UNITED STATES DEPARTMENT OF COMMERCE
Bureau of the Census
Washington, D.C. 20233

Executive Steering Committee
For A.C.E. Policy II
Report No. 1
October 13, 2001

ESCAP II: Demographic Analysis Results

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U S C E N S U S B U R E A U

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Executive Summary

What is the estimate of net undercount in Census 2000 based on Demographic Analysis (DA)?

The revised DA estimate of 281.76 million is 0.34 million higher than the Census 2000 count of 281.42 million. This difference implies a net undercount rate of 0.12 percent.

How did the revised DA estimates change from the March 2001 DA estimates?

The revised DA estimates of population and net undercount for 2000 have changed little from the March DA results (from 282.3 million based on the March Alternative DA set to 281.8 million based on the Revised September DA estimate). The revisions lowered the estimated DA net undercount rate–from 0.32 to 0.12 percent. The revisions did not alter the DA finding that net undercount rates in 2000 were substantially lower than in 1990–or that a differential undercount continued to exist between Blacks and the rest of the population.

What are the implications for the adjustment decision?

DA continues to differ substantially from the Accuracy and Coverage Evaluation (A.C.E.). The revised DA estimates measure a lower net undercount than the A.C.E., the same finding as in the March 2001 analysis. For 2000, the revised DA estimates a net undercount of 0.3 million, or 0.12 percent, compared with the A.C.E. estimate of 3.3 million, or 1.15 percent.

Background

On March 1, 2001, the Census Bureau issued the recommendation of the Executive Steering Committee for A.C.E. Policy (ESCAP) that the Census 2000 Redistricting Data not be adjusted based on data from the A.C.E. The broad overarching concern was that the DA and the A.C.E. estimates of the population were inconsistent. Due principally to the uncertainty in the estimates of unauthorized immigration, DA used a range for making comparisons with the census and A.C.E. results. The "Base" DA set of estimates–which was at the low end of the range–assumed that the net increase in the number of unauthorized immigrants during the 1990-2000 intercensal decade was 2.77 million; the "Alternative" set–the high end of the range–doubled the assumed increase in unauthorized immigrants to 5.53 million (yielding an implied total of 8.86 million unauthorized residents in 2000). This alternative appeared reasonable because it produced a new foreign-born total that was roughly consistent with results from the March CPS reweighted to

Census 2000 total populations by race, ethnicity, and broad age groups. The "Base" DA estimated a <u>net overcount</u> of 1.8 million–that is, a net undercount rate of -0.65 percent in 2000.[1] The "Alternative" DA, with its larger flow of unauthorized immigrants in the 1990's, gave a <u>net undercount</u> of 0.9 million, or 0.32 percent. Comparatively, the A.C.E. estimates a <u>net undercount</u> of 3.3 million, or 1.15 percent, for Census 2000.

Between March and September, an extensive DA research program addressed the discrepancy between the results of the DA and the A.C.E. adjusted estimates of population. Specifically, the research examined both the historical levels of the components of population change to address the possibility that the 1990 DA estimates understated the total population and assessed whether DA had not captured the full growth between 1990 and 2000. The research activities were concentrated in two areas.

<u>International Migration</u>

Assumptions regarding the components of international migration contain the largest uncertainty in the DA estimates completed by March 1, 2001. Although the research during the March-September period focused primarily on those components of international migration that are least well measured–specifically, emigration, temporary migration, and unauthorized immigration–the research also examined the assumptions related to the other components that were incorporated in the March 2001 DA estimates.

<u>Robustness of Demographic Analysis</u>

The research between March and September also examined the remaining assumptions underlying the DA components of change. They include assumptions related to the birth and death components and the size of the Medicare population relative to the total population age 65 and over.

The Revised DA estimates presented in this report are the outcome of this intensive investigation. Particular attention is given to the international migration components.

Results

The September population and undercount estimates for 2000 based on the revised DA estimates changed little from the March Alternative DA results (from 282.3 million based on the March DA set to 281.8 million based on the Revised September DA estimate). In fact, the revisions of the DA components of change lowered the estimated DA net undercount rates–from 1.85 percent to 1.65 percent for 1990 and from 0.32 percent to 0.12 percent for 2000. The revisions did not alter the DA finding that net undercount rates in 2000 were substantially lower than in 1990–or that a differential undercount continued to exist between Blacks and the rest of the population.

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

The largest numerical revision to the components of change was for unauthorized immigrants. The revised estimate of the residual foreign born population–a category comprised primarily of the unauthorized population–was 10.24 million, or 1.38 million higher than the implied estimate used in the March Alternative DA population estimate of 282.3 million. However, the estimate of legal immigration decreased by 879,619 and the estimate of births was lowered by 715,181. The net effect of the revisions was to lower the DA estimate of the population by 575,853.

As a result, the revised DA estimates measure a lower net undercount than the A.C.E., the same finding as in the March 2001 analysis. For 2000, the September DA estimates a net undercount of 0.3 million, or 0.12 percent, compared with the A.C.E. estimate of 3.3 million, or 1.15 percent.

Both the DA and A.C.E. estimates measure a lower net undercount for Census 2000 than for the 1990 census, but DA implies a greater change (see Table A). Under the September DA, the net undercount rate was lowered by 1.53 percentage points from 1.65 percent in 1990 to 0.12 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 continue to disagree in that DA finds a reduction in the net undercount rates of NonBlack men and women in 2000 compared with the rates of previous censuses. The A.C.E. indicates no change or a slight increase in undercount rates for NonBlack adults as a group.

