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MEMORANDUM FOR Howard Hogan
Chief, Decennial Statistical Studies Division

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Subject: Accuracy and Coverage Evaluation Survey:
Demographic Analysis Results

The attached document was prepared at your request to assist the Executive Steering Committee on A.C.E. Policy in its recommendation regarding the release of the statistically corrected data or data without statistical correction.

This report focuses on the consistency of the A.C.E. results with findings based on Demographic Analysis (DA). DA is a separate and independent coverage evaluation program conducted at the Census Bureau.

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March 2, 2001

Accuracy and Coverage Evaluation: Demographic Analysis Results

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Accuracy and Coverage Evaluation 2000: Demographic Analysis Results

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EXECUTIVE SUMMARY

Introduction

Demographic Analysis (DA) is a well developed tool for evaluating coverage of the national population that has been used extensively at the Census Bureau for every census since 1960. The demographic approach, which is largely based on administrative records, differs fundamentally from the survey-based Accuracy and Coverage Evaluation (A.C.E.).

This report focuses on one of the principal purposes of DA in census evaluations, namely assessing the survey-based A.C.E. coverage estimates at the national level. Because DA and the A.C.E. use entirely independent methodologies, any differences between them are important to understand.

Three limitations on the use of DA must be acknowledged. First, the major DA estimates are available only at the national level and only for two broad race categories: Black and All Other Races Combined. The latter is referred to as "NonBlack" in this report.

Second, the DA estimates contain some uncertainty because the aggregate administrative data used to construct them are corrected for various types of errors and some components must be estimated. We were particularly concerned about the reliability of the immigration components and conducted a sensitivity analysis in response. This analysis led to the incorporation of an "alternative" set of DA estimates to allow for the possible understatement of immigration (specifically, undocumented immigration) in the "base" DA components of growth.

Third, the effect of the new "mark one or more" instruction for the Census 2000 question on race complicates the traditional comparison of DA estimates by race with census race tabulations. In fact, the Census 2000 tabulations do not include a category "Black" that is comparable to 1990 or earlier census tabulations. Consequently, two tabulations for Black respondents were used: one reflects the number of people who reported Black only, the other reflects those who reported Black whether or not they reported any other races. These two approaches are referred to as Model 1 and Model 2. The tables and figures also show the average of the two model estimates for comparison with the historical DA estimates and 2000 A.C.E. results.

The inconsistencies in the race data place even more importance on the use of sex ratios for making inferences about coverage by race in Census 2000. And, in fact, the sex ratios for people who reported Black only are nearly identical to the sex ratios for people who reported Black whether or not they reported any other race.

An important distinction between DA and the A.C.E. estimates is that DA covers the total

population while the A.C.E. is limited to the household population. The difference between these two universes is the Group Quarters (GQ) population. Because the census counts of the group quarters population tracked the available independent benchmarks reasonably well, this report assumes that the two universes can be made consistent by adding the GQ population to the A.C.E estimates.

Due to the uncertainty in the estimates of undocumented immigration, DA uses a low and high range for making comparisons with the census and A.C.E. results. The "base" DA set of estimates assumes that the net increase in the number of undocumented immigrants during the 1990-2000 intercensal decade was 2.8 million; the "alternative" set doubles the assumed increase in undocumented immigrants to 5.5 million. Doubling undocumented immigration implies that 11.1 percent of the population was foreign born in on April 1, 2000, compared with 10.9 percent in the reweighted March 2000 Current Population Survey, and that 12.7 percent was Hispanic, compared with 12.6 percent in the unadjusted Census 2000 results.[1] Until we can obtain more complete data about the foreign born from Census 2000 sample data to recalibrate the DA in detail, this alternative assumption appears to be a reasonable higher estimate of the total net flow of undocumented immigrants during the 1990s.[2]

Results

DA measures a lower net undercount than the A.C.E., according to either of the two sets of DA estimates developed. The "base" DA estimates a net overcount of 1.8 million–that is, a net undercount rate of -0.65 percent in 2000.[3] The "alternative" DA, which assumed additions to the flow of undocumented immigration in the 1990's, gives a net undercount of 0.9 million, or 0.32 percent. Comparatively, the A.C.E. estimates a net undercount of 3.3 million, or 1.15 percent, for Census 2000.

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[1]Starting in 1994, the March Current Population Survey asked about country of birth and, for those born outside the United States, year of entry to the United States. The published March 2000 Current Population Survey (CPS) data were controlled to age, race, sex, and Hispanic origin estimates based on the 1990 census. For the ESCAP deliberations, the CPS data were recalculated using aggregate Hispanic origin data from Census 2000. Subsequently, the CPS data were further refined by recalculating using more detailed age, race, sex, and Hispanic origin counts from Census 2000 and the formal weighting procedures of the CPS. These results (which are included in this report) are slightly different, but lead to the same conclusions.

[2]There are a number of other components in international migration that will need to be examined in future analyses including changes in emigration and in temporary legal residents, but increasing these components would also tend to produce a percent foreign born that is greater than the March 2000 Current Population Survey estimate.

[3]In Table A, net overcounts are denoted by a minus sign.

The DA and A.C.E. estimates both measure a reduction in net undercount in Census 2000 compared with the 1990 census, but DA implies a greater change (see Table A). Under the base set, the estimated DA net undercount rate fell by 2.5 percentage points from 1.85 percent in 1990 to -0.65 percent (an overcount) in 2000. Under the alternative DA set, the net undercount rate was reduced by 1.53 percentage points from 1.85 percent in 1990 to 0.32 percent in 2000. In contrast, the A.C.E. estimate of 1.15 percent net undercount in 2000 was 0.43 percentage points lower than the 1.58 percent in 1990.

Additionally, both DA and the A.C.E. measure a reduction in the net undercount rates of Black and NonBlack children (aged 0-17 years) compared with 1990. Both methods also measure a reduction in the net undercount rates of Black men and women (aged 18 and over).

DA and A.C.E. estimates disagree in that DA finds a reduction in the net undercount rates of NonBlack men and women in Census 2000 compared with the rates of previous censuses. The reduction is larger under the base DA set than under the alternative DA set. The A.C.E. indicates no change or a slight increase in undercount rates for NonBlack adults as a group.

Other demographic benchmarks support the DA finding of a large reduction in net undercount in Census 2000 compared with 1990 and previous censuses. The comparisons of census counts to auxiliary data sets (such as school enrollment data for children and Medicare enrollment for the population 65 years an over) are consistent in indicating Census 2000 has more complete coverage than the 1990 census.

Finally, an important question for the A.C.E. methodology is whether the group of people not counted by the Census is also less likely than the remainder of the population to be included in the A.C.E. survey. This phenomenon is called "correlation bias." Comparisons of the DA and A.C.E. sex ratios show that correlation bias in the survey estimates was not reduced for Black men between 1990 and 2000. The A.C.E. sex ratios (ratio of men per 100 women) for Black adults are much lower than the "expected" sex ratios based on DA, implying that the A.C.E. is not capturing the high undercount rate of Black men relative to Black women. The size of this bias is about the same as in the 1990 Post Enumeration Survey (PES).

Table A -- Estimates of Percent Net Undercount, by Race, Sex, and Age: 1990 and 2000
(a minus sign denotes a net overcount)

	Demographic Analysis					PES/A.C.E		
		2000		Change:1990-2000		PES	A.C.E.	Change:
Category	1990	Base	Alternative	Base	Alternative	1990	2000	1990-2000
Total	1.85	-0.65	0.32	-2.50	-1.53	1.58	1 15	-0.43
Black								
0-17	5.93	1.69	2.00	-4.24	-3.93	7.05	2.93	-4.12
Male, 18+	9.79	6.89	7.79	-2.90	-2.00	3.76	2.10	-1.66
Female, 18+	1 68	0.06	0.92	-1.62	-0.76	2.64	1.28	-1.36
NonBlack								
0-17	1.61	-0.61	0.29	-2.22	-1.32	2.46	1.27	-1.19
Male, 18+	2.14	-0.94	0.23	-3.08	-1.91	1.19	1.44	0.25
Female, 18+	0.28	-1 80	-0.84	-2.08	-1 12	0.34	0.44	0.10

Source: U.S. Census Bureau, Population Division.
Note: Estimates by race shown for 2000 are based on the "average" of Model 1 and Model 2 estimates described in the text.

Introduction

Demographic Analysis (DA) is a well developed tool for evaluating coverage. DA is an analytic approach that has been extensively used at the Census Bureau to measure coverage of the national population in every census since 1960 (see Siegel and Zelnik, 1966; U.S. Bureau of the Census, 1974, 1988; and Robinson et al. 1993a for the demographic evaluations of the 1960-1990 censuses).

Demographic Analysis represents a macro-level approach for estimating the net undercount by comparing aggregate sets of data or counts. The demographic approach differs fundamentally from the survey-based Accuracy and Coverage Evaluation (A.C.E.). The traditional DA population benchmarks are developed for the census date by analysis of various types of demographic data essentially independent of the census, such as administrative statistics on births, deaths, immigration, and Medicare enrollments, as well as estimates of legal emigration and net undocumented immigration. The difference between the DA benchmarks and the census count provides an estimate of the census net undercount. Dividing the net undercount by the DA benchmark provides an estimate of the net undercount rate.

Internal consistency is an important aspect of DA. The foundation of the demographic method is the longitudinal consistency of the underlying demographic data. DA follows the process of population change as it occurs, starting with births, then incrementing or decrementing cohort size with subsequent information on mortality and net migration. The administrative data for DA have no sampling error and are available annually for the core components of births, deaths, immigration, and Medicare enrollments.

Demographic Analysis estimates serve two principal purposes in census evaluation:

1) DA estimates provide an independent benchmark to assess completeness of coverage in the current census and document changes in coverage from previous censuses. The national DA estimates have become the accepted benchmark for tracking historical trends in net census undercounts and for assessing coverage differences by age, sex, and race. As in past censuses, DA estimates provide a new independent assessment of coverage in Census 2000 to add to the historical time series. (See Robinson et al, 2000, for a discussion of the DA program for 2000).

2) The independence and internal consistency of the DA estimation process allow us to check the survey-based A.C.E. coverage estimates; in particular, we can assess the consistency of the age-sex results. As noted above, DA and A.C.E. use entirely different methodologies. Because the sources and patterns of errors in the two estimates are sufficiently different, any disagreement in the results is important to understand.

This report focuses on the second use of DA, that is, to assess the consistency of the DA and A.C.E. coverage results.

Background

The Demographic Analysis coverage benchmarks provide a useful assessment of the accuracy of the A.C.E. results. DA estimates have some limitations and some differences in the population whose coverage is being measured, however. They are discussed below.

Limited detail of DA estimates

The major DA estimates are available only at the national level and only for two broad race categories: Black and All Other Races Combined.[4] The latter is referred to as "NonBlack" in this report. Because independent DA benchmarks are not available for the specific A.C.E. poststrata cells, we compare the DA results to the A.C.E. results after aggregation across poststrata.

Uncertainty in DA estimates

A concern regarding DA estimates is the uncertainty of the measured undercounts. The aggregate administrative data and estimates used to construct the DA benchmarks are corrected for various types of errors. There are assumptions in this estimation process, some of which can be validated and some of which are based on quite limited information.

Births are by far the largest component of population change in the DA system; thus, even relatively small errors in the estimates of births and the assumptions used to correct for underregistration of births can have significant effects. The potential error would be greatest for the cohorts born prior to 1950, where adjustments for birth underregistration are largest. DA estimates for race groups are affected by the differences in the classification of births by race used in the registration system with race classifications in the census. Race at birth is assigned on the basis of the race of the parents, and different algorithms can lead to different race assignments for births to mixed-race couples. While not affecting DA totals, this uncertainty affects DA race estimates principally for the cohorts born after 1980. (See Robinson, 1991, for a discussion of errors in the births estimates, and Robinson and Lapham, 1991, for a discussion of the inconsistency in race classifications.)

Immigration and emigration, while smaller overall components than births, are subject to greater relative error because of the greater uncertainty of some specific estimated elements (especially emigration and net undocumented immigration). (See Woodrow, 1991a and 1991b, for discussions of sources of error in these components.) As will be discussed later in this report, we are particularly concerned about the reliability of the immigration components as they affect

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[4] Throughout this report the term Black is used to refer to the Black or African American population.

the DA estimates of net coverage in 2000. We conducted a sensitivity analysis to assess the possible impact of error in the emigration and net undocumented immigration components. This analysis led to the incorporation of an "alternative" set of DA estimates to allow for the possible understatement of net undocumented immigration in the DA components of growth.

For the first time, the national DA estimates in 1990 were accompanied by quantifiable measures of error (Das Gupta, 1991). Appendix Table 4 shows the uncertainty measures for the 1990 DA undercount rate estimates. This research demonstrates that DA estimates are subject to less error in terms of measuring differences in coverage according to age, sex, and race than in terms of measuring absolute coverage levels. Many of the errors in the estimates are consistent and hence tend to "cancel" in comparisons across sex, race, and time. For example, the DA sex ratios (ratio of men to women) are less error-prone than the DA undercount estimates (see Robinson et al., 1993a). The uncertainty measures also indicate that the DA estimate might tend to understate the "true" population. As shown in Appendix Table 4, the mid-point of the intervals for individual age-sex-race groups are almost always higher than the observed estimate.

We will develop a set of uncertainty measures for the 2000 DA estimates in later research. We need to understand more about possible biases in the components of change from 1990 to 2000, in particular the immigration component. We will carefully evaluate the Census 2000 sample data on nativity, place of birth, and year of immigration for this purpose.

Inconsistencies in race classifications

The race categories in the DA estimates largely reflect the race assigned in the particular administrative record at the time of the event (birth, death, or enrollment in Medicare). The DA estimates of net undercount will be biased if people who are classified as a particular race in DA (e.g., Black) report as a different race in the census.

The effect of the new "mark one or more" instruction for the Census 2000 question on race complicates the traditional comparison of DA estimates by race with census race tabulations. In fact, the Census 2000 tabulations do not include a category "Black" that is comparable to 1990 or earlier census tabulations. Tabulations for the Black population for 2000 contain tabulations of the number of people who reported Black only and tabulations of the number who reported Black whether or not they reported other races.

