



UNITED STATES CENSUS OF
POPULATION
1960

Journey to Work

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

REFERENCE COPY

U.S. CENSUS OF POPULATION: 1960

Final Report PC(2)-6B

SUBJECT REPORTS

Journey to Work

*Commutation Streams and Social and Economic
Characteristics of Commuters in Standard
Metropolitan Statistical Areas*

*Prepared under the supervision of
HOWARD G. BRUNSMAN, Chief
Population Division*



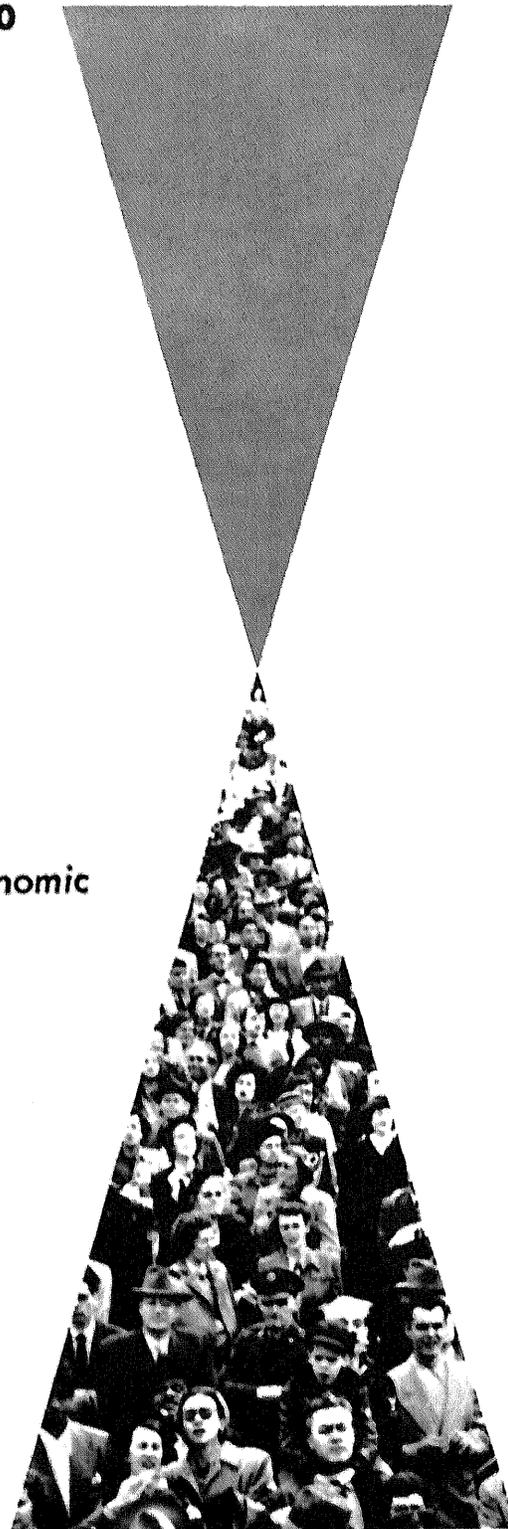
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PREFACE

This report presents statistics from the 1960 Census of Population on the patterns of commuting in standard metropolitan statistical areas of 250,000 or more, and the characteristics of commuters. Legal provision for this census, which was conducted as of April 1, 1960, was made in the Act of Congress of August 31, 1954 (amended August 1957), which codified Title 13 United States Code.

The major portion of the information compiled from the 1960 Census of Population appears in Volume I, Characteristics of the Population, which contains data for the United States, States and counties and their urban and rural parts, cities, minor civil divisions, etc. The present report is part of Volume II, Subject Reports, and is designated as PC(2)-6B. A summary description of all the final reports of the 1960 Population Census appears on page IV.

ACKNOWLEDGMENTS

A large number of persons participated in the various activities of the 1960 Census of Population. Primary responsibilities were exercised by many of the persons listed on the preceding page. Within the Population, Demographic Operations, Field, Geography, and Statistical Methods Divisions, most of the staff members worked on the program. Important contributions were also made by the staffs of the Administrative Service Division, Everett H. Burke, Chief; Budget and Management Division, Charles H. Alexander, Chief; Data Processing Systems Division, Robert F. Drury, Chief; Jeffersonville Census Operations Office, Robert D. Krook, Chief; Personnel Division, James P. Taff, Chief; and Statistical Research Division, William N. Hurwitz, Chief.

Henry D. Sheldon, Chief, Gordon F. Sutton, and Siegfried A. Hoermann, assisted by Gladys G. Handy, of the Demographic Statistics Branch, Population Division, had the major responsibility for planning this report and developing its content. John C. Beresford provided liaison with the operations staff, Elizabeth A. Larmon assisted in the preparation of the introductory text, and Mildred M. Russell and Leah S. Anderson performed the technical editorial work. The procedures for compiling the data were devised by Patience Lauriat, Catherine M. Neafsey, Leo Solomon, George E. Turner, and Anthony B. Woodell of the Demographic Operations Division. The sampling materials were prepared by Robert Hanson, Stanley M. Edelstein, and Anthony G. Turner of the Statistical Methods Division.

The census program was designed in consultation with a number of advisory committees and many individuals in order to maximize the usefulness of the data. Among the groups organized for this purpose were the Technical Advisory Committee for the 1960 Population Census, the Council of Population and Housing Census Users, and the Federal Agency Population and Housing Census Council (sponsored by the U.S. Bureau of the Budget). The persons who served with these groups represented a wide range of interest in the census program; their affiliations included universities, private industry, research organizations, labor groups, Federal agencies, State and local governments, and professional associations.

Tabulation of the data in this report was supported, in part, by funds provided by the Housing and Home Finance Agency.

October 1963.

FINAL REPORTS OF THE 1960 CENSUS OF POPULATION

The final reports of the 1960 Population Census are arranged in three volumes and a joint Population-Housing series of census tract reports. The 1960 Population Census publication program also includes preliminary, advance, and supplementary reports, certain evaluation, procedural, and administrative reports, and graphic summaries. After publication, copies of all reports are available for examination or purchase at any U.S. Department of Commerce Field Office.