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 (ratio of men per 100 women) show that correlation bias in the survey estimates was not reduced for Black men between 1990 and 2000. The A.C.E. sex ratios for Black adults are much lower than the "expected" sex ratios based on DA, implying that the A.C.E. is not capturing the higher undercount rate of Black men relative to Black women. The size of this bias in the A.C.E. 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)

Category	Demographic Analysis		PES/A.C.E	
			PES	A.C.E.
	1990	2000	1990	2000
Total	1.65	0.12	1.58	1.15
Black	5.52	2.78	4.43	2.07
0-17	5.27	1.30	7.05	2.92
Male, 18+	9.57	7.67	3.76	2.10
Female, 18+	2.05	0.75	2.64	1.28
NonBlack	1.08	-0.29	1.18	1.01
0-17	1.12	0.54	2.46	1.27
Male, 18+	1.74	0.29	1.19	1.43
Female, 18+	0.44	-1.02	0.34	0.44

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.

PES - Post Enumeration Survey
A.C.E. - Accuracy and Coverage Evaluation

INTRODUCTION

Demographic Analysis (DA) is a well-developed tool for evaluating population 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; Robinson et al., 1993a for the demographic evaluations of the 1960-1990 censuses; and U.S. Bureau of the Census, 2001, for the initial DA evaluation of Census 2000).

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 analyzing various types of demographic data essentially independent of the census, such as administrative statistics on births, deaths, authorized international migration, and Medicare enrollments, as well as estimates of legal emigration and net unauthorized 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. (See Appendix A of U.S. Bureau of the Census, 2001, for more details of the DA methodology).

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 essentially 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.

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

On March 1, 2001, the Census Bureau issued the recommendation of the Executive Steering Committee for A.C.E. Policy (ESCAP) that the Census 2000 Redistricting Data not be adjusted based on the Accuracy and Coverage Evaluation (A.C.E.). The broad overarching concern was that the Demographic Analysis (DA) and the A.C.E. estimates of the population were inconsistent. Even though alternative demographic estimates were produced by varying the assumptions underlying the Demographic Analysis, the highest reasonable estimate indicated that Census 2000 undercounted the population by 0.32 percent, while the A.C.E. produced a net undercount estimate of 1.15 percent.

The ESCAP identified three scenarios that could alone or in combination explain the discrepant results between Demographic Analysis and the A.C.E:

C   The 1990 census coverage measurement survey (Post Enumeration Survey), the 1990 Demographic Analysis estimates, and the 1990 census may have understated the Nation's population, while Census 2000 included portions of this previously not enumerated population.

C   Demographic Analysis estimates might not have captured the full growth between 1990 and 2000, specifically due to static assumptions about critical components of international migration such as unauthorized migration, temporary migration, and emigration.

C   Census 2000, as adjusted by the A.C.E., might overestimate the Nation's population. This situation raises the possibility of an undiscovered problem with the A.C.E. or Census 2000 methodology.

While the initial ESCAP recommendation concerned the Census 2000 Redistricting Data, by mid-October, the Census Bureau had to recommend whether Census 2000 data should be adjusted for future uses, such as the census long form data products, post-censal population estimates, and demographic survey controls. In order to inform that decision, the ESCAP requested that further research be conducted.

Between March and September, the Demographic Analysis-Population Estimates (DAPE) research project addressed the discrepancy between the demographic analysis data and the A.C.E. adjusted estimates of the population. Specifically, the research examined the historical levels of the components of population change to address the possibility that the 1990 Demographic Analysis estimates understated the national population and assessed whether demographic analysis had not captured the full growth between 1990 and 2000. The research activities were concentrated in two areas.

<u>International Migration</u>

Assumptions regarding the components of international migration contain the largest uncertainty in the DA estimates completed by March 2001. Although the research during the March-September period focused primarily on those components of international migration that are least well measured–specifically, emigration, temporary migration, and unauthorized immigration–the research also examined the assumptions related to the other components that were incorporated in the March 2001 DA estimates.

<u>Robustness of Demographic Analysis</u>

The research between March and September also examined the remaining assumptions underlying the DA components of change. They include assumptions related to the birth and death components and the size of the Medicare population relative to the total population age 65 and over.

The Revised DA estimates presented in this report are the outcomes of this intensive investigation with particular attention to the international migration components.

While the Revised DA estimates address some of the uncertainties concerning the international migration components, they still continue to have some limitations and some differences when compared with the A.C.E. estimates. 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.[2] 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

Another 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 small errors in the estimates of births and the assumptions used to correct for underregistration of

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

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, 1991a, for a discussion of errors in the births estimates, and Robinson and Lapham, 1991, for a discussion of the inconsistency in race classifications.)

Research was conducted on the assumptions underlying the birth and death components. The principal outcome of this research was a revision in the assumptions about registration completeness of births since 1968. The previous DA estimates assumed that all births in years since 1968 (the last year of the most recent test of birth registration completeness) were registered at the same percent (99.2 percent). Under the revision, we allow for registration completeness to gradually rise to 100 percent in 1985 (the first year natality statistics were reported electronically from all the states), and remain at 100 percent through 2000. The effect of this revision lowers the estimated number of births for 1968-2000 by 715,181 (which lowers the 2000 DA estimate of total population by the same amount). The estimate of deaths was increased by 18,709.

International migration is an important component in the DA estimates. However, because administrative records for various components of international migration are incomplete or missing, assumptions about these components are particularly sensitive. Furthermore, estimates of certain components of international migration such as emigration and unauthorized migration, are based on census data and usually are not updated until sample data from the decennial census are processed. By using preliminary sample data from Census 2000, we were able to update these components of international migration more than a year ahead of schedule.