To deal with the reporting of more than one race, we present alternative DA estimates using two models: (1) Model 1 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black only, (2) Model 2 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black whether or not they reported any other race. At the youngest ages the differences are the greatest. The tables and figures also show the average of the two model estimates for comparison to the historical DA estimates and 2000 A.C.E. results. These averages are not point estimates; research on the detailed Census 2000 race and ethnicity data to be conducted later this year (Baumgardner et al., 2001)

may provide a basis for determining at which point along the Model 1 to Model 2 range of census race tabulations the DA estimate might best be compared.

A final inconsistency affects race comparisons of the DA and A.C.E. estimates. In 1990, the 9.8 million people (mainly Hispanics) who reported their race as "Other Race-Not Specified" in the census were redistributed (for DA estimation) to the categories White; Black; American Indian, Eskimo, or Aleut; and Asian or Pacific Islander so that the census counts were consistent with the race categories of the historical demographic estimates. A similar "modification" to make the census race categories more comparable with the historical demographic data was again used in 2000 for the DA estimation.

The inconsistencies in the race data place even more importance on the use of sex ratios for making inferences about coverage by race categories in Census 2000. Specifically, to the extent that the inconsistencies in reporting and the numbers marking more than one race are about the same for men and women, the inconsistencies will tend to cancel out in the calculation of sex ratios. We found this assumption held true: in Census 2000, the sex ratios for people who reported Black only are nearly identical to the sex ratios for people who reported Black whether or not they reported other races.

DA and A.C.E. universe differences

An important distinction between DA and the A.C.E. estimates is that DA covers the total population while the A.C.E. is limited to the household population. The difference in the universes is the Group Quarters (GQ) population. The GQ population is included in the DA estimates, and cannot be separated. The GQ population is excluded from the A.C.E. universe.

The A.C.E. approach essentially assumes that coverage of GQs in the census is the best we can achieve. Differential coverage of the household and GQ population could affect the comparisons with the DA estimates, especially for population subgroups where the GQ population is relatively large.

We assess the impact of GQ population coverage in two ways. First, the GQ population's share of the total population of each of the A.C.E. age-sex-race groups can be determined from Census 2000 data. This points to the subgroups that may be affected by the presence of differential coverage of GQs (if it exists) and identifies other groups where the GQ population is so small that it has little effect on the estimates. The GQ population's share of the total population is more than 5 percent for five of the broad A.C.E. race-sex-age categories–men and women aged 18-29 (both race categories) and Black men aged 30-49. The GQ percent exceeds 15 percent for Black men 18-29; the coverage estimates for this group may be affected in particular by the presence of any differential coverage of GQs.

Second, we compared rough benchmarks of the GQ population by type (e.g., correctional institutions, nursing homes, military quarters, college dormitories) to Census 2000 results to

broadly assess coverage completeness of GQs. The benchmarks of the GQ population generally agree with the Census 2000 results.

Results

Development of "Alternative" DA estimates based on benchmark analysis

Demographic Analysis provides historical measures of total and differential undercount based on demographic measures of components of population change – births, deaths, immigration, and (for the elderly) changes in Medicare enrollment. Most of these components are well measured (especially for recent decades) but several components of immigration have considerable uncertainty. Among the latter components are net undocumented immigration, legal emigration, and the change in the number of temporary legal migrants. Net undocumented immigration is especially subject to uncertainty and must be estimated by comparing detailed data from successive censuses with administrative data on legal immigration. For the 1990 to 2000 period, the net flow of undocumented immigration was estimated at 2.8 million.

For the total population, the preliminary DA results (referred to as the base DA estimates) imply a net overcount of 1.8 million, or 0.65 percent in Census 2000. The overcounts in the base DA estimates are especially large for NonBlacks, in particular NonBlack men aged 18-29. Upon further examination of the results, we realized that the understatement of immigration, particularly undocumented immigration, could be a reason for these unexpected results. We conducted a systematic analysis using "error of closure" and other analytic methods that led to the development of the alternative DA set of estimates that incorporated an allowance for a higher estimate of net undocumented immigration. We use this alternative set, in addition to the current or "base" set, in the discussion of the DA coverage results and comparisons to the A.C.E. results. Before presenting those results, we describe the analysis that led to the development of the alternative DA set.

Census-level error of closure

As part of the Census Bureau's ongoing population estimates program, the 1990 census population for race groups (White; Black; American Indian, Eskimo, or Aleut; Asian and Pacific Islander) and for Hispanics are carried forward each year based on estimates of components of change since 1990. Estimates of the April 1, 2000 population are available. Differences from the Census 2000 counts provide an "error of closure," which measures the net effect of differences in coverage in 1990 and 2000, and errors in the measurement of the components of change (1990 to 2000), for the detailed demographic groups. Although very crude, these error of closure measures, when supplemented by the DA results, provide a way to assess the overall consistency of the census, A.C.E., and demographic estimates. Major deviations could signal a serious error in one of the systems, which should be investigated. (See Robinson et al, 1993b, for

an example of the error of closure analysis of the 1990 census results.) In particular, we can check if the pattern of deviations by demographic characteristics such as age and sex provides clues to the possible understatement of immigration as suggested by the unusually large overcounts shown by the base DA estimates for NonBlacks aged 18-29.

Table 1 presents error of closure measures for the total population, Hispanics, and NonHispanics. The overall census result is 2.8 percent above the demographic benchmark for males and 2.2 percent above for females, implying higher net coverage in Census 2000 relative to 1990 and/or an understatement of the components of change (causing the 2000 DA estimate to be too "low"). The error of closure is relatively small and uniform across age-sex groups for the NonHispanic population. This may suggest that the 1990-2000 coverage change was relatively uniform by age and sex for NonHispanics, or that the error in component estimation did not disproportionately affect specific NonHispanic groups. The Black population falls mostly in this category.

On the other hand, the error of closure is around 10 percent for the total Hispanic population, and very different by age and sex. The error exceeds 30 percent for Hispanic men aged 18-29 (31.5 percent). Since coverage for this group probably did not improve by 31 percent relative to 1990, some of the error is likely caused by the understatement of growth (possibly through undocumented immigration). Hispanics are largely classified in the NonBlack category for DA, so this large relative bias for Hispanic men aged 18-29 is a factor leading to the large DA overcounts for NonBlack men aged 18-29 shown in Table 7.

Other comparisons

In addition to the error of closure analysis, we can also examine the estimated changes between 1990 and 2000 in the Hispanic population and the foreign born population. If immigration is understated in the estimated components of change, then the percent of the population that is Hispanic, and the percent of the population that is foreign born, should both be understated relative to Census 2000 results.

The best data for addressing these questions would be demographic analysis estimates for the Hispanic and foreign born populations and the detailed Census 2000 sample data on country of birth and period of entry cross classified by age, sex, race, and other characteristics. Unfortunately, none of these data are currently available. However, we can make some preliminary assessments by developing an estimate of the Hispanic and foreign born populations in 2000 implied by DA. Additionally, we can develop an estimate of the foreign born population in 2000 by recalculating data from the March 2000 Current Population Survey (CPS) using the Census 2000 counts of detailed age, race, sex, and Hispanic origin populations and the formal weighting procedures of the CPS.

Tables 2A and 2B show the percent of the population that is Hispanic and the percent of the population that is foreign born, measured or implied by the census, DA, and the A.C.E. According to census results, the percent of the population that is Hispanic increased from 9.0

percent in 1990 to 12.6 percent in 2000. Under the base DA, the implied percent Hispanic in 2000 is only 12.1 percent. Table 2B shows that in 1990, 8.0 percent of the total population was foreign born, 35.8 percent of the Hispanic population was foreign born, and 5.3 percent of the NonHispanic population was foreign born. The March 2000 CPS indicates that the foreign born make up 10.1 percent of the total population, 38.4 percent of Hispanics, and 6.7 percent of NonHispancis. Comparing these data to the percents implied by the base DA provides further evidence of an understatement in the immigration component.

The immigration component is basically a compilation of many subcomponents–some of which are better measured than others. Because of the lack of data, the estimates of the undocumented immigration component, as well as the estimates for legal emigration and temporary migration, are subject to a greater amount of uncertainty. We have examined the results of assuming various mixtures of increasing undocumented immigration and decreasing emigration. We are continuing to explore the effects of changing levels of legal temporary residents and other smaller immigration components. Given the large proportion of Hispanics among undocumented immigrants and the implied deficit of Hispanics in the base DA estimates, we chose to increase the undocumented immigration component in specifying the assumptions for the alternative DA.

Setting the Alternative DA assumptions

How much should we increase net undocumented immigration? Adopting a simple approach, we first estimated the additional number of undocumented immigrants that would be necessary to reach the A.C.E. 2000 results. To do so, we would have to increase the net flow of undocumented immigrants during the decade from the assumed amount of 2.8 million to 8.0 million, almost triple the level. As indicated in Tables 2A and 2B, this assumption results in a percent Hispanic that is higher than in Census 2000, 13.2 percent compared to 12.5 percent. Additionally, the implied percent foreign born would climb to 11.9 percent for the total population and 42.9 percent for the Hispanic population, both substantially above the reweighted CPS estimates.

Balancing the percent Hispanic and the percent foreign born to be close to the CPS estimates requires a much smaller increase in undocumented immigration than 8 million. A doubling of the net increase in undocumented immigrants during the 1990 to 2000 decade, from 2.8 million to 5.5 million, would result in an estimated 12.7 percent Hispanic in 2000, slightly above Census 2000–and an estimated percent foreign born of 11.1, which is above the CPS estimates. This leads us to believe that any further increase in the assumed net flow of undocumented immigrants during the decade would likely be too high. In other words, to provide a reasonable upper estimate of undocumented immigration, we chose to assume a doubling of the net flow of undocumented from 2.8 million to 5.5 million.

Comparison of 2000 A.C.E. coverage patterns with Base and Alternative DA estimates and historical trends

This section compares the base and alternative DA estimates to Census 2000 counts and the A.C.E. results. Tables 3 to 8 present the summary results. The base DA estimates represent the estimates developed using the currently available demographic components of change, where as the alternative estimates include a doubling of the estimated net number of undocumented immigrants during the 1990's. The Appendix Tables provide additional information.

Total population

The Census 2000 count of 281.4 million is 1.8 million higher than the base DA estimate of 279.6 million (Table 3). Relative to DA, the difference implies a net overcount of 0.65 percent, which is often expressed as a net undercount of -0.65 percent. This net coverage is dramatically different from that in the 1990 or any other previous census. In 1990, the net undercount estimated by DA was 4.7 million or 1.85 percent.

The alternative DA estimate is 282.3 million, 0.9 million above the Census 2000 count of 281.4 million. With the higher alternative estimate, DA measures a net undercount (0.32 percent).

The alternative DA estimate measures a lower level of net undercount than the A.C.E. estimate of 3.3 million (1.15 percent). Either of the two DA sets imply a greater reduction in net undercount from 1990 than the A.C.E. (Table 4). Under the base set, the estimated DA net undercount rate fell by 2.5 percentage points from 1.85 percent net undercount in 1990 to -0.65 percent in 2000. Under the alternative DA set, the net undercount rate is reduced by 1.53 percentage points from 1.85 percent in 1990 to 0.32 percent in 2000.

The A.C.E. estimate of 1.15 percent net undercount in 2000 was 0.43 percentage points lower than the 1.58 percent in 1990.

Sex

Both the base and alternative DA estimates show a relatively large reduction in the net undercount of both males and females, though a smaller decline is indicated by the alternative DA. According to the alternative set, the male net undercount drops from a rate of 2.8 percent in 1990 to 0.9 percent in 2000 (Table 4 and Figure 1). For females, the net undercount of 0.9 percent in 1990 falls to -0.3 percent (an overcount) in 2000. The drop was greater for males, reducing the male-female differential from 1.9 percentage points in 1990 to 1.2 percentage points in 2000.

The A.C.E. measures a much smaller reduction in the net undercount rates from 1990 than the base or alternative DA. The alternative DA net percent undercount for males in 2000 is 0.6

percentage points below the A.C.E. estimate of 1.5 percent; the alternative DA estimate for females is 1.0 percentage point below the A.C.E. estimate of 0.8 percent.

Sex and age

The more detailed estimates for sex and age groups continue to reveal the pervasiveness of the change in coverage from 1990 to 2000 as measured by DA. The alternative DA estimates for all age-sex groups continue to display lower levels of net undercount in 2000 than in 1990. The 2000 estimate is much lower for children (aged 0-17) and lower for adults of both sexes (Table 5 and Figure 2), though the reduction with the alternative set is less than indicated by the base DA estimates.

Under the alternative DA set, only 2 of the 8 age-sex groups show net overcounts, compared with 5 of the 8 groups using the base set. Note in particular the large change between the two sets in the estimated net undercount rate of men and women aged 18-29. The male rate switches from -2.6 percent (an overcount in the base set) to a 0.3 percent undercount (alternative set), and the female rate is reduced from -3.1 percent to -0.7 percent. The change in the net undercount rates for those aged 18-29 from 1990 to 2000 is more consistent with the pattern of change for most other age-sex groups under the alternative DA.

The alternative DA net undercount rates are 1.0 percentage points or more below the corresponding A.C.E. estimates for 3 age-sex groups (0-17 for males and 18-29 for both sexes). The alternative DA estimate for men is higher than the A.C.E. estimate for ages 30-49 (the base DA estimate was lower) and the alternative DA estimates for the population aged 50 and older (both sexes) resemble the A C.E. results.

Unlike either of the DA sets, the A.C.E. does not indicate any improvement in coverage for adult men and women in 2000 compared with the rates of 1990 (Figure 2). Both DA sets agree with the A.C.E. in finding an appreciable reduction in the net undercount of children.

Race and sex

For the 2000 base DA estimates classified by race, three different sets are presented: (1) Model 1, which compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black only, (2) Model 2, which compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black whether or not they reported other races, and (3) an average of the estimates from the two models (Table 6 and Figure 3).

For both the base and alternative DA, the net undercount rates of Blacks are lower in 2000 than 1990 under both models, with the reduction being much greater under Model 2. For Black males, the group with the highest net undercount rates historically, the average rate of 5.1 percent for 2000 from the base DA is 3.4 percentage points below the 1990 estimate of 8.5 percent. For Black females, the average rate of 0.6 percent in the base DA is appreciably lower than the 1990

estimate of 3.0 percent (a drop of 2.4 percentage points).