Certain types of unpublished statistics are available for the cost of preparing a copy of the data. Also, under certain conditions, special tabulations of the 1960 Census data can be prepared on a reimbursable basis. In addition, there are available for purchase magnetic tapes and punchcards containing 1960 Census information on the characteristics of a one-in-a-thousand and a one-in-ten-thousand sample of the population of the United States. Confidentiality of the information, as required by law, has been maintained by the omission of certain identification items. Further information about any of these materials can be obtained by writing to the Chief, Population Division, Bureau of the Census, Washington, D.C., 20233.

Volume I. Characteristics of the Population. This volume consists of separate reports for the United States, each of the 50 States, the District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and Canal Zone. For each of these 57 areas, the data were first issued in four separate paper-bound "chapters," designated as PC(1)-A, B, C, and D. (For Guam, Virgin Islands, American Samoa, and Canal Zone, the material normally contained in chapters B, C, and D are included in chapter B.) For library and general reference use, the paper-bound reports have been assembled and reissued in buckram-bound books identified as Parts A and 1 to 57 of Volume I.

Series PC(1)-1A to 57A: Chapter A. Number of Inhabitants. These reports contain final population counts for States and counties and their urban and rural parts, and for standard metropolitan statistical areas, urbanized areas, all incorporated places, unincorporated places of 1,000 inhabitants or more, and minor civil divisions.

Series PC(1)-1B to 57B: Chapter B. General Population Characteristics. These reports present statistics on sex, age, marital status, color or race, and relationship to head of household for States and counties and their urban and rural parts, and for standard metropolitan statistical areas, urbanized areas, places of 1,000 inhabitants or more, and minor civil divisions.

Series PC(1)-1C to 53C: Chapter C. General Social and Economic Characteristics. These reports cover the subjects of nativity and parentage, State of birth, country of origin of the foreign stock, mother tongue, place of residence in 1955, year moved into present house, school enrollment by level and type, years of school completed, families and their composition, fertility, veteran status, employment status, weeks worked in 1959, year last worked, occupation group, industry group, class of worker, place of work, means of transportation to work, and income of persons and families. Each subject is shown for some or all of the following areas: States and counties and their urban, rural-nonfarm, and rural-farm parts, standard metropolitan statistical areas, urbanized areas, and urban places.

Series PC(1)-1D to 53D: Chapter D. Detailed Characteristics. These reports present most of the subjects covered in chapter C, above, cross-classified by age, color, and other characteristics. There is also included additional information on families, as well as data on single years of age, detailed occupation, and detailed industry. Each subject is shown for some or all of the following areas: States and their urban, rural-nonfarm, and rural-farm parts; and large counties, cities, and standard metropolitan statistical areas.

Volume I, Part A: Number of Inhabitants. This is a compendium of the 57 chapter A reports, i.e., PC(1)-1A to 57A.

Volume I, Parts 1 to 57: Characteristics of the Population. The 57 parts relate respectively to the United States, each of the 50 States, District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and Canal Zone. Each part contains the data previously published in the four chapters A, B, C, and D, and is in the form of a separate, buckram-bound book. Parts 54, 55, 56, and 57--for Guam, Virgin Islands, American Samoa, and Canal Zone, respectively--are bound in a single book.

Volume II (Series PC(2) reports). Subject Reports. Each report in this volume concentrates on a particular subject. Detailed information and cross-relationships are generally provided on a national and regional level; in a few reports data for States or standard metropolitan statistical areas are also shown. Among the characteristics covered are ethnic origin and race, fertility, families, migration, education, employment, unemployment, occupation, industry, and income. There is also a report on the geographic distribution and characteristics of inmates of institutions.

Volume III (Series PC(3) reports). Selected Area Reports. Three of the reports in this volume present selected characteristics of the population (1) for State economic areas, (2) for standard metropolitan statistical areas, and (3) according to the size of place where the individual resided. A fourth report provides data on the social and economic characteristics of Americans overseas.

Series PHC(1). Census Tract Reports. These reports present information on both population and housing subjects. There is one report for each of 180 tracted areas in the United States and Puerto Rico. The population subjects include age, race, marital status, country of origin of the foreign stock, relationship to head of household, school enrollment, years of school completed, place of residence in 1955, employment status, occupation group, industry group, place of work, means of transportation to work, and income of families, as well as certain characteristics of the nonwhite population in selected tracts. The housing subjects include tenure, color of head of household, vacancy status, condition and plumbing facilities, number of rooms, number of bathrooms, number of housing units in structure, year structure built, basement, heating equipment, number of persons in unit, persons per room, year household head moved into unit, automobiles available, value of property, and gross and contract rent, as well as certain characteristics of housing units with nonwhite household head for selected tracts. In addition, for selected tracts these reports contain data on certain population and housing subjects for persons of Puerto Rican birth or parentage and for white persons with Spanish surname. (This series is the same as the tract reports listed in the publication program for the 1960 Census of Housing.)