To increase the quality of the estimates of international migration (thereby increasing the validity of the DA estimates), as stated before, we undertook a research project to update our estimates of these components. The DAPE research project was initiated in April 2001 to validate previous estimates of the number of international migrants and to update these estimates for 2000 using new data. A major purpose of the DAPE project was to provide the best estimates of the foreign-born population to use when evaluating the total population results from Census 2000.

Appendix A presents a discussion of the components of the foreign born and focuses on the findings from the DAPE research project. In particular, the appendix assesses the assumptions used to estimate the various types of international migrants (legal immigrants, temporary migrants, unauthorized migrants, and emigrants) and the effect of alternative assumptions in estimating the size of the foreign-born population. By reviewing alternative assumptions about the types of international migrants, we are able to assess the completeness of coverage of the foreign-born population in Census 2000, and the reasonableness of the resulting estimates.

As shown in Appendix A, the alternative assumptions for components of the foreign-born

population lead to different implied total foreign-born populations by migrant status. The implied undercount for the total foreign born is different under the various assumptions; nevertheless, these totals do not differ enough to greatly affect DA estimates of the total population. For example, the lower bound assumption of 3.3 percent net undercount of the foreign born equates to a DA population of 281.3 million, or more than 3 million people lower than the A.C.E. total population. An upper bound assumption of 6.7 percent is consistent with a DA population of 282.5 million–more than 2 million lower than the A.C.E. total population.

Finally, the reliability of the 2000 DA estimates for ages 65 and over based on Medicare data was also assessed in the DAPE research project. This research evaluated the quality of the basic administrative data on Medicare enrollment and the adjustments for people 65 and over who are not enrolled in Medicare. The review found the 2000 Medicare data to be sound; small revisions in the adjustments for underenrollment raised the Medicare-based DA estimate in 2000 by 65,644.

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 are biased to the extent that people who are classified as a particular race in DA (e.g., Black) reported 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 as well.

To deal with the reporting of more than one race, we present alternative DA estimates of census undercount using two models: (1) Model 1 compares the 2000 DA estimates for Blacks with Census 2000 tabulations for people who reported Black only, and (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 between the two models are the greatest. The tables and figures show the average of the two model estimates for comparison with the historical DA estimates and 2000 A.C.E. results. These averages are not necessarily the best point estimates; research on the detailed Census 2000 race and ethnicity data to be conducted later this year 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 racial 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.

Differences in the DA and A.C.E. universes

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, but 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 well with the Census 2000 results.

RESULTS

Development of Revised DA estimates

Demographic Analysis provides historical measures of total and differential undercount by age, sex, and race based on demographic measures of components of population change – births, deaths, international migration, and (for the elderly) 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 unauthorized immigration, legal emigration, and the change in the number of temporary legal migrants. Unauthorized immigration is especially subject to uncertainty and must be estimated by comparing detailed data from successive censuses with administrative data on legal immigration.

In the DA analysis conducted in March, the preliminary DA estimate of 279.6 million (referred to as the base DA estimate) implied a net overcount of 1.8 million, or 0.65 percent for the total population in Census 2000. The overcounts in the base DA estimates were 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 unauthorized 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 doubled the assumed net increase in the number of unauthorized immigrants during the 1990-2000 intercensal decade from 2.8 million to 5.5 million. This alternative appeared reasonable because it produced a new foreign-born total that was roughly consistent with results form the March CPS reweighted to Census 2000 total populations by race, ethnicity, and broad age groups. We used this alternative DA, in addition to the current or base DA, in the discussion of the coverage results and comparisons with the A.C.E. results. The alternative DA estimate of 282.3 million implied a net undercount of 0.32 percent.

As noted, between March and September, an extensive DA research program addressed the discrepancy between the results of the DA and the A.C.E. adjusted estimates of the population. The research both examined the historical levels of the components of population change to address the possibility that the 1990 DA estimates understated the total population and assessed the possibility that DA did not capture the full growth between 1990 and 2000. Particular attention was given to the international migration components. This intensive investigation led to revisions of most of the components. The effect of these revisions on the components of change are summarized in Table 1. The results of the revisions on the 2000 and 1990 DA estimates and implied net undercount rates are shown in Table 2.

Components

The September population and undercount estimates for 2000 based on the revised DA estimates changed little from the March DA results (from 282.3 million based on the March Alternative DA set to 281.8 million based on the Revised September DA estimate). In fact, the revisions of

the DA components of change lowered the estimated DA net undercount rates--from 1.85 percent to 1.65 percent in 1990 and from 0.32 percent to 0.12 percent in 2000. The revisions did not alter the DA finding that net undercount rates in 2000 were substantially lower than in 1990–or that a differential undercount continued to exist between Blacks and the rest of the population.

The largest numerical revision to the components of change was for unauthorized immigrants. The revised estimate of the residual foreign–born population--a category comprised primarily of the unauthorized population--was 10.24 million (9.98 million for under age 65), or 1.38 million higher than the implied estimate used in the March Alternative DA population estimate of 282.3 million. However, the estimate of legal immigration decreased by 879,619 and the estimate of births was lowered by 715,181. The net effect of the revisions was to lower the DA estimate of the population by 575,853, or 0.20 percent**.**

Net Undercount Rates

Table 2 shows the effect of the revisions to the components of change on the estimated DA net undercount rates for 1990 and 2000. The initial and revised rates are compared for race and sex groups. For 1990, the cumulative component changes lowered the net undercount rates--from 1.85 percent to 1.65 percent in 1990 and from 0.32 percent to 0.12 percent in 2000. The revision was greater for males than for females in 1990 and greater for females than males in 2000.