The overall patterns of coverage in 2000 and changes from 1990 and earlier censuses as measured by the base DA for Blacks are repeated for the alternative set, with the reduction being slightly less under the alternative set. Nonetheless, the undercount rate of Black males (average rate of 5.8 percent for alternative DA) remains considerably higher than for Black females or NonBlack males or females.

Both DA sets are consistent with the A.C.E. results indicating a sharp decrease in the net undercount rate for Blacks in Census 2000. The DA estimates give a different sex structure to the undercount, however. DA measures a higher net undercount of Black males than does the A.C.E., but a lower net undercount rate for Black females. As will be noted in the discussion of sex ratios, the higher DA percents for Black males than for Black females are indicative of correlation bias in the A.C.E. results.

Moving from the base to the alternative DA has a greater effect on the estimates for NonBlacks than for Blacks, because few undocumented immigrants are thought to be Black. The alternative set modifies the undercount patterns for NonBlacks, reducing the relatively large net overcounts indicated by the base DA set. The net undercount of -0.9 percent (an overcount) for NonBlack males (average estimate) measured by the base DA set becomes a 0.2 percent net undercount under the alternative set, while the -1.4 percent net undercount for NonBlack females is reduced to a net undercount of -0.5 percent.

Both the base and alternative DA net undercount rates for NonBlacks fall below the A.C.E. estimates, with the difference being much less for the alternative set. The alternative DA rate for NonBlack males (average estimate of 0.2 percent) is 1.2 percentage points less than the A.C.E. rate of 1.4 percent and the average rate for NonBlack females (-0.5 percent) is 1.1 percentage points less than the corresponding A.C.E. estimate of 0.6 percent. Under either DA, a relatively large improvement in coverage from 1990 to 2000 is measured. The A.C.E. results show improvement in coverage for NonBlacks of a much smaller magnitude than the DA findings.

Race, sex, and age

Compared to historical DA trends, the DA estimates for 2000 reveal a broad decline in net undercount rates for almost all race-sex-age categories (Table 7 and Figure 4). The estimated net undercount rates for Black males and females in 2000 are lower than the corresponding 1990 rates for most of the age-sex comparisons under both the base and alternative DA and for both Models 1 and 2. Using the average of Model 1 and Model 2 estimates, and examining both the base and the alternative DA, the 2000 rate exceeds the 1990 rate only once--for Black males aged 18-29 (8.1 percent under alternative DA compared with 7.7 percent in 1990). As in previous censuses, the undercount rates of Black men aged 18-29 and 30-49 in 2000 are substantially higher than the estimates for any other race-sex group.

The A.C.E. finds a large reduction in the net undercount rate of Black children and most Black adult age categories compared with the 1990 PES estimates. This overall reduction is consistent with the results indicated by the range of DA estimates for Blacks, except for ages 18-29. The A.C.E. estimates a Black male net undercount rate that is essentially the same as the Black female rate, while the alternative DA estimates a Black male rate that is much higher than the Black female rate (about 8 percent average rates and under 2 percent average rates, respectively).

Both DA sets agree with the A.C.E. results in finding a broad-based improvement in coverage for Blacks from 1990 to 2000 (see Figure 4), although both DA sets measure a much higher net undercount rate for Black males aged 18-29 and 30-49 than the A.C.E. For Black females, the range of 2000 DA estimates is lower than the A.C.E. estimates for ages 18-29; however, the DA rates bound the A.C.E. estimates for ages 30-49 and 50 and older.

For NonBlacks, the estimated net undercount rates of both DA sets continue to show a relatively large improvement in coverage from 1990, though the change is less under the alternative DA set. In particular, the estimated net overcount of NonBlacks ages 18-29 under the base DA was reduced considerably under the alternative DA.

In 1990, both DA and the PES generally measured undercounts for all age groups within the NonBlack population, the exception being that the PES measured an overcount for both older men and older women. In contrast, for 2000, both the base and the alternative DA generally find overcounts except for NonBlack men aged 30-49 and NonBlack girls aged 0-17, while the A.C.E. continues to measure undercounts except for those aged 50 and older.

Comparison of sex ratio results

The base DA "expected" sex ratios for adult Blacks are much higher than the corresponding sex ratios from Census 2000 or the A.C.E. estimates (Table 8 and Figure 5). This finding is indicative of the higher undercount rate of Black men relative to Black women measured by DA. It is important to note that these findings are the same whether using Model 1 or Model 2. The "gap" in the sex ratios for NonBlacks is much smaller, reflecting the smaller male-female difference in estimated undercount rates.

These results imply that the A.C.E. understated the net undercount of adult Black men (the well-known "correlation bias"). As illustrated by the sex ratio comparisons for 1990, correlation bias (relative to DA) is consistently found in the results of previous coverage measurement surveys.

Other demographic coverage benchmarks

This section compares the available demographic benchmarks for subnational areas with to the Census 2000 and A.C.E. results. Although these benchmarks have noticeable limitations, they provide additional consistency checks to inform the previous demographic findings on Census 2000 coverage and changes from previous censuses.

During the 1990s, we developed a set of illustrative coverage indicators for subnational areas and used them to broadly evaluate coverage in the 1995 Test Census and 1998 Dress Rehearsal (Robinson, 1996; Robinson et al. 1999). The indicators include independent benchmarks for the total population, housing units, and various age segments of the population. The benchmarks for the population aged 7 to 14 are based on school enrollment data and the benchmarks for the population 65 and over are based on Medicare data. We examine the overall consistency of these benchmarks with the census results. If inconsistences are found (e.g., an indicator suggests a decline or increase in coverage from the previous census), then coverage in the data sets or the census has changed. This analysis can provide a crude assessment of the overall agreement of the census, demographic benchmarks, and A.C.E. results.

Table 9 presents coverage ratios in 1990 and 2000 for county aggregations implied by three different data sets: population estimates to assess relative coverage of the total population in 1990 and 2000; school enrollment data to infer relative coverage of the population aged 7 to 14; and Medicare data to assess relative coverage of the population 65 and over. The county data are aggregated first into regions, then sorted by the percent of their population that is not NonHispanic White (minority concentration), and finally sorted by Hard-to-Count scores. The comparison of ratios for the total population and each age group are consistent in indicating an increase in coverage from 1990 to 2000–in all regions of the country, and among all groups examined here. In fact, the ratios suggest that coverage change was greater in areas with higher minority concentrations. This result is consistent with the national DA and A.C.E. results that show relatively greater reduction in net undercount from 1990 to 2000 for Blacks (and for other minority groups using the A.C.E.).

For example, Table 9 shows that the total enumerated population relative to the population estimate increased from 98.4 in 1990 to 101.0 in 2000, an increase of 2.6. This measure for the 187 counties with more than 50 percent minority concentration registered a greater increase–from 96.7 to 100.3, or by 3.6. For the 1,767 counties with less than 10 percent minority concentration, the 1990 to 2000 increase is 1.4. The pattern of change is similar for the measures based on the school enrollment and Medicare enrollment data. They increased for all county groupings–but tended to increase more for the areas with greater minority concentrations and higher hard-to-count scores. These findings of "universal" coverage change from 1990 to 2000 are consistent with the DA estimates in Tables 4 to 7 that indicate a large decline in net undercount–for NonBlacks as well as Blacks, and for older ages as well as younger ages.

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Table 1--Comparison of Census 2000 Counts with Demographic-based Population Estimates (2000 Population estimates are based on 1990 census benchmarks carried forward with estimates of components of change for 1990 to 2000)

	2000 Estimate		2000 Census		2000 Census minus 2000 Estimate			
					Amount		Percent	
	Male	Female	Male	Female	Male	Female	Male	Female
TOTAL								
Total	134,289,122	140,319,224	138,053,563	143,368,343	3,764,441	3,049,119	2.80	2.17
0-17	36,062,099	34,344,874	37,059,196	35,234,616	997,097	889,742	2.76	2 59
18-29	22,418,204	21,942,596	23,672,589	22,852,201	1,254,385	909,605	5.60	4.15
30-49	41,724,771	42,515,455	42,659,073	43,092,246	934,302	576,791	2.24	1 36
50+	34,084,048	41,516,299	34,662,705	42,189,280	578,657	672,981	1.70	1 62
HISPANIC								
Total	16,173,101	16,004,873	18,161,795	17,144,023	1,988,694	1,139,150	12.30	7.12
0-17	5,814,029	5,549,484	6,334,844	6,007,415	520,815	457,931	8.96	8.25
18-29	3,364,576	3,159,992	4,424,498	3,704,716	1,059,922	544,724	31 50	17.24
30-49	4,735,952	4,562,559	5,207,769	4,821,610	471,817	259,051	9.96	5.68
50+	2,258,544	2,732,838	2,194,684	2,610,282	-63,860	-122,556	-2.83	-4.48
NONHISPANIC								
Total	118,116,021	124,314,351	119,891,768	126,224,320	1,775,747	1,909,969	1.50	1.54
0-17	30,248,070	28,795,390	30,724,352	29,227,201	476,282	431,811	1 57	1.50
18-29	19,053,628	18,782,604	19,248,091	19,147,485	194,463	364,881	1.02	1.94
30-49	36,988,819	37,952,896	37,451,304	38,270,636	462,485	317,740	1.25	0.84
50+	31,825,504	38,783,461	32,468,021	39,578,998	642,517	795,537	2.00	2.05

Source: U S. Census Bureau, Population Division.
See Appendix B for description of methodology for the 2000 population estimates.

Table 2A. Percent of the U.S. Population that is Hispanic According to Census Counts, DA and A.C.E. Estimates

	% Hispanic
1990 census	8.99
Census 2000	12.55
2000 A.C.E.	12 76
Implied by Base DA (assumes 2.77 million net undocumented migrants)	12.13
Implied by Alternate DA (assumes 5.53 million net undocumented migrants)	12.72
Implied by controlling to A C.E [1] (assumes 8 02 million net undocumented migrants)	13 20

Source: U S. Census Bureau, Population Division.

[1] Undocumented migration is increased to 8.02 million, the amount necessary to reach the A.C.E. population total in 2000, starting with the 1990 Census adjusted by the PES and using the remaining components from the Base DA

Table 2B. Percent of the U.S. Population that is Foreign Born According to Census Counts, CPS, DA and A.C.E. Estimates

	Total	Hispanic	NonHispanic
1990 census	7.95	35.81	5.26
Revised March CPS 2000[1]	10.86	39.42	6.75
Implied by Base DA (assumes 2.77 million net undocumented migrants)	10.26	36.52	6.63
Implied by Alternate DA (assumes 5.53 million net undocumented migrants)	11.13	40.05	6.92
Implied by controlling to A.C.E.[2] (assumes 8.02 million net undocumented migrants)	11.89	42.94	7.16

Source: U.S Census Bureau, Population Division

[1] The published March 2000 Current Population Survey (CPS) data were controlled to age, race, sex, and Hispanic origin estimates based on the 1990 census. For the ESCAP deliberations, the CPS data were recalculated using aggregate Hispanic origin data from Census 2000 Subsequently, the data were further refined by recalculating using more detailed age, race, sex, and Hispanic origin numbers and the formal weighting procedures of the CPS These results, which are included in this report, are slightly different, but lead to the same conclusions.

[2] The undocumented population is increased by the amount necessary to reach the A.C.E. population estimate.

Table 3-- Census Count, Base and Alternative Demographic Analysis (DA) Estimates, and Accuracy and Coverage Evaluation (A.C.E.) Estimate for the U.S. Resident Population: April 1, 2000

(a minus sign denotes a net overcount)

	Count or Estimate
1. Census Count	281,421,906
2. DA Estimate	
a. Base Set	279,598,121
b Alternative Set	282,335,711
3. A.C E Estimate	284,683,782
Difference from Census Count	
4. DA Estimate	
a Base Set (=2a-1)	-1,823,785
b Alternative Set (=2b-1)	913,805
5. A.C.E Estimate (=3-1)	3,261,879
Percent Difference	
6. DA Estimate	
a. Base Set (=4a/2a*100)	-0.65
b. Alternative Set (=4b/2b*100)	0.32
7. A.C E Estimate (=5/3*100)	1.15

Source: U.S. Census Bureau, Population Division.

Note:The DA estimates for ages under 65 are based on components of population change (births, deaths, legal immigration and estimates of emigration and undocumented immigration.)
The DA estimates for ages 65 and over are based on 2000 Medicare data, adjusted for underenrollment.
DA Base Set - DA estimates without alternative assumptions (see components in Table A1).
DA Alternative Set - DA base estimates with alternative assumption that doubles the estimated net number of undocumented immigrants entering during the 1990's.

