Committee. The index provides a range of poverty income cutoffs adjusted by such factors as family size, sex of family head, number of children under 18 years old and farm and nonfarm residence. At the core of this definition of poverty is a nutritionally adequate food plan ('economy' plan) designed by the Department of Agriculture for 'emergency or temporary use when funds are low.' The index allows for differences in the cost of living between farm and nonfarm families by setting the poverty thresholds for farm families at 85 percent of the corresponding levels for nonfarm families. The poverty income cutoffs are revised annually to allow for changes in the cost of living as reflected in the Consumer Price Index.

"In 1969, the poverty thresholds ranged from $1,487 for a female unrelated individual 65 years old and over living on a farm to $6,116 for a nonfarm family with a male head and with seven or more persons (Table A). The average poverty threshold for a nonfarm family of four headed by a male was $3,745.

"Poverty thresholds are computed on a national basis only. No attempt has been made to adjust these thresholds for regional, State or other local variations in the cost of living (except for the farm-nonfarm differential described above).

"*Alternate poverty levels.* Because the poverty levels currently in use by the Federal government do not meet all the needs of the analysts of the data, two variations of the poverty definition were created at the same

*Appendix, pp. 29-31.

TABLE A.

Weighted Average Thresholds at the Poverty Level in 1969, by Size of Family and Sex of Head, by Farm and Nonfarm Residence

Size of Family	Total	Nonfarm			Farm		
		Total	Male Head	Female Head	Total	Male Head	Female Head
All unrelated individuals	$1,834	$1,840	$1,923	$1,792	$1,569	$1,607	$1,512
Under 65 years	1,888	1,893	1,974	1,826	1,641	1,678	1,552
65 years and over	1,749	1,757	1,773	1,751	1,498	1,508	1,487
All families	3,388	3,410	3,451	3,082	2,954	2,965	2,757
2 persons	2,364	2,383	2,394	2,320	2,012	2,017	1,931
Head under 65 years	2,441	2,458	2,473	2,373	2,093	2,100	1,984
Head 65 years and over	2,194	2,215	2,217	2,202	1,882	1,883	1,861
3 persons	2,905	2,924	2,937	2,830	2,480	2,485	2,395
4 persons	3,721	3,743	3,745	3,725	3,195	3,197	3,159
5 persons	4,386	4,415	4,418	4,377	3,769	3,770	3,761
6 persons	4,921	4,958	4,962	4,917	4,244	4,245	4,205
7 or more persons	6,034	6,101	6,116	5,952	5,182	5,185	5,129

time that modifications were made in the poverty index: One is set at 75 percent of the official government standard and the other at 125 percent of this standard. Some data based on these two alternate poverty levels are presented in several of the tables in this report.

"Weighted average thresholds at the poverty level. The poverty cutoffs used by the Bureau of the Census to determine the poverty status of families and unrelated individuals consist of a set of 124 thresholds arranged in a four-dimensional matrix consisting of family size (from one person to seven or more persons) cross-classified by presence and number of family members under 18 years old (from no children present to six or more children present), sex of head, and farm and nonfarm residence. The one- and two-person families are further differentiated by age of head (under 65 years and 65 years and over). The total family income of each family in the sample is tested against the appropriate poverty thresholds to determine the poverty status of that family. (If the family's total income is less than its corresponding poverty cutoff, the family is classified as poor. Otherwise, it is classified as nonpoor.) The average thresholds shown in Table A, however, were weighted by the presence and number of children. For example, for a given size of family, sex of head and residence category, the weighted average threshold for that group is obtained by multiplying the dollar amount for each presence and number of children category within the given family size by the number of families in that category. These products are then aggregated across the entire range of presence and number of children categories, and the total aggregate is

divided by the total number of families in the group to yield the weighted average threshold at the poverty level for that size of family.

"Because family composition varies by farm and nonfarm residence, the weighted average thresholds at the poverty level for farm families, as shown in Table A, will not be exactly 85 percent of the nonfarm levels. Moreover, since family composition does not remain constant from year to year, the weighted average thresholds for 1969 will not reflect exactly the increase in the CPI between 1969 and earlier years.

"Since the basic thresholds used to determine the poverty status of families and unrelated individuals are applied to all families and unrelated individuals, the weighted poverty thresholds are derived using all families and unrelated individuals rather than just those families and unrelated individuals classified as poor. Consequently, to obtain the weighted poverty thresholds for families and unrelated individuals below 75 percent and below 125 percent of the poverty level, the weighted poverty thresholds shown in Table A may be multiplied directly by 0.75 and 1.25, respectively.

"The thresholds presented in Table A are based on the March 1970 Current Population Survey. However, it is felt that these thresholds would not differ significantly from those based on the Census."

The key statement in the foregoing is, "The index provides a range of poverty income cutoffs adjusted by such factors as family size, sex of the family head, number of children under 18 years old and farm and nonfarm residence." Thus, when Census data are tabulated for families, total family income is taken into account, as are the various family characteristics which determine whether or not that income is high enough to be above the poverty level (or whether it is above or below the weighted average thresholds at the poverty level).

The poverty index, whether or not one agrees with the cutoff, is a more accurate measure of *relative* poverty than gross income, since it takes family size and other factors into consideration.

Using techniques previously discussed, we extracted the numbers and percentages of families and persons under the poverty level and constructed Tables 7 and 8, presented below. These tables confirm the relationship between poverty and race previously demonstrated, but they have the advantage of being based on a significantly more sensitive measure. One of the key facts here is that nine percent of all white persons were counted below the poverty level, while the corresponding figures for Black and Puerto Rican persons are 24.4 percent and 35.3 percent, respectively (Table 8).

Finally, we note in both the Census definition of poverty status and the original Census data that there are alternative poverty level cutoffs: 75 percent and 125 percent of the poverty level. Table 9 gives the percentages of both families and persons of the three races who are below 75, 100 and 125 percent of the poverty level. These figures are summarized for each race by the city as a whole. Again, it is strikingly clear that using any one

TABLE 7
Number and Percentage of Families in New York City Counties, Under the Poverty Level, by Race

	Families							
	Total		White[a]		Black		Puerto Rican	
Counties	N	%[b]	N	%	N	%	N	%
Bronx	60,462	15.5	16,353	7.4	19,573	22.4	24,536	30.4
Kings	95,135	13.9	36,661	7.9	35,950	23.2	22,524	34.5
New York	47,207	13.1	16,097	7.1	18,187	20.7	12,923	28.2
Queens	30,161	5.5	22,470	4.9	6,827	11.2	864	10.8
Richmond	3,542	4.8	3,068	4.4	415	13.1	59	7.4
Total	236,507	11.5	94,649	6.5	80,952	20.5	60,906	30.4

[a]Figures for white families were derived by subtracting Black and Puerto Rican figures from totals for all families.
[b]Percentages are of total families in each racial group in each county.

Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, New York State*, Report PC(1)-C34, Tables 90, 95, 101, 124, 128 and 133.

TABLE 8
Number and Percentage of Total Persons in New York City Counties Under the Poverty Level, by Race

	Persons							
	Total		White[a]		Black		Puerto Rican	
Counties	N	%[b]	N	%	N	%	N	%
Bronx	282,612	19.5	79,564	10.1	90,800	25.9	112,248	35.7
Kings	453,887	17.6	170,935	10.3	176,022	27.1	106,930	39.5
New York	262,033	17.3	107,934	11.3	94,539	25.3	59,560	32.3
Queens	148,688	7.5	109,191	6.4	35,414	14.0	4,083	12.5
Richmond	17,453	6.1	14,866	5.5	2,246	16.5	341	8.8
Total	1,164,673	14.9	482,490	9.0	399,021	24.3	283,162	35.1

[a]Figures for white persons derived by subtracting Black and Puerto Rican figures from totals for all persons.
[b]Percentages are of total persons in each racial group in each county.

Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, New York State*, Report PC(1)-C34, Tables 90, 95, 101, 124, 128 and 133.

TABLE 9
Percentages of Families and Persons at Three Poverty Levels, by Race

	Families			Persons		
Poverty Levels	White	Black	Puerto Rican	White	Black	Puerto Rican
Under 75% of poverty level	4.3	13.3	18.4	6.3	15.8	20.0
Under 100% of poverty level	6.5	20.5	30.4	9.0	24.3	35.1
Under 125% of poverty level	9.5	27.8	41.7	12.8	32.3	45.2

of the three indices of poverty, the percentages of Blacks and Puerto Ricans living below these levels are much higher than the percentages of whites.

Graphic Presentation

Up to this point in our first case study we have explored different techniques for the *numerical* presentation of statistical data. There are, however, *graphic* techniques which may be employed very effectively to present the same data. Charts are the most commonly used and can be effective in both written reports and in conjunction with oral presentations.

Charts are particularly useful in making comparisons among groups because they make relative magnitudes so apparent. There are various types of charts; the most commonly used are graphs (or curve charts), column charts and bar charts. Graphs are often most useful in presenting time series data or data involving large numbers of categories of one varibale. Column and bar charts are, on the other hand, more useful in presenting data for a small number of time periods or in making comparisons among several groups at a single point in time.

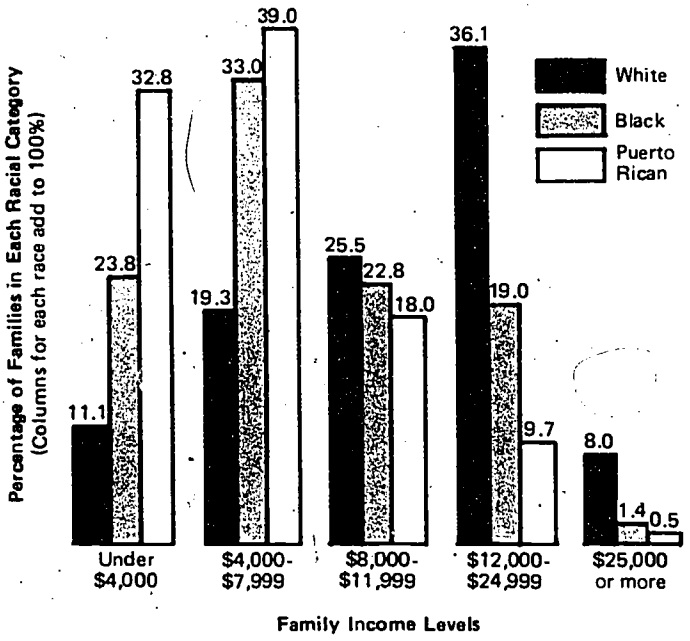
A good chart will contain many of the same items present in a good table: a clear title, explanatory headnotes, footnotes and a source citation.

To illustrate, let us examine a couple of charts constructed to portray the relationship between race and poverty. Chart 1 (based on Table 3 above) shows the percentages of white, Black and Puerto Rican families at different income levels. Each racial group is represented by a column of a certain shade; the height of the column represents the percentage of that group in the particular income category. Comparisons may be made among columns of the same shading across income levels, so that it may be seen, for example, that the percentage of white families in the lowest income category is fairly small and the percentages in the middle-to-high categories are large. One may also compare percentages of the three racial groups that fall within particular income levels; for instance, in the lowest category, the percentage of white families is smallest, that of Black families is much larger and that of Puerto Rican families is *largest*. Finally, comparisons can be made both within income levels and across them, simultaneously, so that the overall pattern is perceived. In this example, it is clear that the lower the income level, the larger the percentage of Black families and the still larger percentage of Puerto Rican families; and conversely.

The second chart, 2 (based on Table 9 above) represents graphically the percentages of persons under each of three poverty levels. This bar chart is helpful in visualizing the relative percentages of persons of each race under 75 percent of the poverty level, under the official level (100 percent) and under 125 percent of the official level.

CHART 1.

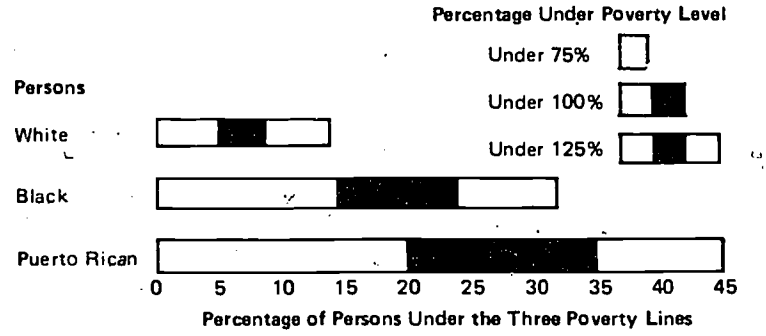
Percentage of Families by Race in Grouped Income Levels in 1969 in New York City



Source: Derived from U.S. Bureau of the Census, *General Social and Economic Characteristics, New York State*, Report PC(1)-C34, Tables 89, 94 and 100.

CHART 2.

Percentages of Persons by Race Under Different Poverty Lines for New York City: 1970



Source: U.S. Bureau of the Census, *General Social and Economic Characteristics, New York State*, Report PC(1)-C34, Tables 90, 95, 101, 124, 128 and 133.

Chapter 4.
Exercises in Extracting Information From Statistical Tables

The simplest and probably the most frequent use of Census Bureau statistics is to provide a few summary figures for a paper, report or speech. The next few pages provide an example of a simple analytic text, and the tables on which it is based. The exercises that follow the example describe hypothetical situations, provide statistics relating to each situation, and ask the student to write a few paragraphs on the basis of these statistics. Exercises 1 through 4 specify the information to be obtained from the statistics. Exercises 5 through 7 provide only descriptions of situations and the statistics themselves; the student must determine what information in the tables and charts is relevant to his or her needs.

In doing the exercises which follow students should remember several points:

1. Close attention is required to pick up the right figure from a table. When using a very large table it is useful to put a pencil mark by every figure that will be needed before beginning the calculations, and a second pencil mark beside the figure when it is used.

2. Always give the source of any data. If a table is constructed, the source of the figures should be given below the table. If the data are put into text, use a phrase such as "according to the U.S. Census Bureau," and then show the additional detail about the source in a footnote.

A student using figures he or she derived (e.g., percentages not shown in the original table), should be sure to indicate this fact by a phrase such as "Calculating the percent increase between 1970 and 1973 from Census Bureau data shows that . . ." with the additional information about the specific source shown in a footnote.

3. A small table inserted in text does not require a title if the preceding sentence explains what the table is to show. If the table is so large that it must be shown on a separate page, a title is required.

4. If a table is supposed to add to totals, check to be certain that it does. (Remember in this connection that percentages are rounded, so they may not add to exactly 100 percent. In fact, the larger the number of rounded figures to be summed, the larger the possible variation from a known total.)

