

Racial and Ethnic Diversity in Large Urban Areas in the U.S., 1980-2020

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Abstract

The racial and ethnic diversity of 56 of the largest urban areas has increased dramatically from 1980 to 2020. The average share of the population White dropped from three-quarters to a little over half while the average Latino share nearly tripled. The mean value of an index of diversity jumped from 49 to 74 over the same period. Urban areas with the highest levels of diversity had much less than half of the population White with varying mixes of Blacks, Latinos, and Asians. Areas with the lowest diversity had high percentages of their populations White with one exception (El Paso with a large Latino population). In 1980, average diversity in the suburban periphery was far lower than in the urban core, especially for areas in the Northeast and Midwest. Suburban diversity increased substantially by 2020 in all regions, but remained far lower in the Northeast and Midwest.

Introduction

The United States is rapidly becoming more racially and ethnically diverse. The Census Bureau projects that Whites will constitute less than half of the nation's population by the middle of the 2040s (U.S. Census Bureau 2015). The changes are especially striking in large urban areas; significant numbers have populations that are less than half White. This paper describes the increase in diversity from 1980 to 2020 in those areas using a measure that summarizes diversity among Whites, Blacks, Latinos, and Asians. Changes in diversity are contrasted between the newer suburban periphery of the urban areas and the older urban core.

In the middle of the last century, research on racial diversity emphasized the differences between Whites and Blacks, the largest groups in the population. Much of the attention focused on residential segregation by race. A large literature developed, with major landmarks being books by Taeuber and Taeuber (1965) and Massey and Denton (1993). Some early work addressed segregation by ethnicity, but the populations considered were the foreign-born from different European countries and their children (Lieberson 1962).

With the sizes of the Latino and Asian populations increasing, Massey and Denton (1987) examine residential segregation among all four groups. As their indexes measured segregation between two population groups, this involves the production of large numbers of values for all combinations. Frey and Farley (1996) compute the segregation between each of the groups other than Whites and all others. Massey and Tannen (2018) attempt to deal with the large numbers of results by taking weighted averages of the indexes.

The problems associated with using measures designed for two groups with multiple racial and ethnic groups lead researchers to use diversity indexes producing a single value characterizing the distribution of the population across multiple groups. Diversity is considered high with an even distribution of the population among the groups and low if the population is concentrated in a single group. The measures are used to assess racial and ethnic diversity in multiple ways.

Brown and Sharma (2010) and Pendergrass (2022) are examples of studies that address the diversity of total urban area populations, relating this to segregation within the urban areas. Neighborhood racial and ethnic diversity is also calculated for census tracts. Modarres (2004) maps tract diversity and examines changes over time in Los Angeles. Hipp (2007) looks at the relationship of diversity to crime at the tract level using data for multiple cities. Several studies examine the relationship of neighborhood racial and ethnic diversity to trust and a sense of belonging in Canada (Hou and Wu 2009; Wu, Hou, and Schimmele 2011). Farrell and Lee (2011) use not only the values of diversity for individual tracts but combine these to obtain measures of overall neighborhood diversity for entire metropolitan areas.

Segregation is often considered to be a distinct concept from diversity, a measure of the unevenness in the distribution of racial and ethnic groups in census tracts relative to the distribution in the urban area. Segregation measures for multiple groups are derived using urban area and neighborhood diversity. Iceland (2004) presents measures of both overall neighborhood diversity and urban area segregation. Other studies using such measures of racial and ethnic segregation include Farrell (2008) and Brown and Sharma (2010).

The transition from the focus on Black-White racial differences to the inclusion of other racial and ethnic groups is nicely illustrated by three articles in a journal issue dealing with the existence of stable racial integration. Each establishes criteria for considering a neighborhood to be integrated. Smith (1998) considers only the percentages of the population Black and White, explicitly excluding Hispanics from both groups. Galster (1998) acknowledges the importance of other racial and ethnic groups and then proposes to deal with the problem by using percentages White and non-White with the latter including members of other groups in addition to Blacks. Finally, Ellen (1998) includes non-Hispanic Whites, Blacks, and members of all other racial and ethnic groups taken together.

Others have defined racially-mixed neighborhoods using more inclusive sets of racial and ethnic groups. Denton and Massey (1991) examine changes in the percentages of Whites, Blacks, Latinos, and Asians in tracts in large metropolitan areas from 1970 to 1980. Farrell and Lee (2011) classify tracts using the level of neighborhood racial and ethnic diversity to examine changes in metropolitan areas from 1990 to 2000. Hipp and Kim (2023) develop a measure of persistent racial diversity using tract diversity levels from 1980 to 2010 for Southern California.

A traditional research question has involved the distribution of racial and ethnic groups between the central cities and suburban rings of metropolitan areas. This also begins with a focus on percentages Black and White, with a paper by Sharp and Schnore (1962) an early example. The dominant view is expressed dramatically in the oft-quoted title of the article “Chocolate city, vanilla suburbs” (Farley, *et al.* 1978). Clark (2006, 2007) broadens the focus with one paper addressing the percentages Latino and Asian and the second Blacks. In the book *Diversity Explosion*, Frey (2015) examines the percentage distributions of four racial and ethnic groups at various geographic levels from the nation to central cities and suburbs to segregation at the neighborhood level. Massey and Tannen (2018) describe the dramatic suburbanization of racial and ethnic groups from 1970 to 2010.

In a paper perhaps most similar to the present research, Lichter, Thiede, and Brooks (2023) use a diversity index to examine changes in racial and ethnic population distributions in principal (central) cities and suburbs of Metropolitan Statistical Areas (MSAs) from 1990 to 2020. They show increasing percentages of all groups residing in the suburbs and increasing levels of diversity in the suburbs. The work has a number of problems. Starting with the 1990 census, the definition of central cities (later called principal cities) was expanded beyond the largest city or cities in an MSA to include additional cities having significant employment. This led to the inclusion of cities that most would consider to be suburban such as Arlington, Texas, and Palm Springs, California (Ottensmann 1996). Even the original central cities include widely varying proportions of their metropolitan areas, making comparisons across MSAs problematic. The research also sought to distinguish areas in the suburban ring as inner suburbs, outer suburbs, and the suburban fringe. This was based on whether a county included a portion of a principal city, was not one of these counties but was part of the MSA in 1990, or was added to the MSA later. This ignores the differences in the sizes of counties and MSAs and changes in the definitions of MSAs. Counties in much of the West can be very large. The San Diego MSA consists of a single county and thus cannot have any outlying or fringe counties. Smaller MSAs are also more likely to have only one county. The paper presents maps showing the division of five (large) MSAs into these areas. Atlanta has the nice progression from principal cities to the fringe areas. Chicago and St. Louis have only one place on the periphery where a fringe area is identified, and their

inner suburbs extend the edge of the MSA in multiple places. New York is even worse, with areas of outer suburbs falling between areas of inner suburbs.