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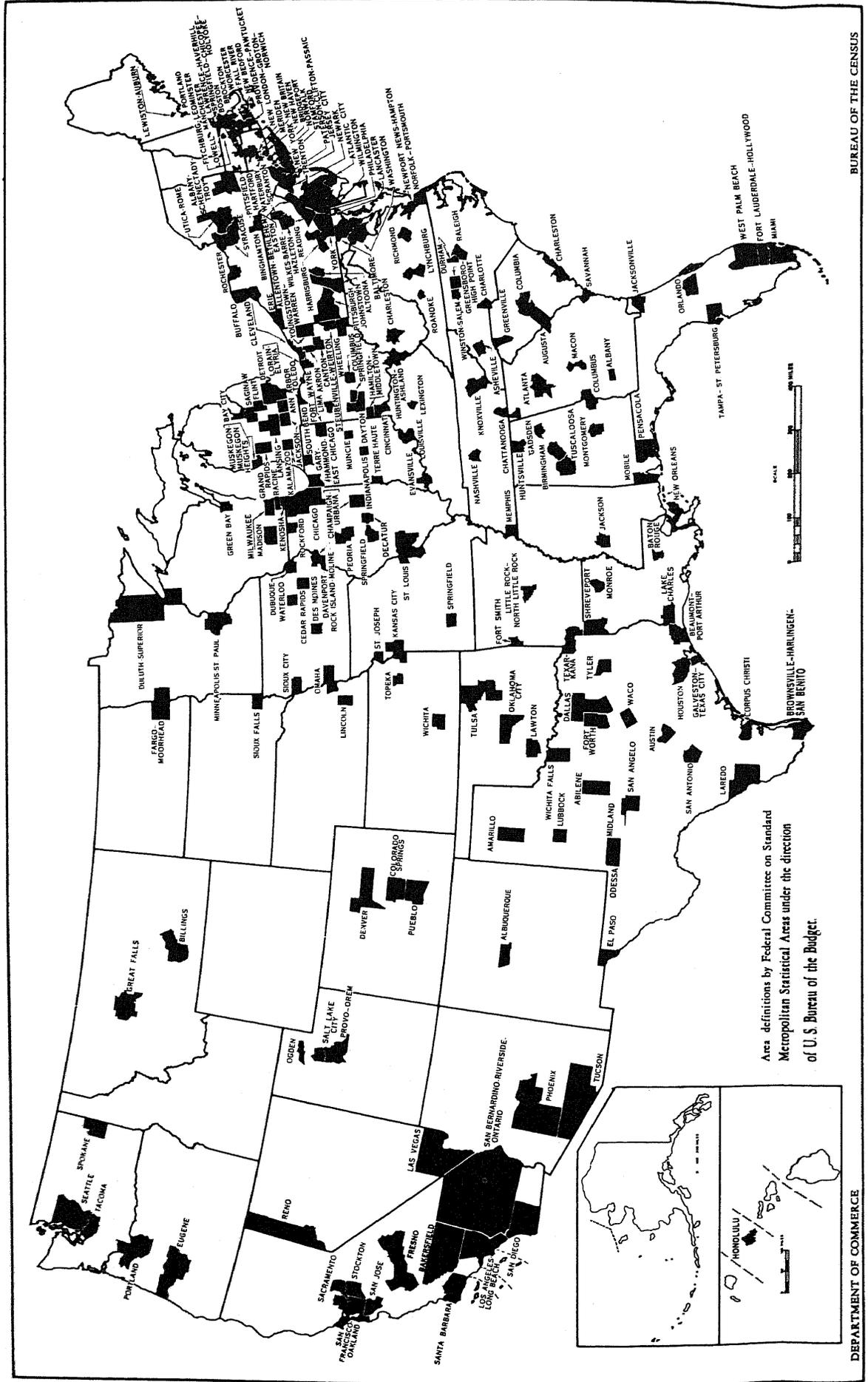
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STANDARD METROPOLITAN STATISTICAL AREAS OF THE UNITED STATES: 1960



Area definitions by Federal Committee on Standard Metropolitan Statistical Areas under the direction of U.S. Bureau of the Budget.

Journey to Work

GENERAL

This is a report on workers classified by place of residence and place of work. Data are presented on the daily flow of workers into, and out of, standard metropolitan statistical areas (SMSA's) of 250,000 or more as well as among the constituent parts of these areas. Data are also provided on means of transportation to work and other characteristics of workers. For the purposes of this report, workers are defined as civilians employed and at work and members of the Armed Forces not sick, on leave, etc., during the week preceding census enumeration. The statistics are based on a 25-percent sample of the population enumerated in the Eighteenth Decennial Census of Population, taken as of April 1, 1960.

RELATED MATERIALS

Other 1960 Census statistics on place of work and means of transportation to work are presented in chapters C and D of Volume I, Characteristics of the Population, and in the census tract reports.

In chapter C, General Social and Economic Characteristics, place of work is classified simply as to whether it was in the same county (or equivalent area) as the worker's county of residence or in a different county. Statistics are shown for States and for their urban and rural parts, by color; for SMSA's, for urbanized areas, and for urban places of 10,000 inhabitants or more, data are presented for all workers, supplemented by data for nonwhites in areas with 1,000 or more nonwhites. Means of transportation is shown for the same areas as those covered by statistics on place of work, but without separate data for nonwhite workers.

In chapter D, Detailed Characteristics, classification of place of work is by central city of SMSA of residence, ring (i.e., remainder of SMSA), and outside SMSA of residence separately for workers living in the central city and in the ring of each SMSA of 100,000 or more. Each such residence by place-of-work group is shown by color, sex, age, means of transportation to work, occupation, and industry--the latter two groups excluding Armed Forces. In addition, a table concerned with the earnings of workers crossing State boundaries in their journey to work shows average earnings in 1959, by class of worker, of workers residing in each State who work in the same State, who work in each specific contiguous State, and who work in noncontiguous States.

In the reports entitled 1960 Censuses of Population and Housing, Census Tracts, place of work and means of transportation to work are shown for census

tracts and summaries are included for each urban place of 25,000 or more and each county, in each of 178 SMSA's and in Middlesex and Somerset Counties in the New York-Northeastern New Jersey Standard Consolidated Area. The place-of-work categories include central cities, other selected cities, remainders of counties containing central cities, each of the additional counties within the respective SMSA's, and the total for areas outside the SMSA of residence.

Additional statistics on journey to work are included in other Volume II and Volume III reports of the 1960 Census of Population which either have already been published or are being planned for publication.

AVAILABILITY OF UNPUBLISHED DATA

There are several sources of unpublished data on place of work and means of transportation to work collected in the 1960 Census. First, statistics corresponding to those presented in chapter C, Volume I, have been tabulated but not published for each urban place of 2,500 to 10,000 and for the rural-farm and rural-nonfarm parts of each county.

Second, more geographic detail on place of work outside the SMSA of residence for workers residing in tracted areas is available in unpublished special table PH-2. A total of not more than 13 separate place-of-work categories is shown in this table, including those specific areas shown in the published tables for census tracts. In addition, the distribution of workers over a 13-category place-of-work listing is available in special table PH-4 for population residing outside tracted areas by residence in (1) wards of cities of 25,000 or more, (2) urban places of less than 25,000, and (3) the remainder of each minor civil division or census county division. Data on means of transportation to work are available for the same areas in this table. Photocopies of special tables PH-2 and PH-4 are available at cost from the Bureau of the Census.

Third, the contents of the present report were prepared by means of tabulating data summaries on place of work. These summaries are available on UNIVAC computer tape and are in the following form: One record is available for every residence-by-place-of-work combination reported in the census in which either residence or place of work was located in an SMSA of 250,000 or more. These records contain information on the number of workers living in a specified area and working in another specified area. The geographic detail is described in the section below on "Journey to work." Moreover, the counts of workers in

each residence-by-place-of-work "stream" are distributed by the characteristics appearing in table 2 of this report, as well as by additional characteristics.