5. The percent difference between two figures depends on whether it is shown as a percent of the larger or the smaller figure. For example, 2,000 is 100 percent more than 1,000 but 1,000 is 50 percent less than 2,000.

6. Unrounded figures should be rounded when used in computations and comparisons with other rounded figures. For example, in Exercise 4, the figures shown for each year of age in 1960 and in 1970 are given in full whereas those for 1974 are shown in 1,000's. Before starting to compute the changes between years, all the unrounded figures should be rounded to 1,000—i.e., figures between 500 and 1,499 are rounded to 1,000, those between 1,500 and 2,499 are rounded to 2,000 etc., so the figure for 8 year olds in 1960, 3,621,283 becomes 3,621 thousand (3,621,000) and the figure for 9 year olds in 1960, 3,475,779, becomes 3,476 thousand (3,476,000).

Example of Simple Analytic Text and Tables (Reproduced from *1970 Census of Population and Housing*, PHC(2)-4, *General Demographic Trends for Metropolitan Areas: Arizona*)

Standard Metropolitan Statistical Areas

At the time of both censuses slightly more than one-half of Arizona's total population lived in the Phoenix SMSA. During the decade Phoenix grew more rapidly than any other metropolitan or nonmetropolitan area in the State, increasing by 304,000 persons, or by 46 percent. In 1970, the population of the SMSA was 968,000. The Tucson SMSA, with a population one-third as large as that of Pheonix, also grew very rapidly during the decade, from 266,000 to 352,000, or by 32 percent. The growth of both SMSA's was based to a larger extent on net inmigration than on natural increase (see table 3).

The fastest growing areas within the two SMSA's were the suburban rings, which had growth rates more than twice as high as the central cities. Nonetheless, there were very large increases in the populations of both central cities over the decade, amounting to 142,000 in Phoenix and 50,000 in Tucson. Between 1960 and 1970 each of these cities annexed suburban territory containing substantial populations (table B). More than 50 percent of the growth of Phoenix city and Tucson city alike was produced by population gained as a result of such annexations. As presently constituted, the major portion of the population of each SMSA resides in the central city: in 1970, 60 percent of the Phoenix's population and 75 percent of Tucson's population was found in the central city.

The age composition of the populetions of both Phoenix and Tucson were altered over the decade in the same ways as in the State as a whole: increases in the population 15 to 24 years old and 45 years old and over outweigh all other age changes. In Tucson city, the young adult population and the elderly population 65 and over grew at almost identical rates (by more than 60 percent), but the numerical increase of the 15 to 24 year old population was twice as great. In the city of Phoenix, young adults increased by 77 percent, and the period was supplemented by a net inmigration of 226,000 persons. Within the State only the metropolitan areas gained population as a result of inmigration. Nonmetropolitan areas show a small net outmigration equivalent to 2 percent of their 1960 population.

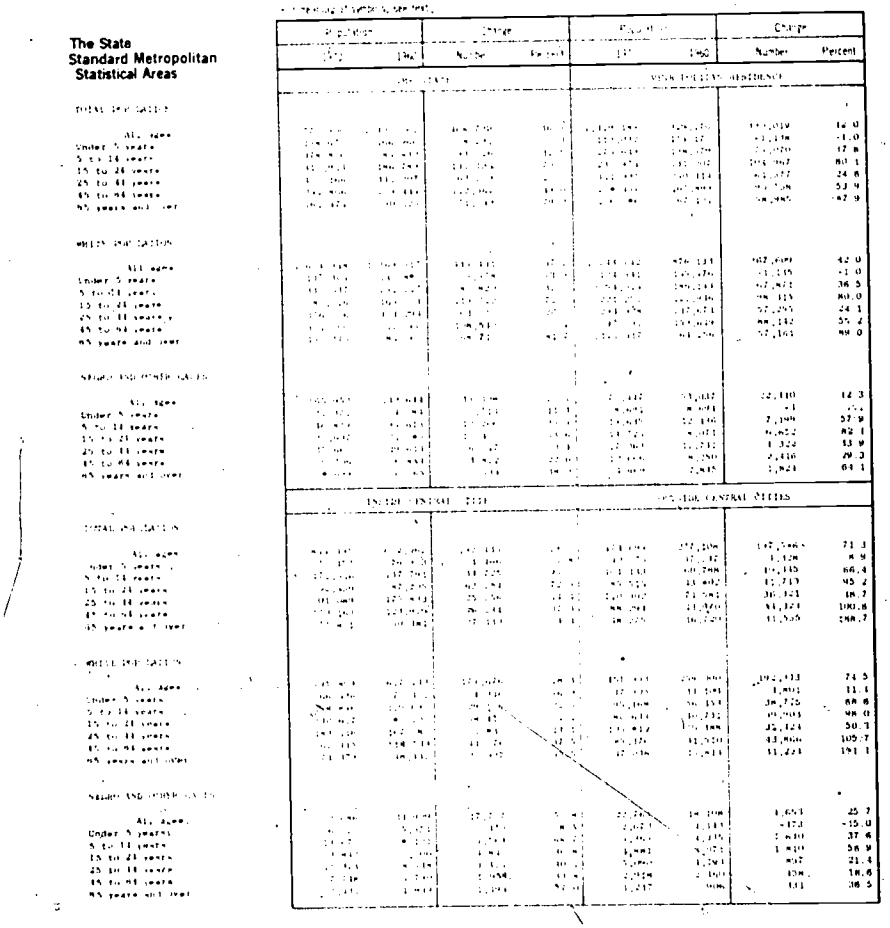
Arizona's migratory gain was wholly white. Other races show a net outmigration of 22,000 persons, equivalent to more than 16 percent of their 1960 population.

Throughout Arizona there were large increases in the populations of two broad age groups: 15 to 24 years old and 45 years of age and over (see table 4). The fastest growing age group in metropolitan and nonmetropolitan areas alike was the elderly population, 65 years of age and over. In the State as a whole, this age group increased by 71,000 persons, or by 79 percent over the decade. In the metropolitan areas, the rate of growth for this group was slightly higher, 88 percent. The bulk of the increase in the State's elderly population was due to net inmigration, perhaps as much as 50,000 of the 71,000 increase. Young adults 15 to 24 years of age grew at slightly lower rates, but their numerical increases were much greater than those of the elderly population. The growth of the 45 to 64 year old population was also substantial in all parts of Arizona, particularly in the suburban rings of the two SMSA's. The number of young children under 5 years of age was diminished in both metropolitan and nonmetropolitan areas during the decade, to only a minor extent in the metropolitan areas, but by more than 13 percent in the nonmetropolitan areas. Schoolchildren and adults 25 to 44 years of age show moderate increases for the period.

Changes in the age composition of the population are the product in part of changing birth rates and in part, are due to migration which is highly selective by age. Low birth rates during the 1960's contribute to the diminution of the population under 5 years of age, whereas the post-World War II "baby boom" is currently reflected in the large size of the population 15 to 24 years old.

Example of Simple Analytic Text and Tables (Reproduced from *1970 Census of Population and Housing*, PHC(2)-4, *General Demographic Trends for Metropolitan Areas: Arizona*)—Continued

Table 4. Population Inside and Outside Central Cities by Race and Age: 1970 and 1960



Example of Simple Analytic Text and Tables (Reproduced from *1970 Census of Population and Housing*, PHC(2)-4. *General Demographic Trends for Metropolitan Areas: Arizona)*—Continued

Table 4. **Population Inside and Outside Central Cities by Race and Age: 1970 and 1960**—Con.

[For meaning of symbols, see text]

The State Standard Metropolitan Statistical Areas	Population		Change		Population		Change	
	1970	1960	Number	Percent	1970	1960	Number	Percent
	TUCSON SMSA				INSIDE CENTRAL CITY			
TOTAL POPULATION								
All ages	351,667	265,660	86,007	32.4	262,933	212,892	50,041	23.5
Under 5 years	28,540	32,012	-3,452	-10.8	21,603	25,626	-4,023	-15.8
5 to 14 years	70,835	55,258	15,577	28.2	52,085	43,781	8,304	19.0
15 to 24 years	66,379	39,678	26,701	67.5	51,552	31,370	20,182	64.3
25 to 44 years	80,017	69,680	10,337	14.8	58,148	55,685	3,481	6.2
45 to 64 years	70,124	49,388	20,738	42.0	51,465	39,897	11,568	29.0
65 years and over	33,752	19,644	14,108	82.0	27,282	16,733	10,549	63.0
WHITE POPULATION								
All ages	329,278	249,053	80,225	32.2	249,299	203,614	45,685	22.4
Under 5 years	26,142	29,540	-3,398	-11.5	19,999	24,074	-4,075	-16.9
5 to 14 years	65,162	51,422	13,740	26.8	48,700	41,736	6,964	16.7
15 to 24 years	61,950	37,070	24,880	67.1	48,923	30,037	18,886	62.8
25 to 44 years	74,926	65,620	9,306	14.2	55,828	53,297	2,531	4.8
45 to 64 years	68,854	48,676	20,178	43.2	49,463	38,264	11,199	29.3
65 years and over	34,224	18,725	15,499	82.4	26,286	16,206	10,080	62.2
NEGRO AND OTHER RACES								
All ages	22,389	16,607	5,782	34.8	13,634	9,278	4,356	46.9
Under 5 years	2,418	2,472	-54	-2.2	1,404	1,352	52	3.8
5 to 14 years	5,853	3,836	1,817	47.4	3,385	2,045	1,340	65.5
15 to 24 years	4,429	2,608	1,821	69.8	2,629	1,333	1,296	97.2
25 to 44 years	5,091	4,060	1,031	25.4	3,218	2,388	830	34.8
45 to 64 years	3,270	2,710	560	20.7	2,002	1,833	389	22.8
65 years and over	1,528	921	607	65.9	996	527	469	89.0
	Population			Change				
	1970		1960	Number			Percent	
	OUTSIDE CENTRAL CITY							
TOTAL POPULATION								
All ages	88,734		52,768	35,966			68.2	
Under 5 years	7,157		6,586	571			8.7	
5 to 14 years	18,750		11,477	7,273			63.4	
15 to 24 years	14,827		8,308	6,519			78.5	
25 to 44 years	20,471		13,895	6,576			48.1	
45 to 64 years	18,459		9,489	8,970			96.8	
65 years and over	8,470		2,913	5,557			190.8	
WHITE POPULATION								
All ages	79,979		45,439	34,540			76.0	
Under 5 years	6,143		5,466	677			12.4	
5 to 14 years	16,462		9,686	6,796			70.2	
15 to 24 years	13,027		7,033	5,994			85.2	
25 to 44 years	18,998		12,323	6,675			54.2	
45 to 64 years	17,391		8,412	8,979			106.7	
65 years and over	7,938		2,519	5,419			215.1	
NEGRO AND OTHER RACES								
All ages	8,755		7,329	1,426			19.5	
Under 5 years	1,014		1,120	-106			-9.5	
5 to 14 years	2,268		1,791	477			26.6	
15 to 24 years	1,800		1,275	525			41.2	
25 to 44 years	1,473		1,672	201			12.0	
45 to 64 years	1,268		1,077	191			17.7	
65 years and over	532		394	138			35.0	

Exercise 1, National Elections

From the table, "Vote Cast for President, 1900 to 1972, and for Representatives, 1932 to 1972, by Political Parties" (see page 54), reprinted from the section on elections in the *Statistical Abstract of the United States, 1974*, write one or two paragraphs that answer the following questions:

a. Which Presidents since 1900 received--
   (1) The highest percentage of the popular vote
   (2) The next highest

b. Which presidential candidates since 1900 received--
   (1) The lowest percentage of the popular vote
   (2) The next lowest

c. In which years since 1900 did the Republican and Democratic presidential candidates together receive--
   (1) The highest percentage of the popular vote
   (2) The next highest
   (3) The lowest
   (4) The next lowest

   Note: Add the numbers of votes cast for the two candidates and divide the sum by the total popular vote, for each presidential election year. (Adding the percentages shown in the table for the two candidates would provide a slightly different total.) In some cases it will be necessary to carry the calculations to the third digit past the decimal point to obtain the correct answer.

d. In how many elections between 1932 and 1972 did Democratic candidates for the House of Representatives receive a larger percentage of the total vote than Republican candidates?

e. In what years did the Republican candidates receive more of the total vote than the Democratic candidates?

Exercise 2, Black-Owned Businesses

Situation. An association to which you belong is preparing a report on the socio-economic situation of Blacks in the Nation. The president of the association has asked you to contribute a few paragraphs on black-owned businesses, and has given you a Census Bureau report, *Minority Owned Businesses--Black*.

In this report is a chart showing the *receipts* of black-owned firms by industry (Figure 1, reproduced on p. 56). To obtain data on the *numbers* of black-owned firms by industry, you construct a summary table (see p. 57) of data selected from Table 1 in the publication.