The revisions of the components did not alter the DA finding that net undercount rates in 2000 were substantially lower than in 1990. As shown in the last two columns of Table 2, the overall decline in net undercoverage remained at 1.53 percentage points under the revised set of DA estimates; the declines became more uniform for sex groups and increased for Blacks.

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

This section compares the revised DA estimates to Census 2000 counts and the A.C.E. results. Tables 3 to 8 present the summary results. As noted, the revised DA estimates represent the estimates developed on the basis of extensive research conducted since March of 2001 that led to the reestimation of the demographic components of change. These estimates replace the "base" and "alternative" estimates presented in the original DA report. The Appendix Tables provide additional information.

Total population

The Census 2000 count of 281.4 million is 0.34 million lower than the revised DA estimate of 281.8 million (Table 3). Relative to DA, the difference implies a net undercount of 0.12 percent. This net coverage is dramatically different from that in the 1990 or any other previous census. In 1990, the revised net undercount estimated by DA was 4.2 million or 1.65 percent.

The revised DA estimate measures a lower level of net undercount than the A.C.E. estimate of 3.3 million (1.15 percent) and the DA estimate implies a greater reduction in net undercount from 1990 than the A.C.E. (Table 4). The estimated DA net undercount rate fell by 1.53 percentage points from 1.65 percent net undercount in 1990 to 0.12 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

The DA estimates show a relatively large reduction in the net undercount of both males and females. The male net undercount drops from a rate of 2.4 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 -0.6 percent (an overcount) in 2000. The male-female differential in net undercount rates was 1.5 percentage points in 2000, the same as in 1990.

The A.C.E. measures a much smaller reduction in the net undercount rates from 1990 than the DA estimate. The DA net percent undercount for all males in 2000 is 0.6 percentage points below the A.C.E. estimate of 1.5 percent; the DA estimate for females is 1.4 percentage points below the A.C.E. estimate of 0.8 percent.

Sex and age

The more detailed DA estimates for sex and age groups continue to reveal the pervasiveness of the change in coverage from 1990 to 2000. The 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). For women, 3 of the 4 age-sex groups show net overcounts in 2000.

The DA net undercount rates are 1.0 percentage points or more below the corresponding A.C.E. estimates for 4 age-sex groups (0-17 for males, 18-29 for each sex, and 30-49 for women). The DA estimate for men is equal to the A.C.E. estimate for ages 30-49 and the DA estimates for the population aged 50 and older (each sex) resemble the A.C.E. results.

Unlike DA, 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). The A.C.E. estimates agree with DA in finding an appreciable reduction in the net undercount of children.

Race and sex

For the 2000 DA estimates classified by race, three different sets were prepared: (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. All three sets are presented in the Appendix Tables; the average set is discussed here (Table 6 and Figure 3).

The DA estimates for race groups demonstrate the extensiveness of the reduction in net undercount in Census 2000 according to the DA methodology. For Black males, the group with the highest net undercount rates historically, the rate of 5.15 percent for 2000 is 3.0 percentage points below the 1990 estimate of 8.13 percent. For Black females, the rate of 0.52 percent is appreciably lower than the 1990 estimate of 3.05 percent (a drop of 2.5 percentage points).

The DA estimates 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.

The DA net undercount rates for NonBlacks fall consistently below the A.C.E. estimates. The DA rate for NonBlack males (estimate of 0.21 percent) is 1.2 percentage points less than the A.C.E. rate of 1.4 percent and the rate for NonBlack females (-0.78 percent) is 1.4 percentage points less than the corresponding A.C.E. estimate of 0.64 percent. According to the DA estimates, a relatively large improvement in coverage from 1990 to 2000 is measured. The A.C.E. results show improvement in coverage for NonBlacks in 2000 of a much smaller magnitude than the DA findings.

Race, sex, and age

Compared with 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 all age-sex comparisons. 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. The main exception is for Black men aged 18-29, where the A.C.E. rate for 2000 (3.85 percent) is slightly higher than the 1990 PES rate (3.58 percent). For Black females, the 2000 DA estimates are substantially lower than the A.C.E. estimates for ages 18-29; however, the DA rates correspond to the A.C.E. estimates for ages 30-49 and 50 and older.

One distinct difference between the DA and A.C.E. estimates for Blacks is the demographic structure of the net undercount rates by gender. DA measures a much higher net undercount rate

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for Black males than for Black females at ages 18-29 and 30-49 than the A.C.E. For example, the A.C.E. estimates a Black male net undercount rate that is essentially the same as the Black female rate for ages 18-29 (about 3.8 percent), while the alternative DA estimates a Black male rate that is much higher than the Black female rate (5.7 percent and -0.7 percent, respectively).

For NonBlacks, both DA and the A.C.E. measure a reduction in the net undercount rate of children (aged 0-17)–like that for Black children (see Figure 4). However, DA and A.C.E. give discordant results for adult men and women. DA shows a significant reduction in the net undercount rates for all age groups of NonBlack adults over 18 years of age, while the A.C.E. indicates no change or a slight increase in undercount rates as a group.

Sex ratios

The 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.