This research examines racial and ethnic diversity in large urban areas from 1980 to 2020. The urban areas are defined in a consistent manner not dependent on arbitrary county boundaries like MSAs. This procedure also allows the delineation of the older inner core and new suburban periphery in a way that makes possible consistent comparisons among urban areas (as opposed to the problems with central cities and suburban rings).

The next section describes the urban area dataset that provides the context for this research. The selection of the four racial and ethnic groups, the population data for these groups, and their presentation are addressed next. Two indexes have most often been used to measure diversity. A diversity index is presented in a way that makes its functioning more transparent. This is shown to be equivalent to a version of one of the common indexes. Information on the percentages of the population in the racial and ethnic groups provides context and serves as an introduction to the results on diversity. The diversity results are presented in two sections. The first describes levels and trends in diversity in the entire urban areas. This is followed by the comparison of diversity in the suburban periphery and the urban core.

The *Urban Patterns 2* data

The *Urban patterns 2* dataset includes housing unit counts for census tracts from 1950 to 2020 that have been used to delineate 56 large urban areas in the United States for each census year. Data for 2010 and 2020 are from the Census and the National Historical Geographic Information System (Manson, *et al.* 2022). Data from the censuses from 1970 to 2000 are from a unique dataset from the Urban Institute and Geolytics (2003) with the data normalized to 2000 census tract boundaries. Housing units for 1950 and 1960 are estimated from the data on housing units by year built from later years, taking the numbers built before 1950 and 1960 as the estimates of the numbers present in those years. These estimates include error resulting from changes to the housing stock over time, especially the loss of units, but analyses suggest that the estimates for urban area totals are reasonable for two decades back in time. Census tract boundaries for 2020 are used for the dataset. The census tract relationship files are used to estimate values for the 2020 tracts from data for earlier years. Detailed documentation of the dataset and listings of all data sources are included in Ottensmann (2023a).

Urban areas consist of contiguous census tracts that meet urban criteria. Some large areas of continuous urban tracts include what should reasonably be considered two or more urban areas. Areas in the northeastern United States are a major example. To distinguish separate urban areas, Combined Statistical Areas (CSAs) are used (and Metropolitan Statistical Areas (MSAs) that are not included in a CSA). CSAs are used

rather than the more commonly used MSAs as they better represent the full extent of urban areas. The CSAs are only used to identify the urban areas, such as Philadelphia, New York, and Hartford. The boundaries are established at the locations where the urban areas have become contiguous as they have expanded. The urban areas included in the dataset are the 56 areas with more than 300,000 housing units in 2020.

The criteria defining the urban areas are as close as possible to those being used for delineating the 2020 census Urban Areas, which include what were formerly called Urbanized Areas (U.S. Census Bureau 2022). A census tract is considered to be urban and is included in an urban area if it has a housing unit density greater than 200 housing units per square mile and is contiguous to the urban area. To include urban territory that is nonresidential, a tract is also included if over one-third of its area has impervious surface of 20 percent or more. An additional condition is that a tract is only considered to be urban if it has been designated as urban for the following census year providing a pattern of cumulative expansion of the urban areas. This direction has been chosen rather than the reverse (if urban, then urban later) because the more recent data are considered to be more accurate.

Urban areas include multiple areas of urban territory that were originally separate but that have since growth together. Such areas that are sufficiently large are considered to be urban centers and are included in an urban area with tracts assigned to one of those urban centers. The Dallas-Fort Worth area is an example. As the areas become contiguous, tracts are assigned to the center growing more rapidly toward the other and to provide more continuous, less irregular boundaries. Areas are considered separate urban centers and are included in an urban area if the number of housing units in 2020 exceeds 16 percent of the total units in the urban area. This cutoff was established by identifying as candidates all initially separate areas deemed large enough to potentially be considered urban centers and then setting the threshold. The smallest urban centers in relation to the total size of the urban area are Providence, with Boston; Tacoma, with Seattle; and High Point, with Greensboro and Winston-Salem. Next highest, at 11 percent are Port Charlotte in the Sarasota-Bradenton area and Winter Haven in the Orlando area. The names given to the urban areas include the names of all urban centers that are included.

Studies of urban diversity have frequently considered the distribution of members of racial and ethnic groups in the central city and the remainder of the urban area, however defined. The latter would be referred to as the “ring” or more often the “suburbs.” The basic notion is that the central city encompasses the older portion of the urban area while the suburban ring is the newer, more recently developed area. The problem is that cities are political entities and their boundaries encompass widely varying portions of their urban areas. In some urban areas, territory that had been developed and became a part of the urban area in the nineteenth and early twentieth century are outside the central city, in the area considered to be the suburbs. Conversely,

central cities in other urban areas have been able to continue expanding their boundaries such that they include a large share of more recent development.

The dataset used here allows for the designation of the older and the more recently developed portions of the urban area in a consistent manner. The extent of the urban area in 1940 is delineated using estimates of housing units by census tracts. This is referred to as the urban core. Starting with 1950, that portion of the urban area outside the urban core is considered to be the suburban periphery. Thus the suburban periphery is approximately that part of the urban area developed after World War II, the area often considered to be the suburbs. This urban core-suburban periphery distinction has been used to examine change in the large urban areas (Ottensmann 2023b).

Racial and ethnic groups and data

The identification of the racial and ethnic groups to be used in the research necessarily depends on the classifications used by the census for collecting and reporting the data. This section describes the selection of the four groups and the sources of the data.