No. 680. Vote Cast for President, 1900 to 1972, and for Representatives, 1932 to 1972, by Political Parties

[Prior to 1958, excludes Alaska and Hawaii. Vote cast for major party candidates includes the votes of minor parties cast for those same candidates. See also *Historical Statistics, Colonial Times to 1967*, series Y 27–31 and Y 146–149]

Year	Candidates for President		Vote cast for President						
	Democratic	Republican	Total popular vote [1]	Democratic			Republican		
				Popular vote		Electoral vote	Popular vote		Electoral vote
				Number	Percent		Number	Percent	
			1,000	*1,000*			*1,000*		
1900	Bryan	McKinley	13,968	6,357	45.5	155	7,218	51.7	292
1904	Parker	T. Roosevelt	13,521	5,084	37.6	140	7,628	56.4	336
1908	Bryan	Taft	14,884	6,412	43.1	162	7,675	51.6	321
1912	Wilson	Taft	15,037	6,297	41.9	435	3,487	23.2	8
1916	Wilson	Hughes	18,531	9,128	49.3	277	8,534	46.1	254
1920	Cox	Harding	26,748	9,130	34.1	127	16,143	60.4	404
1924	Davis	Coolidge	29,086	8,385	28.8	136	15,718	54.0	382
1928	Smith	Hoover	36,812	15,016	40.8	87	21,392	58.1	444
1932	F. D. Roosevelt	Hoover	39,732	22,810	57.4	472	15,759	39.7	59
1936	F. D. Roosevelt	Landon	45,643	27,753	60.8	523	16,675	36.5	8
1940	F. D. Roosevelt	Willkie	49,900	27,313	54.7	449	22,348	44.8	82
1944	F. D. Roosevelt	Dewey	47,977	25,613	53.4	432	22,018	45.9	99
1948	Truman	Dewey	48,794	24,179	49.6	303	21,991	45.1	189
1952	Stevenson	Eisenhower	61,551	27,315	44.4	89	33,936	55.1	442
1956	Stevenson	Eisenhower	62,027	26,023	42.0	73	35,590	57.4	457
1960	Kennedy	Nixon	68,838	34,227	49.7	303	34,108	49.5	219
1964 [2]	Johnson	Goldwater	70,645	43,130	61.1	486	27,178	38.5	52
1968 [2]	Humphrey	Nixon	73,212	31,275	42.7	191	31,785	43.4	301
1972 [2]	McGovern	Nixon	77,719	29,170	37.5	17	47,170	60.7	520

Year	Vote cast for President—Con.				Year	Vote cast for Representatives [3]				
	Socialist and Soc. Labor	Misc. independent [3]	Prohibition	Communist		Total [4]	Democratic		Republican	
							Number	Percent	Number	Percent
	1,000	*1,000*	*1,000*	*1,000*		*1,000*	*1,000*		*1,000*	
1900	128	56	209	–	1932	37,657	20,540	54.5	15,575	41.4
1904	434	117	259	–	1934	32,256	17,385	53.9	13,558	42.0
1908	435	108	254	–	1936	42,866	23,044	55.8	17,003	39.6
1912	929	4,119	206	–	1938	36,236	17,612	48.6	17,047	47.0
					1940	46,951	24,092	51.3	21,393	45.6
1916	599	49	221	–						
1920	952	334	189	–	1942	28,074	12,934	46.1	14,203	50.6
1924	[4] 36	[5] 4,853	58	[4] 36	1944	45,103	22,808	50.6	21,303	47.2
1928	289	74	20	[4] 21	1946	34,398	15,221	44.2	18,400	53.5
					1948	45,933	23,820	51.9	20,920	45.5
1932	915	63	82	103	1950	40,342	19,785	49.0	19,750	49.0
1936	200	897	38	80						
1940	131	3	59	46	1952	57,571	28,605	49.7	28,431	49.4
1944	124	147	75	–	1954	42,580	22,347	52.5	20,034	47.0
					1956	58,426	29,850	51.1	28,449	48.7
1948	169	2,351	104	–	1958 [10]	45,818	25,733	56.2	19,894	43.4
1952	50	176	73	–	1960	64,133	33,111	54.7	28,759	44.8
1956	46	325	42	–						
1960	[4] 48	410	46	–	1962	51,261	26,905	52.5	24,210	47.2
					1964	65,886	37,700	57.2	27,866	42.3
1964 [2]	[4] 45	268	23	–	1966	52,900	26,917	50.9	25,525	48.3
1968 [2]	[6] 53	[7] 10,092	15	1	1968	66,109	33,045	50.0	31,850	48.2
1972 [2]	120	1,219	14	26	1970	54,173	28,923	53.4	24,415	45.1
					1972	71,188	36,780	51.7	33,064	46.4

– Represents zero. [1] Includes votes for minor party candidates, independents, unpledged electors, and scattered write-in votes. [2] Includes District of Columbia.
[3] Mainly Progressive in 1912 and 1924, States Rights and Progressive in 1948, and American Independent in 1968 and 1972. [4] Socialist Labor only.
[5] Includes 4,831,000 votes cast for La Follette, candidate for the Progressive Party.
[6] Workers Party. [7] Includes 9,906,000 votes cast for George Wallace, American Independent Party.
[8] See also table 689. [9] Includes minor party votes. [10] Includes Hawaii figure for July 1959.

Source: 1900–1936, Edgar Eugene Robinson, *The Presidential Vote* and *They Voted for Roosevelt*, Stanford University Press, Stanford, 1934 and 1947, respectively. Later data, Elections Research Center, Washington, D.C., *America at the Polls* (copyright); U.S. Congress, Clerk of the House, *Statistics of the Presidential and Congressional Election* and *Statistics of the Congressional Election*.

Assignment. Write a few paragraphs on black-owned businesses.

On the basis of information in the chart (p. 57), include at least the following information on black-owned businesses:

a. For all black-owned firms—

(1) Receipts in 1969
(2) Receipts in 1972
(3) Percent increase in receipts from 1969 to 1972
(4) Number of firms in 1969
(5) Number of firms in 1972
(6) Percent increase in number of firms from 1969 to 1972
(7) Number of paid employees in 1967
(8) Number of paid employees in 1972
(9) Percent increase in number of paid employees from 1967 to 1972
(10) Percent of firms that had paid employees in 1972

b. For the industry group that had the largest receipts in 1972 give—

(1) Name of industry group
(2) Items (1) through (10) under item a, above, for this industry group

c. For the industry group that had the largest increase in receipts between 1969 and 1972, give—

(1) Items (1) through (10) under item a, above, for this industry group

d. For the industry group that had the largest number of firms in 1972, give—

(1) Name of industry
(2) Items (1) through (10) under item a, above, for this industry group

Questions

2-1. Do the figures you have obtained or calculated from the table on p. 57 confirm the impression of progress given by the chart on percent increase in receipts (some part of which is due to inflation) on p. 56?

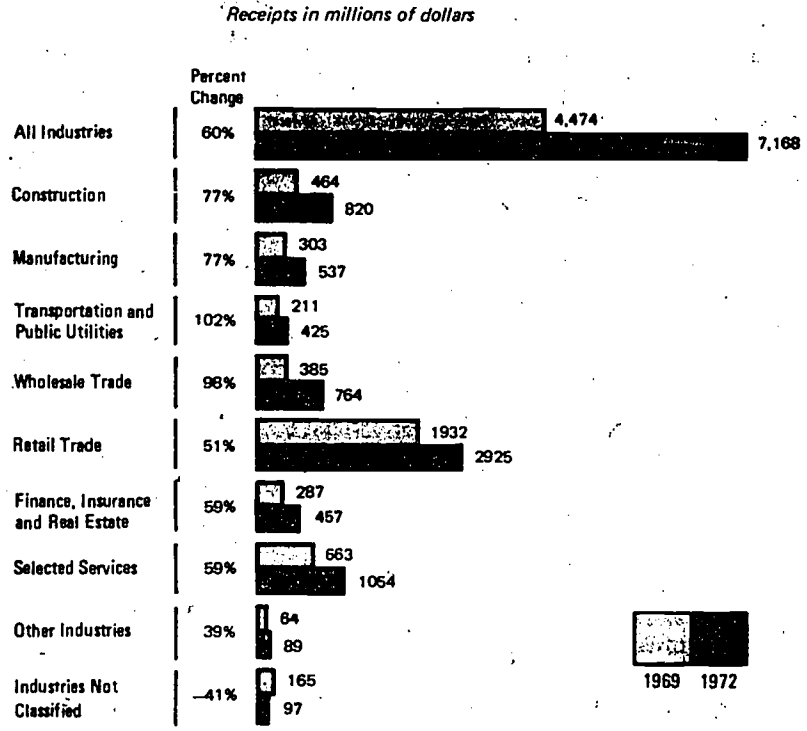
2-2. Are there any aspects of the situation that you consider discouraging, and if so which?

2-3. In your opinion, would the general socio-economic status of blacks in the future be most improved by large increases in black-owned (a) firms with paid employees, (b) one-person and family enterprises, or (c) firms in specific industry groups; *and,* is your opinion based entirely or in part on the statistics in this exercise (and if so, which), and/or on related statistics from other sources (e.g., on black unemployment), or on unquantified factors such as social status?

Note. The introduction to the report, *Minority-Owned Businesses—Black,* warns that "Caution should be exercised in comparing data presented in this report with published or unpublished data from other 1972 Economic Censuses." It goes on to explain that noncomparability

can result from differences (1) in the industries covered in the Survey of Minority-Owned Businesses and in the other Economic Censuses, (2) in the units tabulated (firms, in the Survey; each establishment owned by a firm, in the Censuses), and (3) in the receipts size (all firms, whether or not they had gross receipts, in the Survey; only those with more than specified minimum receipts, in most of the Censuses).

Figure 1. Receipts of Black-Owned Firms by Industry: 1969 and 1972



Reproduced from: U.S. Bureau of the Census. *1972 Survey of Minority-Owned Business Enterprises. Special Report: Minority-Owned Businesses—Black,* MB72-1.

Selected Statistics by Industry for Black-Owned Firms: 1972 and 1969

Industry	1972				1969			
	All Firms	With Paid Employees		Without Paid Employees	All Firms	With Paid Employees		Without Paid Employees
	Firms (number)	Firms (number)	Employees (number)	Firms (number)	Firms (number)	Firms (number)	Employees (number)	Firms (number)
All Industries	194,986	31,893	196,596	163,093	163,072	38,303	151,996	124,769
Construction	20,151	4,436	29,741	15,714	16,235	3,886	17,900	12,349
Manufacturing	4,116	1,706	20,390	2,410	2,980	1,565	12,306	1,415
Transportation and Public Utilities	21,738	1,680	10,714	20,058	16,733	2,141	7,520	14,592
Wholesale Trade	2,091	926	7,691	1,165	1,660	742	5,601	918
Retail Trade	56,617	12,215	58,326	44,402	45,220	17,208	55,159	28,012
Finance, Insurance, and Real Estate	8,001	1,130	17,771	6,871	7,612	1,390	8,952	6,222
Selected Services	68,469	9,192	49,102	59,277	56,077	8,728	38,183	47,349
Other Industries	4,283	428	2,282	3,855	3,407	663	2,127	2,744

Source of data: U.S. Bureau of the Census, *1972 Survey of Minority-Owned Business Enterprises. Special Report: Minority Owned Businesses –Black, MB72-1.*

Exercise 3, Government Employees and Payrolls

Situation. You are Chief of the Fire Department of Central City, Southwest State. You are writing to the Mayor urging an 8 percent pay increase for the firemen. Your main obstacle appears to be a recent statement by a local newspaper, which is crusading to reduce city government spending, that both the number of employees and the payroll of the Fire Department have more than doubled since you were appointed Fire Chief in 1965. The statement is not true, but too nearly so. Between 1965 and 1973, the number of employees increased 67.3 percent and the payroll increased 127 percent. You hope to put these increases into perspective with the use of official nation-wide statistics.

Assignment. Using data found in tables 424 and 425 in the *Statistical Abstract of the United States, 1974* (see p. 59), write two or three paragraphs that include at least the following:

a. A table showing the percent increase between 1965 and 1973 in (1) total number of full-time employees (or equivalent) and (2) total payrolls, of (a) Central City, (b) all municipalities in the United States, and (c) all other local governments (i.e., counties, school districts, and "other in Table No. 424).

b. Comments on this table.

c. A comparison of the percents of total payrolls of all local governments spent for (1) fire protection, (2) police protection, and (3) sanitation and sewerage in 1973 with the corresponding figures for your city—5 percent, 10 percent, and 2.5 percent respectively.

d. Comments on these figures.

Questions

3-1. Do these comparisons support or negate your contention that the firemen of Central City should be increased, or do they neither support nor negate it?

3-2. Should you abandon your effort to get a pay increase for the firemen at this time, or should you look for other data?

Exercise 4, School-Age Population

Situation. A State Teachers College has had a steadily increasing enrollment for a number of years and is now badly overcrowded. The Dean has been urging the State legislature to provide funds for an expansion of the College facilities. One of the legislators asserts that there are too many people graduating from Teachers Colleges now, because the school-age population in the United States has decreased in the last few

No. 424. Governmental Employment and Payrolls: 1950 to 1973

[For October. 1950 excludes Alaska and Hawaii. See also *Historical Statistics, Colonial Times to 1957*, series Y 205-240]

Year and function	Employees (1,000)					Payroll (mil. dol.)				
	Total	Federal (civilian) [1]	State and local			Total	Federal (civilian) [1]	State and local		
			Total	State	Local			Total	State	Local
1950	6,402	2,117	4,285	1,057	3,228	1,528	613	915	218	696
1960	8,808	2,421	6,387	1,527	4,860	3,333	1,118	2,215	524	1,691
1965	10,589	2,588	8,001	2,028	5,973	4,884	1,484	3,400	649	2,751
1967	11,867	2,993	8,874	2,335	6,539	6,056	1,842	4,213	1,106	3,108
1970	13,028	2,881	10,147	2,755	7,392	8,334	2,428	5,906	1,612	4,294
1971	13,316	2,872	10,444	2,832	7,612	8,911	2,529	6,382	1,742	4,641
1972	13,604	2,795	10,809	2,937	7,872	9,723	2,710	7,013	1,931	5,082
Total, 1973	**14,139**	**2,786**	**11,353**	**3,013**	**8,339**	**11,015**	**3,012**	**8,003**	**2,146**	**5,857**
National defense and international relations	1,053	1,053	(X)	(X)	(X)	1,117	1,117	(X)	(X)	(X)
Postal service	692	692	(X)	(X)	(X)	720	720	(X)	(X)	(X)
Education	5,922	21	5,901	1,280	4,621	4,193	20	4,173	810	3,363
Teachers	3,214	(X)	3,214	391	2,823	2,993	(X)	2,993	391	2,602
Highways	604	5	599	287	312	439	7	432	232	200
Health and hospitals	1,375	221	1,154	553	601	978	220	758	391	367
Police protection	616	35	581	66	515	527	48	480	63	416
Fire protection	299	(X)	299	(X)	299	210	(X)	210	(X)	210
Sanitation and sewerage	306	(X)	306	(X)	306	149	(X)	149	(X)	149
Parks and recreation	191	(X)	191	(X)	191	95	(X)	95	(X)	95
Natural resources	413	225	188	158	30	370	241	129	112	17
Financial administration	381	112	269	103	167	308	132	176	79	97
All other	2,387	422	1,965	567	1,398	1,909	507	1,402	459	943

X Not applicable. [1] Includes Federal civilian employees outside United States.

Source: U.S. Bureau of the Census, *Public Employment*, annual.

