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## POPULATION ESTIMATES

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### ESTIMATES OF THE POPULATION OF THE STANDARD METROPOLITAN AREAS OF HOUSTON, MILWAUKEE, ST. LOUIS, AND WASHINGTON, D. C.: JANUARY 1, 1956

This report presents estimates of the population of the standard metropolitan areas of Houston, Texas; Milwaukee, Wis.; St. Louis, Mo.; and Washington, D. C., by constituent parts, for January 1, 1956. The estimates were prepared at the request of the Federal Civil Defense Administration as part of a larger study relating to civil defense planning sponsored by that agency. The report may serve as a guide as to the types of methods and techniques that can be used to develop current estimates of the population of metropolitan areas where several different kinds of appropriate data are available.

Methodology.--Several relatively standard procedures were used in developing the current estimates of population shown here. All the methods use the 1950 Census as a base and available current series of figures to estimate the population growth or decline since 1950. The choice of method or methods for a particular area was dictated by the scope and quality of the available current data. In order to reduce the amount of error, an average of the results of several independent methods or combination of methods was employed in most instances. In several cases, however, the quality and timeliness of the data available were such that only one procedure was applicable.

Briefly, the methods used were (a) the component method II using vital statistics to measure natural increase and school enrollment

(or school census data) to estimate net migration, (b) vital rates method using data on births and deaths, and (c) dwelling unit method in which the change in the number of occupied dwelling units on the estimate date is estimated from one or more series and this, in turn, is used to estimate the change in population of the area.<sup>1</sup>

The component method II, as used here, involves adding to the 1950 population of the area the natural increase (excess of births over deaths) between April 1, 1950, the date of the last census, and the estimate date, and adding or subtracting an estimate of the net migration for the same period. The latter estimate is obtained by a comparison of the estimated number of children of elementary school age, based on school enrollment (or school census) on the estimate date, with the number of children of this same age expected to survive from the appropriate age groups of 1950. The comparison yields an estimate of a net migration rate for children of school age, and this rate, in turn, becomes the basis for estimating net migration for the population of all ages. This method is used by the Bureau

<sup>1</sup> For an evaluation of several methods of preparing population estimates including the component method II and vital rates, see: Jacob S. Siegel, Henry S. Shryock, Jr., and Benjamin Greenberg, "Accuracy of Postcensal Estimates of Population for States and Cities," *American Sociological Review*, Vol. 19, No. 4, August 1954, pp. 440-446.

of the Census in preparing its annual series of current estimates of State populations.<sup>2</sup> A detailed description of this method was recently published in Current Population Reports, Series P-25, No. 133.

The vital rates method of estimating current population is based on the assumption that changes in the number of births and deaths in an area reflect changes in the size of the population in which the births and deaths occur. Briefly, to compute estimates by this procedure, the ratio of the area death rate to the United States rate in 1950 is applied to the United States rate at the estimate date to obtain an estimate of the area death rate at that date. This latter number is divided into the current number of deaths to residents of the area to provide a current population estimate. A corresponding figure is derived by a similar type of manipulation of births and birth rates. These two figures are then averaged to obtain one population estimate.<sup>3</sup> The ratio of the area rates to the national rates is used in order to reduce the effects of changes in the level of the birth and death rates.

The dwelling unit method of estimating population rests on the assumption that changes in the number of dwelling units in an area reflect changes in the number of inhabitants. The change in the number of dwelling units between 1950 and the estimate date is derived from data on building permits and demolitions, and from data on electric and gas utility connections to residential units. In some instances, such data may be supplemented by local land use surveys and data from tax assessment records. The population on the estimate date is obtained by multiplying the estimated number of occupied dwelling units by the estimated number of persons per occupied dwelling unit on the estimate data. However, changes in the population reflect not only changes in the number of dwelling units but also changes in vacancy rates and in the number of persons per occupied dwelling unit. It is desirable, therefore, to take into account possible changes in these factors between

the benchmark date and the estimate date. In the absence of direct information relating to such changes, however, 1950 Census values may be used.

Thus, 1950 vacancy rates are assumed in the estimates prepared by this technique. Allowances were made, however, for postcensal changes in the number of persons per occupied dwelling unit. It was not believed that the same change had occurred for all the areas. Changes in the average size of households for the central cities may be substantially different from those occurring in the outlying suburban counties. Considerable judgment had to be exercised in determining the average number of persons per occupied dwelling unit on the estimate date. In general, some decline in average size of households was assumed for the central cities on the basis of the 1940-50 trends, whereas 1950 values were used for the surrounding areas.

The dwelling unit procedure outlined above produces estimates of the population in households, and it was necessary as a final step to add in an allowance for the population in quasi households (hotels, large rooming houses, institutions, and the like). For present purposes, the 1950 quasi-household population was used inasmuch as there were no indications for these areas that any substantial changes had occurred in the size of this segment of the population. Where there are indications that appreciable changes have occurred, then current figures for this portion are usually available locally, and appropriate adjustments in the procedure should be made.

The dwelling unit technique is beset with many hazards, and extreme care has to be exercised in its application. Its use here was limited to those areas where the basic data appeared to be exceptionally reliable and complete. Furthermore, the averaging technique tends to eliminate extreme errors and to reduce the dependence of the results on any one set of indicators.