The census considers Hispanic or Latino to be ethnic status, asking whether or not respondents identify themselves as members of that group. Those responding yes are all considered to constitute one of the racial and ethnic groups regardless of how they identify as to race. Those not Hispanic or Latino are then potential members of the other racial groups.

The three largest racial groups are those identifying only as Whites, only as African Americans or Blacks, and only as Asians. These are included in the research. The three other single-race groups (which include some other race) each have less than one percent of the United States population in 2020. Those specifying two or more races, allowed since the 2000 census, are only four percent of the population in 2020 and much smaller shares in the prior censuses. As this was not an option for earlier censuses from which data are also used, this group cannot be included.

One modification is made for comparability with the earlier census data. Before 2000, the Native Hawaiian and Other Pacific Islander group was combined with the Asian group and was identified as Asians and Pacific Islanders. So for the censuses from 2000 forward, the Asian group and the Native Hawaiian and Other Pacific Islander group are combined to form an equivalent Asian and Pacific Islander group.

For this research, the distribution of the population by race and ethnicity is considered with respect to the total of the populations in the four groups. In other words, the (very small) population not in these groups is not included. Thus the percentages of the population in the four groups sums to one hundred percent.

The extent of the urban areas in each year have been delineated using census tracts. Data at the tract level are required for the populations in the racial and ethnic

groups to allow for aggregation to the larger areas. Racial and ethnic group populations by census tract for 2000, 2010, and 2020 are from the census via the National Historical Geographic Information System (Manson, *et al.* 2022). The Neighborhood Change Database (Urban Institute and Geolytics 2003) is the source of the data for 1980 and 1990, normalized to 2000 census tract boundaries. The 1970 census was the first in which the question on Hispanic status was asked, but this was done in a way that produced data that was not reliable, and it is not used in this research (Cohn 2010). Hipp and Kim (2023) make the same decision.

For data using the 2000 and 2010 census tract boundaries (which change somewhat at each census), estimates are made for the 2020 tracts. Tract relationship files from the census are used for the estimation following the same procedure used for the urban patterns data as described in the detailed documentation (Ottensmann 2023a).

Several notes on presentation. “Blacks” is used to refer to the group identifying as non-Hispanic African American or Black. In a survey (Sigelman, Tuch, and Martin 2005) members of that group indicated approximately equal preference for the two terms. Black is chosen as the more long-standing descriptor. “Latino” is used for the Hispanic or Latino population. While more favor Hispanic over Latino, half indicated no preference (Pew Research Center 2013). Latino is more inclusive and accurate, encompassing those from Latin America whose native language is not Spanish. The group including Asians and native Hawaiians and other Pacific Islanders is labeled simply “Asians” for brevity and because they constitute the overwhelming majority in most cases. Reference to the more encompassing description will be made when appropriate (as in discussions of Honolulu). The groups are listed in this order, which is descending order of size at the start of the research in 1980.

Descriptions of areas as majority-minority or identification of groups other than White as minorities will not be used in this paper. It becomes confusing and nonsensical to identify a group as a minority when in some situations they constitute a majority of the population. Furthermore, referring to Whites as the majority group (when often they are not) and the other groups as minorities denotes a special status for Whites as compared to the other groups, which is not appropriate. If the terms majority and minority are used, they will refer to the conditions of constituting more than half or less than half of the population.

Measuring diversity

This section presents a continuous measure of racial and ethnic diversity that can be used to measure the overall level of diversity in urban areas and in smaller areas down to the neighborhood level (census tracts). The most commonly used measures of diversity are reviewed first. This is followed by the development of an index in a way

that more clearly illustrates how it is a measure of diversity, which is then shown to be a variant of one of the traditional measures.

Three of the more useful reviews of measures of diversity are White (1988), Reardon and Firebaugh (2002) and Budescue and Budescue (2012). The first two extend their discussions to the measurement of segregation as well. All identify two diversity measures, the entropy index and the interaction index, called the generalized variance by Budescue and Budescue.

Entropy is a concept from information theory developed by Shannon (1948) that is a measure of uncertainty. This is related to diversity as the level of uncertainty as to the group membership of a person selected from a population is zero if the population consists only of members of a single group, minimum diversity. As diversity increases, so does the uncertainty. Theil (1972) extends the application of the concept as a measure of diversity and in these applications the index is sometime referred to as Theil entropy. The formula for the entropy index E is

$$E = \sum_{i=1}^n p_i \log \left(\frac{1}{p_i} \right)$$

where p_i is the proportion of the population in group i out of n groups and $\log ()$ is the natural logarithm. It decreases towards zero as the proportion in one group approaches 1 and increases to a maximum that depends on the number of groups when group proportions are equal.

Of the studies using a diversity index cited in the introduction, Iceland (2004), Modarres (2004), and Farrell and Lee (2011) use the entropy index as a measure of neighborhood diversity. Measures of segregation using an index based on entropy have been used by Iceland (2004), Farrell (2008) and Brown and Sharma (2011), with the latter comparing this to entropy at the urban area level. Entropy can be used as a measure of diversity in other contexts. Reardon, Tun, and Eitle (2000) studied segregation in schools and in an interesting study, Dougherty (2003) considered racial and ethnic diversity in churches.

The interaction index is the probability that two persons chosen at random from a population will be members of different groups. Simpson (1949) proposed the index as a measure of species diversity in an ecosystem. Herfindahl (1950) and Hirschman (1964) used their index as a measure of industrial concentration. In the literature it is most often referred to as the Simpson index, the Herfindahl index, or the Herfindahl-Hirschman index though other names are used as well. The formula for the interaction index I is

$$I = 1 - \sum_{i=1}^n p_i^2$$

The minimum value is zero when the entire population is concentrated in a single group and the maximum value is reached with equal proportions, with that maximum depending on the number of groups. Some versions do not subtract the sum of the squared proportions from one so the value of the index declines as diversity increases.

The interaction index has also been widely used to study racial and ethnic diversity with numerous examples cited in the introduction. Pendergrass (2022) and Lichter, Thiede, and Brooks (2023) measure diversity for urban areas. General studies of neighborhood level diversity are Modarres (2004) and Hipp and Kim (2023). Neighborhood diversity is also used as a predictor of other characteristics, by Hipp (2007) for crime and by Hou and Wu (2009) and Wu, Hou, and Schimmele (2011) for trust and a sense of belonging. Examples employing the interaction index for other forms of diversity include Talen (2005) for neighborhood age and income diversity and Greenberg (1956) for linguistic diversity.