No. 425. State and Local Government Employment and Payrolls: 1955 to 1973

[For October. 1955 excludes Alaska and Hawaii. For payrolls, see also *Historical Statistics, Colonial Times to 1957*, series Y 223-240]

Item	State and local			State	Local [1]				
	Total	Education	Other		Total	Counties	Municipalities	School districts	Other [2]
EMPLOYEES (1,000)									
All employees, 1973	11,353	5,901	5,451	3,013	8,339	1,451	2,471	3,694	724
Full-time	8,838	4,213	4,624	2,367	6,471	1,243	1,964	2,750	484
Part-time	2,515	1,688	827	647	1,868	208	477	944	240
Full-time equivalent:									
1955	4,487	1,935	2,552	1,081	3,406	604	1,252	1,341	209
1960	5,570	2,525	3,045	1,353	4,217	725	1,447	1,729	302
1965	6,937	3,337	3,600	1,751	5,186	893	1,638	2,257	368
1967	7,455	3,658	3,797	1,946	5,509	973	1,715	2,449	371
1970	8,528	4,258	4,271	2,302	6,226	1,088	1,922	2,796	420
1971	8,806	4,403	4,403	2,384	6,422	1,153	1,990	2,895	444
1972	9,179	4,590	4,588	2,470	6,708	1,218	2,011	2,999	477
1973	9,578	4,751	4,827	2,547	7,031	1,318	2,109	3,074	530
MONTHLY PAYROLL (mil. dol.)									
1955	1,419	662	757	326	1,093	162	414	453	64
1960	2,215	1,095	1,120	524	1,691	249	583	735	118
1965	3,400	1,778	1,623	849	2,551	377	818	1,189	167
1967	4,213	2,244	1,969	1,106	3,108	465	972	1,475	196
1970	5,906	3,170	2,737	1,612	4,294	640	1,361	2,032	262
1971	6,382	3,382	3,000	1,742	4,641	722	1,482	2,146	290
1972	7,013	3,686	3,327	1,931	5,082	807	1,619	2,327	328
1973	8,003	4,173	3,830	2,146	5,857	952	1,855	2,622	427

[1] Except for 1967, subject to sampling variation. [2] Townships and special districts.

Source: U.S. Bureau of the Census, *Public Employment*, annual.

years and will decrease more in the next few years. You have obtained the data shown on page 61 in order to write a report which you hope will rebut the legislator's argument.

Assignment. Write a few paragraphs that include at least the following:

a. The increase or decrease in the population aged 6 to 18 from 1960 to 1974

b. The average annual percent increase or decrease (*not* the average annual *rate* of increase) of the population aged 6-18–

   (1) From 1960 to 1970
   (2) From 1970 to 1974

c. The percent of the total population that the age group 6-18 constituted in–

   (1) 1960
   (2) 1970
   (3) 1974

d. The approximate increase or decrease between 1974 and 1980 in the following age groups assuming that almost all members of the 1974 age groups will survive to 1980 and that neither immigration nor emigration will be a significant factor. (For example, the comparison of those aged 7-11 in 1974 with those aged 1-5 in 1974–who will be aged 7-11 in 1980–supplies the approximate increase or decrease in age group 7-11 between 1974 and 1980.)

   (1) Age group 7-11
   (2) Age group 14-17
   (3) Age group 18-21

Questions

4-1. Do your figures confirm the legislator's statement?
4-2. Should the State Teachers College be expanded?

Population of the United States by Single Years of Age to Age 25: 1960, 1970, and 1974

1960[a]		1970[b]		1974[c]	
All ages	179,325,657	All ages	203,211,926	All ages	211,909,000
Under 1 year	4,126,560	Under 1 year	3,495,277	Under 5 years	34,304,000
1 year	4,120,654	1 year	3,377,502	Under 1 year	3,006,000
2 years	4,091,155	2 years	3,290,419	2 years	3,212,000
3 years	4,006,415	3 years	3,418,679	3 years	3,522,000
4 years	3,977,080	4 years	3,582,460	4 years	3,501,000
5 years	3,955,378	5 years	3,811,077	5 to 9 years	17,592,000
6 years	3,836,848	6 years	3,952,146	5 years	3,409,000
7 years	3,769,853	7 years	4,012,474	6 years	3,385,000
8 years	3,621,283	8 years	4,052,265	7 years	3,478,000
9 years	3,475,779	9 years	4,128,285	8 years	3,533,000
10 years	3,486,601	10 years	4,282,106	9 years	3,788,000
11 years	3,483,316	11 years	4,126,685	10 to 14 years	20,719,000
12 years	3,583,685	12 years	4,183,341	10 years	4,114,000
13 years	3,514,503	13 years	4,101,977	11 years	4,035,000
14 years	2,747,860	14 years	4,095,359	12 years	4,128,000
15 years	2,802,230	15 years	4,029,034	13 years	4,215,000
16 years	2,838,751	16 years	3,889,652	14 years	4,229,000
17 years	2,871,916	17 years	3,825,343	15 to 19 years	20,324,000
18 years	2,498,600	18 years	3,766,102	15 years	4,236,000
19 years	2,275,937	19 years	3,560,217	16 years	4,204,000
20 years	2,190,081	20 years	3,490,530	17 years	4,209,000
21 years	2,203,165	21 years	3,328,236	18 years	4,093,000
22 years	2,158,805	22 years	3,441,099	19 years	4,082,000
23 years	2,106,815	23 years	3,423,546	20 to 24 years	19,733,000
24 years	2,144,299	24 years	2,687,608	20 years	4,075,000
25 years	2,166,315	25 years	2,760,539	21 years	3,858,000
				22 years	3,702,000
				23 years	3,559,000
				24 years	3,539,000
				25 to 29 years	16,233,000
				25 years	3,500,000

[a]Source of data: U.S. Bureau of the Census. *1960 Census of Population*, Vol. 1, *Characteristics of the Population*, Part 1, *United States Summary*.

[b]Source of data: U.S. Bureau of the Census. *1970 Census of Population*, Vol. 1, *Characteristics of the Population*. Part 1, *United States Summary*, Section 1.

[c]Source of data: U.S. Bureau of the Census. "Estimates of the Population of the United States, By Age, Sex, and Race: April 1, 1960 to July 1, 1973," *Current Population Reports: Population Estimates and Projections*, Series P-25, No. 519, April 1974.

Exercise 5, Crime Rates

Situation. You live in a city which in 1972 had about 40,000 inhabitants (i.e., 40 percent of the 100,000 population base for the rates shown in the table on page 61). This city is a suburb of, and adjacent to, an Eastern city of more than 1,000,000 population. The Chief of Police of your city reported that in 1972 there were 220 violent crimes and 1,100 crimes against property in the city. The latter include 250 auto thefts.

Assignment. Using the statistics in Table 246 (reproduced below) of the Census Bureau's *Statistical Abstract of the United States*, write one or two paragraphs comparing the crime rates of your city with those of other cities of about the same population and with those of some large Eastern cities. Are the crime rates in your city, separately and together, better or worse than you would expect on the basis of statistics of other cities, or are they about what you would anticipate?

No. 246. Crime Rates, by Type—Population Groups and Selected Cities: 1972

[Offenses known to the police per 100,000 population. For definitions of crimes, see footnotes, table 243. Population in 1972 as estimated by FBI]

Item	Total[1]	Violent crime					Property crime			
		Total	Murder	Forcible rape	Robbery	Aggravated assault	Total	Burglary—breaking or entering	Larceny—theft[2] (except auto theft)	Auto theft
Population group										
Total, 7,085 agencies	4,202	429	9.2	24	202	194	3,769	1,203	2,103	463
Total, 5,085 cities	5,077	538	10.7	27	272	229	4,535	1,390	2,551	594
58 cities, 250,000 or more	6,502	999	19.7	47	579	353	5,498	1,878	2,653	967
96 cities, 100,000–249,999	5,966	502	10.7	27	219	246	5,449	1,708	3,054	687
284 cities, 50,000–99,999	4,779	323	6.2	19	132	165	4,453	1,253	2,720	480
481 cities, 25,000–49,999	4,197	267	5.1	15	102	145	3,927	1,066	2,472	389
1,224 cities, 10,000–24,999	3,588	200	4.1	12	65	129	3,386	894	2,249	244
2,972 cities, less than 10,000	3,201	204	3.8	12	45	133	2,995	789	2,003	203
Suburbs, 2,107 agencies[3]	3,293	222	4.6	17	72	128	3,068	963	1,817	288
Rural areas, 1,610 agencies	1,431	128	6.2	11	16	95	1,298	558	667	73
Selected cities										
New York, N.Y.	5,505	1,525	21.4	42	991	471	3,980	1,876	1,142	962
Chicago, Ill.	5,850	1,104	21.3	46	704	334	2,836	1,096	474	966
Los Angeles, Calif.	8,050	1,128	17.7	78	503	531	5,109	2,555	1,366	1,189
Philadelphia, Pa.	3,560	785	21.3	30	498	236	2,217	1,085	310	822
Detroit, Mich.	8,452	1,650	40.1	55	1,147	409	5,510	2,843	1,296	1,371
Houston, Tex.	5,973	627	22.9	38	398	169	4,068	2,288	918	863
Baltimore, Md.	7,810	1,869	36.8	52	1,070	711	3,813	1,896	989	932
Dallas, Tex.	7,491	905	22.1	61	301	521	4,294	2,470	1,205	620
Washington, D.C.	7,037	1,685	32.8	96	1,036	521	3,321	1,711	831	778
Cleveland, Ohio	6,623	1,129	41.3	63	758	267	4,392	1,405	630	2,357
Indianapolis, Ind.	3,666	325	8.7	36	184	96	2,205	1,089	634	482
Milwaukee, Wis.	3,962	221	7.8	12	104	97	2,725	693	1,281	751
San Francisco, Calif.	8,500	1,144	11.8	74	669	390	5,674	2,124	1,931	1,620
San Diego, Calif.	5,756	323	4.2	22	164	133	3,433	1,334	1,558	541
San Antonio, Tex.	5,780	510	15.5	38	179	277	3,595	1,798	1,168	630

[1] Includes manslaughter by negligence, not shown separately.
[2] Population group data include, and selected city data exclude, larceny under $50.
[3] Agencies represented in suburban areas are also included in other city groups.

Source: U.S. Federal Bureau of Investigation, *Uniform Crime Reports for the United States*, 1972.

Exercise 6, Concentration of Manufacturing in Large Companies

Situation. As a lobbyist for a large manufacturing company you are writing a speech to be delivered by a sympathetic Congressman. The theme of the speech is that the concentration of manufacturing in a relatively small number of firms is not necessarily bad for the country, and that in some ways it is good. You wish to make the following points: (1) In general, there has been very little increase in such concentration in the past few years; (2) There are many industries in which the large companies now have a smaller share of the market, and (3) There are many industries in which there are now more companies.

Assignment. First, write a few paragraphs supporting points (1), (2) and (3) above, using statistics selected from the tables of pages 64-67. To improve the credibility of the speech, and to avert rebuttal speeches if possible, include some statistics that do not support, or do not entirely support, your argument. (For example, you might write that "Although the share of the 50 largest companies increased from 17 to 24 percent between 1947 and 1970, almost all of that increase occurred before 1955.")

Second, using statistics from the same tables, pages 64-67, write a few paragraphs rebutting the speech you wrote for the Congressman. Include the one or two most striking statistics used in the first speech in support of its position, but counter them with other statistics that were not used in the first speech.

(Was it easier to find statistics to support the position of the first speech or the second?)

No. 1232. Percent Share of Largest Companies in Manufacturing: 1947 to 1970

[Companies ranked on value added by manufacture; companies in each group are not identical for all years]

ITEM	1947	1954	1958	1963	1966	1967	1970
Value added by manufacture:							
Largest 50 companies	17	23	23	25	25	25	24
Largest 100 companies	23	30	30	33	33	33	33
Largest 150 companies	27	34	35	37	38	38	38
Largest 200 companies	30	37	38	41	42	42	43

	ALL COMPANIES, 1967		PERCENT SHARE OF LARGEST COMPANIES, 1967				
	Unit	Total	Total	50 largest	51-100 largest	101-150 largest	151-200 largest
All employees, total [1]	Mil.	19	34	20	6	4	4
Payroll	Bil. dol.	132	40	25	7	5	3
Value of shipments [2]	Bil. dol.	557	43	25	8	6	4
New capital expenditures	Bil. dol.	22	51	27	13	6	4

[1] Includes central administrative offices and auxiliaries.
[2] Includes substantial duplication since output of some establishments is used as materials by others.

Source: U.S. Bureau of the Census, 1967 issue of Manufactures, special report, *Concentration Ratios in Manufacturing*; MC67(S)-2.1 and *General Summary*, MC67(1)-1, and 1970 Annual Survey of Manufactures, *Value of Shipment Concentration Ratios*, M70(AS)-9.

No. 1233. Percent of Shipments Accounted for by Large Manufacturing Companies, Selected Industries: 1947 to 1970

[Prior to 1967, excludes Alaska and Hawaii. First 50 industries as determined by value added by manufacture in 1970. Industry codes and descriptions are based on the 1967 *Standard Industrial Classification Manual* (SIC). Determination of company affiliation of establishment is based on census reports and publicly available records. "Largest" companies are determined by each company's value added by manufacture *in the specified industry*. Industries in the "not elsewhere classified" category are omitted, regardless of their value added]

Industry code [1]	INDUSTRY AND YEAR	Number of companies	Value added by manufacture [2] (mil. dol.)	VALUE OF SHIPMENTS				
				Total [3] (mil. dol.)	Percent of total, ranked by company size			
					4 largest	8 largest	20 largest	50 largest
3312	Blast furnaces and steel mills	1947 (NA)	2,545	(NA)	[4] 50	[4] 66	[4] 81	(NA)
		1958 148	5,080	(NA)	[4] 53	[4] 70	[4] 84	[4] 96
		1963 161	7,700	16,418	51	70	86	97
		1967 200	8,910	19,621	51	69	84	96
		1970 (NA)	9,328	21,402	47	65	(NA)	(NA)
3711	Motor vehicles	1967 107	7,354	27,296	92	98	99+	99+
		1970 (NA)	7,348	27,751	91	97	(NA)	(NA)
3714	Motor vehicle parts and accessories	1967 1,424	5,712	11,624	60	68	78	87
		1970 (NA)	6,432	13,073	58	66	(NA)	(NA)
3662	Radio and TV communications equip	1963 1,001	4,328	7,146	29	45	69	84
		1967 1,111	5,456	8,556	22	37	61	81
		1970 (NA)	6,040	9,331	19	33	(NA)	(NA)
2711	Newspapers	1947 8,115	1,399	1,891	21	26	36	(NA)
		1958 7,947	2,617	3,616	17	24	35	51
		1963 7,992	3,202	4,484	15	22	36	52
		1967 7,589	4,184	5,757	16	25	40	56
		1970 (NA)	5,214	6,991	16	24	(NA)	(NA)
3721	Aircraft	1958 [4] 113	3,399	5,363	59	83	99	99+
		1963 92	[5] 3,543	[4] 6,317	59	83	99	99+
		1967 91	[5] 5,448	[5] 11,080	69	89	99	99+
		1970 (NA)	5,128	10,996	65	87	(NA)	(NA)
2834	Pharmaceutical preparations	1947 1,123	609	941	28	44	64	(NA)
		1958 1,064	1,887	2,533	27	45	73	87
		1963 944	2,596	3,314	22	38	72	89
		1967 791	3,720	4,606	24	40	71	90
		1970 (NA)	4,748	6,028	26	43	(NA)	(NA)

See footnotes at end of table.