Table 4--Estimates of Percent Net Undercount by Sex, Using Two DA Sets of Estimates: 1940 to 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis								Survey-based	
							2000		PES	A.C.E.
	1940	1950	1960	1970	1980	1990	Base DA	Alt DA	1990	2000
Total Population	5.38	4.14	3.08	2.71	1.22	1.85	-0.65	0.32	1.58	1.15
Male	5.75	4.45	3.51	3.45	2.20	2.79	-0 13	0.91	1.93	1.51
Female	5 00	3.84	2 66	1.99	0.28	0.94	-1.16	-0.25	1.25	0.79
Male.Female Diff.	0.75	0.61	0 85	1.46	1.92	1.85	1 03	1 16	0.68	0.72

Source. U.S. Census Bureau, Population Division.
Source of DA: 1940-1990-- Robinson, J. Gregory, Bashir Ahmed, Prithwis Das Gupta, and Karen Woodrow, "Estimates of Population Coverage in the 1990 United States Census Based on Demographic Analysis", Journal of the American Statistical Association, Vol. 88, No. 423, pp. 1061-1077. Estimates for 2000 - See Appendix Tables 1- 3.
Source of PES / A.C.E. See Appendix Table 1 and 2

Figure 1--Percent Net Undercount by Sex Based on DA or PES/A.C.E: 1990 and 2000

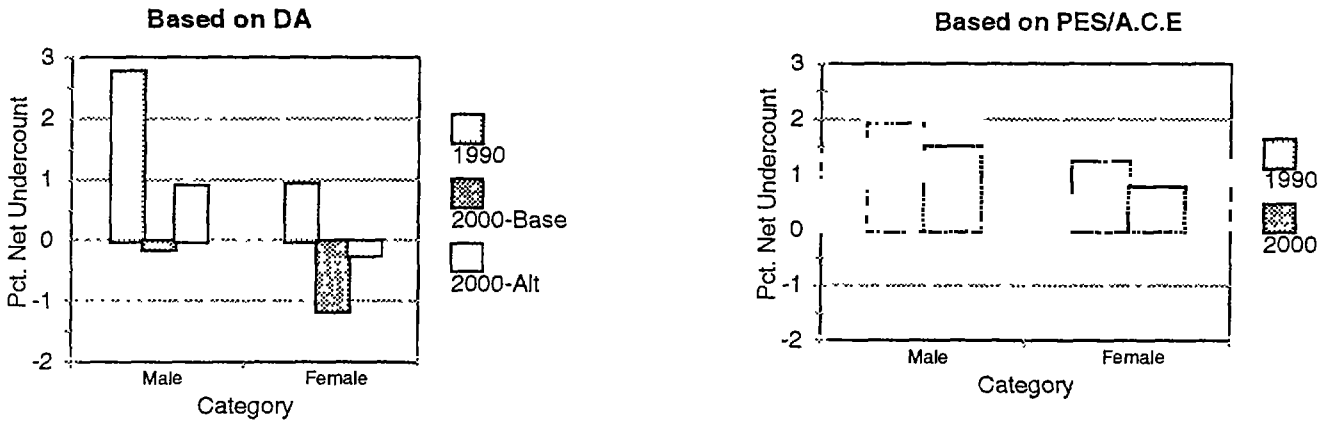


Table 5--Estimates of Percent Net Undercount by Sex and Age, Using Two DA Sets of Estimates: 1960 to 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis						Survey-based	
					2000		PES	A.C.E
	1960	1970	1980	1990	Base DA	Alt DA	1990	2000
MALE								
Total	3.51	3.45	2.20	2.79	-0.13	0 91	1.93	1.51
0-17	2.82	2.71	0.91	2.16	-0.51	0.27	3 17	1 53
18-29	5.85	3 89	3.27	2.15	-2 57	0 34	3.16	3.45
30-49	4.24	5.09	3 64	3.83	1 28	2.26	1.85	1.81
50+	2.22	2.53	1.25	2.72	0.15	0.29	-0 57	-0.24
FEMALE								
Total	2.66	1.99	0.28	0.94	-1.16	-0 25	1.25	0.79
0-17	1 84	2 37	0.90	2.43	0.06	0.87	3.20	1.54
18-29	2.76	1 32	0.43	0.64	-3.07	-0 66	2 81	2.11
30-49	1 88	1.25	-0 03	0.50	-0.91	0.04	0.88	0.95
50+	4.56	2 62	-0 17	0.24	-1 43	-1 28	-1.20	-0 76

Source· U.S Census Bureau, Population Division.

Figure 2--Percent Net Undercount by Sex and Age Based on DA or PES/A.C.E: 1990 and 2000

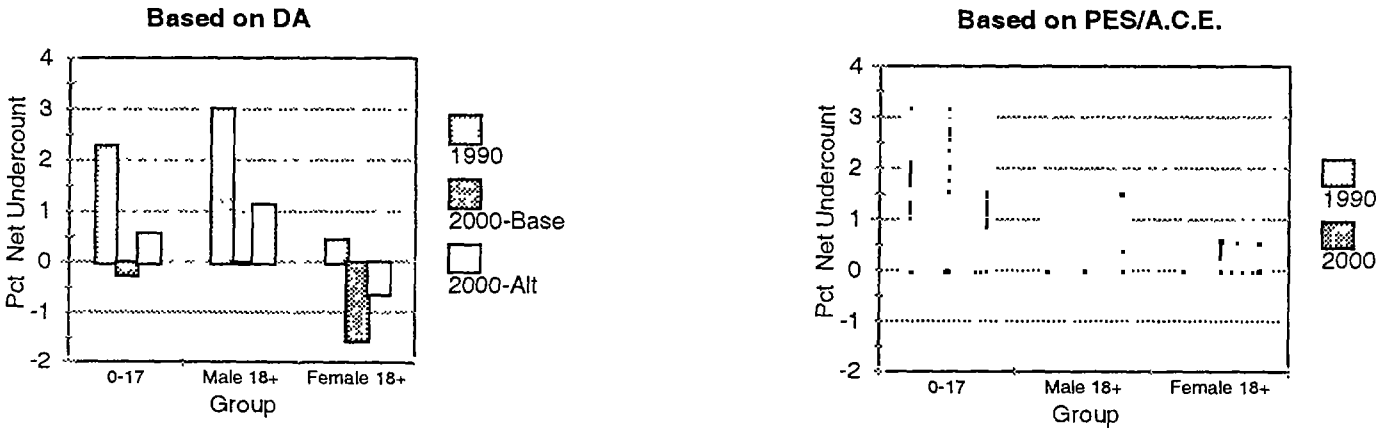


Table 6--Estimates of Percent Net Undercount by Race and Sex, Using Two DA Sets of Estimates: 1960 to 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis										Survey-based		
					2000 - Base DA			2000 - Alt DA			PES	A.C.E.	A.C.E.
	1960	1970	1980	1990	Average	Model 1	Model 2	Average	Model 1	Model 2	1990	Model 1	Model 2
Total Population	3.08	2.71	1.22	1 85	-0.65	-0.65	-0.65	0 32	0.32	0.32	1.58	1.15	1 15
Black	6.57	6.48	4 50	5 68	2.80	4.67	0.93	3 51	5.36	1.65	4.43	2.05	2.08
Male	8.76	9.10	7.47	8 49	5.10	6 94	3.26	5 81	7.64	3 98	4.90	2.36	2.39
Female	4.42	3.97	1.67	3.01	0.63	2.52	-1 27	1 32	3.20	-0.56	4 01	1.77	1.80
Nonblack	2.65	2.21	0.77	1.29	-1.19	-1.48	-0.90	-0.17	-0.45	0.12	1 18	1.02	1.01
Male	2 87	2.71	1.47	1.97	-0.93	-1.21	-0.65	0.17	-0.11	0 44	1.52	1.40	1.39
Female	2.44	1.73	0.09	0.63	-1.44	-1.74	-1.14	-0.50	-0.79	-0.20	0.85	0.64	0.63
Black:Nonblack Diff.	3.92	4.27	3 73	4.39	3.99	6.15	1 83	3.67	5.81	1.53	3.25	1 03	1 07

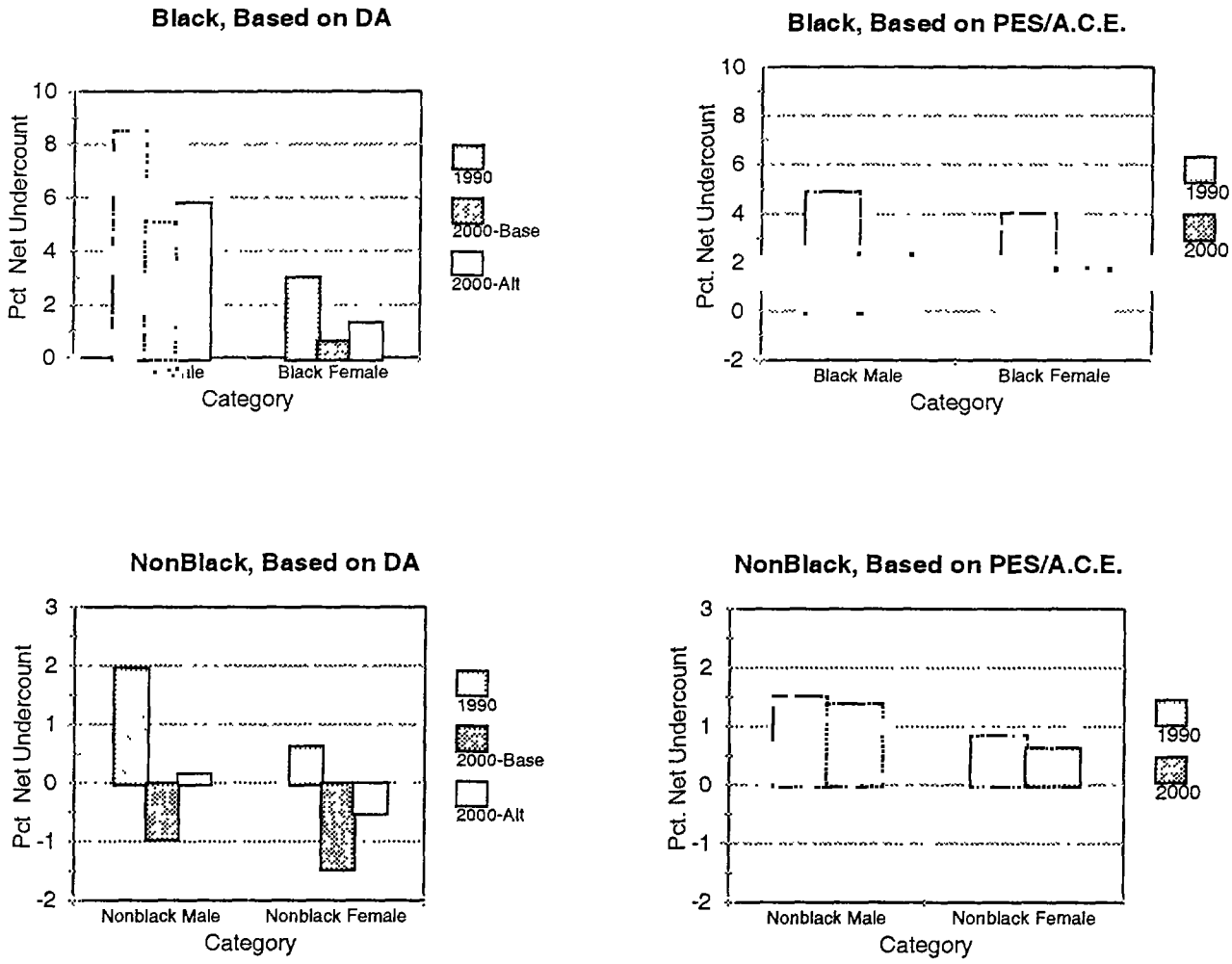
Source: U S. Census Bureau, Population Division

Note: Model 1 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who only reported Black. Model 2 compares the 2000 DA estimates for blacks with Census 2000 tabulations for people who reported Black whether or not they reported any other race. An average of the two model estimates is shown These averages represent the midpoint of the range

Source of DA: 1960-1990-- Robinson, J. Gregory, Bashir Ahmed, Prithwis Das Gupta, and Karen Woodrow, "Estimates of Population Coverage in the 1990 United States Census Based on Demographic Analysis", Journal of the American Statistical Association, Vol. 88, No. 423, pp. 1061-1077. Estimates for 2000. See Appendix Table 1 and Table 2.

Source of PES / A C.E. See Appendix Tables 1-3.

Figure 3--Percent Net Undercount by Race and Sex, Based on DA or PES/A.C.E.: 1990 and 2000



Note: The "averages" for the Base and Alternative DA Estimates are plotted in these figures.

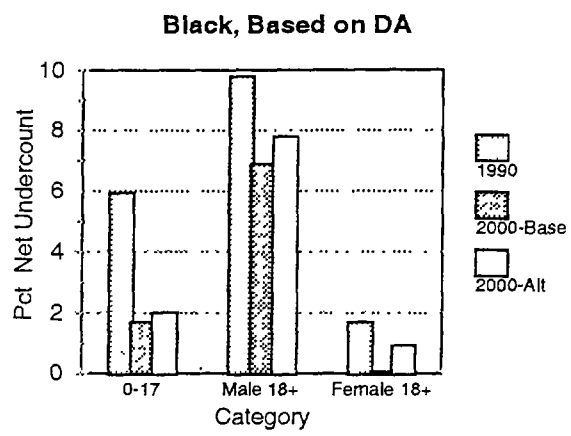
Table 7--Estimates of Percent Net Undercount by Race, Sex and Age, Using Two DA Sets of Estimates: 1960 to 2000

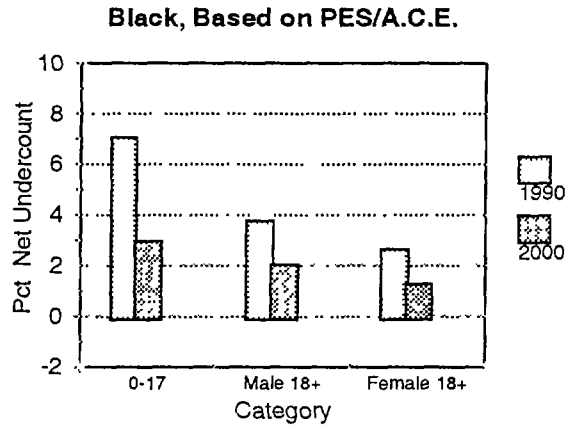
(a minus sign denotes a net overcount)