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Table 1-- Demographic Analysis Estimates of the U.S. Resident Population for April 1, 2000 and Estimates of Components of Change: 1935-2000

DA Set and Component	Date	Population Estimate	Revised Component Estimate	Change	
				Number	Percent
1) March Alternative DA	Mar 2001	282,335,711			
Revisions to Ages Under 65 (1935 - 2000 Components)					
2) Births	Sept 2001		234,860,298	-715,181	-0.25
3) Deaths	Sept 2001		14,766,776	18,709	0.01
4) Legal Immigration	Sept 2001		20,332,038	-879,619	-0.31
5) Legal Emigration	Sept 2001		5,485,117	212,430	0.08
6) Other Legal Migration	Sept 2001		2,249,001	-116,385	-0.04
7) Residual Foreign Born Migration, 2000 (includes unauthorized immigrants)	Sept 2001		9,982,932	1,320,867	0.47
8) Revision to Ages 65 and over (based on 2000 Medicare)	Sept 2001		34,587,440	65,644	0.02
9) Revised DA	Sept 2001	281,759,858		-575,853	-0.20

Notes:

Row 1 - The Alternative DA (Alt DA) set used as part of the March 2001 ESCAP decision.

Row 6 - Other Legal Migration includes: net movement of civilian citizens, net migration from Puerto Rico, temporary migrants, and Armed Forces overseas.

Row 7 - The residual foreign-born migration component is the difference between the Census 2000 foreign-born population and an estimate of the legally resident foreign-born population. The residual is comprised largely of unauthorized immigrants, but also includes error in the estimate of legal residents and errors in reporting foreign born in the census. The component incorporates an assumed net undercount of 15 percent for unauthorized immigrants.

Row 9 - The net change of -575,853 also includes a reduction of 20,041 in the March Alternative DA estimate resulting from a reconstruction of the entire set of DA components over the 1935 to 2000 period.

| | 1990 | | | 2000 | | | 1990-2000 | |
Category	Initial	Revised	Change	Initial	Revised	Change	Initial	Revised
Total	1.85	1.65	-0.20	0.32	0.12	-0.20	-1.53	-1.53
Male	2.79	2.39	-0.40	0.91	0.86	-0.05	-1.88	-1.53
Female	0.94	0.93	-0.01	-0.25	-0.60	-0.35	-1.19	-1.53
Black	5.68	5.52	-0.16	3.51	2.78	-0.73	-2.17	-2.74
Male	8.49	8.13	-0.36	5.81	5.15	-0.66	-2.68	-2.98
Female	3.01	3.05	0.04	1.32	0.52	-0.80	-1.69	-2.53
NonBlack	1.29	1.08	-0.21	-0.17	-0.29	-0.12	-1.46	-1.37
Male	1.97	1.55	-0.42	0.17	0.21	0.04	-1.80	-1.34
Female	0.63	0.62	-0.01	-0.50	-0.78	-0.28	-1.13	-1.40

Table 2-- Comparison of Initial and Revised Demographic Analysis (DA) Estimates of Percent Net Undercount: 1990 and 2000

Notes:

Initial - DA estimates shown in March 2001 report. The Initial DA estimate for 2000 represents the "Alternative" DA estimate.

Revised - DA estimates based on revision to components of change as described in this report.

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

	Count or Estimate
1. Census Count	281,421,906
2. DA Estimate	
a. Alternative Set (March 2001)	282,335,711
b. Revised Set (September 2001)	281,759,858
3. A.C.E. Estimate	284,683,782
Difference from Census Count:	
4. DA Estimate	
a. Alternative Set (=2a-1)	913,805
b. Revised Set (=2b-1)	337,952
5. A.C.E. Estimate (=3-1)	3,261,876
Percent Difference	
6. DA Estimate	
a. Alternative Set (=4a/2a*100)	0.32
b. Revised Set (=4b/2b*100)	0.12
7. A.C.E. Estimate (=5/3*100)	1.15

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 Alternative Set - DA estimates used in the March 2001 DA report (incorporated an alternative assumption that doubled the estimated net number of undocumented immigrants entering during the 1990s).
DA Revised Set - DA estimates that incorporate revisions to components of change (described in this report).

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

Table 4--Estimates of Percent Net Undercount by Sex: 1990 and 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis		Survey-based	
	1990 Revised	2000 Revised	PES 1990	A.C.E. 2000
Total Population	1.65	0.12	1.58	1.15
Male	2.39	0.86	1.93	1.51
Female	0.93	-0.60	1.25	0.79
Male:Female Diff.	1.46	1.46	0.68	0.72