No. 1233. Percent of Shipments Accounted for by Large Manufacturing Companies, Selected Industries: 1947 to 1970—Continued

[See headnote, p 720]

Industry code [1]	Industry and year	Number of companies	Value added by manufacture [2] (mil. dol.)	Value of shipments: Total [3] (mil. dol.)	Value of shipments: Percent of total, ranked by company size: 4 largest	8 largest	20 largest	50 largest
2911	Petroleum refining	1947	277	1,494	6,624	37	59	83	(NA)
		1958	289	2,119	14,106	32	55	82	94
		1963	266	3,137	16,497	34	56	82	95
		1967	276	4,745	20,294	33	57	84	96
		1970	(NA)	4,561	22,738	33	57	(NA)	(NA)
3079	Miscellaneous plastics products	1963	4,101	1,661	3,165	8	12	20	31
		1967	4,495	2,986	5,415	8	13	21	33
		1970	(NA)	3,955	6,993	8	13	(NA)	(NA)
3461	Metal stampings	1967	2,564	3,031	5,894	39	44	51	60
		1970	(NA)	3,357	6,454	40	46	(NA)	(NA)
3861	Photographic equipment and supplies	1947	346	265	458	61	70	81	(NA)
		1958	450	789	1,134	65	74	85	99
		1963	499	1,270	1,851	63	76	86	95
		1967	505	2,481	3,605	69	81	89	93
		1970	(NA)	3,148	4,373	75	86	(NA)	(NA)
2051	Bread, cake, and related products	1947	5,985	1,100	2,404	16	26	36	(NA)
		1958	5,305	2,112	3,670	22	33	42	51
		1963	4,339	2,404	4,506	23	35	45	56
		1967	3,445	2,753	5,102	26	38	47	58
		1970	(NA)	3,113	5,607	29	39	(NA)	(NA)
3599	Misc. machinery, exc. electrical	1963	12,032	1,366	2,036	8	12	20	7
		1967	15,055	2,531	3,712	7	11	17	24
		1970	(NA)	2,708	3,957	7	12	(NA)	(NA)
3722	Aircraft engines and engine parts	1947	54	954	465	72	88	98	(NA)
		1958	186	1,616	3,359	56	77	92	(NA)
		1963	194	2,244	4,025	57	79	94	99+
		1967	205	2,922	5,290	64	81	93	97
		1970	(NA)	2,659	5,150	68	81	(NA)	(NA)
2621	Papermills, exc. building paper	1963	186	1,657	3,825	26	42	63	85
		1967	203	2,356	4,844	26	43	65	86
		1970	(NA)	2,652	5,674	26	43	(NA)	(NA)
2011	Meatpacking plants	1947	1,999	4,977	(NA)	41	54	63	(NA)
		1958	2,646	1,677	(NA)	34	46	57	65
		1963	2,833	1,908	12,435	31	40	49	60
		1967	2,529	2,221	15,576	26	39	49	61
		1970	(NA)	2,630	18,055	23	37	(NA)	(NA)
2752	Commercial printing, lithographic	1963	6,738	1,302	2,150	6	10	16	25
		1967	6,178	1,898	3,139	5	8	15	24
		1970	(NA)	2,546	4,155	4	8	(NA)	(NA)
2026	Fluid milk	1958	5,006	1,991	5,802	28	29	37	45
		1963	4,030	2,203	7,026	28	30	40	48
		1967	2,988	2,351	7,826	22	30	42	51
		1970	(NA)	2,443	8,253	20	(8)	(NA)	(NA)
2844	Toilet preparations	1947	692	(NA)	881	24	38	59	(NA)
		1958	721	697	997	29	45	70	87
		1963	673	1,233	1,793	38	52	75	90
		1967	628	1,731	2,516	38	52	74	90
		1970	(NA)	2,434	3,461	39	52	(NA)	(NA)
3531	Construction machinery	1963	561	1,301	2,696	42	53	70	84
		1967	578	2,506	4,138	41	53	72	85
		1970	(NA)	2,402	4,886	42	53	(NA)	(NA)
3011	Tires and inner tubes	1963	105	1,822	2,950	70	89	97	99+
		1967	119	1,823	3,734	70	88	97	100
		1970	(NA)	2,365	4,587	72	89	(NA)	(NA)
2751	Commercial printing, exc. lithographic	1963	11,979	1,578	2,645	13	19	28	83
		1967	11,955	1,948	3,256	14	21	29	39
		1970	(NA)	2,253	3,727	15	21	(NA)	(NA)
3661	Telephone, telegraph apparatus	1947	50	884	(NA)	(NA)	(NA)	(NA)	(NA)
		1958	44	750	(NA)	92	96	99+	(NA)
		1963	65	1,014	1,736	92	96	99	99+
		1967	82	1,537	2,591	93	96	99	99+
		1970	(NA)	2,247	3,956	94	99	(NA)	(NA)
2086	Bottled and canned soft drinks	1947	5,169	(NA)	748	10	14	20	(NA)
		1958	3,990	845	1,435	11	15	22	24
		1963	3,569	1,233	2,211	12	17	24	33
		1967	3,057	1,679	3,173	13	20	28	38
		1970	(NA)	2,147	4,606	13	20	(NA)	(NA)

See footnotes at end of table.

No. 1233. Percent of Shipments Accounted for by Large Manufacturing Companies, Selected Industries: 1947 to 1970—Continued

[See headnote, p. 720]

Industry code [1]	Industry and year	Number of companies	Value added by manufacture [2] (mil. dol.)	Value of shipments: Total [3] (mil. dol.)	Percent of total, ranked by company size: 4 largest	8 largest	20 largest	50 largest
2111	Cigarettes	1947	19	? 368	? 1,132	90	99+	100	(X)
		1958	12	? 1,059	? 2,159	79	99+	100	(X)
		1963	7	? 1,310	? 2,655	80	100	(X)	(X)
		1967	8	? 1,640	? 3,045	81	100	(X)	(X)
		1970	(NA)	? 2,038	? 3,503	84	(S)	(NA)	(NA)
3522	Farm machinery	1963	1,481	2,328	2,842	43	55	67	77
		1967	1,526	2,042	4,300	44	56	68	77
		1970	(NA)	2,038	4,367	40	51	(NA)	(NA)
3585	Refrigeration machinery [4]	1963	555	893	(NA)	25	39	58	77
		1967	624	1,480	(NA)	31	45	62	78
		1970	(NA)	1,990	4,395	31	48	(NA)	(NA)
2721	Periodicals	1947	2,106	665	1,059	34	43	58	(NA)
		1958	2,245	933	1,651	31	41	55	69
		1963	2,562	1,349	2,296	28	42	59	73
		1967	2,430	1,869	3,096	24	37	56	72
		1970	(NA)	1,931	3,158	28	41	(NA)	(NA)
2082	Malt liquors	1947	404	809	1,316	21	30	44	(NA)
		1958	211	1,115	1,980	28	44	68	88
		1963	171	1,296	2,315	34	52	78	94
		1967	125	1,546	2,930	40	59	86	98
		1970	(NA)	1,899	3,685	46	64	(NA)	(NA)
3544	Special dies, tools, jigs, and fixtures	1963	5,850	1,029	1,389	6	9	14	21
		1967	6,532	1,647	2,202	4	7	12	19
		1970	(NA)	1,815	2,479	7	9	(NA)	(NA)
3321	Gray iron foundries [5]	1947	1,554	733	1,173	16	24	35	(NA)
		1958	1,199	811	1,406	24	33	47	61
		1963	1,062	1,168	1,985	28	37	51	65
		1967	969	1,543	2,638	27	36	50	64
		1970	(NA)	1,768	3,035	30	40	(NA)	(NA)
2421	Sawmills and planing mills, general	1963	11,931	1,376	3,156	11	14	20	29
		1967	10,016	1,656	3,506	11	15	22	31
		1970	(NA)	1,735	3,936	16	20	(NA)	(NA)
2335	Women's and misses' dresses	1963	4,577	1,181	2,411	6	9	14	23
		1967	5,008	1,589	3,086	7	9	14	23
		1970	(NA)	1,731	3,366	10	13	(NA)	(NA)
2731	Book publishing	1947	635	263	464	18	29	48	(NA)
		1958	883	616	1,001	16	28	48	69
		1963	936	996	1,535	20	33	56	76
		1967	963	1,437	2,135	20	32	57	77
		1970	(NA)	1,704	2,437	21	35	(NA)	(NA)
2824	Organic fibers, noncellulosic	1963	14	922	1,403	94	99	100	(X)
		1967	22	1,252	2,033	84	94	(D)	100
		1970	(NA)	1,696	2,822	73	89	(NA)	(NA)
2841	Soap and other detergents	1963	641	1,137	2,128	72	80	88	93
		1967	599	1,404	2,593	70	78	86	92
		1970	(NA)	1,660	2,989	70	79	(NA)	(NA)
3141	Shoes, except rubber	1947	1,077	746	1,726	28	35	45	(NA)
		1958	871	1,086	2,026	27	34	43	55
		1963	784	1,216	2,249	25	32	43	47
		1967	676	1,528	2,771	27	34	46	61
		1970	(NA)	1,658	2,973	28	36	(NA)	(NA)
2631	Paperboard mills	1963	146	1,186	2,315	27	43	67	90
		1967	148	1,509	2,907	27	42	67	92
		1970	(NA)	1,649	3,389	28	44	(NA)	(NA)
2851	Paints and allied products	1963	1,579	1,112	2,546	23	34	47	60
		1967	1,459	1,319	2,911	22	35	48	61
		1970	(NA)	1,612	3,408	22	34	(NA)	(NA)
3494	Valves and pipe fittings	1947	436	285	634	24	32	50	(NA)
		1958	535	716	1,197	17	27	46	66
		1963	580	943	1,589	13	23	41	62
		1967	575	1,377	2,275	14	23	42	65
		1970	(NA)	1,588	2,679	14	23	(NA)	(NA)

See footnotes at end of table.

No. 1233. Percent of Shipments Accounted for by Large Manufacturing Companies, Selected Industries: 1947 to 1970—Continued

[See headnote, p. 720]

Industry code [1]	Industry and year	Number of companies	Value added by manufacture [2] (mil. dol.)	Value of shipments: Total [3] (mil. dol.)	Value of shipments: Percent of total, ranked by company size: 4 largest	8 largest	20 largest	50 largest
3731	Shipbuilding and repairing	1947	272	[4] 518	[4] 803	43	55	73	(NA)
		1958	293	[4] 914	[4] 1,626	48	66	80	91
		1963	305	[4] 1,010	[4] 1,680	48	63	81	92
		1967	380	[4] 1,430	[4] 2,518	42	59	77	90
		1970	(NA)	[4] 1,573	[4] 2,534	46	65	(NA)	(NA)
3443	Fabricated platework (boiler shops)	1963	1,301	770	1,623	25	34	48	59
		1967	1,346	1,393	2,089	30	36	48	59
		1970	(NA)	1,527	2,980	30	37	(NA)	(NA)
3621	Motors and generators	1947	224	236	996	59	66	80	(NA)
		1958	317	813	1,360	47	56	72	88
		1963	316	993	1,710	50	59	73	88
		1967	320	1,431	2,402	48	60	74	87
		1970	(NA)	1,475	2,475	50	62	(NA)	(NA)
3441	Fabricated structural steel	1963	1,636	815	1,916	15	20	28	41
		1967	1,865	1,319	2,968	13	18	26	38
		1970	(NA)	1,461	3,139	13	18	(NA)	(NA)
2033	Canned fruits and vegetables	1963	1,135	[7] 1,029	[7] 2,743	24	34	50	66
		1967	930	[7] 1,413	[7] 3,468	22	34	52	70
		1970	(NA)	[7] 1,444	[7] 3,629	21	33	(NA)	(NA)
2511	Wood household furniture	1947	2,208	493	899	7	11	19	(NA)
		1958	2,742	705	1,312	9	13	22	34
		1963	2,937	993	1,858	11	16	25	39
		1967	2,934	1,322	2,439	12	18	29	44
		1970	(NA)	1,404	2,641	14	23	(NA)	(NA)
3357	Nonferrous wiredrawing and insulating	1963	210	678	2,118	44	62	79	92
		1967	206	1,330	3,591	39	55	76	92
		1970	(NA)	1,392	4,144	45	62	(NA)	(NA)
3651	Radio and TV receiving sets	1963	322	911	2,255	41	62	82	94
		1967	303	1,405	3,846	49	69	85	95
		1970	(NA)	1,388	3,595	48	67	(NA)	(NA)
2211	Weaving mills, cotton	1958	321	1,079	2,719	25	40	59	79
		1963	229	1,257	3,104	30	46	67	87
		1967	218	1,624	3,328	30	48	68	88
		1970	(NA)	1,196	2,547	33	50	(NA)	(NA)
3541	Machinery tools, metal-cutting types	1947	312	348	494	20	30	50	(NA)
		1958	608	421	685	21	32	52	74
		1963	784	699	1,061	20	32	52	74
		1967	865	1,391	2,127	21	33	54	77
		1970	(NA)	1,106	1,829	24	37	(NA)	(NA)

D Withheld to avoid disclosure. NA Not available.
S Withheld because data did not meet publication standards. X Not applicable.

[1] Standard Industrial Classification code.

[2] Derived by subtracting total cost of materials, supplies, fuel, electric energy, cost of resales, and contract work done by others from value of shipments including resales, and other receipts and adjusting resulting amount by net change in finished products and work-in-process inventories between beginning and end of year.

[3] Comprises for all manufacturing establishments classified in an industry value of (a) products primary to the industry, (b) secondary products which are primary to other industries, (c) miscellaneous receipts such as those for contract and commission work on materials owned by others, scrap, salable refuse, repair, etc., and (d) resales, i.e., products resold in the same condition as bought.

[4] Percent computed on value added as there was substantial duplication in data for value of shipments.

[5] A number of small establishments were misclassified into this industry affecting the number of companies, but having no appreciable effect on value or percentage of shipments.

[6] Value of work done reported instead of value of shipments: therefore, value added not adjusted for inventory change.

[7] Value of production reported instead of value of shipments: therefore, formula for computing adjusted value added modified to include only changes in work-in-process inventories between beginning and end of year.