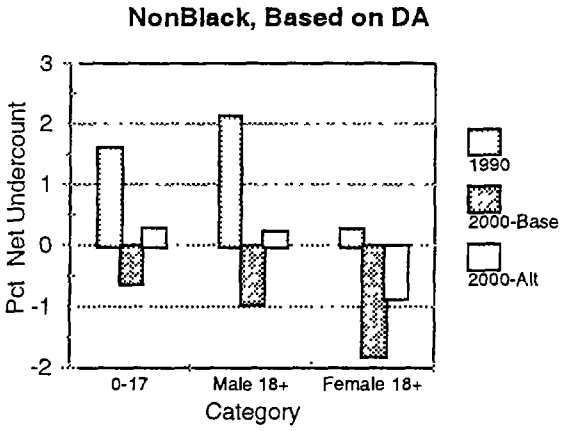
Category	Demographic Analysis										PES	A.C.E.	A.C.E
					2000 - Base DA			2000 - Alt DA					
	1960	1970	1980	1990	Average	Model 1	Model 2	Average	Model 1	Model 2	1990	Model 1	Model2
BLACK MALE													
Total	8.76	9.10	7 47	8.49	5.10	6.94	3.26	5.81	7.64	3.98	4.90	2.36	2 39
0-17	5.38	6.23	4.19	5 93	1.47	4.86	-1 92	1.75	5.13	-1 63	7.02	2 92	2.90
18-29	15.14	12.05	9.20	7.68	6.45	8.02	4.88	8.07	9.62	6 52	3.58	3.82	3.87
30-49	11.87	14.46	13 14	12.33	9.18	10.11	8 25	10 06	10.98	9.13	6.29	2.58	2.59
50+	6.63	6.32	4 62	8.28	3.29	4.08	2.49	3.42	4.21	2 62	-0.38	-0.68	-0 67
BLACK FEMALE													
Total	4.42	3.97	1.67	3.01	0.63	2.52	-1.27	1.32	3.20	-0.56	4.01	1.77	1.80
0-17	4.01	5.59	3.94	5.93	1.92	5.39	-1.56	2.25	5.71	-1.22	7 07	2.95	2.93
18-29	5.45	4.54	2.42	2.90	0.12	1.93	-1.70	1 76	3.54	-0.03	5.49	3.76	3.76
30-49	2.05	0.53	0 57	2.50	0.98	2 06	-0.10	1.86	2.93	0.79	3.20	1.26	1.27
50+	7 57	3.77	-1.87	-0.75	-1.31	-0 45	-2.16	-1.15	-0.30	-2.00	-1.22	-0.84	-0.83
NONBLACK MALE													
Total	2.87	2.71	1.47	1.97	-0.93	-1.21	-0.65	0.17	-0.11	0.44	1.52	1.40	1.39
0-17	2.45	2.15	0.32	1.46	-0.90	-1.56	-0.23	-0 02	-0.67	0.64	2.46	1 28	1 26
18-29	4.60	2.82	2.40	1.26	-4.17	-4 45	-3.89	-1.01	-1 28	-0.74	3 10	3 39	3.38
30-49	3.38	3.98	2.47	2.70	0.10	-0.04	0.24	1.10	0.96	1.24	1.30	1.70	1.70
50+	1.82	2.18	0.93	2.17	-0.16	-0.24	-0.08	-0.02	-0.10	0.06	-0.59	-0.20	-0 20
NONBLACK FEMALE													
Total	2.44	1.73	0.09	0.63	-1.44	-1.74	-1.14	-0.50	-0.79	-0.20	0.85	0.64	0 63
0-17	1.51	1.83	0.34	1.76	-0.32	-1.01	0.38	0.60	-0.09	1.29	2.47	1.28	1.26
18-29	2.40	0.88	0.11	0.26	-3.66	-4.00	-3.32	-1.10	-1 43	-0.77	2.36	1.83	1.81
30-49	1.86	1.34	-0.10	0.22	-1.21	-1.38	-1.04	-0.24	-0.41	-0.07	0 55	0 91	0.90
50+	4 30	2.52	0.00	0 35	-1.45	-1 54	-1.35	-1 29	-1.38	-1 20	-1 19	-0 75	-0 75

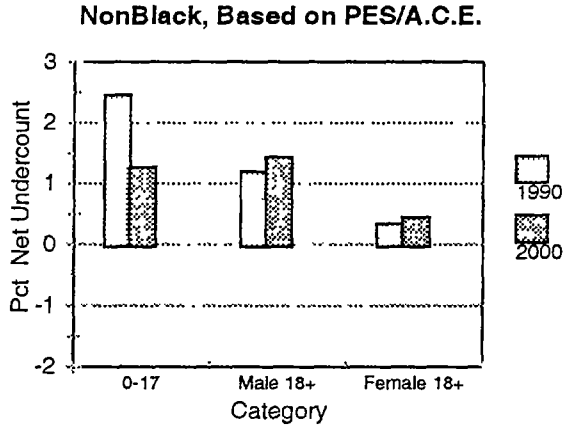
Source: U.S. Census Bureau, Population Division.

Figure 4--Percent Net Undercount by Race, Sex, and Age, Based on DA or PES/A.C.E: 1990 and 2000









Note: The "averages" for the Base and Alternative DA Estimates are plotted in these figures.

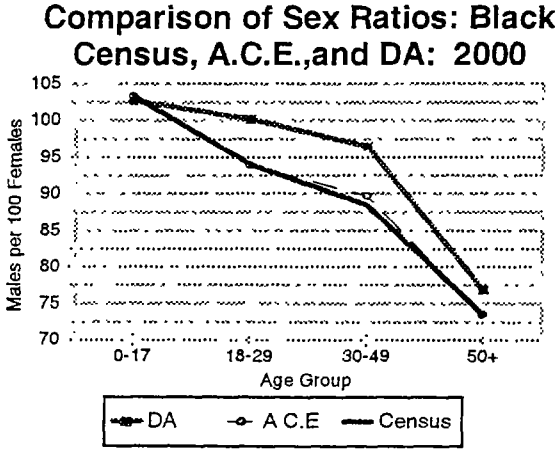
Table 8--Sex Ratios for the Census, PES / A.C.E., and DA, by Race and Age: 1990 and 2000

(Sex ratios represent males per 100 females)

Category	1990			2000					
				DA		A.C.E.		Census	
	DA	PES	Census	Base	Alt	Model 1	Model 2	Model 1	Model 2
BLACK									
Total	95.16	90.44	89.59	94 90	94.94	91 05	91.19	90.59	90.66
0-17	102 42	102 37	102 42	102.73	102.68	103.30	103 07	103.31	103 09
18-29	99 27	92 13	93.99	100.22	100.32	94.10	93.91	93 99	93.74
30-49	95.92	89.00	86.17	96.47	96 54	89.66	89.65	88 53	88 42
50+	78 33	72.08	71 49	76.94	76.92	73.51	73.55	73 47	73.44
NONBLACK									
Total	97 19	96.54	95.89	97.66	97 80	97.88	97.91	97.15	97.18
0-17	105 23	105 51	105.51	104 95	104.91	105 50	105.59	105.53	105.60
18-29	104.94	104 57	103.78	104.81	105 42	106.89	107.03	105.27	105.38
30-49	102 00	100 34	99.59	101.94	101.98	101.36	101.42	100.59	100.64
50+	80.79	79.86	79.38	84.17	84 16	83.54	83.57	83 10	83.12

Source: U S Census Bureau, Population Division.
Note. Model 1 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who only reported Black. Model 2 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black whether or not they reported any other race.
DA, survey, and census data used to compute sex ratios are consistent with data used in Table 7.

Figure 5 --Comparison of Sex Ratios for Black and NonBlack: Census, A.C.E. and DA: 2000



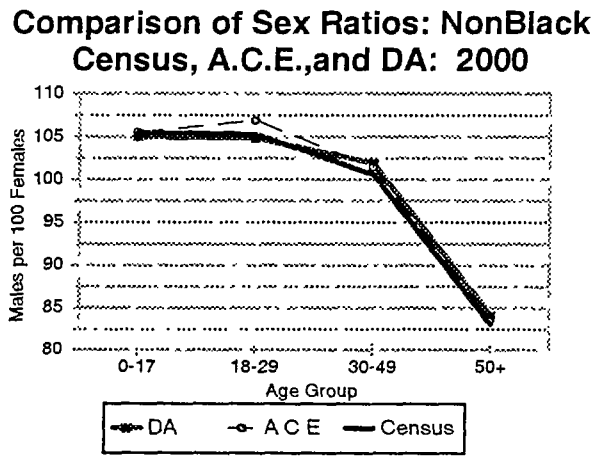


Table 9. Census Counts Relative to Demographic Benchmarks for County Groupings: 1990 and 2000

		Total Population			Ages 7-14			Ages 65+		
		Census compared to population estimates[1]			Census compared to school enrollment			Census compared to Medicare enrollment		
Category	Counties	1990 Census	2000 Census	Diff	1990 Census	2000 Census	Diff	1990 Census	2000 Census	Diff
	(1)	(2)	(3)	(4)=3-2	(5)	(6)	(7)=6-5	(8)	(9)	(10)=9-8
Region										
All Counties	**3,141**	**98.4**	**101.0**	**2.6**	**98.6**	**101.9**	**3.3**	**103.0**	**105.9**	**2.8**
Northeast	217	99 2	102.4	3 2	99.7	101.1	1.4	101.9	104 5	2.6
Midwest	1,055	99.3	100.8	1.5	100.3	101.9	1 6	101 4	103 3	1 8
South	1,424	97.9	101 1	3.2	96.6	101.4	4.8	104.5	107.7	3.3
West	445	97.5	100 1	2 6	98 9	103.4	4.5	103 9	107 2	3.3
Minority Concentration										
All Counties	**3,138**	**98.4**	**101.0**	**2.6**	**98.6**	**101.9**	**3.3**	**103.0**	**105.9**	**2.8**
Minority > 50%	187	96.7	100 3	3.6	95.2	100 4	5 3	104.5	109 1	4 6
Minority 25-50%	553	97.8	101.0	3 1	97.5	101.4	3.9	102.3	105.3	3.0
Minority 10-25%	631	98.9	101.7	2.8	98.9	101 9	3.1	103.6	106.2	2 7
Minority < 10%	1,767	99 3	100.7	1 4	100 8	103.1	2.3	102 6	104 9	2.3
Hard-to-Count (HTC) Scores										
All Counties	**3,138**	**98.4**	**101.0**	**2.6**	**98.6**	**101.9**	**3.3**	**103.0**	**105.9**	**2.8**
HTC >=70	415	96 9	100.2	3.4	95.8	100.9	5.1	103.3	107.7	4.4
HTC 50-70	620	98 0	101.6	3.6	97.9	101.4	3.5	103 2	106.6	3.3
HTC 30-50	889	98.9	101.4	2.5	98.8	101.7	2.9	102.6	104.9	2.3
HTC < 30	1,214	99.5	100.5	1.1	101.1	103.5	2.4	103.2	105.4	2 2

Col 2 Represents ratio of 1990 census to 1990 PES adjusted population times 100.
Col. 3 Represents ratio of 2000 Census to 2000 population estimate (adjusted for net undercount using the PES times 100)
Col. 5 Represents ratio of 1990 census ages 7-14 to 1989-90 school enrollment (grades 1-8) times 100.
Col. 6 Represents ratio of Census 2000 ages 7-14 to 1998-99 school enrollment (grades 1-8) times 100.
Col 8 Represents ratio of 1990 census ages 65+ to 1990 Medicare enrollment times 100.
Col. 9 Represents ratio of Census 2000 ages 65+ to 1999 Medicare enrollment times 100.

Minority concentration is based on 1990 census population of counties, and includes all groups other than Non-Hispanic Whites.
HTC Scores are based on 12 specific demographic, housing, and socioeconomic variables that are associated with nonresponse and undercount (including percent renter, multi-units, lack of telephone, vacancy rates, poverty, not high school graduate, mobility, and language isolation) Three counties that do not have demographic data for both 1990 and 2000 are excluded. See appendix B for discussion of methodology

Note. Numbers may differ in last digit due to rounding.

[1] The population estimates are based on the same assumption as the base DA, but have been calculated for subnational areas.

Appendix A

Description of Methodology for Demographic Analysis

The particular analytic procedure used to estimate coverage nationally for the various demographic subgroups depends primarily on the nature and availability of the required demographic data. Two principal demographic techniques are used to produce the demographic analysis estimates for 2000, one for the population under age 65 and another for the population 65 and over. Essentially the same methodology was used for the 1990 census. In this section we describe the age group components, the development of historical estimates, and the limitations of the estimates.

Age group components

(1) Ages under 65. The Demographic Analysis estimates for the population below age 65 are based on the compilation of historical estimates of the components of population change: births (B), deaths (D), immigration (I), and emigration (E). Presuming that the components are accurately measured, the population estimates (P_{0-64}) are derived by the basic demographic accounting equation applied to each birth cohort:

$$P_{0-64} = B - D + I - E \qquad (1)$$

The actual calculations are carried out for single-year birth cohorts. For example, the estimate of the population age 40 on April 1, 2000 is based on births from April 1959 to March 1960 (adjusted for under-registration), reduced by deaths to the cohort in each year between 1960 and 2000, and incremented by estimated immigration and emigration of the cohort over the 40-year period.

The historical data on births come from the vital registration system. These data have been available for all states since about 1933. The extent of underregistration has been empirically quantified and correction factors are available. Births represent by far the largest component in equation 1. The component of deaths is also based on the vital registration system. These records are relatively complete. Data on legal immigration come from the Immigration and Naturalization Service. The number of emigrants and undocumented immigrants are estimated using analytic methods; these two components are subject to the greatest uncertainty.

(2) Age 65 and Over. Administrative data on aggregate Medicare enrollments are used to estimate the population age 65 and over (P_{65+}):

$$P_{65+} = M + m, \qquad (2)$$

where M is the aggregate Medicare enrollment and m is the estimate of under-enrollment. Although Medicare enrollment is generally presumed to be quite complete, adjustments are made to the basic data to account for groups who are omitted. An estimated 3.7 percent of the 65 and over population 65 and over was not enrolled in Medicare in 2000. (See Robinson, 1991b for a

description of the methodology used to estimate Medicare underenrollment.)

Appendix Table 1 displays the components of change used to carry forward the DA population from 1990 to 2000 to estimate the population under age 65 in 2000. The table also shows the estimated DA population 65 and over in 2000 based on Medicare data.

Limitations of the demographic estimates

The aggregate administrative data and estimates that are incorporated in equations 1 and 2 above are corrected for various types of errors. Many assumptions go into this estimation process, some of which can be validated and some of which are based on quite limited information.

Births are by far the largest component of population change involved in the DA system; thus, even relatively small errors in the estimates of births and the assumptions used to correct for underregistration can have significant effects. The adjustments for birth underregistration are based on three tests of registration completeness (1940, 1950, and 1964-68). The estimated level of completeness was 92.5 in 1940 (81.9 percent for Black births), 97.9 in 1950 (93.7 for Black births), and 99.2 by 1964-68 (98.0 for Black births). Factors for other years are derived by interpolation and extrapolation. In particular, the estimated number of Black births depends on the quality of the adjustment factors. An investigation and subsequent revision of the 1940 birth registration results led to a downward adjustment to the time series of Black births (1935-1945) and lowered the estimated net undercount for those Black cohorts (Passel, 1991; Robinson, 1991). See Robinson (1991a) for a discussion of the uncertainty in the birth series used to construct the demographic estimates.