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

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

Based on DA

Based on PES/A.C.E.
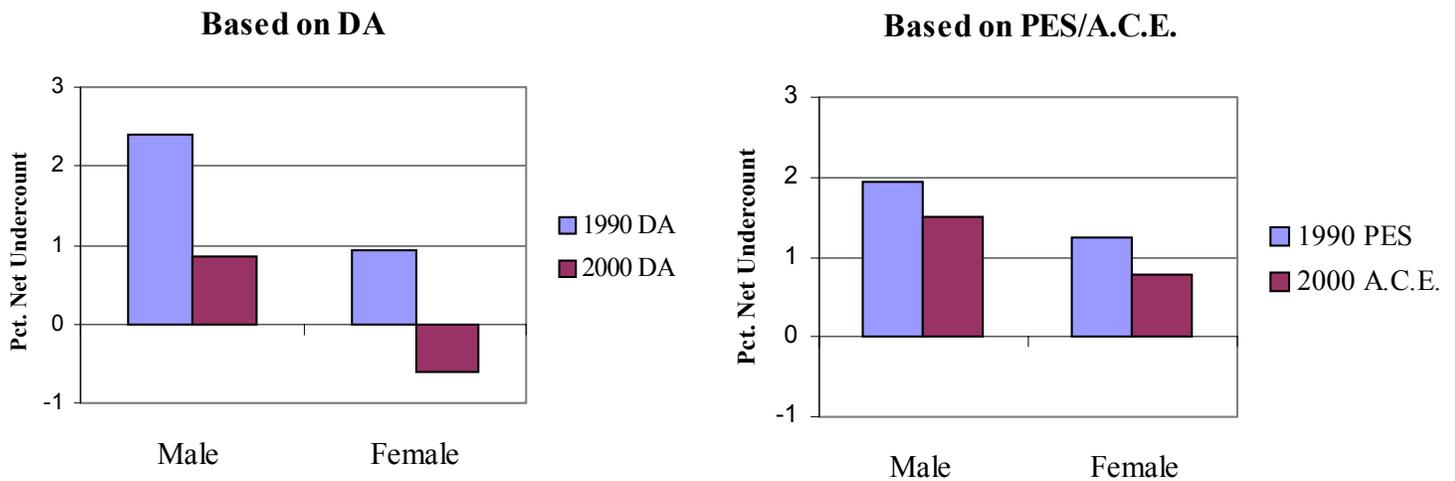
Table 5--Estimates of Percent Net Undercount by Sex and Age:
1990 and 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis		Survey-based	
	1990 Revised	2000 Revised	PES 1990	A.C.E 2000
MALE				
Total	2.39	0.86	1.93	1.51
0-17	1.70	0.45	3.17	1.53
18-29	2.31	0.29	3.16	3.45
30-49	3.47	1.83	1.85	1.81
50+	1.84	0.48	-0.57	-0.24
FEMALE				
Total	0.93	-0.60	1.25	0.79
0-17	1.86	0.89	3.20	1.54
18-29	0.63	-1.74	2.81	2.11
30-49	0.68	-0.70	0.88	0.95
50+	0.58	-1.16	-1.20	-0.76

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

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

Based on DA

Based on PES/A.C.E.

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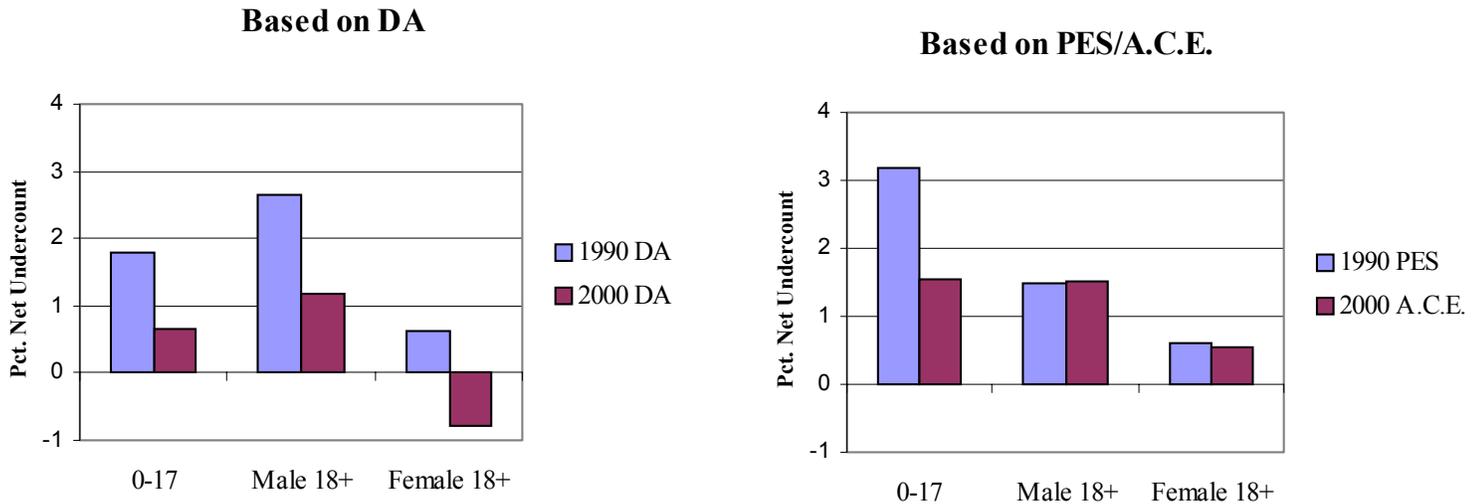
Table 6--Estimates of Percent Net Undercount by Race and Sex: 1990 and 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis		Survey-based	
	1990 Revised	2000 Revised	PES 1990	A.C.E. 2000
Total Population	1.65	0.12	1.58	1.15
Black	5.52	2.78	4.43	2.07
Male	8.13	5.15	4.90	2.38
Female	3.05	0.52	4.01	1.78
Nonblack	1.08	-0.29	1.18	1.01
Male	1.55	0.21	1.52	1.39
Female	0.62	-0.78	0.85	0.64
Black:Nonblack Diff.	4.44	3.07	3.25	1.06

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.