[8] Includes foundries producing gray-iron castings for other plants of the same company. Accordingly, percentages do not reflect market shares in industry as such.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, 1970, *Value of Shipments, Concentration Ratios*, M 70 (AS)-9.

Exercise 7, Electric Household Appliances

Situation. A middle-aged member of the State legislature is concerned about the increasing use of electricity by households. He has decided that the only energy-consuming appliances a household really needs are those that were in his home when he was a child—namely, a toaster, range, refrigerator, hand iron, water heater, and circulating fan. He wants to find some statistics on the amount of electricity that would be saved by a household that eliminated (a) selected electric appliances that consume unusually large amounts of energy, and (b) those electric appliances that are "obviously silly gadgets."

Assignment. Write one or two paragraphs that contain the information requested about the items that seem most annoying to the legislator using the data in Table No. 859 in the Census Bureau's *Statistical Abstract of the United States, 1974*, reproduced below.

No. 859. Annual Energy Requirements of Electric Household Appliances

Type of appliance	Average wattage	Estimated kilowatt-hours consumed
Food preparation:		
Blender	386	15
Broiler	1,436	100
Carving knife	92	8
Coffee maker	894	106
Deep fryer	1,448	83
Dishwasher	1,201	363
Egg cooker	516	14
Frying pan	1,196	186
Hot plate	1,257	90
Mixer	127	13
Oven, microwave	1,450	190
Range		
With oven	12,200	1,175
With self-cleaning oven	12,200	1,205
Roaster	1,333	205
Sandwich grill	1,161	33
Toaster	1,146	39
Trash compactor	400	50
Food Preparation:—Con.		
Waffle iron	1,116	22
Waste disposer	445	30
Food preservation:		
Freezer (15 cu. ft.)	341	1,195
Frost'ess	440	1,761
Refrigerator (12 cu. ft.)	241	728
Frostless	321	1,217
Refrigerator/freezer (14 cu. ft.)	326	1,137
Frostless	615	1,829
Laundry:		
Clothes dryer	4,856	993
Iron (hand)	1,008	144
Washing machine:		
automatic	512	103
Laundry—Con.		
nonautomatic	298	76
Water heater	2,475	4,219
Quick-recovery	4,474	4,811
Comfort conditioning:		
Air cleaner	50	216
Air-conditioner, room	1,566	1,389
Bed covering	177	147
Dehumidifier	257	377
Fan:		
Attic	370	291
Circulating	88	43
Rollaway	171	138
Window	200	170
Heater, portable	1,322	176
Heating pad	65	10
Humidifier	177	136

Source: The Library of Congress, *Energy Facts*, November, 1973.

Chapter 5.
A Case Study: Using Unpublished Small-Area Data to Determine Where to Locate a Recreation Center

The City Council of Western City, in Southwest State,* decided that its budget permitted the establishment of one recreation center. A Council member of Mexican heritage stated that the recreation center should be located where it would serve the Mexican community of the city because this community contained a disproportionate number of low-income families with numerous children who were living in overcrowded residences; therefore, he said, the Mexican-Americans had more need for free recreational facilities than the rest of the inhabitants of the city.

The other Council members were not sure that this statement was correct. They pointed out that there were numerous other low-income families in the city, and that the Mexican-American group included quite a number of middle-income and higher income families.

Furthermore, they said, the climate of Western City attracted large numbers of retired persons, most of whom were living on small pensions, and it might be argued that the only recreation center in the city should be located where it could best serve the city's senior citizens. The Mexican-American Council member countered this argument by saying that the aged were dispersed throughout all sections of the city, so that there was no particular area in which a recreation center would be available to large numbers of them. The other Council members again were not sure that he was correct. They mentioned that there were Mexican-Americans in every section of the city, and that the older people might be no more dispersed geographically than the Mexican-American group.

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*This case study and the exercises that follow it assume that the student is familiar with the analytic techniques explained in Chapter Three.

This case study uses 1970 Census data for a real city of the United States. The city has been thinly disguised by giving it a fictitious name and by removing the street names from the Census tract map used in the case study. Any resemblance to any character, governmental organization, fiscal situation, or policy question in the city whose data were used in the case study is entirely accidental.

One of the Council members then said that they were discussing the issue on the basis of their differing impressions of the composition of the various neighborhoods of the city, and that there were statistics available from the 1970 Census of Population and Housing which would give them a firm basis of fact upon which to make a decision. The Council thereupon decided to seek a statistical analysis of this matter.

A staff assistant, Mr. Carter, was assigned this research task. He went immediately to the largest library in the city. He could find no cards for the 1970 Census reports in the library catalog. The only Census Bureau publication he found on the reference shelves was the *Statistical Abstract of the United States;* it did not contain the detailed statistics for Western City that he needed. A consultation with the librarian led him to a drawer in which reports of the censuses were kept. This library like many others, ordered census reports covering the city and State in which it was located and the national summary census reports. The reports for Southwest State and also the national summary reports included some summary figures on Western City and on the SMSA (standard metropolitan statistical area) in which Western City was located. There were also separate reports for the SMSA; these reports included separate statistics for Western City, and some of these reports had statistics by census tracts (small areas delineated for statistical purposes in large cities and adjacent areas) and by city blocks.*

Mr. Carter decided that his first step would be to see what he could find on overcrowding in the Mexican-American community. In the Housing Census report on the Western City SMSA in the HC(2) series, *Metropolitan Housing Characteristics,* there was a Table Finding Guide on p. IV. A note on this page told him that "An asterisk (*) indicates data are shown for housing units with Negro head of household, and the dagger symbol (†) means that the data are shown for housing units with household head of Spanish heritage; these data are shown when an area has 25,000 or more Negro or Spanish heritage population, respectively."

The report contained no tables for Negroes, because there were fewer than 25,000 in Western City, but most of the types of data shown for the population and housing units of Western City as a whole were also shown in separate tables for persons of "Spanish language or Spanish surname" and their housing units. Mr. Carter knew that in Western City the "persons of Spanish language or Spanish surname" were almost all

*The census reports themselves contain the information about the data that is needed to use them. Appendix A of each report, "Area Classification," contains definitions of the areas for which data were reported in that report. In each census report, "Definitions and Explanations of Subject Characteristics" are given in Appendix B. Appendix C provides information on "Accuracy of the Data." The last Appendix D, is a description of the "Publication and Computer Summary Tape Program."

Mexican-Americans, and that he could use the figures for this group as a good approximation of the characteristics of the Mexican-American community.

On reviewing the Table Finding Guide, it appeared to Mr. Carter that some of the tables for Western City containing data on "Persons per room" should answer the question as to whether there was more overcrowding in residences of the Mexican-American population of Western City than in the rest of the population. He decided that Table B4, for the entire population of Western City, and B-22, the equivalent Table for the population "of Spanish language or Spanish surname," were the most appropriate for this purpose. (Table B-4 is reproduced on p. 88.)

All of the tables that showed the number of persons per room, including tables B-4 and B-22, also divided them into (1) those in housing units with plumbing facilities and (2) those in housing units without plumbing facilities, and also showed separate data for (3) owner-occupied and (4) renter-occupied housing units. Mr. Carter was uncertain whether these categories would be of use for his purpose. A glance at the two tables showed him that there were many more owner-occupied than renter-occupied housing units among both the total population and the Spanish-language-or-Spanish-surname population. However, a comparison of these figures did not immediately tell him if there was any differences in the proportions that owned their homes, so he worked out the percentages, as follows:

Occupied Housing Units	Total		Owner-Occupied		Renter-Occupied	
	No.	%	No.	%	No.	%
All Western City	84,226	100	54,031	64.1	30,195	35.8
Mexican-American Occupied	14,911	100	9,518	63.8	5,393	36.2

There appeared to be essentially no difference in the proportions of population that owned their homes, but he decided to check this by seeing what happened if he subtracted the Mexican-American housing units from the total of occupied housing units. He then obtained another row for the table above, as follows:

Other than Mexican-American	69,315	100	44,513	64.2	24,802	35.8

He was now satisfied that he could safely say that the Mexican-American population was about as likely as the rest of the population to own their own homes: about 64 percent of the housing units occupied by each group were owned by the occupants.

He was also certain that this was all that the Council would be interested in knowing about owner-occupancy versus renter-occupancy, and he decided that in his report he would not show the figures on persons per room separately for owner-occupied and renter-occupied housing units.

He then wondered if he should show separate data for housing units with all plumbing facilities and for those lacking some or all plumbing facilities. He decided to set up a summary table for this variable, like the one he had made for owner-occupied and renter-occupied housing units, to see what it would tell him. It looked like this:

Housing Units	Total		With All Plumbing Facilities		Lacking Some or All Plumbing Facilities	
	No.	%	No.	%	No.	%
All Western City	84,226	100	83,076	98.6	1,150	1.4
Mexican-American Occupied	14,911	100	14,403	96.6	508	3.4
Other than Mexican-American	69,315	100	68,673	99.1	642	0.9

He decided that this table was interesting enough to include in his report, since the proportion of Mexican-American housing units lacking some or all plumbing facilities, which certainly were substandard housing, was almost four times as large as for the other housing units. He also decided that this was probably all the Council needed to know about plumbing facilities in Western City for its immediate purpose.

Mr. Carter now realized that the table he wanted to prepare on persons per room by size of household would require adding four figures in the report (for owner-occupied housing units (1) with all plumbing facilities and (2) lacking some or all plumbing facilities, and for all renter-occupied (3) with all plumbing facilities and (4) lacking some or all plumbing facilities) for each figure he put in the table. Furthermore, he wanted to show figures for the other-than-Mexican-American group, which would require subtracting the figures for the Mexican-American from the figures for all of Western City. And then he would have to calculate percentages! His next step was to borrow a pocket calculator.

As he worked on this table, Mr. Carter was bothered by the column headings for number of persons per room. He had difficulty thinking of 0.50 persons or less, or 0.51 to 1.00 persons, etc. He finally added footnotes to the table to translate these headings into number of rooms per person. (See Table 1, page 73.)

He found that this table clearly indicated more crowded households in the Mexican-American community. For example, the absolute number of Mexican-American households with 1.51 or more persons per room was larger than the number of these very overcrowded households in all the rest of the population, even though the Mexican-American population was a fairly small percentage of the total population.

At first he felt that this table was sufficient indication of a higher incidence of poverty among the Mexican-American population; then it occurred to him that it might reflect cultural differences in patterns of

TABLE 1.

Overcrowding in Western City Residences: Mexican-American Households and All Other Households

Occupied Housing Units	Total		Persons per Room: 0.50 or less[a]		0.51 to 1.00[b]		1.01 to 1.50[c]		1.51 or more[d]	
	No.	%	No.	%	No.	%	No.	%	No.	%
Mexican-American Occupants										
Total	14,403	100	3,429	23.8	7,037	48.9	2,687	18.7	1,250	8.7
1 person	1,110	100	1,008	90.8	102	9.2	–	–	–	–
2 persons	2,706	100	1,914	70.7	779	28.8	–	–	13	0.5
3 persons	2,485	100	459	18.5	1,924	77.4	94	3.8	8	0.3
4 persons	2,402	100	43	1.8	2,095	87.2	228	9.5	36	1.5
5 persons	1,979	100	5	0.3	1,318	66.6	536	27.1	120	6.1
6 persons or more	3,721	100	–	–	819	22.0	1,928	49.2	1,073	28.8
Other Occupants										
Total	69,823	100	35,940	51.5	29,607	42.4	3,202	4.6	1,074	1.5
1 person	15,058	100	13,752	91.4	1,306	8.7	–	–	–	–
2 persons	24,012	100	17,943	74.7	5,774	24.0	–	–	295	1.2
3 persons	10,909	100	3,640	33.4	7,037	64.5	220	2.0	12	0.1
4 persons	9,226	100	469	5.1	8,413	91.2	249	2.7	95	1.0
5 persons	5,556	100	136	2.4	4,643	83.6	609	11.0	168	3.0
6 persons or more	5,062	100	–	–	2,434	48.0	2,124	42.0	504	10.0

[a] Two or more rooms per person in household.

[b] Less than two rooms but no less than one room per person.

[c] Less than one room but no less than two-thirds of a room per person (e.g., four persons in three rooms, or three persons in two rooms).

[d] Less than two-thirds of a room per person (e.g., four or more persons in two rooms, or five or more persons in three rooms).

Source of data: U.S. Bureau of the Census, *Census of Housing, 1970: Metropolitan Housing Characteristics.* HC(2)-000, *Western City, SWES., SMSA.*

expenditures rather than lower incomes. He decided that the Council members should see some figures on income also.

By looking in the Table Finding Guide in the HC(2) report, he found that Tables B-3 and B-21 showed income by size of household for all Western City and for the Spanish-language-or-Spanish-surname population, respectively.

These two tables, B-3 and B-21, had the separate figures for owner-occupied and renter-occupied housing units that characterized the HC(2) reports. Before doing the addition necessary to combine these two sets of figures, he looked at the Vol. I Population Census report for Southwest State. However, the tables on households in this volume did not show income by size of family, and furthermore, persons in one-person households were included in the category of "unrelated individuals," so he could not arrive at the same totals for numbers of households that he had in the HC(2) reports. Some of the tables in this Population Census Vol. I report showed income by some selected characteristics of family composition, but a "family" was defined as having two or more members, so one-person households were not included. The PC(2)-1A report, *National Origin and Language*, did not include any statistics for Western City. The PC(2)-1C report, *Persons of Spanish Origin*, and the PC(2)-1D report, *Persons of Spanish Surname*, did show data separately for Western City, but each of these reports covered only a part of the population included in the "Spanish Language or Spanish Surname" group for which figures were shown in the HC(2) report, and which he considered to be, in Western City, a good approximation of the Mexican-American population. He decided that he had better use Tables B3 and B-21 in the HC(2) report. (Table B-21 is reproduced on page 89).

Because the question to be answered about income related specifically to the lower-income groups, Mr. Carter included in his table all of the categories shown in the report for families with income of $5,000 or less, but for higher incomes he combined into three categories the data for the six separate categories shown in the report. (See Table 2a, p. 75).

In looking over Table 2a, Mr. Carter noticed that for every group with family income of less than $5,000, the percentage for Mexican-American households in the group was lower than the percentage of other households. This certainly appeared to contradict the assertion that there was a higher proportion of poor households among the Mexican-American population. He also noticed, however, that for the households with 5 or more persons in this lower-income population, all except one of the percentages for the Mexican-American households were higher than for the rest of the households. He decided to see what the percentages would be for these lower-income populations if he calculated them for columns instead of rows (see Table 2b, p. 76).