With the exception of a correction for infant deaths occurring in years prior to 1960, death statistics are used without any adjustments for misreporting of age, sex, or race or for underregistration. Immigration and emigration, while overall smaller components than births or deaths, are subject to larger relative error because of the greater uncertainty of some specific estimated elements (especially emigration and undocumented immigration). See Woodrow, 1991a and 1991b for a discussion of the uncertainty in the immigration components used to construct the demographic estimates. We will be conducting extensive evaluations of the immigration components using Census 2000 data on nativity, place of birth and year of entry.

The overall accuracy of the demographic estimates depends on the quality of the demographic data and adjustments. The internal consistency of the demographic estimates permits the trends and changes in net coverage patterns over time to be estimated more precisely than the exact level of net coverage in any given census (see Robinson et al., 1990; Robinson et al., 1993a).

Another limitation of the demographic analysis is that the demographic estimates for age, sex, and race groups only measure net undercount in the census. They do not tell us about the separate components of net coverage error (omissions, erroneous inclusions) or net content error (see Hogan and Robinson, 1993).

Appendix Table A1. Components Used to Construct the Base Set of Demographic Analysis Estimates of Population for April 1, 2000: United States

Component	Total			Non Black			Black		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
DA Population 1990 Ages <55	200,582,797	101,706,607	98,876,190	172,874,466	87,924,317	84,950,149	27,708,331	13,782,290	13,926,041
Births	40,112,465	20,525,369	19,587,096	33,267,980	17,048,824	16,219,156	6,844,485	3,476,545	3,367,940
Deaths	4,668,595	3,018,296	1,650,299	3,614,682	2,349,780	1,264,902	1,053,913	668,516	385,396
Legal Immigration	6,763,134	3,092,255	3,670,879	5,879,485	2,668,890	3,210,595	883,648	423,365	460,283
Legal Emigration	2,435,675	1,299,013	1,136,663	2,156,783	1,149,962	1,006,821	278,892	149,051	129,841
Refugees	937,866	500,427	437,439	850,079	447,063	403,016	87,787	53,364	34,423
Puerto Rican Migration	126,951	59,361	67,590	115,659	54,056	61,603	11,292	5,305	5,987
Net Temporary Residents	373,676	258,965	114,712	366,740	254,413	112,327	6,936	4,551	2,385
Net Civilian Citizen Migration	316,599	125,091	191,508	236,688	93,008	143,680	79,911	32,083	47,828
Net AFO Change	-229,517	-207,651	-21,866	-163,013	-149,591	-13,422	-66,504	-58,060	-8,444
Net Undocumented Immigration	2,737,590	1,444,933	1,292,657	2,464,548	1,307,783	1,156,764	273,042	137,150	135,892
DA Population 2000 Ages <65	245,076,326	123,603,351	121,472,975	210,447,194	106,448,205	103,998,989	34,629,131	17,155,146	17,473,985
DA Population 2000 Ages 65 and over (Medicare- Based)	34,521,796	14,271,949	20,249,847	31,696,737	13,189,990	18,506,746	2,825,059	1,081,959	1,743,100
DA Population 2000 All Ages	279,598,121	137,875,300	141,722,821	242,143,931	119,638,196	122,505,736	37,454,190	18,237,104	19,217,086

Note. Components are for "Base" DA and are consistent with the "Base" DA estimates shown in Table 3
Numbers may differ in last digit due to rounding

Appendix B

Description of Methodology for Other Demographic Benchmarks

Introduction

We supplement the Demographic Analysis results, which are available only at the national level, with other demographic benchmarks and analytic techniques that provide inferences of coverage changes for subnational areas.

The use of independent demographic benchmarks to evaluate the census and A.C.E. results relies on three estimates or data sets. Some of the benchmarks refer to the total population, some pertain to limited age groups only. Our objective is to see if the different benchmarks can together provide an independent basis to evaluate the change in coverage patterns from 1990 to 2000. Given some uncertainty in the demographic estimates, no one method can stand alone. If, however, all or most estimates are consistent in pointing to a reduction in the net undercount in Census 2000, we can have more confidence in the results.

Methodology

The three approaches to developing independent demographic benchmarks are as follows:

(1) Independent benchmarks of the total population in 2000.

(2) Independent benchmarks of the population 65 and older based on Medicare data.

(3) Independent benchmarks of the school-age population based on school enrollment data.

The development of the above benchmarks is described below.

The methods employed in this project use aggregate level administrative data to produce the independent benchmarks. Other research is being conducted at the Census Bureau which uses administrative records at the individual level. That project is not included in this work, but a comprehensive integrated coverage measurement program in 2000 would draw from both approaches (aggregate and individual levels).

Independent benchmarks of the total population in 2000

The Census Bureau, as part of its postcensal population estimates program, produces annual estimates of the total population for states, counties, and places. The estimates for Census 2000 are based on the 1990 census, carried forward with estimated components of change (births, deaths, net migration). The estimates program represents a cost effective, operationally feasible, and timely source for providing independent benchmarks for evaluating the results.

To produce the 2000 population estimates, the demographic accounting equation is:

$$ {}_{T}P_{2000} = {}_{T}C_{90} + B_{90\text{-}00} - D_{90\text{-}00} + M_{90\text{-}00} \quad (1) $$

where:

${}_{T}P_{2000}$ = "Census-level" estimate for the total population (all ages) in 2000

${}_{T}C_{90}$ = Census count of the total population in 1990

$B_{90\text{-}00}$ = Births occurring between the census (1990) and the estimate date (2000)

$D_{90\text{-}00}$ = Deaths to the population occurring between the census (1990) and the estimate date (2000)

$M_{90\text{-}00}$ = Estimated net migration occurring between the census (1990) and the estimate date (2000) (includes domestic and international migration)

A description of the Census Bureau methodology of producing subnational population estimates is provided by Batutis (1994), Long (1993) and Sink (1996). An evaluation of the accuracy of the 1990 postcensal population estimates (compared to 1990 census counts) is provided by Davis (1994).

For this evaluation, allowance is also made for net under enumeration in 1990 (the standard population estimates are "census level"). This is accomplished by adding a factor for undercount to equation 1:

$$ {}_{T}P'_{2000} = {}_{T}P_{2000} + {}_{T}U_{90} \quad (2) $$

where:

${}_{T}P'_{2000}$ = Adjusted-level for the total population in 2000

${}_{T}U_{90}$ = Estimate of net undercount in the 1990 census

The factor for undercount is based on the 1990 PES and supplemented by illustrative estimates developed below.

Independent benchmarks of the population 65 and older in 1990 and 2000 based on Medicare data

Medicare data have been used extensively in the development of demographic analysis coverage estimates for the nation and in the production of postcensal population estimates for states and counties. Medicare tabulations at the county level for the most currently available date (1999) provide independent benchmarks for assessing the Census 2000 results for the population 65 and older.

We use Medicare data to assess coverage of the population 65 and older as follows:

$$\text{Ratio}_{x} = {}_{65+}P_{x} \,/\, {}_{65+}M_{x} \qquad (3)$$

where:

Ratio = Ratio of census population 65 and over to Medicare enrollment for the population 65 years and over (in 1990 or 2000)

${}_{65+}P_{x}$ = Census population 65 and over (in 1990 or most currently available for comparison to Census 2000)

${}_{65+}M_{x}$ = Count of the number of persons aged 65 and over enrolled in Medicare (in 1990 or most currently available for comparison to Census 2000)

The ratios of the census population to Medicare enrollment in 1990 and 2000 are used to broadly assess change in coverage. If the ratio in 2000 is greater than the ratio in 1990 we infer an improvement in census coverage of the population 65 and older; if the ratio in 2000 is lower we infer a decline in coverage.

The ratios themselves cannot be used as direct measures of coverage because of known differences between the census and Medicare universes. First, no allowance is made for underenrollment in the Medicare files (estimated to be about 3 percent nationally). Second, the county of residence in the census could be different than that reported in the Medicare file (e.g., location of doctor's office address). As long as the underenrollment and residency reporting remain about the same in 1990 and 2000, the change in the ratios can be used as a rough indicator of change in coverage. Estimates of national underenrollment imply about the same relative underenrollment in 1990 and 2000.

Also, since the Medicare data used (1990-1999) represent a 9-year interval, and the census represents a 10 year interval (1990-2000), the ratios of the two numbers (census /Medicare) will overstate the 1990 to 2000 change shown in Table 9. This inconsistency will have less effect on comparisons of the ratios across groups (e.g., by region, minority concentrations) which is a main focus of the benchmark comparisons.

School Enrollment Data

Administrative data on school enrollment provide independent benchmarks for evaluating coverage of the school-age population. The school enrollment data, which are quite complete (especially for public schools), can be compared with the enumerated school age population to provide coverage indicators at the time of the 1990 census and Census 2000. This provides an effective means to measure change in completeness of coverage between the two points in time (1990 and 2000), in a manner similar to the use of the Medicare data for the older population.

We utilize school enrollment data to infer the change in coverage as follows:

$$Ratio_x = {}_{7\text{-}14}P_x \; / \; SE_x \qquad (4)$$

where:

Ratio = Ratio of census population to school enrollment (in 1990 or 2000)

${}_{7\text{-}14}P_x$ = Census population aged 7-14 (in 1990 or 2000)

SE_x = Count of the number of persons enrolled in grades 1 to 8 (in 1989-90 or 1998-99). The enrollment data refer to 1989-1990 (for comparison to the 1990 census) or 1998-1999 (most currently available for comparison to Census 2000). Both public and private enrollment data are used.

If the ratio in 2000 is greater than the ratio in 1990, we infer an improvement in census coverage of the school-aged population; if the ratio in 2000 is lower we infer a decline in coverage. As with the discussion of the Medicare-based ratios, the ratios themselves cannot be used as direct measures of coverage because of known differences between the census and school enrollment universes. First, no allowance is made for children not enrolled in school (which would include those in institutions and schooled at home). Second, the county of residence in the census could be different than that reported in the school file (i.e., location of school's address). As long as the enrollment levels and school districts remain about the same in 1990 and 2000, the change in the ratios can be used as a rough indicator of change in coverage.

Also, since the school enrollment data used (1990-1999) represent a 9-year interval, and the census represents a 10 year interval (1990-2000), the ratios of the two numbers (census /school enrollment) will overstate the 1990 to 2000 change shown in Table 9. This inconsistency will have less effect on comparisons of the ratios across groups(e.g., by region or minority concentrations).

Appendix C

Foreign Born Methodology

The results of the base DA analysis as well as the examination of other demographic benchmarks led us to examine the demographic components of population change. If immigration is understated in the estimated components of change, then the percent of the population that is Hispanic and the percent of the population that is foreign born should be understated relative to Census 2000 results.

The best data for addressing these questions would be the demographic analysis estimates for the Hispanic and foreign born populations as well as the detailed Census 2000 sample data on nativity, place of birth, and year of entry cross classified by age, sex, race, and other characteristics. Unfortunately, none of these data are currently available for this analysis. However, we can make some preliminary assessments by developing an implied set of demographic analysis estimates for the Hispanic and foreign born. Additionally, we can develop implied data on the foreign born in Census 2000 by reweighting data from the Current Population Survey (CPS) for 2000 to reflect the Census 2000 populations.

For this analysis, several estimates of the foreign born in 2000 were developed using the traditional demographic component technique. This technique carries a beginning population forward using estimates of the components of population change (births, deaths, and international migration) during the period.

The international migration component is a compilation of measured and unmeasured subcomponents. The measured components include legal immigration and refugees, legal emigration, movement between the United States and Puerto Rico, and movement of civilian citizens between the United States and foreign countries. Because of the lack of "hard" available data, the estimates of undocumented immigration, as well as the estimates for emigration and temporary migration, are subject to a greater amount of uncertainty. Various scenarios were developed that varied the level of undocumented migration and emigration. However, upon examining the resulting percent of the population that is foreign born and the percent of the population that is Hispanic, we concentrated on varying the undocumented migration component.

Step one in the development of the estimates of the foreign born began with the construction of the 1990 foreign-born population consistent with the 1990 adjusted population. This was necessary because nativity is a sample characteristic, hence the foreign-born population adjusted for the net undercount was not available. Two adjusted foreign born populations were developed - one consistent with the 1990 PES Modified Age, Sex, Race file (MARS) file adjusted population and one consistent with the 1990 DA population.

For the 1990 PES population, we applied the foreign-born percentages from the 1990 census by age group, sex, race, and Hispanic origin to the corresponding 1990 population that reflected the PES adjustment. Once the beginning population was available, it was a straightforward approach to carry out the demographic accounting process. For this process, we assumed that the relevant death rates applied equally to the native and foreign-born populations. Since no births can be "foreign born" we are left with only the international migration component. Since a small portion of the emigration component is assumed to be native emigration, we excluded that portion from the foreign-born calculations and assumed the remaining amounts of international migration were applicable to only the foreign-born population. In doing this, we did include the movement between the U.S. and Puerto Rico as well as the movement of civilian citizens in the foreign born calculations.

In one set of estimates, we used the base set of components of population change and calculated the resulting foreign-born percentages. In another set, we doubled the number of net undocumented migrants and calculated the resulting foreign-born percentages. In a third illustrative set, we increased the number of undocumented immigrants to a level that would enable us to reach the 2000 A.C.E. population total using the 1990 PES population as the beginning point with the remaining components of population change at the base level. This scenario resulted in an increase in the undocumented migration component from 2.77 million to 8.02 million.

The estimates of the foreign born using the 1990 DA population as the base were carried out in a similar manner. The only difference was the development of the base population. Because the 1990 DA population was only available for the Black and NonBlack populations, we calculated an implied Hispanic DA population first and then developed the relevant foreign-born population.

To develop the implied Hispanic DA population, we increased the 1990 PES population to match to the 1990 DA levels. This resulted in raising the 1990 PES adjustment from 4,046,555 to 4,683,913 and raising the adjusted Hispanic population by 186,000. We developed the implied DA NonHispanic population by simply subtracting the implied Hispanic DA estimates from the totals for DA.