Requests for unpublished data giving a specific description of the figures desired may be made in

writing to the Chief, Population Division, Bureau of the Census, Washington, D.C., 20233. Inquiries concerning unpublished data on computer tape should be transmitted to the Bureau as soon as possible, because tape files are not maintained indefinitely.

DEFINITIONS AND EXPLANATIONS

The definitions and explanations set forth here should be interpreted in the context of the 1960 Censuses, in which data were collected by a combination of self-enumeration, direct interview, and observation by the enumerator. Some of the definitions used in 1960, apart from the main subjects of place of work and means of transportation to work, differ from those used in 1950. These changes were made after consultation with users of census data in order to improve the statistics, even though it was recognized that comparability would be affected.

The definitions below are consistent with the instructions given to the enumerator. As in all surveys, there were some failures to execute the instructions exactly. Through the forms distributed to households, the respondents were given explanations of some of the questions more uniformly than would have been given in direct interviews. Nevertheless, it was not feasible to give the full instructions to the respondents, and some erroneous replies have undoubtedly gone undetected.

More complete discussions of the definitions of population items are given in 1960 Census of Population, Volume I, Characteristics of the Population, Part 1, United States Summary, and in each of the State parts.

JOURNEY TO WORK

Statistics in this report are presented for the working population which consists of persons employed and at work and members of the Armed Forces not sick, on leave, etc. Data on journey to work relate to the calendar week prior to the date of enumeration. This week is not the same for all respondents because not all persons were enumerated during the same week.

These statistics were derived from answers to the following questions on the FOSDIC document:

P28a. If he worked last week ("Yes" in P22)— What city (or town) did he work in last week?		
Not in a city..	<input type="radio"/>	Skip to P28c
This city ---	<input type="radio"/>	
Different city →	Specify	
P28b. If city or town—Did he work inside city limits?		
	<input type="radio"/>	Yes
P28c. What county (and State) did he work in?		
	<input type="radio"/>	No
This county --	<input type="radio"/>	
Different county →	Specify	
	County	AND State
P29. If he worked last week ("Yes" in P22)— How did he get to work? Mark 1 circle for principal means used last week		
<input type="checkbox"/>	Railroad	<input type="checkbox"/>
<input type="checkbox"/>	Subway, elevated	<input type="checkbox"/>
<input type="checkbox"/>	Bus, streetcar	<input type="checkbox"/>
<input type="checkbox"/>	Taxicab	<input type="checkbox"/>
<input type="checkbox"/>	Private auto or car pool	<input type="checkbox"/>
<input type="checkbox"/>	Walk only	<input type="checkbox"/>
<input type="checkbox"/>	Worked at home	<input type="checkbox"/>
<input type="checkbox"/>	Other means	<input type="checkbox"/>

Definitions

Employed persons at work and members of the Armed Forces not sick, on leave, etc.--Employed persons at work comprise all civilians 14 years old and over who were "at work"--those who did any work for pay or profit, or worked without pay for 15 hours or more on a family farm or in a family business. Members of the Armed Forces "... not sick, on leave, etc." consists of persons on active duty with the United States Army, Air Force, Navy, Marine Corps, or Coast Guard except those in an absence status.

Data shown on occupation and industry, however, exclude members of the Armed Forces and thus are directly comparable with data on "employed persons, at work" as shown in other census reports.

Place of work.--This refers to the geographic location in which workers carried out their occupational or job activities. For the purposes of this report, locations of place of residence and place of work are, generally, in terms of specific areas of the following kinds: (1) Central cities of standard metropolitan statistical areas, (2) other cities of 50,000 or more, (3) counties with no separately identified cities or towns, and (4) remainder of counties, in counties with separately identified cities or towns.

Persons working at more than one job were asked to report on the job at which they worked the greatest number of hours during the reference week. Salesmen, deliverymen, and others who work in several places each week were requested to name the place in which they began work each day, if they reported to central headquarters. In cases in which daily work was not begun at a central place each day, the person was asked to report the county in which he had worked the greatest number of hours during the previous week.

Means of transportation to work.--This refers to the principal mode of travel or type of conveyance used by workers in traveling to and from work by civilians at work during the reference week and Armed Forces personnel (except those on leave, sick, etc.). The enumerator was instructed that "principal means" referred to the means of transportation covering the greatest distance, if more than one means was used in daily travel, or to the means of transportation used most frequently, if different means were used on different days. He was further instructed that "railroad" was defined to include commuter and other regular trains operated by railroads, whereas "subway or elevated" was meant to refer to a rapid transit system operating on its own right-of-way. "Bus or streetcar" was defined as referring to public vehicles operating within or between cities on public streets or highways.

The term "public transportation" is applied to a combination of schedule entries on means of transportation and is comprised of "railroad," "subway or elevated," and "bus or streetcar."

Interpreting Statistics on Place of Work

Streams of workers.--Not only the places of work but also the places of residence of civilians at work and members of the Armed Forces were assembled to identify separately each of the following kinds of geographic units:

1. Each city of 50,000 or more (including cities that were expected to achieve this size by 1960).

2. Each central city of a standard metropolitan statistical area not included in 1 above.

3. In conterminous United States, except for Connecticut, Massachusetts, Rhode Island, and the densely settled portions of Maine and New Hampshire, counties, or their remainders in cases where the counties contain separately identified place-of-work areas. In the excepted areas in New England, quasi-counties, comprised of segments of counties resulting from the superimposing of SMSA boundaries, stand in the stead of counties.

4. Incorporated places of 5,000 or more and election districts (or their remainders) in Alaska, and census county divisions in Hawaii.

In this report the records of workers were assembled by geographic unit of residence and by geographic unit of place of work; where the number of workers residing in one area and working in that area or any other was 50 or greater, that "stream" of workers is shown in table 1 provided, of course, that either residence or place of work, or both, was located in an SMSA of 250,000 or more. The "50-worker rule" applies to streams between specific geographic units, between a geographic unit and a county, geographic unit and an SMSA, and between a county and an SMSA. Thus, data may be shown for the stream with 50 or more workers commuting between an SMSA and a county outside the SMSA, although no separate figures are shown for the components of the county in relation to the SMSA because each substream contains less than 50.

In the table 1 presentation for an SMSA, for areas within the SMSA, the "rule of 50" does not apply; that is, all streams among units within the SMSA are shown.