It is easy enough to plug example values for proportions associated with lower and higher levels of diversity into the formulas for the two indexes to demonstrate that values are larger for higher levels of diversity. But in neither case is it especially obvious from looking at the formulas how the indexes are actually capturing this variation in diversity. An approach making the measurement of diversity more transparent is proposed.

A criterion for a measure of diversity, met by both the entropy and interaction indexes, is that maximum diversity is achieved with equal proportions of the population in each of the groups (White 1986; Reardon and Firebaugh 2002; Budescu and Budescu 2012). This intuitive notion is taken as the starting point for developing the index of diversity. Equal proportions in all groups implies that the proportions are all equal to $1/n$, where n is the number of groups. Then the difference between the proportion in each group and $1/n$ is a measure of the contribution of that group to the departure from maximum diversity. These differences will be both negative and positive, so they are squared and summed to get a measure of the total departure from maximum diversity,

$$\sum_{i=1}^n \left(p_i - \frac{1}{n} \right)^2$$

This sum can vary from zero for maximum diversity to $1 - 1/n$ when the entire population is concentrated in a single group. To norm this to range from zero to one, multiply by the inverse of that maximum. Then subtract from one so the index increases

with greater diversity, ranging from zero for concentration in a single group to one for equal proportions, maximum diversity. The formula for the diversity index D is

$$D = 1 - \frac{n}{n-1} \sum_{i=1}^n \left(p_i - \frac{1}{n} \right)^2 = 1 - \frac{n}{n-1} \left(\sum_{i=1}^n p_i^2 - \frac{1}{n} \right)$$

The first expression shows the index as one minus the normed sum of the squared departures from maximum diversity. The second includes the sum of the squared proportions included in the interaction index. And the term subtracted from one is that sum of squared proportions normed to range from zero to one. So this diversity index is equivalent to the interaction/Simpson/Herfindahl-Hirschman index adjusted to vary between zero and one.

In this research the values for the diversity index are multiplied by one hundred for presentation. Minimum diversity, the population concentrated in a single group, still has the value of zero. Equal proportions in each group is maximum diversity with a value of one hundred.

Percentages in racial and ethnic groups

This section examines the percentage distribution of the population in the four racial and ethnic groups to set the context for looking at diversity. Table 1 shows the mean percentages in each group across the 56 large urban areas from 1980 to 2020. The changes over the forty-year period are striking. The average share White drops from about three quarters of the population to just over half. In 1980, only three urban areas had less than fifty percent of their populations White—Honolulu, El Paso, and San Antonio. By 2020, 19 areas, one-third, were less than half White. (Honolulu is the area where it is important to offer the reminder that the category Asian includes Asians plus Native Hawaiians and other Pacific Islanders.)

Latinos and Asians experienced the larger increases in population share. Hispanics went from less than eight percent of the population to over 20 percent, with their share overtaking Blacks in 2010. Asians, the smallest group, saw the share more than triple from 2.6 percent to 7.9 percent. The larger increases for these groups are associated with the faster growth of urban areas. The correlations of the change in the total urban area population from 1980 to 2020 to the changes in the percent Latino and Asian were 0.59 and 0.48. The change in percent White was inversely related to change in population with a correlation of -0.65.

Figure 1 shows the mean shares of the population from 1980 to 2020 for the racial and ethnic groups. It dramatically illustrates the decline in the mean percent of the population White for the average urban area and the increases in the shares for the

Table 1. Mean percent of population in racial and ethnic groups, 1980-2020.

Year	Percent White	Percent Black	Percent Latino	Percent Asian
1980	74.3	15.5	7.7	2.6
1990	71.0	15.8	9.4	3.8
2000	64.8	16.4	13.8	5.0
2010	59.2	16.7	17.8	6.3
2020	55.0	16.6	20.4	7.9

other three groups. The mean share of the population Black remains relatively steady over the period, increasing only slightly. While Latinos and Asians on average accounted for just over ten percent of the mean share of the population in 1980, numbers increased such that they constituted nearly thirty percent in 2020.

The percentages displayed in Table 1 are the mean values across the 56 urban areas. The values for the individual areas vary greatly. Table 2 gives additional statistics

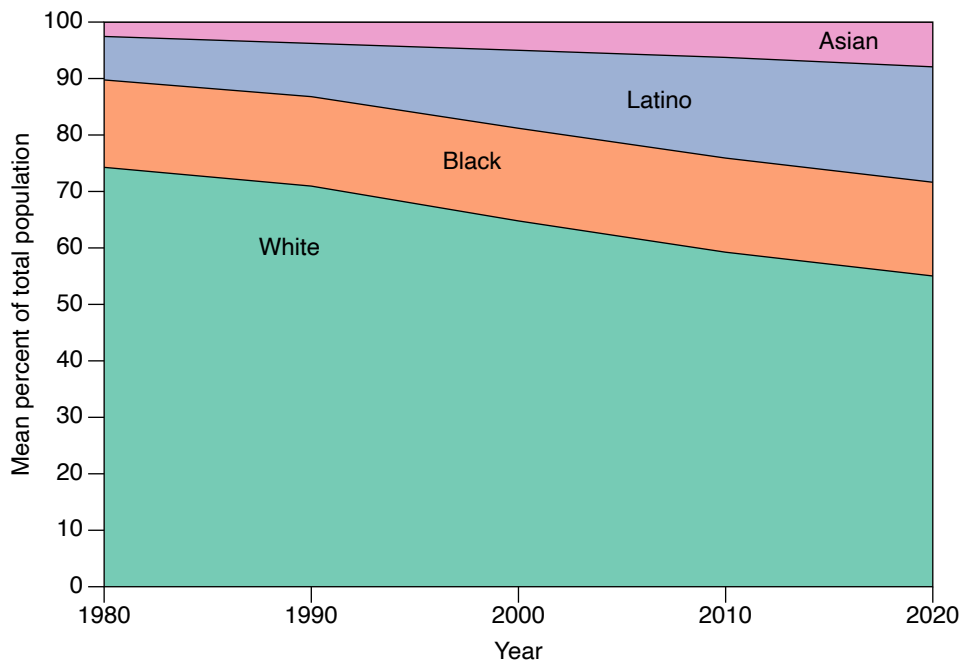


Figure 1. Area graph of mean percent of population in racial and ethnic groups, 1980-2020.