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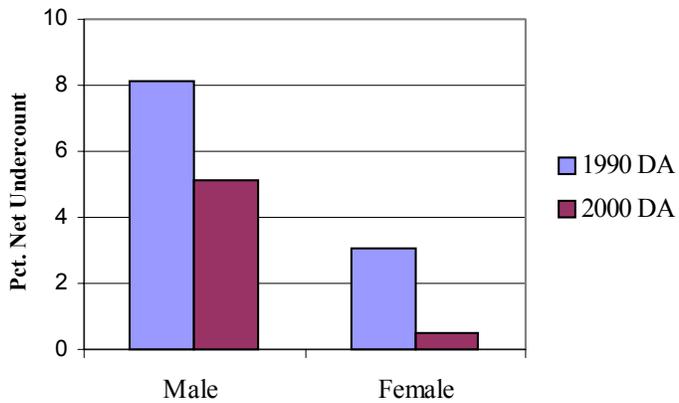
Black, based on DA

Black, based on PES/A.C.E.
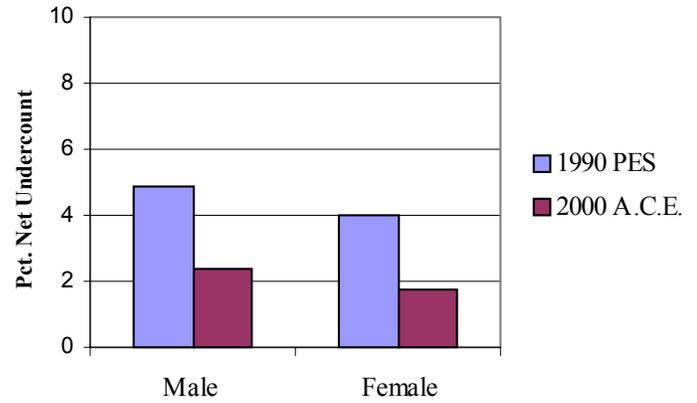
NonBlack, based on DA
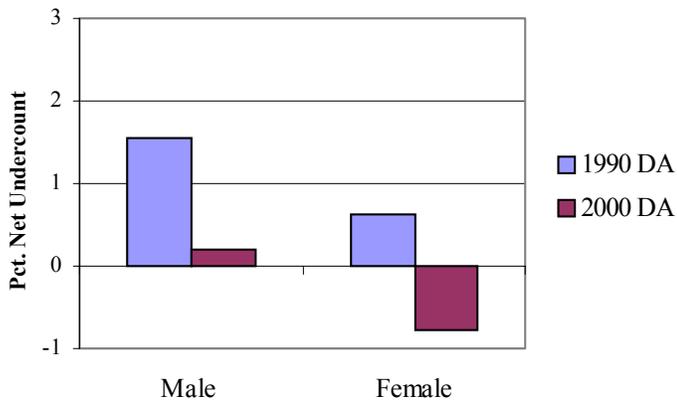
NonBlack, based on PES/A.C.E.
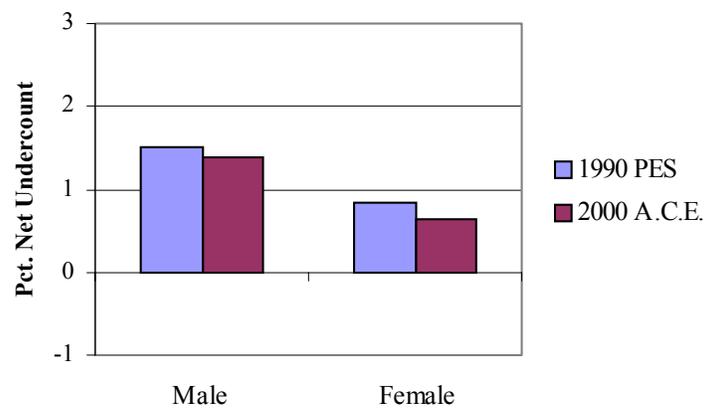
Note: The "averages" for the Model 1 and Model 2 estimates are plotted in these figures.

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Table 7--Estimates of Percent Net Undercount by Race, Sex and Age: 1990 and 2000

(a minus sign denotes a net overcount)

Category	Demographic Analysis		Survey-based	
	1990 Revised	2000 Revised	PES 1990	A.C.E. 2000
BLACK MALE				
Total	8.13	5.15	4.90	2.38
0-17	5.26	1.06	7.02	2.91
18-29	8.22	5.71	3.58	3.85
30-49	13.02	9.87	6.29	2.58
50+	5.30	3.87	-0.38	-0.67
BLACK FEMALE				
Total	3.05	0.52	4.01	1.78
0-17	5.28	1.54	7.07	2.94
18-29	3.38	-0.66	5.49	3.76
30-49	2.90	1.28	3.20	1.27
50+	-0.54	-1.03	-1.22	-0.83
NONBLACK MALE				
Total	1.55	0.21	1.52	1.39
0-17	1.03	0.33	2.46	1.27
18-29	1.35	-0.63	3.10	3.38
30-49	2.17	0.63	1.30	1.70
50+	1.50	0.14	-0.59	-0.20
NONBLACK FEMALE				
Total	0.62	-0.78	0.85	0.64
0-17	1.20	0.77	2.47	1.27
18-29	0.16	-1.94	2.36	1.82
30-49	0.37	-1.01	0.55	0.90
50+	0.69	-1.18	-1.19	-0.75

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.

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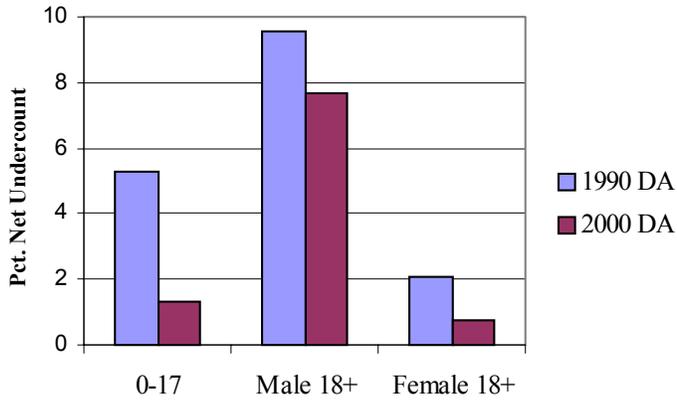
Black, based on DA