In viewing statistics for the streams for a given SMSA, it should be noted that the category "remainder of county" as a place of work or of residence outside that SMSA refers to a specific area and is not a residual category. For example, in the presentation for the Davenport-Rock Island-Moline, Iowa-Ill., SMSA, 144 workers are reported as working in the SMSA and as residing in Cook County, Illinois (page 30). Note, however, that the following subdivisions of Cook County shown are "Chicago city," with 54 workers, and "Remainder of county," with 68 workers, the sum of which is only 122. There are, then, other components of Cook County in which fewer than 50 workers reside who work in the SMSA in question and are not separately shown apart from the total from Cook County.

Appendix A contains a reference list of the components of all counties with two or more geographic units, as used in this report.¹

In Connecticut, Massachusetts, and Rhode Island, as well as in the densely settled portions of Maine and New Hampshire, further variations of places of work and places of residence are encountered. Identification of place of work (or residence) may be in terms of expressions such as "Fairfield County, non-metropolitan part" or "Bridgeport metropolitan part, Fairfield County." These descriptive titles refer to quasi-counties and indicate whether or not the unit is within an SMSA. These quasi-counties are fully identified by city and town composition in Appendix B.

The reading of table 1 may be simplified by an illustration. On page 30, for the Davenport-Rock Island-Moline, Iowa-Ill., SMSA, the first data line, "residing in SMSA, all workers," shows 101,535 workers who are living in the SMSA, 72,748 of whom use "private automobile or carpool" as means of transportation to work. There are, then, 101,535 workers who live inside that SMSA apart from any consideration of where they work.

The second data line, "working in SMSA," denotes the number of persons who both live and work within the SMSA. There are 101,535 workers living in the SMSA, of whom 95,138 also work in the SMSA. The following seven lines show the breakdown of this group of 95,138 by location of place of work for each of the geographic units found within the SMSA.

Similarly, the line entitled "working outside SMSA" is followed by the external locations of places of work of residents of the SMSA in each instance where at least 50 workers are to be found at work. Note that the external locations may include foreign countries as well as any areas of United States jurisdiction or sovereignty.²

Continuing down the listing for the Davenport-Rock Island-Moline, Iowa-Ill., SMSA, the last subcategory for "working outside SMSA" is "elsewhere," a residual which contains the count of workers in streams not meeting the "50 or more" requirement. Then, the "not reported" category includes all those who were classified as "workers" in the census but for whom information on place of work was insufficient for the purposes of coding or was not reported.

The next block of data lines is similar to the first, but residence and workplace are reversed. Here, the first line, "working in SMSA," refers to the total number of workers at work within the SMSA regardless of where they lived. It does not, however, include persons living in outlying areas of the United States or in foreign countries; that is, it is limited to persons who were included in the 1960 Census enumeration of the 50 States and the District of Columbia.³

¹ For areas in Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island, see Appendix B.

² Areas outside the United States are occasionally designated by residual entries such as "Other West Indies," and "Other Pacific Islands." See Appendix C.

³ Although this report presents data on the number of persons living in, for example, Buffalo, N.Y., and working in Canada, no information on persons living in Canada and working in Buffalo is available.

The following blocks of data proceed upon the same pattern as the first two: For each geographic component of the SMSA a presentation is provided which shows the locations of places of work for workers who are residents of the geographic unit and the locations of places of residence for workers who reported the unit as their place of work.

Metropolitan status and location relationships.-- Selected characteristics of workers living or working in SMSA's of 250,000 or more are presented in table 2. In contrast to the specific streams of workers shown in the first table, the presentation in table 2 is in the form of generalized streams of workers among components of each SMSA and between SMSA components and areas outside the SMSA.

The locations of residence and place of work presented for each SMSA are by central city or ring of the SMSA and outside the SMSA, distinguishing among same and different counties and among central cities, for those SMSA's with more than one central city. Workers living (or working) outside the SMSA are classified as to location in a county of residence (or county of work) contiguous or noncontiguous to the county of work (or county of residence) and, for contiguous counties, whether the county is in another SMSA (metropolitan) or not (nonmetropolitan). A reference list of counties outside each SMSA which are contiguous to counties in SMSA's of 250,000 or more by metropolitan status is presented in Appendix D.

Quality and Limitations of the Data

During the tabulation of statistics on place of work, it was discovered that some enumerators working in counties containing central cities of SMSA's, but outside the cities themselves, had failed to identify correctly these central cities as places of work. For the convenience of the enumerator and the coder, the POSDIC document contained a circle labeled "this city" for indicating that the place of work was in the respondent's city or town of residence. Some enumerators understood this category to refer to a nearby large city and filled the circle when they should have written in the name of that city in P28a. Since the city that actually contained the place of work was frequently a central city of an SMSA, the original data for both tables 1 and 2 were impaired.

After a limited study of the relevant materials, including some of the Household Questionnaires (which gave the respondent's own written reply), it was decided that a simple mechanical edit would tend to improve the statistics. This mechanical edit applies to places for workers living in unincorporated parts of counties containing the central city of an SMSA (or county with a population of 50,000 or more). For these workers, a workplace code of "this city" was used as the largest city in the county. This code was not used in New England, New Jersey, or the townships of Pennsylvania since it was considered likely that the category "this city" was used rather than the town or township rather than the county. For the same reason, in all States, the code was not used for workers living in incorporated places not edited. Finally, codes of "this city" for

workers living in unincorporated areas outside counties containing central cities of SMSA's (or other city of 50,000 or more) were tabulated as "balance of county" since it was not clear what city, if any, was intended.

Later, a national sample of reports of place of work was assembled for the purposes of estimating the magnitude of the error before and after the corrective edit. On a national basis, excluding from consideration the New England States and New Jersey, it appears that the published statistics are substantially better than would have been the case had the corrective edit been omitted. The number of workers residing outside central cities in the balances of central counties and working in the central cities appeared to be considerably understated before the correction and only slightly overstated, in net effect, after the correction. For workers living in incorporated places within central counties or, in Pennsylvania, in urban townships within central counties, there still remains a small understatement of the number of persons whose place of work was in the central city. Moreover, it is probable that there is also some understatement of commuting to central cities from outside the central counties. It was not feasible to estimate the error or take corrective action for these more distant areas. Therefore, it cannot be readily determined whether the total number of commuters to central cities of SMSA's is overstated or understated in the published statistics.