Once we developed the implied DA Hispanic and NonHispanic populations, we developed the relevant foreign-born populations and estimates for 2000 paralleling the method for the 1990 PES population. Tables 2A and 2B present the implied foreign-born and Hispanic percentages resulting from these various calculations.

Appendix Table 1--Comparison of the Census, A.C.E., and DA Estimates of Population and Percent Net Undercount: 2000 - Model 1

(Estimates for race groups reflect "Model 1" census tabulations) (a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (1)	Census Counts with race Modified (used for DA) (2)	A.C.E. Estimated Population (3)	DA BASE Estimated Population (4)	DA ALT. Estimated Population (5)	Net Undercount A.C.E.		Net Undercount DA BASE	Net Undercount DA ALT.	DA BASE	DA ALT.
						Amount (6)=(3)-(1)	Percent (7)=(6)/(3)	Amount (8)=(4)-(2)	Amount (9)=(5)-(2)	Percent (10)=(8)/(4)	Percent (11)=(9)/(5)
TOTAL	281,421,906	281,421,906	284,683,782	279,598,121	282,335,711	3,261,876	1 15	(1,823,785)	913,805	-0.65	0.32
Male	138,053,563	138,053,563	140,175,329	137,875,300	139,320,232	2,121,766	1.51	(178,263)	1,266,669	-0.13	0.91
Female	143,368,343	143,368,343	144,508,454	141,722,821	143,015,479	1,140,111	0.79	(1,645,522)	(352,864)	-1 16	-0 25
BLACK	34,658,190	35,704,124	35,384,873	37,454,190	37,726,855	726,683	2.05	1,750,067	2,022,731	4 67	5.36
Male	16,465,185	16,971,124	16,863,645	18,237,104	18,374,077	398,460	2.36	1,265,981	1,402,953	6.94	7.64
Female	18,193,005	18,733,000	18,521,227	19,217,086	19,352,778	328,222	1.77	484,086	619,778	2.52	3.20
NONBLACK	246,763,716	245,717,782	249,298,910	242,143,931	244,608,856	2,535,194	1.02	(3,573,851)	(1,108,926)	-1.48	-0.45
Male	121,588,378	121,082,439	123,311,683	119,638,196	120,946,155	1,723,305	1.40	(1,444,243)	(136,284)	-1.21	-0.11
Female	125,175,338	124,635,343	125,987,226	122,505,735	123,662,701	811,888	0 64	(2,129,608)	(972,642)	-1.74	-0.79
TOTAL MALE											
All ages	138,053,563	138,053,563	140,175,329	137,875,300	139,320,232	2,121,766	1.51	(178,262)	1,266,669	-0.13	0.91
0-17	37,059,196	37,059,196	37,634,604	36,871,477	37,158,795	575,408	1 53	(187,719)	99,599	-0.51	0 27
18-29	23,672,589	23,672,589	24,517,556	23,078,475	23,753,737	844,967	3.45	(594,114)	81,148	-2.57	0 34
30-49	42,659,073	42,659,073	43,443,356	43,211,046	43,645,054	784,283	1 81	551,973	985,981	1 28	2 26
50+	34,662,705	34,662,705	34,579,813	34,714,303	34,762,646	(82,892)	-0.24	51,598	99,941	0 15	0.29
18+	100,994,367	100,994,367	102,540,725	101,003,824	102,161,437	1,546,358	1.51	9,457	1,167,070	0.01	1.14
TOTAL FEMALE											
All ages	143,368,343	143,368,343	144,508,454	141,722,821	143,015,479	1,140,111	0.79	(1,645,522)	(352,864)	-1.16	-0 25
0-17	35,234,616	35,234,616	35,786,168	35,255,353	35,543,886	551,552	1.54	20,737	309,270	0.06	0.87
18-29	22,852,201	22,852,201	23,344,636	22,171,349	22,702,804	492,435	2 11	(680,852)	(149,397)	-3 07	-0 66
30-49	43,092,246	43,092,246	43,506,365	42,701,768	43,111,457	414,119	0.95	(390,478)	19,211	-0.91	0 04
50+	42,189,280	42,189,280	41,871,285	41,594,351	41,657,332	(317,995)	-0.76	(594,929)	(531,948)	-1.43	-1 28
18+	108,133,727	108,133,727	108,722,286	106,467,468	107,471,593	588,559	0 54	(1,666,259)	(662,134)	-1.57	-0 62

Appendix Table 1 cont. --Comparison of the Census, A.C.E., and DA Estimates of Population and Percent Net Undercount: 2000 - Model 1

(Estimates for race groups reflect "Model 1" census tabulations) (a minus sign denotes a net overcount)

Race,Sex, Age	Census Counts as Tabulated (1)	Census Counts with race Modified (used for DA) (2)	A.C.E. Estimated Population (3)	DA BASE Estimated Population (4)	DA ALT. Estimated Population (5)	Net Undercount A.C.E.		Net Undercount DA BASE	Net Undercount DA ALT.	DA BASE	DA ALT.
						Amount (6)=(3)-(1)	Percent (7)=(6)/(3)	Amount (8)=(4)-(2)	Amount (9)=(5)-(2)	Percent (10)=(8)/(4)	Percent (11)=(9)/(5)
BLACK MALE											
All ages	16,465,185	16,971,124	16,863,645	18,237,104	18,374,077	398,460	2.36	1,265,981	1,402,953	6.94	7.64
0-17	5,532,176	5,728,700	5,698,648	6,021,380	6,038,300	166,472	2.92	292,680	309,600	4.86	5.13
18-29	3,079,238	3,192,384	3,201,682	3,470,922	3,532,123	122,444	3.82	278,538	339,739	8 02	9.62
30-49	4,891,384	5,034,696	5,020,804	5,601,221	5,655,841	129,420	2 58	566,525	621,145	10.11	10 98
50+	2,962,387	3,015,344	2,942,512	3,143,582	3,147,813	(19,875)	-0.68	128,238	132,469	4.08	4 21
18+	10,933,009	11,242,424	11,164,997	12,215,725	12,335,777	231,988	2.08	973,301	1,093,353	7.97	8.86
BLACK FEMALE											
All ages	18,193,005	18,733,000	18,521,227	19,217,086	19,352,778	328,222	1.77	484,086	619,778	2.52	3.20
0-17	5,353,520	5,545,392	5,516,334	5,861,590	5,880,958	162,814	2.95	316,198	335,566	5 39	5 71
18-29	3,274,167	3,396,445	3,402,256	3,463,204	3,521,016	128,089	3.76	66,759	124,571	1.93	3.54
30-49	5,529,188	5,686,774	5,599,970	5,806,463	5,858,602	70,782	1 26	119,689	171,828	2 06	2.93
50+	4,036,130	4,104,389	4,002,668	4,085,829	4,092,202	(33,462)	-0.84	(18,560)	(12,187)	-0.45	-0.30
18+	12,839,485	13,187,608	13,004,893	13,355,496	13,471,820	165,408	1.27	167,888	284,212	1.26	2.11
NONBLACK MALE											
All ages	121,588,378	121,082,439	123,311,683	119,638,196	120,946,155	1,723,305	1 40	(1,444,243)	(136,284)	-1.21	-0.11
0-17	31,527,020	31,330,496	31,935,956	30,850,097	31,120,495	408,936	1 28	(480,399)	(210,001)	-1.56	-0.67
18-29	20,593,351	20,480,205	21,315,874	19,607,553	20,221,614	722,523	3 39	(872,652)	(258,591)	-4 45	-1.28
30-49	37,767,689	37,624,377	38,422,552	37,609,825	37,989,213	654,863	1.70	(14,552)	364,836	-0 04	0.96
50+	31,700,318	31,647,361	31,637,301	31,570,721	31,614,833	(63,017)	-0.20	(76,640)	(32,528)	-0.24	-0.10
18+	90,061,358	89,751,943	91,375,727	88,788,099	89,825,660	1,314,369	1.44	(963,844)	73,717	-1.09	0 08
NONBLACK FEMALE											
All ages	125,175,338	124,635,343	125,987,226	122,505,735	123,662,701	811,888	0.64	(2,129,608)	(972,642)	-1.74	-0.79
0-17	29,881,096	29,689,224	30,269,834	29,393,763	29,662,928	388,738	1.28	(295,461)	(26,296)	-1.01	-0.09
18-29	19,578,034	19,455,756	19,942,380	18,708,145	19,181,788	364,346	1.83	(747,611)	(273,968)	-4.00	-1 43
30-49	37,563,058	37,405,472	37,906,395	36,895,305	37,252,855	343,337	0.91	(510,167)	(152,617)	-1.38	-0.41
50+	38,153,150	38,084,891	37,868,617	37,508,522	37,565,130	(284,533)	-0.75	(576,369)	(519,761)	-1 54	-1 38
18+	95,294,242	94,946,119	95,717,393	93,111,972	93,999,773	423,151	0.44	(1,834,147)	(946,346)	-1 97	-1.01

Appendix 1 Notes

1) DA Base set–DA estimates without alternative assumptions. DA Alternative set–DA estimates with alternative assumption that doubles the estimated net number of undocumented immigrants entering during the 1990's

2) Model 1 census tabulations for Blacks (col. 1 and 2) include persons who reported only Black.

3) The tabulations used for A.C.E. and DA differ because of the modification of persons who marked only the "other race" circle. For DA, these persons are reassigned to a specific race category (including Black) to be consistent with the historical demographic data series used to construct the DA estimates (which do not include the "other race" category). For the A.C. E., persons who marked only the "other race" circle are included in the domain which also contains Non Hispanic Whites

4) Numbers may differ in last digit due to rounding

Appendix Table 2-- Comparison of the Census, A.C.E., and DA Estimates of Population and Percent Net Undercount: 2000 - Model 2

(Estimates for race groups reflect "Model 2" census tabulations) (a minus sign denotes a net overcount)

Race,Sex, Age	Census Counts as Tabulated (1)	Census Counts with race Modified (used for DA) (2)	A C.E. Estimated Population (3)	DA BASE Estimated Population (4)	DA ALT. Estimated Population (5)	Net Undercount A.C E		Net Undercount DA BASE	Net Undercount DA ALT	DA BASE	DA ALT
						Amount (6)=(3)-(1)	Percent (7)=(6)/(3)	Amount (8)=(4)-(2)	Amount (9)=(5)-(2)	Percent (10)=(8)/(4)	Percent (11)=(9)/(5)
TOTAL	281,421,906	281,421,906	284,683,782	279,598,121	282,335,711	3,261,876	1.15	(1,823,785)	913,805	-0.65	0.32
Male	138,053,563	138,053,563	140,175,328	137,875,300	139,320,232	2,121,765	1 51	(178,263)	1,266,669	-0.13	0.91
Female	143,368,343	143,368,343	144,508,454	141,722,821	143,015,479	1,140,111	0 79	(1,645,522)	(352,864)	-1.16	-0.25
BLACK	36,419,434	37,104,248	37,192,328	37,454,190	37,726,855	772,894	2.08	349,943	622,607	0.93	1.65
Male	17,315,333	17,643,072	17,738,786	18,237,104	18,374,077	423,453	2.39	594,033	731,005	3.26	3.98
Female	19,104,101	19,461,176	19,453,542	19,217,086	19,352,778	349,441	1 80	(244,090)	(108,398)	-1.27	-0.56
NONBLACK	245,002,472	244,317,658	247,491,454	242,143,931	244,608,856	2,488,982	1.01	(2,173,727)	291,198	-0.90	0.12
Male	120,738,230	120,410,491	122,436,542	119,638,196	120,946,155	1,698,312	1.39	(772,295)	535,664	-0 65	0 44
Female	124,264,242	123,907,167	125,054,912	122,505,735	123,662,701	790,670	0 63	(1,401,432)	(244,466)	-1.14	-0.20
TOTAL MALE											
All ages	138,053,563	138,053,563	140,175,328	137,875,300	139,320,232	2,121,765	1.51	(178,262)	1,266,669	-0.13	0 91
0-17	37,059,196	37,059,196	37,634,604	36,871,477	37,158,795	575,408	1.53	(187,719)	99,599	-0 51	0 27
18-29	23,672,589	23,672,589	24,517,556	23,078,475	23,753,737	844,967	3.45	(594,114)	81,148	-2.57	0.34
30-49	42,659,073	42,659,073	43,443,356	43,211,046	43,645,054	784,283	1.81	551,973	985,981	1.28	2 26
50+	34,662,705	34,662,705	34,579,813	34,714,303	34,762,646	(82,892)	-0.24	51,598	99,941	0.15	0.29
18+	100,994,367	100,994,367	102,540,724	101,003,824	102,161,437	1,546,357	1.51	9,457	1,167,070	0.01	1.14
TOTAL FEMALE											
All ages	143,368,343	143,368,343	144,508,454	141,722,821	143,015,479	1,140,111	0.79	(1,645,522)	(352,864)	-1.16	-0 25
0-17	35,234,616	35,234,616	35,786,168	35,255,353	35,543,886	551,552	1.54	20,737	309,270	0.06	0 87
18-29	22,852,201	22,852,201	23,344,636	22,171,349	22,702,804	492,435	2.11	(680,852)	(149,397)	-3.07	-0 66
30-49	43,092,246	43,092,246	43,506,365	42,701,768	43,111,457	414,119	0 95	(390,478)	19,211	-0.91	0 04
50+	42,189,280	42,189,280	41,871,285	41,594,351	41,657,332	(317,995)	-0.76	(594,929)	(531,948)	-1.43	-1 28
18+	108,133,727	108,133,727	108,722,286	106,467,468	107,471,593	588,558	0.54	(1,666,259)	(662,134)	-1.57	-0 62

Appendix Table 2 cont.--Comparison of the Census, A.C.E., and DA Estimates of Population and Percent Net Undercount: 2000 - Model 2