Table 2. Summary statistics for percent in racial and ethnic groups, 2020.

	Mean	Minimum	First quartile	Median	Third quartile	Maximum
Percent White	55.0	15.3	44.7	57.0	67.6	81.5
Percent Black	16.6	10.9	7.2	15.8	21.8	53.1
Percent Latino	20.4	15.8	10.7	14.1	26.6	84.6
Percent Asian	7.9	9.5	3.9	5.2	8.9	65.8

for the percentages for the four racial and ethnic groups in 2020. Percent White and percent Latino have the largest ranges, from minimum values of about 15 percent to maximum values over 80 percent. Percent Black ranges from 11 to 53 percent and percent Asian from 4 to 66 percent. The extent of these ranges is influenced by the presence of outliers, some quite extreme. The maximum percent Asian is 66 percent while the third-highest area is 19 percent Asian. For Latinos, the high of 84 percent is again well above the third-highest value of 53 percent, and for Blacks, the comparable figures are 53 and 37 percent. The outliers, not as extreme, for Whites are at the low end of the distribution. The minimum of 11 percent can be compared with 29 percent for the urban area that is the third lowest.

Casual inspection of the data suggests that the percentages in the four racial and ethnic groups vary by the region of the country. Table 3 gives the mean percentages for the urban areas in each region. The four census regions are used with one exception. The census puts the Washington-Baltimore area in the South. As it is part of the huge, nearly continuous area of urban development extending to north of Boston, the area is considered to be in the Northeast in the current research.

Table 3. Mean percent for racial and ethnic groups by region, 2020.

	Northeast	Midwest	South	West
Percent White**	62.0	66.2	50.6	49.5
Percent Black***	16.8	18.2	21.8	5.5
Percent Latino*	13.7	10.2	22.9	28.8
Percent Asian**	7.5	5.3	4.8	16.2

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Mean percent White is significantly higher in the Northeast and Midwest, lower and nearly identical in the South and West. Urban areas in the South have the highest average percent black while the mean for the West is by far the lowest among the four regions. Urban areas in the West have the highest mean percent Latino and Asian. Second highest for Latino is the South and second highest for Asian is the Northeast. Differences in the means across regions are all statistically significant.

Diversity of large urban areas

This section uses the diversity index to examine levels and changes in the racial and ethnic diversity of the 56 large urban areas from 1980 to 2020. It begins with consideration of summary statistics for all of the areas, followed by a look at individual urban areas with high, medium, and low levels of diversity. Simple exploratory models examining the relationship of some basic urban area characteristics to diversity and change conclude the section.

Table 4 presents summary statistics for the diversity index for the urban areas from 1980 to 2020. Simply looking at the means shows the great increase in diversity over the period from 49 to 74. The statistics for other aspects of the distribution are also generally rising. The diversity values for the individual urban areas vary widely—36 to 93, a 57 point difference in 2020.

The graph in Figure 2 illustrates the distribution of urban area diversity in each year and how that changes over time. The graph includes lines for the median, the minimum and maximum, and the values for the first and third quartiles. The area between the first and third quartiles, encompassing the middle half of the urban areas, is shaded orange. The yellow areas between the quartiles and the extremes include the top and bottom quarters of the distribution.

Table 4. Summary statistics for diversity index, 1980-2020.

<i>Year</i>	<i>Mean</i>	<i>Minimum</i>	<i>First quartile</i>	<i>Median</i>	<i>Third quartile</i>	<i>Maximum</i>
1980	49.2	14.1	36.9	50.4	64.2	77.0
1990	54.1	22.1	43.6	56.1	67.9	86.7
2000	62.0	31.9	50.6	63.0	74.5	88.8
2010	68.9	36.0	59.9	70.5	78.9	92.1
2020	73.8	36.0	66.6	75.0	83.5	92.9

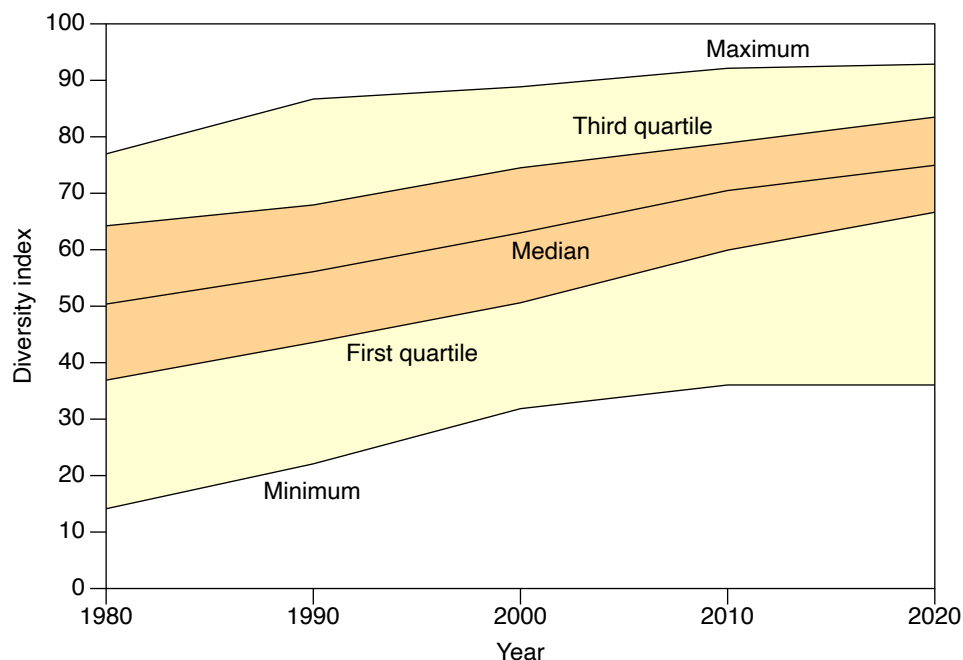


Figure 2. Distribution of diversity index, 1980-2020.