It became apparent during the preparation of statistics for chapter D of Volume I that in a few instances, notably Armed Forces installations, appreciable numbers of reports of place of work in the central city were found among persons living in the ring of SMSA's who had specified, in the means of transportation inquiry, that they "worked at home." On the whole, it is probable that the inconsistencies arose in the incorrect assignment of place of work by the above-described edit to the central city. Although it was not possible to consider retabulation of these data to correct this error, the tabular inconsistencies were removed by assigning the cases to the means-of-transportation category of "not reported" in chapter D. In the present report, a departure from the treatment of statistics on place of work in Volume I has permitted the correction of this error at the expense of generating differences in comparable figures found in the Volume I reports, particularly in those areas with large military installations.

Specifically, the place of work of workers reporting that they worked "at home" in response to the question on means of transportation to work, was allocated to the geographic unit of residence regardless of inconsistent or missing information on place of work. For this reason, then, data presented here depart in different ways from statistics shown in chapter C of Volume I and in the census tract reports on the one hand, and from chapter D, Volume I, on the other.⁴ In chapter C and in the census tract reports, the discrepancy was not recognized, while in

⁴ See the list of corrections in the State parts of Volume I for further details.

chapter D such discrepancies were reconciled as noted above, by showing means of transportation as "not reported."

Statistics shown for SMSA's in New England differ from comparable figures appearing in the census tract reports and in Volume I, chapters C and D. These differences reflect corrections in the distribution of reports on place of work which were not sufficiently specific as to location to permit assembly of data by the quasi-county areas described above. The number of workers shown as "not reported" as to place of work has been increased and the number shown as working outside the SMSA of residence shows a compensating decrease. However, the statistics for areas involved in this modification appear in separately listed categories following the "not reported" data lines in table 1.

Within the present report, minor inconsistencies, which were identified after the tabulation of the data, result from incorrect processing of a small number of cases scattered over most areas. These inconsistencies may be best understood by an illustration:

The number shown in table 1 for the group of workers "residing in Boston city" who were working in Boston is 216,361 (see page 132). This number should be identical to the number shown for the group who were "working in Boston city" and residing in Boston. However, the figure shown in the latter presentation, 216,180, is 181 short of the correct figure found in the former.

For each such inconsistency, statistics shown in the "Residing in ..." blocks are correct while the corresponding statistics shown in the "Working in ..." blocks are incorrect.

Similarly, any discrepancies between statistics shown in the "Residing in ..." blocks in table 1 and the figures derived from corresponding detail in table 2 are attributable to errors in table 2. Carrying out the Boston example, table 2 (p. 182) shows 216,180 workers living and working in the central city of the Boston, Mass., SMSA, as contrasted with the correct figure of 216,361, referred to above, in the block of data in table 1 entitled, "Residing in Boston city."

MEDIAN

The median is presented in connection with the data on earnings. It is the value which divides the distribution into two equal parts, one-half the cases falling below this value and one-half the cases exceeding this value.

A plus (+) or minus (-) sign after the median indicates that the median is above or below that number. For example, a median of \$10,000+ for income indicates that the median fell in the interval "\$10,000 or more."

MEAN (ARITHMETIC)

The mean is shown in the presentation on earnings and wage or salary income. It refers to the dollar value which is equal to the aggregate, or the sum, of

earnings or of wage and salary incomes, divided by the number of workers with earnings or with wage and salary incomes, respectively, in 1959.

URBAN-RURAL RESIDENCE

In general, the urban population comprises all persons living in urbanized areas and in places of 2,500 inhabitants or more outside urbanized areas. More specifically, according to the definition adopted for use in the 1960 Census, the urban population comprises all persons living in (a) places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contain no incorporated municipalities as subdivisions and have either 25,000 inhabitants or more or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile; (d) counties in States other than the New England States, New Jersey, and Pennsylvania that have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more. The population not classified as urban constitutes the rural population.

FARM-NONFARM RESIDENCE

The rural population is subdivided into the rural-farm population, which comprises all rural residents living on farms, and the rural-nonfarm population, which comprises the remaining rural population. In the 1960 Census, the farm population consists of persons living in rural territory on places of 10 or more acres from which sales of farm products amounted to \$50 or more in 1959 or on places of less than 10 acres from which sales of farm products amounted to \$250 or more in 1959. All persons living in group quarters are classified as nonfarm except the relatively few living in workers' quarters (including quarters for migratory agricultural workers) that are located on a farm or ranch.

STANDARD METROPOLITAN STATISTICAL AREAS

Except in New England, an SMSA is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, 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, SMSA's consist of towns and cities, rather than counties.

The population inside SMSA's is further classified as "in central city" and "outside central city." With a few exceptions, central cities are determined according to the following criteria:

1. The largest city in an SMSA is always a central city.

2. One or two additional cities may be secondary central cities on the basis and in the order of the following criteria:

a. The additional city or cities have at least 250,000 inhabitants.

b. The additional city or cities have a population of one-third or more of that of the largest city and a minimum population of 25,000.

AGE

The age classification is based on the age of the person in completed years as of April 1, 1960, as determined from the reply to a question on month and year of birth.

COLOR

The term "color" refers to the division of population into two groups, white and nonwhite. The color group designated as "nonwhite" includes Negroes, American Indians, Japanese, Chinese, Filipinos, Koreans, Hawaiians, Asian Indians, Malaysians, Eskimos, Aleuts, etc. Persons of Mexican birth or ancestry who are not definitely of Indian or other nonwhite race are classified as white.

HOUSEHOLD, GROUP QUARTERS, AND RELATIONSHIP TO HEAD OF HOUSEHOLD

A household consists of all the persons who occupy a housing unit. A house, an apartment or other group of rooms, or a single room, is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live and eat with any other persons in the structure and there is either (1) direct access from the outside or through a common hall or (2) a kitchen or cooking equipment for the exclusive use of the occupants.

All persons who are not members of households are regarded as living in group quarters. Group quarters are living arrangements for institutional inmates or for other groups containing five or more persons unrelated to the person in charge. Most of the persons in group quarters live in rooming houses, college dormitories, military barracks, or institutions. Inmates of institutions are persons for whom care or custody is provided in such places as homes for delinquent or dependent children; homes and schools for the mentally or physically handicapped; places providing specialized medical care for persons with mental disorders, tuberculosis, or other chronic disease; nursing and domiciliary homes for the aged and dependent; and prisons and jails.