(Estimates for race groups reflect "Model 2" census tabulations) (a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (1)	Census Counts with race Modified (used for DA) (2)	A C.E. Estimated Population (3)	DA BASE Estimated Population (4)	DA ALT. Estimated Population (5)	Net Undercount A.C E Amount (6)=(3)-(1)	Net Undercount A.C E Percent (7)=(6)/(3)	Net Undercount DA BASE Amount (8)=(4)-(2)	Net Undercount DA ALT. Amount (9)=(5)-(2)	Net Undercount DA BASE Percent (10)=(8)/(4)	Net Undercount DA ALT. Percent (11)=(9)/(5)
BLACK MALE											
All ages	17,315,333	17,643,072	17,738,786	18,237,104	18,374,077	423,453	2.39	594,033	731,005	3.26	3.98
0-17	6,012,924	6,136,802	6,192,496	6,021,380	6,038,300	179,572	2.90	(115,422)	(98,502)	-1.92	-1.63
18-29	3,221,614	3,301,702	3,351,304	3,470,922	3,532,123	129,690	3.87	169,220	230,421	4.88	6 52
30-49	5,047,295	5,139,186	5,181,571	5,601,221	5,655,841	134,276	2.59	462,035	516,655	8.25	9.13
50+	3,033,500	3,065,382	3,013,416	3,143,582	3,147,813	(20,084)	-0.67	78,200	82,431	2.49	2.62
18+	11,302,409	11,506,270	11,546,291	12,215,725	12,335,777	243,882	2.11	709,455	829,507	5.81	6.72
BLACK FEMALE											
All ages	19,104,101	19,461,176	19,453,542	19,217,086	19,352,778	349,441	1.80	(244,090)	(108,398)	-1.27	-0.56
0-17	5,832,333	5,952,902	6,008,245	5,861,590	5,880,958	175,912	2.93	(91,312)	(71,944)	-1.56	-1.22
18-29	3,434,591	3,522,107	3,568,727	3,463,204	3,521,016	134,136	3.76	(58,903)	(1,091)	-1.70	-0 03
30-49	5,706,371	5,812,103	5,779,748	5,806,463	5,858,602	73,377	1.27	(5,640)	46,499	-0.10	0.79
50+	4,130,806	4,174,064	4,096,822	4,085,829	4,092,202	(33,984)	-0 83	(88,235)	(81,862)	-2.16	-2 00
18+	13,271,768	13,508,274	13,445,297	13,355,496	13,471,820	173,529	1.29	(152,778)	(36,454)	-1.14	-0 27
NONBLACK MALE											
All ages	120,738,230	120,410,491	122,436,542	119,638,196	120,946,155	1,698,312	1.39	(772,295)	535,664	-0.65	0.44
0-17	31,046,272	30,922,394	31,442,108	30,850,097	31,120,495	395,836	1.26	(72,297)	198,101	-0.23	0 64
18-29	20,450,975	20,370,887	21,166,252	19,607,553	20,221,614	715,277	3.38	(763,334)	(149,273)	-3.89	-0 74
30-49	37,611,778	37,519,887	38,261,785	37,609,825	37,989,213	650,007	1.70	89,938	469,326	0.24	1.24
50+	31,629,205	31,597,323	31,566,397	31,570,721	31,614,833	(62,808)	-0 20	(26,602)	17,510	-0 08	0 06
18+	89,691,958	89,488,097	90,994,434	88,788,099	89,825,660	1,302,476	1.43	(699,998)	337,563	-0.79	0.38
NONBLACK FEMALE											
All ages	124,264,242	123,907,167	125,054,912	122,505,735	123,662,701	790,670	0.63	(1,401,432)	(244,466)	-1.14	-0.20
0-17	29,402,283	29,281,714	29,777,923	29,393,763	29,662,928	375,640	1.26	112,049	381,214	0.38	1 29
18-29	19,417,610	19,330,094	19,775,909	18,708,145	19,181,788	358,299	1.81	(621,949)	(148,306)	-3.32	-0 77
30-49	37,385,875	37,280,143	37,726,617	36,895,305	37,252,855	340,742	0.90	(384,838)	(27,288)	-1.04	-0 07
50+	38,058,474	38,015,216	37,774,463	37,508,522	37,565,130	(284,011)	-0.75	(506,694)	(450,086)	-1.35	-1 20
18+	94,861,959	94,625,453	95,276,989	93,111,972	93,999,773	415,030	0.44	(1,513,481)	(625,680)	-1 63	-0 67

Appendix 2 Notes:

1) DA Base set–DA estimates without alternative assumptions. DA Alternative set–DA estimates with alternative assumption that doubles the estimated net number of undocumented immigrants entering during the 1990's.

2) Model 2 census tabulations for Blacks (col. 1 and 2) include persons who reported Black whether or not they reported another race.

3) The tabulations used for A.C E and DA differ because of the modification treatment of persons who marked only the "other race" circle. For DA, these persons are reassigned to a specific race category (including Black) to be consistent with the historical demographic data series used to construct the DA estimates (which do not include the "other race" category) For the A.C. E., persons who marked only the "other race" circle are included in the domain which also contains Non Hispanic Whites.

4) Numbers may differ in last digit due to rounding

Appendix Table 3--Comparison of Census, PES and DA Estimates of Population and Percent Net Undercount: 1990

(a minus sign denotes a net overcount)

Race,Sex, Age	Census Counts as Tabulated (1)	Census Counts with race Modified (used for DA) (2)	PES Estimated Population (3)	DA Estimated Population (4)	Net Undercount PES		Net Undercount DA	
					Amount (5)=(3)-(1)	Percent (6)=5/3	Amount (7)=(4)-(2)	Percent (8)=7/4
TOTAL	248,709,873	248,709,873	252,712,820	253,393,786	4,002,947	1.58	4,683,913	1.85
Male	121,239,418	121,239,348	123,623,142	124,719,564	2,383,724	1 93	3,480,216	2.79
Female	127,470,455	127,470,525	129,089,678	128,674,222	1,619,223	1.25	1,203,697	0.94
BLACK	29,986,060	30,483,281	31,377,093	32,319,553	1,391,033	4.43	1,836,272	5.68
Male	14,170,151	14,420,331	14,900,868	15,758,711	730,717	4 90	1,338,380	8.49
Female	15,815,909	16,062,950	16,476,225	16,560,842	660,316	4.01	497,892	3.01
NONBLACK	218,723,813	218,226,592	221,335,727	221,074,233	2,611,914	1.18	2,847,641	1.29
Male	107,069,267	106,819,017	108,722,274	108,960,853	1,653,007	1.52	2,141,836	1.97
Female	111,654,546	111,407,575	112,613,453	112,113,380	958,907	0.85	705,805	0.63
TOTAL MALE								
All ages	121,239,418	121,239,348	123,623,142	124,719,564	2,383,724	1.93	3,480,216	2.79
0-17	32,584,278	32,750,854	33,649,794	33,474,758	1,065,516	3.17	723,904	2.16
18-29	24,312,055	24,436,887	25,105,216	24,974,147	793,161	3.16	537,260	2 15
30-49	36,281,757	36,110,628	36,965,692	37,549,070	683,935	1.85	1,438,442	3.83
50+	28,061,328	27,940,979	27,902,440	28,721,589	(158,888)	-0.57	780,610	2.72
18+	88,655,140	88,488,494	89,973,348	91,244,806	1,318,208	1.47	2,756,312	3.02
TOTAL FEMALE								
All ages	127,470,455	127,470,525	129,089,678	128,674,222	1,619,223	1.25	1,203,697	0.94
0-17	31,020,154	31,172,863	32,045,587	31,950,086	1,025,433	3 20	777,223	2.43
18-29	23,738,756	23,833,448	24,424,918	23,986,940	686,162	2.81	153,492	0.64
30-49	37,032,606	36,900,573	37,361,657	37,086,454	329,051	0.88	185,881	0.50
50+	35,678,939	35,563,641	35,257,516	35,650,742	(421,423)	-1 20	87,101	0 24
18+	96,450,301	96,297,662	97,044,091	96,724,136	593,790	0.61	426,474	0.44

Appendix Table 3 cont.--Comparison of Census, PES and DA Estimates of Population and Percent Net Undercount: 1990

Race,Sex, Age	Census Counts as Tabulated	Census Counts with race Modified (used for DA)	PES Estimated Population	DA Estimated Population	Net Undercount PES		Net Undercount DA	
					Amount	Percent	Amount	Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=5/3	(7)=(4)-(2)	(8)=7/4
BLACK MALE								
All ages	14,170,151	14,420,331	14,900,868	15,758,711	730,717	4.90	1,338,380	8.49
0-17	4,849,497	4,975,547	5,215,800	5,288,952	366,303	7.02	313,405	5.93
18-29	3,110,320	3,202,490	3,225,832	3,468,964	115,512	3.58	266,474	7.68
30-49	3,841,762	3,876,914	4,099,633	4,421,916	257,871	6.29	545,002	12.33
50+	2,368,572	2,365,380	2,359,603	2,578,879	(8,969)	-0.38	213,499	8.28
18+	9,320,654	9,444,784	9,685,068	10,469,759	364,414	3.76	1,024,975	9.79
BLACK FEMALE								
All ages	15,815,909	16,062,950	16,476,225	16,560,842	660,316	4.01	497,892	3.01
0-17	4,734,918	4,857,767	5,095,218	5,163,952	360,300	7.07	306,185	5.93
18-29	3,309,077	3,393,150	3,501,319	3,494,449	192,242	5.49	101,299	2.90
30-49	4,458,556	4,495,024	4,606,129	4,610,127	147,573	3.20	115,103	2.50
50+	3,313,358	3,317,009	3,273,559	3,292,314	(39,799)	-1.22	(24,695)	-0.75
18+	11,080,991	11,205,183	11,381,007	11,396,890	300,016	2.64	191,707	1.68
NONBLACK								
All ages	107,069,267	106,819,017	108,722,274	108,960,853	1,653,007	1.52	2,141,836	1.97
0-17	27,734,781	27,775,307	28,433,994	28,185,806	699,213	2.46	410,499	1 46
18-29	21,201,735	21,234,397	21,879,384	21,505,183	677,649	3.10	270,786	1.26
30-49	32,439,995	32,233,714	32,866,059	33,127,154	426,064	1 30	893,440	2.70
50+	25,692,756	25,575,599	25,542,837	26,142,710	(149,919)	-0.59	567,111	2.17
18+	79,334,486	79,043,710	80,288,280	80,775,047	953,794	1 19	1,731,337	2.14
NONBLACK								
All ages	111,654,546	111,407,575	112,613,453	112,113,380	958,907	0.85	705,805	0 63
0-17	26,285,236	26,315,096	26,950,369	26,786,134	665,133	2.47	471,038	1.76
18-29	20,429,679	20,440,298	20,923,599	20,492,491	493,920	2.36	52,193	0.25
30-49	32,574,050	32,405,549	32,755,528	32,476,327	181,478	0.55	70,778	0.22
50+	32,365,581	32,246,632	31,983,957	32,358,428	(381,624)	-1.19	111,796	0 35
18+	85,369,310	85,092,479	85,663,084	85,327,246	293,774	0.34	234,767	0.28

Note: PES estimates are based on the "357-Poststrata" Design. The PES and DA methodology and results are found in Robinson et al (1993a)

Appendix Table 4-- Uncertainty Intervals for the Demographic Analysis Estimates of Percent Net Undercount by Race, Sex, and Age: 1990

Race, Sex, Age	Percent Undercount			95-Percent Confidence Interval		
	Observed	Mean	Difference	Lower	Upper	Length
Black male						
Total	**8.47**	**9.31**	**0.84**	**7.18**	**11.44**	**4.25**
0-9	8.07	8 59	0.52	5.96	11.22	5.26
10-14	1.95	2.51	0.56	0.36	4.65	4 30
20-29	9 09	10.08	0.99	8 35	11.82	3 47
30-44	12.50	13.55	1 05	11.63	15.47	3.83
45-64	11 87	13.44	1.57	9.15	17.74	8.59
65+	3.00	2.34	-0.66	-1 44	6 13	7 56
Black female						
Total	**2.97**	**4.03**	**1.06**	**1.94**	**6.12**	**4.18**
0-9	7.75	8.21	0.46	5 63	10.79	5 16
10-14	2.13	2.62	0.49	0.56	4.68	4.12
20-29	3 47	4.39	0.92	2.68	6.11	3.43
30-44	2 55	3 63	1.08	1 60	5 66	4.06
45-64	0.61	2.29	1.68	-2.07	6 64	8.72
65+	-0.95	1.58	2 53	-1.60	4.76	6.36
Non-Black male						
Total	**1.94**	**2.51**	**0.57**	**1.49**	**3.52**	**2.04**
0-9	2.63	3.19	0.56	2.34	4 03	1.69
10-14	-0.89	-0.16	0.73	-1.11	0.79	1.90
20-29	1.70	2.68	0.98	1 47	3 90	2.42
30-44	2 89	3.85	0.96	2.70	5.00	2.30
45-64	2.73	2.93	0.20	0 87	4 99	4.12
65+	1.42	0.84	-0.58	-1.14	2.83	3.97
Non-Black female						
Total	**0.61**	**1.30**	**0.69**	**0.29**	**2.31**	**2.03**
0-9	2.76	3 33	0.57	2.49	4.16	1.67
10-14	-0.53	0 17	0.70	-0.73	1.07	1.80
20-29	0.63	1.47	0 84	0.42	2.52	2.10
30-44	0.22	1.14	0.92	-0.09	2.36	2 45
45-64	0.44	0 70	0.26	-1.45	2.84	4 29
65+	0.40	1 24	0.84	-0.43	2.92	3.35
Total Population						
Total	**1.83**	**2.49**	**0.66**	**1.63**	**3.36**	**1.73**
0-9	3.53	4.08	0.55	3.08	5.08	2.00
10-14	-0.28	0.40	0.68	-0.55	1.35	1.90
20-29	1 90	2.81	0.91	1.65	3.97	2.33
30-44	2.30	3.25	0 95	2.14	4.37	2.23
45-64	2.02	2.40	0.38	0.67	4.13	3 45
65+	0 79	1 14	0 35	-0 68	2 97	3.66

Source: Das Gupta, Prithwis, 1991. DA Evaluation Project D10. "Models for Assessing Errors in Undercount Rates Based on Demographic Analysis". Preliminary Research and Evaluation Memorandum No. 84, U.S Bureau of the Census.