The half of the urban areas in the middle between the first and third quartile steadily rises and also narrows, ranging from 37 to 64, a 27 point difference in 1980, to 67 to 84, a 17 point difference in 2020. The increase in the maximum slows in later decades and the gap between the third quartile and the maximum declines. This slowing was likely inevitable as the value approaches the maximum possible value for diversity of 100. Over time the growth in the minimum level of diversity declines and then ceases, widening the gap with the first quartile. This resulted from a small number of urban areas that became outliers as will be seen when looking at individual areas at the extremes.

Results for individual urban areas illustrate the relationship of the distribution of the population among the racial and ethnic groups to the value of the diversity index. Table 5 gives the diversity and the percent in the groups for areas with varying levels of diversity. It includes the six areas with the highest diversity, a little over ten percent of all areas, the six areas with the lowest diversity, and the six areas in the middle, just above and below the median.

The first thing to note is the percent of the population White. Less than half of the population in the most diverse areas is White, ranging from 33 to 43 percent. The medium diversity areas are 52 to 62 percent White. With one dramatic exception, the low diversity areas are the most White, ranging from 73 to 82 percent. The exception is El Paso, where Whites are only 11 percent of the population. The El Paso area is 85

Table 5. Urban areas having varying levels of diversity with percent in racial and ethnic groups, 2020.

<i>Urban area</i>	<i>Diversity index</i>	<i>Percent White</i>	<i>Percent Black</i>	<i>Percent Latino</i>	<i>Percent Asian</i>
San Francisco-Oakland-San Jose	92.9	35.3	6.2	24.8	33.6
Houston	92.6	32.5	18.5	39.6	9.4
Dallas-Fort Worth	92.0	41.2	17.7	31.7	9.4
Washington-Baltimore	92.0	42.7	29.9	16.2	11.3
New York	91.7	44.7	15.9	26.6	12.8
Las Vegas	91.5	40.9	13.3	33.8	12.0
...
Phoenix	75.7	56.7	5.9	32.4	5.0
Milwaukee	75.4	61.0	19.8	14.5	4.7
Tucson	75.2	51.9	4.0	40.4	3.6
Seattle-Tacoma	74.7	62.0	6.9	12.4	18.7
Oklahoma City	74.2	62.0	13.6	19.8	4.6
Tampa-St Petersburg	73.9	61.8	12.2	21.7	4.3
...
Buffalo	59.1	72.5	15.5	6.8	5.2
Cincinnati	55.3	74.4	16.5	5.1	3.9
Salt Lake City-Provo	53.5	75.0	1.5	18.4	5.2
Sarasota-Bradenton	48.2	78.5	5.9	13.5	2.1
Pittsburgh	42.6	81.5	11.7	2.7	4.1
El Paso	36.0	11.2	2.8	84.6	1.4

percent Latino, accounting for that area having the lowest diversity of all of the urban areas.

The distribution of the population among the three other groups shows how the individual urban areas achieve their level of diversity. For the areas with the lowest diversity other than El Paso, the answer is simple—low percentages of the population in all three of the groups other than Whites. Salt Lake City-Provo has the highest proportion in another group, 18 percent Latino, but this is combined with 5 percent

Asian and just 1.5 percent Black to produce the fourth-lowest level of diversity among the urban areas.

The high diversity areas mostly have relatively high percentages for all three groups other than Whites. The exception is San Francisco-Oakland-San Jose with only 6 percent Black, but this is offset by the very high 34 percent Asian. None of the other areas have an Asian share close to that, but all are higher than the mean for all of the urban areas. Among the other urban areas, Washington-Baltimore has a much higher share of the population Black than Latino. In the other four areas, the Latino share of the population is larger.

A not dissimilar pattern is present among the areas with medium levels of diversity, though obviously with smaller shares in the groups other than Whites. For Seattle-Tacoma, the Asian population is the largest. Milwaukee has the highest percent Black. For the remaining four areas, the Latino population is larger than the Black population, though the extent of the difference varies. All of these results highlight the degree to which the growing Latino population influences levels of racial and ethnic diversity in these urban areas.

The next step is the examination of the relationship between diversity and change to a small set of urban area characteristics. This is exploratory analysis, focusing on a limited set of variables to reduce the possibility of statistically significant results being obtained solely by chance. The characteristics of the urban area considered include the population size and change in size from 1980 to 2020 and the racial and ethnic makeup of the urban areas and change. Linear regression is used to look at the relationships to diversity in 2020 and to the change in diversity from 1980 to 2020. For 2020 diversity, size and percent in the racial and ethnic groups in 2020 are potential predictors. The model predicting change in diversity from 1980 to 2020 uses population and percent in the groups in 1980.

The models presented in Table 6 predicting diversity in 2020 and the change in diversity from 1980 to 2020 include as predictors those variables that are statistically significant. The first observation is that the population of the urban area was not a significant predictor of either diversity measure. This is worth noting as population size is associated with very many characteristics of urban areas. The change in population from 1980 to 2020 is positively related to diversity in 2020. This is reasonable as urban areas growing more rapidly have greater possibilities for changing the racial and ethnic composition of their populations.

The percent of the population White in 2020 is negatively related to the level of diversity, which is consistent with the observations on the characteristics of areas with high and low levels of diversity. Having a population that was more Black was associated with greater diversity, as was the increase in the percent Asian from 1980 to 2020.

Table 6. Exploratory models predicting diversity in 2020 and change in diversity, 1980-2020.

<i>Independent variable</i>	<i>Diversity index 2020</i>	<i>Change in diversity 1980-2020</i>
Change total population 1980-2020	3.089 **	- -
Percent White 2020/1980	-0.229 **	0.562 ***
Percent Black 2020/1980	0.485 ***	- -
Percent Latino 2020/1980	- -	-0.465 ***
Change percent White 1980-2020	- -	-0.890 ***
Change percent Asian 1980-2020	1.272 ***	- -
Constant	67.517 ***	-30.668 ***
<i>R</i> ²	0.642 ***	0.900 ***

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

For the change in diversity from 1980 to 2020, the percent White in 1980 was positively related to the change in diversity. Starting with more Whites at the beginning of the period affords greater possibilities for decline and the increase in diversity. In a similar fashion, percent Latino and Asian in 1980 are associated with smaller increases in diversity. Starting with smaller populations in these groups provides more opportunity for their shares to increase and therefore greater gains in diversity.