For persons in households, several categories of relationship to head of household are recognized in this report:

1. The head of the household is the member reported as the head by the household respondent. However, if a married woman living with her husband is

reported as the head, her husband is classified as the head for the purpose of census tabulations.

2. The wife of a head of a household is a woman married to and living with a household head. This category includes women in common-law marriages as well as women in formal marriages.

3. Other member of household is comprised of the following:

a. A child of the head: A son, daughter, stepchild, or adopted child of the head of the household.

b. An other relative of the head: A person related to the head of the household by blood, marriage, or adoption, but not included specifically in another category.

c. A nonrelative of the head: Any member of the household who is not related to the household head. This category includes lodgers (roomers and partners, relatives of such persons, and foster children) and resident employees (maids, hired farm hands, etc.).

FAMILY

A family consists of two or more persons in the same household who are related to each other by blood, marriage, or adoption; all persons living in one household who are related to each other are regarded as one family. In a primary family, the head of the family is the head of a household. Other families are secondary families. A "husband-wife" family is a family in which the head and his wife are enumerated as members of the same household.

OCCUPATION AND INDUSTRY

The data on occupation and industry in this report are for employed persons who were at work during the census week and refer to the job held during the week for which employment status was reported. For persons employed at two or more jobs, the data refer to the job at which the person worked the greatest number of hours. The occupation and industry statistics presented here are based on the detailed systems developed for the 1960 Census; see 1960 Census of Population, Classified Index of Occupations and Industries, U.S. Government Printing Office, Washington, D.C., 1960.

INCOME IN 1959

Information on income for the calendar year 1959 was requested from persons 14 years old and over. Earnings are obtained by summing wage or salary income and self-employment income. Wage or salary income is defined as the total money earnings received for work performed as an employee. It represents the amount received before deductions for personal income taxes, Social Security, bond purchases, union dues, etc. Self-employment income is defined as net money income (gross receipts minus operating expenses) from a business, farm, or professional enterprise in which the person was engaged on his own account.

COLLECTION AND PROCESSING OF DATA

COLLECTION OF DATA

Several enumeration forms were used to collect the information for the 1960 Census of Population. A few days before the census date, the Post Office Department delivered an Advance Census Report (ACR) to households on postal delivery routes. This form contained questions which were to be answered for every person and every housing unit. Household members were requested to fill the ACR and have it ready for the enumerator. The census enumerator recorded this information on a form specially designed for electronic data processing by FOSDIC (Film Optical Sensing Device for Input to Computer). The information was either transcribed from the ACR to the complete-count FOSDIC schedule or entered on this schedule during direct interview.

In the densely populated areas, the enumerator left a Household Questionnaire to be completed by each household (or person) in the sample and mailed to the local census office. The population and housing information was transcribed from the Household Questionnaire to a sample FOSDIC schedule. When the Household Questionnaire was not returned or was returned without having been completed, the enumerator collected the missing information by personal visit or by telephone and entered it directly on the sample FOSDIC schedule. In the remaining areas, when the enumerator picked up the ACR, he obtained all the information by direct interview and recorded it directly on the sample FOSDIC schedule.

Soon after the enumerator started work, his schedules were examined in a formal field review. This operation was designed to assure at an early stage of the work that the enumerator was performing his duties properly and had corrected any errors he had made.

More detailed descriptions of the 1960 Census procedures in the collection and processing of the data are given in reports entitled United States Censuses of Population and Housing, 1960: Principal Data Collection Forms and Procedures, 1961; and Processing the Data, 1962, U.S. Government Printing Office, Washington, D.C., 20402.

MANUAL EDITING AND CODING

After the FOSDIC forms had been checked for completeness in the field, they were sent to a central processing office for manual editing and coding and for microfilming. Except where some special problems arose, there was no manual coding of the FOSDIC forms for complete-count data. On the sample forms, the manual operation was limited to those items where coding required the reading of written entries and therefore could not be done effectively by machine. The coding clerks converted the written entries to codes by marking the appropriate circles on the FOSDIC schedules and at the same time were able to correct obviously wrong entries and sometimes supply missing information.

ELECTRONIC PROCESSING

After the enumerators and coders recorded the information by marking the appropriate circles, the schedules were microfilmed. The information on the microfilm was then read by FOSDIC, which converted the markings to signals on magnetic tape. The tape, in turn, was processed in an electronic computer, which was used extensively to edit and tabulate the data and to produce the publication tables.

EDITING

For a majority of items, nonresponses and inconsistencies were eliminated by using the computer to assign entries and correct inconsistencies. In general, few assignments or corrections were required, although the amount varied by subject and by enumerator.

The assignment of an acceptable entry by machine was based on related information reported for the person or on information reported for a similar person in the immediate neighborhood. For example, in the assignment of age in the complete-count tabulations, the computer stored reported ages of persons by sex, color or race, household relationship, and marital status; each stored age was retained in the computer only until a succeeding person having the same characteristics and having age reported was processed through the computer; this stored age was assigned to the next person whose age was unknown and who otherwise had the same characteristics. This procedure insured that the distribution of ages assigned by the computer for persons of a given set of characteristics would correspond closely to the reported age distribution of such persons as obtained in the current census.

The extent of the allocations for nonresponse or for inconsistency is shown for the United States and for States, places of 10,000 inhabitants or more, and other areas in appendix tables in chapters B, C, and D of 1960 Census of Population, Volume I, Characteristics of the Population.

Specific tolerances were established for the number of computer allocations acceptable for a given area. If the number was beyond tolerance, the data were rejected and the original schedules were re-examined to determine the source of the error. Correction and reprocessing were undertaken as necessary and feasible.

ACCURACY OF THE DATA

Human and mechanical errors occur in any mass statistical operation such as a decennial census. Such errors include failure to obtain required information from respondents, obtaining inconsistent information, recording information in the wrong place or incorrectly, or otherwise producing inconsistencies between entries on interrelated items on the field documents. Sampling biases occur because some of the enumerators fail to follow the sampling instructions. Clerical coding and editing errors occur, as well as errors in the electronic processing operation.

Careful efforts are made in every census to keep the errors in each step at an acceptably low level. Review of the enumerator's work, verification of manual coding and editing, checking of tabulated figures, and ratio estimation of sample data to control totals from the complete count reduce the effects of the errors in the census data.