What was clear from Table 2b was that, among the poor households of Western City, a much higher proportion of the Mexican-American households were large. Mr. Carter already knew from the figures in Table 1

TABLE 2a.

Family Income in Western City: Mexican-American Households and All Other Households

	Family Income*															
	Total		Less than $2,000		$2,000 to $2,999		$3,000 to $3,999		$4,000 to $4,999		$5,000 to $9,999		$10,000 to $14,999		$15,000 or more	
Households	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Mexican-American	14,911	100	1,753	11.8	925	6.2	980	6.6	949	6.4	6,259	42.0	2,795	18.7	1,250	8.4
1 person	1,319	100	748	56.6	143	10.8	109	8.3	54	4.0	212	16.1	38	2.9	17	1.3
2 persons	2,796	100	431	15.4	303	10.8	225	8.1	246	8.8	1,020	36.5	428	15.3	143	5.1
3 and 4 persons	4,974	100	431	8.1	283	5.7	348	7.0	310	6.2	2,275	45.7	913	18.4	444	8.9
5 persons	2,017	100	73	3.6	94	4.7	91	4.5	118	5.9	946	46.9	478	23.7	217	10.8
6 persons or more	3,805	100	102	2.7	102	2.7	207	5.4	221	5.8	1,806	47.5	938	24.7	429	11.3
Other	69,315	100	8,924	12.9	4,838	7.0	4,790	6.9	4,499	6.5	22,001	31.7	14,502	20.9	9,761	14.1
1 person	14,948	100	5,171	34.8	1,946	13.1	1,596	10.8	1,128	7.6	3,511	23.6	986	6.6	511	3.4
2 persons	23,922	100	2,426	10.1	2,089	8.7	2,054	8.6	2,088	8.7	8,109	33.9	4,380	18.3	2,776	11.6
3 or 4 persons	20,048	100	1,002	5.0	628	3.1	820	4.1	989	4.9	7,072	35.3	5,539	27.6	3,998	19.9
5 persons	5,518	100	159	2.9	74	1.3	175	3.2	164	3.0	1,798	30.8	1,919	34.8	1,329	24.1
6 persons or more	4,978	100	166	3.3	101	2.0	145	2.9	130	2.6	1,611	32.4	1,678	33.7	1,147	23.0

*Excludes income of household members not related to the head of household, such as roomers and boarders; includes income of heads of households with no other persons, or with other but only unrelated persons, in their households.

Source of data: U.S. Bureau of the Census. *Census of Housing, 1970: Metropolitan Housing Characteristics.* HC(2)-000, *Western City, SWES., SMSA.*

TABLE 2b.

Family Incomes of Less than $5,000 in Western City: Mexican-American and All Other Households

Households	Total (less than $5,000)		Family Income* of Less than $5,000								
			Less than $2,000		$2,000 to $2,999		$3,000 to $3,999		$4,000 to $4,999		
	No.	%	No.	%	No.	%	No.	%	No.	%	Median
Mexican-American	4,607	100.0	1,753	100.0	925	100.0	980	100.0	949	100.0	$2,596
1 person	1,052	22.8	746	42.6	143	15.5	109	11.1	54	5.7	1,409
2 persons	1,205	26.1	431	24.6	303	32.8	225	23.0	246	26.0	2,568
3 and 4 persons	1,342	29.1	401	22.9	283	30.6	348	35.5	310	32.7	2,954
5 persons	376	8.2	73	4.2	94	10.2	91	9.3	118	12.4	3,231
6 persons or more	632	13.7	102	5.8	102	11.0	207	21.1	221	23.3	3,541
Other	23,051	100.0	8,924	100.0	4,838	100.0	4,790	100.0	4,499	100.0	$2,538
1 person	9,841	42.7	5,171	58.0	1,946	40.2	1,596	33.3	1,128	25.1	1,903
2 persons	8,657	37.6	2,426	27.2	2,089	43.2	2,054	42.9	2,088	46.4	2,911
3 and 4 persons	3,439	14.9	1,002	11.2	628	13.0	820	17.1	989	22.0	3,110
5 persons	572	2.5	159	1.8	74	1.5	175	3.7	164	3.7	3,030
6 persons or more	542	2.4	166	1.9	101	2.1	145	3.0	130	2.9	3,280

*See footnote to Table 2a.

Source of data: U.S. Bureau of the Census. *Census of Housing, 1970: Metropolitan Housing Characteristics.* HC(2)-000, *Western City, SWES., SMSA.*

that large Mexican-American households were crowded into a smaller number of rooms per person than the rest of the households in Western City. However, he still wondered about the relative incomes of the two groups.

Mr. Carter had noticed that in the HC(2) report medians were shown for each of the rows of figures with which he was working. However, when he combined the data for the owner-occupied and renter-occupied housing units[1] for Table 2a, he could not use the medians shown in the report and he did not know how to calculate medians for his collapsed tables. He decided he needed to calculate medians for Table 2b to see if they shed any further light on the situation. He was working in a library, and he found there an introductory textbook on statistics which gave him the method.

He started by calculating the median income for the first row of Table 2b, that is, for all Mexican-American households in Western City with incomes less than $5,000. The procedure is as follows:

1. The total number of cases—in this case the total number of households in the group (4,607)—is divided by two. The median household is the 2,304th from either end of the distribution of households.
2. The values for the individual cells are added to locate the income group within which the median falls. It is found that the total for the first income group is 1,753 (less than the middle value by 551) but the cumulative total of the first two income groups (1,753 + 925) is 2,678 (more than the middle value). Therefore, the median is somewhere in the second income group, that is, somewhere between $2,000 and $2,999.
3. The estimated "exact" median is found by interpolation. This is a value $\frac{551}{925}$, or 59.6 percent of the way between the lowest and highest incomes ($2,000-$2,999) in the second group, or since the difference between the high and low incomes of that group is $1,000, and $1,000 x 59.6 percent equals $596, then the median is $2,596.

Continuing in this fashion, he produced the final column shown in Table 2b. The relationships among the figures in this column were similar to those suggested by the income distributions in the table: although the median incomes of the Mexican-Americans in households of from one to four persons were lower than those of other-than-Mexican-Americans in households in the same size groups in the low-income households of Western City, the median incomes of the Mexican-Americans in households with five or more persons were higher.

[1] He had shown these as households that owned their homes and those that were renters, since by definition the persons in an occupied housing unit constitute a household.

Mr. Carter was not sure how the Council would react to the fact that the Mexican-American households with five or more household members were more crowded than the other-than-Mexican-American large households but that they were not poorer. He thought that the decision on where to locate the recreation center might well be made on the basis of the concentration or dispersion of the Mexican-Americans in comparison with the aged, and for this he needed data for small areas within Western City.

He looked first at the report in the HC(3) series, *Block Statistics*, that gave statistics by city block for the Western City urbanized area, but he found that it showed no data on income and that for many blocks the data on age were suppressed,[2] and furthermore it did not provide separate figures for the Mexican-American population.

However, the report in the PHC(1) series, *Census Tracts*, that gave statistics by census tract for the Western City SMSA, showed separate statistics for the total population and for "persons of Spanish language or Spanish surname." Statistics on age and on income were among those included.

This PHC(1) report also included a number of statistics by census tract on characteristics of people with incomes below the poverty level, in Table P-4 for the total population and Table P-8 for "persons of Spanish language or Spanish surname." The definition in Appendix B explained that the determination of poverty level involved a range of income cutoffs or "poverty thresholds" adjusted to take into account such factors as family size, sex and age of the family head, and the number of children. One example was given: "The poverty threshold for a nonfarm family of four was $3,743 in 1969." He hesitated to use these statistics because they were for a group that was defined differently from the other statistics he had used. It seemed clear that many households covered in this Table 2b were eliminated from the poverty statistics, and vice versa. He finally decided to include some of the poverty-level statistics as part of his presentation.

The report included a map of the census tracts in the Western City SMSA, and Mr. Carter made several copies. Some of the census tracts included both a portion of Western City and a portion of the area outside Western City, but for these tracts the tables gave separate statistics for the two parts. He cut off the parts of the map that covered areas of the SMSA outside Western City, and proceeded to show on a set of maps the dispersion in Western City of the various groups of the population that he was studying.

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[2]The only figures shown for age were the percent under 18 and the percent over 62, and these data were suppressed if the base figure for a block was too small for a percentage to be shown or if it might disclose information about particular households.

From the poverty-level statistics he chose the figures on the heads of poverty-level families who were aged 65 or over, in Table P-4, "Income Characteristics of the Population: 1970," as the closest approximation he could find to the low-income retirees that the Council had mentioned as potential users of a recreation center. The only statistics shown for this group were the percentages they constituted of the total number of heads of poverty-level families in the cen : tracts, so he calculated the absolute number represented by these perce .ages (see "Working Table for Map 1," p. 91).

The column of numbers he had just calculated, which were in order by census tract number, did not seem of much help in determining the categories to use on his map. By inspecting this column he could determine, and remember, the census tracts with the highest and lowest numbers of persons in the group in which he was interested, but that was about all. He decided to list the numbers in descending order, from the largest to the smallest (see last two columns on p. 92).

Looking at this list, his main reaction was that the numbers did not fall into groups. If he used all numbers below 15 as his first category, he would put census tracts 33.01 and 44.01, each of which had 15, into the first category, while census tract 40.03, which had just one more than 15, would fall into the second category. A similar situation occurred in the case of most other divisions he tried. He finally classified the census tracts into four groups, beginning with those with no poverty-level families with heads aged 65 or over,[3] then those that had from one to 30 such families, and so on.

He gave this map the title "Distribution of Families with Heads Aged 65 and Over with Income Below Poverty Level" (see Map 1, p. 92).

The other poverty-level statistics he used were the numbers of "related children (i.e., children living with parents or other relatives) under 18 years," in Table P-8, "Economic Characteristics of Persons of Spanish Language or Spanish Surname: 1970" (see p. 92). to produce Map 2, "Distribution of Children Under 18 Years of Age in Mexican-American Families with Income Below Poverty Level" (see p. 93).

As Mr. Carter plotted the data on Maps 1 and 2, he became increasingly uneasy about the small figures for some of the individual census tracts. He had glanced through the appendices in the PHC(1) census tract report, but now he decided that he had better study Appendix C, "Accuracy of the Data."

The first section of this appendix explained that errors could occur during every phase of the census, but that quality control and check measures were used throughout the census "to keep the errors in each step at an acceptably low level." The second section explained that some allocation and substitution of acceptable responses in place of unaccepta-

[3] He later revised this map to eliminate this category.

ble responses was performed during data processing, in cases where a response to an item on the questionnaire was lacking or a response to particular item for a person or housing unit was inconsistent with other information reported for that person or housing unit; the maximum number of allocations or substitutions permitted was predetermined for each item. The next section described the sample design, and the next the ratio estimation procedure whereby the sample data were inflated to agree (in most cases) with the complete counts.

The final section, "Sampling Variability," in Appendix C, presented a method for determining the standard errors of estimates from sample tabulations. Tables D, E, and F, referred to in the quotation below, are shown on pages 81-82. The first part of this section read as follows:

> "The estimates from sample tabulations are subject to sampling variability. The standard errors of these estimates can be approximated by using the data in Tables D through F. The chances are about 2 out of 3 that the difference (due to sampling variability) between the sample estimate and the figure that would have been obtained from a complete count of the population is less than the standard error. The chances are about 19 out of 20 that the difference is less than twice the standard error and about 99 out of 100 that it is less than 2½ times the standard error. . .
>
> "To estimate the standard error for a given characteristic based on the 15-percent sample, or for a more precise estimate for the 20-percent sample, locate in Table F the factor applying to the characteristic and sample size used to tabulate the data and multiply this factor by the standard error found in Table D or E."

On Map 1, Mr. Carter had shown a group of census tracts with from 1 to 29 poverty-level families with heads aged 65 and over, and another group with from 30 to 59 such families. In Table D of Appendix C, 50 was the smallest number estimated from a 20-percent sample for which a standard error was shown; he decided to see what the sampling error of that number would be for aged heads of poverty-level families.

Multiplying the standard error of 15 for an estimated number of 50 persons, shown in Table D, by the factor of 2.0 shown in Table F for tabulations of poverty-status persons, of course gave a result of 30. This meant that in the case of a census tract for which 50 aged (65 years and over) heads of poverty-level families were shown, there were two chances out of three that the number of such family heads was in fact between 20 and 80, and 19 chances out of 20 that it was in fact between about 10 (10 instead of 0 because almost certainly about 10 such families had been found, if the inflated 20-percent sample showed 50) and 110. Census tract No. 45.01 which he had calculated to have 50 such families and had shown on the map as one of the group of tracts with 30 to 59 such families, might well belong in either the next highest or lowest group, and might possibly belong in the highest group, "90 or more."

The figures in Table D indicated that the standard errors were proportionately larger for the smaller numbers, and Mr. Carter wondered just how large they were for numbers that were much smaller than 50.

Appendix C also stated that: "Linear interpolation in Tables D and E will provide approximate results that are satisfactory for most purposes." He thought that it might be possible to obtain satisfactory approximations by extrapolating from 50 down to 0. He started his extension of Table D with a 0 in the column for estimated numbers and another 0 in the column for standard errors, and then realized that this was impossible; the 20-percent sample of a census tract might well have missed the only person, or the only two persons, who had the characteristics of the group he was studying. Therefore, a 0 really meant that there were none or very few such persons.

Furthermore, a number of five such persons really meant that just one had been reported in the 20-percent sample and that the number had been inflated; and 10 meant that two such persons had been in the sample, etc. In fact, the numbers 5 and 10 certainly meant just that there were relatively few such cases. He already knew that for these poverty statistics for persons, which had the highest factor (i.e., 2) of any statistics for this

TABLE D.

Approximate Standard Error of Estimated Number Based on 20-Percent Sample (Range of 2 Chances out of 3)

Estimated Number (persons or housing units)	Standard Error
50	15
100	20
250	30
500	45
1,000	60
2,500	85
5,000	100

TABLE E.

Approximate Standard Error of Estimated Percentage Based on 20-Percent Sample (Range of 2 Chances out of 3)

	Base of Percentage (persons or housing units)					
Estimated Percentage	500	1,000	2,500	5,000	10,000	15,000
2 or 98	1.3	0.9	0.6	0.4	0.3	0.2
5 or 95	2.0	1.4	0.9	0.6	0.4	0.4
10 or 90	2.7	1.9	1.2	0.8	0.6	0.5
25 or 75	3.9	2.7	1.7	1.2	0.9	0.7
50	4.5	3.2	2.0	1.4	1.0	0.8

TABLE F.