Diversity in the suburban periphery and urban core

As discussed in the introduction, longstanding attention has focused on the lower levels of racial and ethnic diversity in the suburbs. This has been examined using the central city-suburb division of Metropolitan Statistical Areas. Because of the arbitrary nature of central city boundaries, the division of the urban areas between the urban core, defined as the extent of the urban area in 1940, and the suburban periphery, the area outside the core, is used to examine the issue of suburban diversity here.

Table 7 gives the mean diversity levels in the suburban periphery and the urban core from 1980 to 2020. The gap in 1980 is large, with average diversity in the suburbs at 36 compared to 61 in the urban core. From 1980 to 2020, mean diversity increases in both areas (as it does in the urban areas as a whole). But the increases are much greater in the suburban periphery such that by 2020 the difference had narrowed to 70 in the suburbs versus 77 in the core. The graph in Figure 3 illustrates the trends in the two areas, showing the convergence in average diversity levels.

Table 7. Mean diversity in the suburban periphery and urban core, 1980-2020.

Year	Mean diversity index		
	Entire urban area	Suburban periphery	Urban core
1980	49.2	36.3	61.3
1990	54.1	43.2	66.2
2000	62.0	53.7	70.7
2010	68.9	63.2	73.8
2020	73.8	69.6	76.6

The relationship between diversity in the suburbs and diversity in the core is measured for each urban area using the ratio of the suburban diversity to the urban core diversity. Table 8 provides summary statistics for the suburb-core diversity ratios for each census year from 1980 to 2020. The mean increases from 0.59 to 0.93 over the period. The median in 2020 is actually slightly higher at 0.97, so for the urban area in the middle of the distribution, suburb and core diversity are nearly equal. All of the values

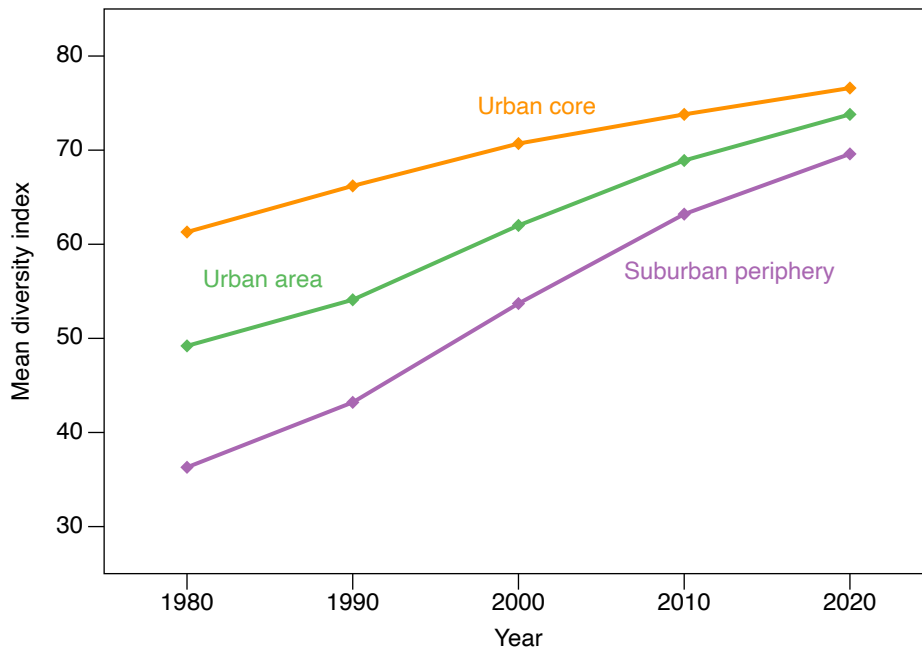


Figure 3. Mean diversity in the suburban periphery and urban core, 1980-2020.

Table 8. Summary statistics for suburban periphery-urban core diversity ratio, 1980-2020.

Year	Mean	Minimum	First quartile	Median	Third quartile	Maximum
1980	0.59	0.21	0.36	0.55	0.73	2.34
1990	0.67	0.23	0.42	0.58	0.85	2.66
2000	0.79	0.24	0.51	0.77	0.96	2.43
2010	0.89	0.31	0.65	0.91	1.05	2.25
2020	0.93	0.40	0.74	0.97	1.08	1.70

for the distribution except the maximum likewise increase steadily over the period. The increases in the third quartile show that by 2010, over one quarter of the urban areas have higher levels of diversity in the suburbs than in the core.

The large variation in the suburb-core diversity ratios again makes it useful to consider the racial and ethnic composition of the urban areas having the highest and lowest ratios, with that information in Table 9. In five of the six areas with the highest suburb-core ratios the percent White ranges from well below average to extremely low. The three areas with the highest ratios have a majority of the population in a single group, Latino for El Paso and San Antonio, Asian and Native Hawaiian and Other Pacific Islander for Honolulu. These areas have below-average diversity for the entire urban area. Orlando and Miami-Fort Lauderdale-West Palm Beach have significant Black populations in addition to Latinos and above-average diversity. Portland is the outlier—very White with an even lower level of diversity in the core than in the suburbs.

The areas with the lowest suburb-core diversity ratios all have large shares of their population White and correspondingly low levels of diversity in the urban area. With respect to the percent White, the level of diversity, and the suburb-core ratio, these areas look very much like the average urban area in 1980, prior to the increases in diversity. Five of the six are older urban areas in the Northeast and Midwest. Sarasota-Bradenton is the exception.

With the areas having the lowest core-suburban diversity ratios also having low levels of diversity, the question arises as to the relationship between the ratio and diversity. There is a fairly weak relationship in 2020 with a positive correlation of 0.29, significant at the 0.05 level. But the departure from this is highlighted by San Francisco-Oakland-San Jose, the area with the highest level of diversity in 2020 having the suburb-core ratio literally at the median.