In addition to the variations discussed in the section on quality and limitations of the data, very minor differences between tables in this report or between corresponding data in this report and chapters C and D of Volume I, Characteristics of the Population, result from imperfections in the electronic equipment. No attempt has been made to reconcile these minor discrepancies.

Some innovations in the 1960 Censuses reduced errors in processing and others produced a more con-

sistent quality of editing. The elimination of the card-punching operation removed one important source of error. The extensive use of electronic equipment insured a more uniform and more flexible edit than could have been accomplished manually or by less intricate mechanical equipment. It is believed that the use of electronic equipment in the 1960 Censuses has improved the quality of the editing compared with that of earlier censuses but, at the same time, it has introduced an element of difference in the statistics.

A group of reports designated Evaluation and Research Program Series will deal with the methods, results, and interpretation of a group of evaluation and research studies of the 1960 Censuses of Population and Housing. A report entitled The Post-Enumeration Survey: 1950, Technical Paper No. 4, presents evaluative material on the 1950 Census.

SAMPLE DESIGN AND SAMPLING VARIABILITY

SAMPLE DESIGN

For persons in housing units at the time of the 1960 Census, the sampling unit was the housing unit and all its occupants; for persons in group quarters, it was the person. On the first visit to an address, the enumerator assigned a sample key letter (A, B, C, or D) to each housing unit sequentially in the order in which he first visited the units, whether or not he completed an interview. Each enumerator was given a random key letter to start his assignment, and the order of canvassing was indicated in advance, although these instructions allowed some latitude in the order of visiting addresses. Each housing unit which was assigned the key letter "A" was designated as a sample unit and all persons enumerated in the unit were included in the sample. In every group quarters, the sample consisted of every fourth person in the order listed.

Although the sampling procedure did not automatically insure an exact 25-percent sample of persons or housing units in each locality, the sample design was unbiased if carried through according to instructions; and, generally, for large areas the deviation from 25 percent was found to be quite small. Biases may have arisen, however, when the enumerator failed to follow his listing and sampling instructions exactly.

RATIO ESTIMATION

The statistics based on the sample of the 1960 Census returns are estimates that have been developed through the use of a ratio estimation procedure. This procedure was carried out for each of 44 groups of persons in each of the smallest areas for which sample data are published.⁵ (For a more complete discussion of the ratio estimation procedure, see 1960 Census of Population, Volume I, Characteristics of the Population, Part 1, United States Summary.)

These ratio estimates reduce the component of sampling error arising from the variation in the size of household and achieve some of the gains of strati-

fication in the selection of the sample, with the strata being the groups for which separate ratio estimates are computed. The net effect is a reduction in the sampling error and bias of most statistics below what would be obtained by weighting the results of the 25-percent sample by a uniform factor of four. The reduction in sampling error is trivial for some items and substantial for others. A by-product of this estimation procedure, in general, is that estimates for this sample are consistent with the complete count with respect to the total population and for the subdivisions used as groups in the estimation procedure.

SAMPLING VARIABILITY

The figures from the 25-percent sample tabulations are subject to sampling variability, which can be estimated roughly from the standard errors shown in tables A and B. These tables⁶ do not reflect the effect of response variance, processing variance, or bias arising in the collection, processing, and estimation steps. Estimates of the magnitude of some of these factors in the total error are being evaluated and will be published at a later date. The chances are about 2 out of 3 that the difference due to sampling variability between an estimate and the figure

⁵ Estimates of characteristics from the sample for a given area are produced using the formula:

$$x' = \sum_{i=1}^{44} \frac{x_i Y_1}{Y_i}$$

where x' is the estimate of the characteristic for the area obtained through the use of the ratio estimation procedure, x_i is the count of sample persons with the characteristic for the area in one (i) of the 44 groups, Y_1 is the count of all sample persons for the area in the same one of the 44 groups, and Y_i is the count of persons in the complete count for the area in the same one of the 44 groups.

⁶ These estimates of sampling variability are based on partial information on variances calculated from a sample of the 1960 Census results. Further estimates are being calculated and will be made available at a later date.

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 $2\frac{1}{2}$ times the standard error. The amount by which the estimated standard error must be multiplied to obtain other odds deemed more appropriate can be found in most statistical textbooks.

Table A shows rough standard errors of estimated numbers up to 50,000. The relative sampling errors of larger estimated numbers are somewhat smaller than for 50,000. For estimated numbers above 50,000, however, the nonsampling errors, e.g., response errors and processing errors, may have an increasingly important effect on the total error. Table B shows rough standard errors of data in the form of percentages. Linear interpolation in tables A and B will provide approximate results that are satisfactory for most purposes.

Table A.--ROUGH APPROXIMATION TO STANDARD ERROR OF ESTIMATED NUMBER
(Range of 2 chances out of 3)

Estimated number	Standard error	Estimated number	Standard error
50.....	15	5,000.....	110
100.....	20	10,000.....	160
250.....	30	15,000.....	190
500.....	40	25,000.....	250
1,000.....	50	50,000.....	350
2,500.....	80		

Table B.--ROUGH APPROXIMATION TO STANDARD ERROR OF ESTIMATED PERCENTAGE
(Range of 2 chances out of 3)

Estimated percentage	Base of percentage					
	500	1,000	2,500	10,000	25,000	100,000
2 or 98.....	1.3	0.9	0.5	0.3	0.1	0.1
5 or 95.....	2.0	1.4	0.9	0.4	0.2	0.1
10 or 90.....	2.8	2.0	1.2	0.6	0.3	0.2
25 or 75.....	3.8	2.7	1.5	0.7	0.4	0.2
50.....	4.4	3.1	1.6	0.8	0.5	0.3

For a discussion of the sampling variability of medians and means and of the method for obtaining standard errors of differences between two estimates, see 1960 Census of Population, Volume I, Characteristics of the Population, Part 1, United States Summary.

Illustration: Table 1 shows that in the Chicago SMSA there are 16,153 workers who reside in Cicero town, work in the SMSA, and travel to work either by private automobile or by carpool. Table A shows that for an estimate of 16,153 the approximate standard error is 197, which means that the chances are about 2 out of 3 that the results of a complete census would not differ by more than 197 from this estimated 16,153. It also follows that there is only about 1 chance in 100 that a complete census result would differ by as much as 492; that is, by about $2\frac{1}{2}$ times the number estimated from table A.