Factor to be Applied to Standard Errors

Subjects	Sample Rate (percent)	Factor
Population Subjects[a]		
*Race	20	1.5
*Age	20	0.9
*household relationship	20	0.6
*Family composition	20	0.6
Country of origin (including Spanish heritage subjects)	15	1.8
Nativity and parentage	15	1.9
School enrollment	15	0.9
Years of school completed	20	1.0
Residence in 1965	15	2.0
Employment status	20	0.8
Place of work	15	1.3
Means of transportation to work	15	1.0
Occupation	20	1.0
Industry	20	1.1
Class of worker	20	1.1
Income:		
Persons	20	1.1
Families	20	1.0
Poverty status:		
Persons	20	2.0
Families	20	1.0
All other:		
20 percent	20	1.0
15 percent	15	1.2
Housing Subjects[a]		
*Tenure	20	0.2
*Rooms	20	0.9
*Persons per room	20	0.5
*Value	20	1.0
Units in structure		0.8
Year structure built	20	0.8
Heating equipment	20	0.8
Basement	20	0.9
Source of water	15	1.1
Sewage disposal	15	1.1
Air conditioning	15	1.0
Year moved into unit	15	1.0
Gross rent	20	1.0
All other:		
20 percent	20	1.0
15 percent	15	1.2

*Tabulated on a 100% basis for Tables P-1, H-1, and H-3. Standard errors are not applicable to these tables.

[a]Tabulations of data for persons of Spanish heritage are based on the 15-percent sample. For subjects shown in this table as based on the 20-percent sample, the factor for persons of Spanish heritage is obtained by multiplying the appropriate factor in this table by 1.2. For subjects shown as based on the 15-percent sample, the factor in this table can be used directly.

SMSA, the standard error for an estimate of 50 was 30. There did not seem to be much point in calculating the standard error for numbers lower than 50.

Mr. Carter's first inclination was to not use these particular statistics at all, but on reflection, he decided that they probably were the best indication available of the information he needed. Certainly census tract 27, which was shown to have 5 senior citizens who were heads of poverty-level families (i.e., 9.4 percent of a total of 53 heads of poverty-level families in the census tract), had fewer such persons than census tract 18 which was shown to have 132 (i.e., 46.6 percent of 283).

He did revise Map 1 to combine the category for "None" with the category "1 to 29," since the term "None" seemed to be too misleading. This meant that 30 census tracts (almost three-fifths of the total of 53 census tracts), were now in the lowest of only four categories, but these 30 census tracts contained only a little more than one-fifth of the persons with the characteristics displayed on the map, so he decided that it was not an unfair presentation—or, at least, that it was as fair as he could make it, since his own personal judgment was inevitably involved in his determination of how to classify and present the data and would inevitably affect at least to some extent the conclusions drawn from the presentation.

Mr. Carter did not consider Maps 1 and 2 sufficient for his report to the City Council, largely because they covered such a small proportion of the population of Western City. Map 1, especially, now showed the location of approximately 1,500 of the approximately 6,900 poverty-level families and of the more than 65,000 total families in Western City. He would have liked a breakdown of the persons 65 and over by income, because he thought it likely that when the City Council mentioned retired persons living on small pensions, they were not thinking only of the older people suffering real poverty, but he did not find this cross-classification by census tracts in the publications.

He was aware that a great deal of detail was available on computer tape that was not in the census publications, and that the computer tapes could be purchased or that the Census Bureau would prepare special tabulations at cost, but he considered it unlikely that the City Council would be willing to pay for either, or to wait for their purchase to be negotiated with the Census Bureau. Furthermore, he thought that it was unnecessary. It seemed to him that the many detailed data provided in the census publications should enable him to present a good enough approximation of the distribution of the low-income senior citizens of Western City to serve the present purpose.

He thought he might be able to show a better picture of the distribution of aged low-income persons than he had in Map 1 if he plotted the data for all persons aged 65 and over and for all families with income less than $5,000 on the same map, but he was not sure how to do it. At this point he used the resources of the library again to see what he could

learn about statistical mapping. Most of the examples he found either used color, which he ruled out because he wanted to make copies on a black-and-white copying machine, or required graphic techniques that would have been difficult for him to execute, such as drawings of schoolhouses of different sizes or bags of money of different sizes, etc., to represent different quantities of the variable portrayed.

He did find two techniques for mapping two variables on the same map that he thought he could execute with a pencil, and he tried both of them to show the distribution of aged persons and of low-income families. The first technique consisted of diagonal lines in one direction for one characteristic and in the opposite direction for the other characteristic. (See Map 3a, p. 94.) This technique was suggested as a fair substitute for a commonly used "overlay" map presentation in which a transparent map showing one variable was laid over a map showing another variable.

The other technique consisted of using one character for a certain number of cases for one variable and a different character for the same number of cases of the second variable. The numbers found in the table were founded, so that in fact, if the number of cases chosen was 100, for example, one character would represent 50 to 149 cases, and two characters would represent 150 to 249 cases, etc.) This had the advantage of being a better representation than Map 3a of the actual numbers shown in the tables, although it was not as easy to see at a glance which were the high and low tracts. (See Map 3b, p. 95.)

He plotted the number of Mexican-American children on another map, using a symbol for each 100, so that it could be compared with Map 3b. Then he remembered that separate statistics for the Spanish-language-or-Spanish-surname population were shown only for census tracts with 400 or more such persons. Children under 18 constituted 46 percent of this population in the city as a whole, so any particular census tract with just over 400 or all ages might well have as many as 50 percent or 200 children under age 18.

He decided to use the figures for Spanish-language-or-Spanish-surname children aged 10-17, on the theory that this was the age group that would make most use of a recreation center. This group constituted 20 percent of the Mexican-American population. Twenty percent of a population just under 400—for example 390—would be 78, and in consequence would be represented with a symbol for 100 if the figure were available; he thought that the presence or absence of a single symbol in at most a very few census tracts would not affect the general impression made by the map, or its utility for the purpose for which it was designed, since the City Council was looking for areas of high concentration, not low.

After plotting the statistics for Mexican-American young people, Mr. Carter saw that there was indeed a concentration of them in one part of the city, as the Mexican-American Council member had suggested. He wondered if there might also be fairly large numbers of other young people in or near the same area who would also be served by a recreation

center in this part of the city. If this was the case, it might influence the decision on where to locate the recreation center. He thought it quite possible that some of the Council members also would wonder about the other-than-Mexican-American young people, as he did. He decided that in any case no one could object if he added the other-than-Mexican-American age group 10-17, and did so. (See Map 4, p. 96.)

When he had completed Map 4, Mr. Carter abandoned hope that there would be one location that would serve pretty well for both the Mexican-American and the other youngsters, especially since the large cluster of other-than-Mexican-American young people was in an area that had relatively few low-income families.

Studying all of his maps, he was fascinated by the similarities and differences between Map 1, 3a, and 3b. These three maps all were attempts to visually portray the geographic distribution of the elderly poor. All showed such a similar pattern that a decision as to where to locate a recreation center for this population group might well have been the same whichever map was used. However, the situation in many of the individual census tracts appeared quite different in the different maps, because of the different (1) data items portrayed, (2) categories used, and (3) cartographic techniques.

Furthermore, Map 2 presented about the same picture of the location of Mexican-American youngsters in low-income families as would be obtained from the combination of information portrayed on Maps 3b and 4, on low-income families and on the Mexican-Americans aged 10-17, respectively.

He decided that most of the Mexican-American youngsters were concentrated in the southern portion of the city, and that the senior citizens were dispersed throughout the city, just as the Mexican-American Council member had said. However, there was a sizable cluster of both poor and elderly in the central northern portion of the city, and this area also included a number of other-than-Mexican-American youngsters. Unfortunately, a location that was equi-distant from the two clusters would not be within easy walking distance of either of them. It appeared to Mr. Carter that if the decision were based on the numbers of poor persons to be served, as the discussion of the City Council had suggested it would be, the recreation center would be placed in the central northern part of Western City.

Exercises

Note: Exercise 1 requires that each student have a copy of a report in the PHC(1) series, *Census Tracts*, for a metropolitan area. Exercise 2 requires a PHC(1) report and also an HC(2) report, *Metropolitan Housing Characteristics*, for the same metropolitan area. It would be preferable for reports for several different metropolitan areas to be available, so the students would not all be working with statistics for the same city, especially if the

class is large. Optimum use of each of these exercises begins with classroom discussion to determine the various appropriate variables, and ends with classroom discussion and comparison of the results obtained by using (a) different variables for the same city, and/or (b) the same variable for different cities.

Exercise 1, Determining Where to Concentrate Campaign Efforts

Situation. A successful, affluent, black lawyer is running for mayor on a Populist platform in a central city of an SMSA. His opponent is Conservative, a three-term member of the School Board, a white woman, with several children and grandchildren. You have volunteered to help the Populist candidate. Because of severely limited campaign funds and time limitations, the candidate has decided he will have to concentrate his campaign on a few sections of the city. He has asked his assistants to prepare independent reports indicating (1) the neighborhoods in which he can expect his greatest support, (2) the neighborhoods that probably will not give him many votes regardless of how much or how well he campaigns, and (3) the neighborhoods in which he might reasonably expect to gain support if he presents his position well. The candidate says that he hopes the reports will reflect enough different points of view to call his attention to factors he may not have previously considered, and to stimulate discussion among his advisors.

Assignment

1. Determine what type of person you think will be characteristic of any one of the three types of neighborhoods mentioned above, and explain why you think so.
2. Select two population or housing characteristics (or one of each) for which data are available in the PHC(1) census tract reports and which you consider good indicators for the type of neighborhood you have selected. Plot these data on one or two maps, whichever seems desirable.

If you select neighborhoods of type (3) above, and if this is a residual category (that is, if it includes all the neighborhoods that you do not expect to either strongly support or strongly reject your candidate), show the type 1 neighborhoods as blank (i.e., white) census tracts, show the type 2 as black, and show two or more categories within type 3 using one of the techniques demonstrated in this case study.

Exercise 2, Location of Poor Quality Rental Housing

Situation. The building code of the central city of an SMSA is 75 years old, and relates entirely to certain structural characteristics that were thought to lessen the danger of serious fires. The members of some churches in the central city of an SMSA have joined a group of highly

dissatisfied low-income renters and some building contractors to lobby for a new building code which would require landlords to bring their rental units up to "decent housing standards."

This ad hoc lobby claims that (a) there are many more rental units than owner-occupied units that do not meet "modern housing standards," (b) the inadequate housing units are clustered in one neighborhood (where one very rich and unpopular landlord owns a great many rental units), (c) the pertinent statistics in the 1970 census cannot be used either to support or refute their claims because the statistics were collected on a sample basis and are therefore unreliable.

Assignment

1. Select one characteristic, for which statistics are available in the HC(2) reports, *Metropolitan Housing Characteristics*, that you consider an indication of poor housing quality in the city you are studying. (Remember that the climate may reduce or increase the need for certain housing features.)

2. Prepare a table showing the numbers and percentages of owner-occupied and renter-occupied housing units having the characteristics you have selected, in the central city only. (Does this table support the contention that in this city there are "many more" rental units than owner-occupied units that do not meet modern housing standards?)

3. Calculate the sampling error of the total number of renter-occupied units having the characteristic you chose using Tables B, C, and D in Appendix C. Then calculate the sampling error of the estimate for one category within that total. (Do these sampling errors support the contention that the statistics are useless because they were collected on a sample basis?)

4. Turn to the PHC(1) census tract report for the same SMSA. On a copy of the census tract map in the report, plot the number of cases of the characteristic you have selected for renter-occupied units, by census tract, for the city. If there are no data in the PHC(1) report for this characteristic, use the equivalent for the characteristic that you can find in the report. If the data on the characteristics are not given separately for rental units (as will quite possibly be the case), show the number of housing units with the selected characteristic and the number of rental units on the same map. Use only one of the mapping techniques demonstrated in this case study or a technique suggested in a text on statistical mapping or used in a statistical publication. (Does your map indicate that inadequate housing units are clustered in one "neighborhood?" (A "neighborhood" might include two or more census tracts.) If so, are there more rental units than inadequate housing units in this neighborhood, or are there more inadequate housing units than rental units? Does your map disprove or fail to disprove the popular impression that one owner of many rental units in one neighborhood is responsible for most of the inadequate housing in the city?)

Working Tables for Map 1, "Distribution of Families with Heads Aged 65 and Over and with Income Below Poverty Level"

Calculation of Nos. of Such Persons from Percentages				Array of Census Tracts by Nos. of Such Persons	
	Heads of Families with Income Below Poverty Level				
	Total	Aged 65 and Over			
Tract No.	No.	Percent	No.	Census Tract No.	No. of Such Persons
1	13	...	0*	18	132
2	65	38.5	25	38	92
3	54	46.3	25	13	78
4	120	31.7	38	31	77
5	127	8.7	11	26	73
6	99	40.4	40	15	66
7	138	14.5	20	30	66
8	131	24.4	32	35	55
9	304	15.1	46	25	51
10	193	8.3	16	45.01	50
11	208	23.1	48	11	48
12	194	20.1	39	9	46
13	264	29.5	78	22	41
14	145	16.6	24	6	40
15	155	42.6	66	12	39
16	74	45.9	34	4	38
17	60	11.7	7	20	37
18	283	46.6	132	16	34
19	15	...	0*	40.05	33
20	201	18.4	37	8	32
21	157	5.7	9	24	32
22	140	29.3	41	32	32
24	331	9.7	32	29.01	31
25	216	23.6	51	37	26
26	250	29.3	73	2	25
27	53	9.4	5	3	25
28	102	17.6	18	29.02	25
29.01	98	31.6	31	14	24
29.02	138	18.1	25	7	20
30	110	50.9	56	28	18
31	196	39.3	77	45.03	18
32	94	34.0	32	10	16
33.01	28	53.6	15	40.03	16
33.02	38	—	0	33.01	15
34	135	3.0	4	44.01	15
35	383	14.4	55	5	11
37	172	15.1	26	39	10
38	405	22.7	92	40.02	10
39	139	7.2	10	44.02	10
40.01	27	25.9	7	21	9
40.02	129	7.8	10	17	7
40.03	94	17.0	16	40.01	7
40.05	143	23.1	33	27	5
40.06	0	—	0	40.07	5
40.07	65	7.7	5	34	4
41.01	0	—	0	1	0
41.02	11	—	0	19	0
43.01	4	—	0	33.02	0
44.01	26	57.7	15	40.06	0
44.02	31	32.3	10	41.01	0
45.01	218	22.9	50	41.02	0
45.02	6	—	0	43.01	0
45.03	85	21.2	18	45.02	0

*About.