In addition to estimates based on the above independent procedures, one series of estimates was prepared representing a combination of the methods discussed above. In this procedure, school enrollment (or school census) data combined with the component method II technique were used to estimate the population of school age (5 to 17 years of age), birth statistics to estimate the population under 5 years of age (with an allowance for net migration based on the school-age migration rates),

<sup>2</sup> See, for example, Current Population Reports, Series P-25, No. 124, "Estimates of the Population of Continental United States, by Regions, Divisions and States, July 1, 1950 to 1954," October 24, 1955.

<sup>3</sup> More detailed discussions of this method are to be found in: Donald J. Bogue, "A Technique for Making Extensive Population Estimates," Journal of the American Statistical Association, Vol. 45, June 1950, pp. 149-163, and U. S. Bureau of the Census, Current Population Reports, Series P-25, No. 97, p. 2.

and the dwelling unit procedure for the population 18 years and over on the estimate date. On a priori grounds, this procedure has much virtue in that it attempts to relate the basic indicators to the age groups to which they are most applicable.

The estimates were generally developed separately for each of the constituent parts of the metropolitan areas and then summed to obtain an estimate for the standard metropolitan area as a whole. The necessary systematic data were not always available for the estimate date. For example, statistics on school enrollment were available only up through the school year ending June 30, 1955. Thus, in many instances, the estimates had to be projected for several months up to January 1956.

Sources of data.--The basic data necessary to prepare the population estimates by these procedures were provided primarily by local and State agencies. Thus, school enrollment and/or school census data were obtained from the local and State departments of education and from the appropriate parochial school system officials; vital statistics were provided by local and State departments of health. Utility information was provided by the local public utilities serving the areas. Data on residential building permits and demolitions were, in many instances, obtained from such secondary sources as city and county planning commissions, chambers of commerce, and from the research departments of the local newspapers. Such secondary sources were used where the data were already available in a tabulated form convenient for our purposes.

ESTIMATES OF THE POPULATION OF THE HOUSTON (TEXAS), MILWAUKEE (WIS.), ST. LOUIS (MO.), AND WASHINGTON (D. C.)  
STANDARD METROPOLITAN AREAS: JANUARY 1, 1956

[Each estimate has been independently rounded to the nearest thousand (to the nearest hundred for Falls Church city, Va.) from figures computed to the last digit; hence, sum of parts may differ slightly from totals shown. Percentages are based on unrounded numbers]

Standard metropolitan area and constituent parts	Population		Change, 1950 to 1956		Percent distribution	
	January 1, 1956	April 1, 1950 (census)	Number	Per cent	1956	1950
Houston Standard Metropolitan Area (Harris County).....	1,077,000	806,701	+270,000	+33.5	100.0	100.0
Houston city.....	711,000	596,163	+115,000	+19.3	66.0	73.9
Remainder of Harris County.....	366,000	210,538	+155,000	+73.8	34.0	26.1
Milwaukee Standard Metropolitan Area (Milwaukee County).....	975,000	871,047	+104,000	+11.9	100.0	100.0
Milwaukee city <sup>1</sup> .....	711,000	637,392	+74,000	+11.5	72.9	73.2
Remainder of Milwaukee County <sup>1</sup> .....	264,000	233,655	+30,000	+13.0	27.1	26.8
St. Louis Standard Metropolitan Area.....	1,892,000	1,681,281	+211,000	+12.5	100.0	100.0
St. Louis city, Mo.....	841,000	856,796	-16,000	-1.9	44.4	51.0
St. Louis County, Mo.....	571,000	406,349	+165,000	+40.5	30.2	24.2
St. Charles County, Mo.....	35,000	29,834	+5,000	+16.5	1.8	1.8
Madison County, Ill.....	214,000	182,307	+32,000	+17.6	11.3	10.8
St. Clair County, Ill.....	231,000	205,995	+25,000	+12.1	12.2	12.3
Missouri parts, total.....	1,446,000	1,292,979	+154,000	+11.9	76.5	76.9
Illinois parts, total.....	445,000	388,302	+57,000	+14.7	23.5	23.1
Total outside central city.....	1,051,000	824,485	+227,000	+27.5	55.6	49.0
Washington, D.C., Standard Metropolitan Area.....	1,884,000	1,464,089	+420,000	+28.7	100.0	100.0
District of Columbia.....	859,000	802,178	+56,000	+7.0	45.6	54.8
Montgomery County, Md.....	290,000	164,401	+126,000	+76.5	15.4	11.2
Prince Georges County, Md.....	302,000	194,182	+107,000	+55.3	16.0	13.3
Arlington County, Va.....	161,000	135,449	+25,000	+18.8	8.5	9.3
Fairfax County, Va. <sup>1</sup> .....	177,000	98,557	+78,000	+79.4	9.4	6.7
Alexandria city, Va. <sup>1</sup> .....	87,000	61,787	+25,000	+41.1	4.6	4.2
Falls Church city, Va.....	9,300	7,535	+1,800	+23.6	0.5	0.5
Maryland parts, total.....	592,000	358,583	+233,000	+65.0	31.4	24.5
Virginia parts, total.....	434,000	303,328	+131,000	+43.1	23.0	20.7
Total outside central city.....	1,026,000	661,911	+364,000	+55.0	54.4	45.2

<sup>1</sup> The estimates relate to the areas as constituted on the dates shown. Thus, population change due to annexations between 1950 and 1956 is reflected in the estimate.

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