Table 9. Urban areas having highest and lowest levels of suburban periphery-urban core diversity ratios with percent for racial and ethnic groups in the urban area, 2020.

<i>Urban area</i>	<i>Suburb-core diversity</i>	<i>Percent White</i>	<i>Percent Black</i>	<i>Percent Latino</i>	<i>Percent Asian</i>
El Paso	1.70	11.2	2.8	84.6	1.4
San Antonio	1.61	29.4	7.7	59.4	3.5
Honolulu	1.33	21.1	2.4	10.7	65.8
Orlando	1.22	45.9	15.7	33.9	4.5
Miami-Ft Lauderdale-W Palm Beach	1.17	32.3	19.2	45.8	2.7
Portland	1.17	71.5	3.7	15.1	9.7
...
Omaha	0.59	72.1	9.5	14.0	4.4
Sarasota-Bradenton	0.58	78.5	5.9	13.5	2.1
Cleveland-Akron	0.52	71.0	20.0	5.9	3.1
Pittsburgh	0.47	81.5	11.7	2.7	4.1
Rochester	0.46	67.5	17.1	10.8	4.7
Buffalo	0.40	72.5	15.5	6.8	5.2

The list of the urban areas with the highest and lowest suburb-core diversity ratios shows differences by region. All of the six highest are in either the South or West. And the lowest areas are in the Northeast and Midwest, with one exception. Table 9 gives the means by region for diversity in the suburban periphery and urban core and the suburb-core ratio for 1980 and 2020.

All of the means for the Northeast and Midwest are very similar, as are the means for the South and West. The differences are striking. In 1980, average suburban diversity in the Northeast and Midwest are both about 20, while suburbs in the South and West are far more diverse, both in the mid-40s. Mean suburban diversity climbs in all regions from 1980 to 2020, with the increases much higher in the Northeast and Midwest. But the large gap between the two pairs of regions persists, with suburban diversity in the Northeast and Midwest at 56 and 58 compared to 75 and 77 in the South and West. The differences in the means are highly statistically significant in both years.

Diversity in the urban core across regions could not have been more different. Average diversity in 1980 in the Northeast and Midwest is slightly lower than in the

Table 9. Mean diversity in suburban periphery and urban core and mean core-periphery ratio by region, 1980 and 2020.

	<i>Northeast</i>	<i>Midwest</i>	<i>South</i>	<i>West</i>
Suburb diversity 1980***	19.7	19.6	45.5	43.6
Suburb diversity 2020***	55.7	58.1	75.4	77.1
Urban core diversity 1980	56.2	57.1	64.7	61.8
Urban core diversity 2020	84.0	80.0	73.6	74.7
Suburb-core ratio 1980***	0.34	0.34	0.74	0.69
Suburb-core ratio 2020***	0.65	0.73	1.06	1.04

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

South and West. By 2020 this had reversed, with core diversity in the Northeast and Midwest slightly higher. The differences are not statistically significant.

The results of this variation, especially in suburban diversity, are the differences in the suburb-core diversity ratios. And while the mean diversity ratios increase in all regions by 2020, the gaps between the regions remains remarkably similar. In 1980, differences between the Northeast and Midwest and the South and West are 0.35 and 0.40. In 2020, differences ranged from 0.31 to 0.41. It is also noteworthy that by 2020, suburban diversity in the South and West increases relative to the core such that in the average urban area, the suburbs are actually more diverse, with mean ratios greater than one. And differences in the mean ratios are clearly statistically significant.

Conclusions

The large urban areas have become much more racially and ethnically diverse over the forty-year period from 1980 to 2020. Just looking at the distribution of the population among the four groups, the average urban area went from being nearly three-quarters White to just slightly over half. Most of the shift involved large increases in the percentages of the population Latino and Asian. Individual urban areas vary greatly, but the most of the urban areas saw shifts in this direction.

A diversity index provides a single value for diversity that measures the extent to which shares in the population approach equality, with zero diversity representing the concentration of the population in a single group. The trend in diversity is consistently upward. The mean value for the diversity index rose from 49 in 1980 to 74 in 2020. Again, while urban areas vary a great deal, all but three of the areas saw increases in diversity over the period.

The mix of the racial and ethnic groups leading to different levels of diversity differs for urban areas. The six areas with the highest levels of diversity necessarily have lower shares of the White population and more of the population in other groups. Significant percentages each of the other groups were generally but not always required to achieve high diversity. For some areas, the share of one of the groups—Blacks, Latinos, or Asians—was especially high while other areas saw a more balanced distribution among those groups.

At the other extreme, urban areas with the lowest levels of diversity had high proportions of their population White with one notable exception. El Paso had the lowest diversity resulting from its largely Latino population.

An exploratory analysis of the relationship of diversity in 2020 and the change in diversity yields a few interesting results. Neither the level of diversity nor its change over the period are significantly related to the population size of the urban area. The increase in population from 1980 to 2020 is positively related to diversity in 2020. Percent White is inversely related to diversity in 2020 as expected but the percent in 1980 is positively related to the change in diversity, likely because a higher White population in 1980 yielded more opportunity for decline and increase in diversity. For a similar reason, percent Latino in 1980 was inversely related to the increase in diversity by affording greater possibility for increase in the Latino share.

From 1980 to 2020 diversity in the suburban periphery increases, reducing or even eliminating the gap between diversity in the suburbs and diversity in the urban core. The idea that the suburbs are largely White, though never true for all urban areas, remained reasonably accurate for many areas in 1980. Three-quarters of the urban areas had 75 percent or more of the population in the suburban periphery White. By 2020, fewer than a quarter of the suburban areas are this White. But the pattern varies greatly by region. In the urban areas in the Northeast and Midwest, while the percent White in the suburbs declines after 1980, nearly half of the suburban areas remain over three-fourths White in 2020. It is the older, more slowly growing urban areas preserving the older patterns.

This paper has focused on the levels and changes in racial and ethnic diversity in the entire urban areas and the large areas of the suburban periphery and the urban core. This does not address the presence of the groups and the changes at the neighborhood level. It is entirely possible for diversity in the larger areas to decline without affecting the diversity or lack of diversity within smaller neighborhoods. This will be addressed in subsequent papers.

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