Black, based on PES/A.C.E.
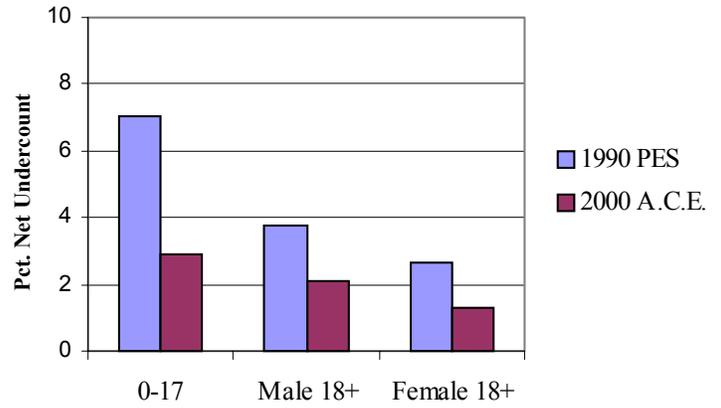
NonBlack, based on DA
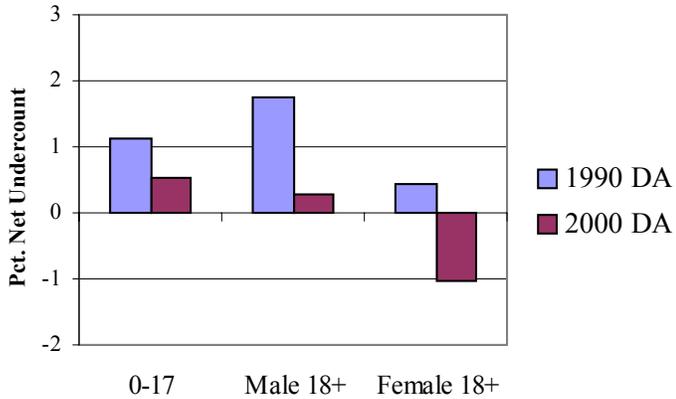
NonBlack, based on PES/A.C.E.
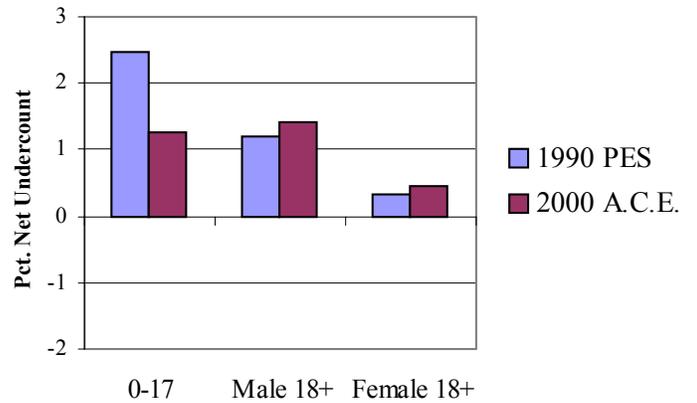
Note: The "averages" of the Model 1 and Model 2 estimates are plotted in these figures.

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)

| | 1990 | | | 2000 | | | | |
| | DA | | | DA | A.C.E. | | Census | |
Category	Revised	PES	Census	Revised	Model 1	Model 2	Model 1	Model 2
BLACK								
Total	94.73	90.44	89.59	95.05	91.05	91.19	90.59	90.66
0-17	102.40	102.37	102.42	102.69	103.30	103.07	103.31	103.09
18-29	99.36	92.13	93.99	100.21	94.10	93.91	93.99	93.74
30-49	96.29	89.00	86.17	96.90	89.66	89.65	88.53	88.42
50+	75.71	72.08	71.49	77.20	73.51	73.55	73.47	73.44
NONBLACK								
Total	96.79	96.54	95.89	98.13	97.88	97.91	97.15	97.18
0-17	105.37	105.51	105.51	105.10	105.50	105.59	105.53	105.60
18-29	105.13	104.57	103.78	106.69	106.89	107.03	105.27	105.38
30-49	101.31	100.34	99.59	102.28	101.36	101.42	100.59	100.64
50+	79.97	79.86	79.38	84.20	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, DA and A.C.E.: 2000

Comparison of Sex Ratios: Black
Census, DA and A.C.E.: 2000

Comparison of Sex Ratios: NonBlack
Census, DA and A.C.E.: 2000
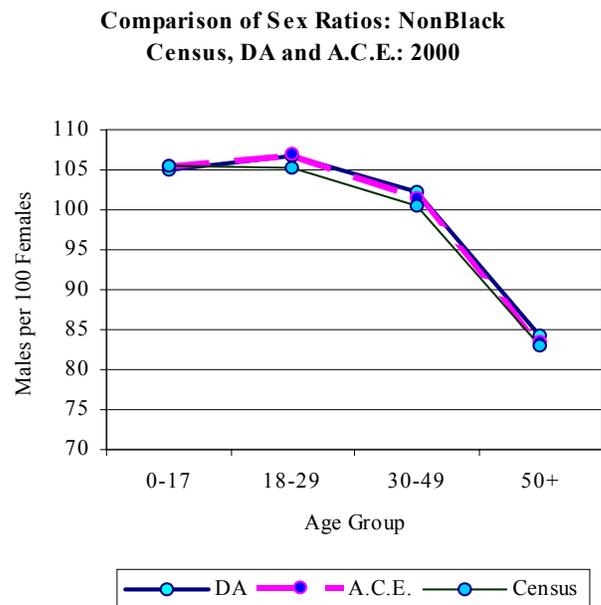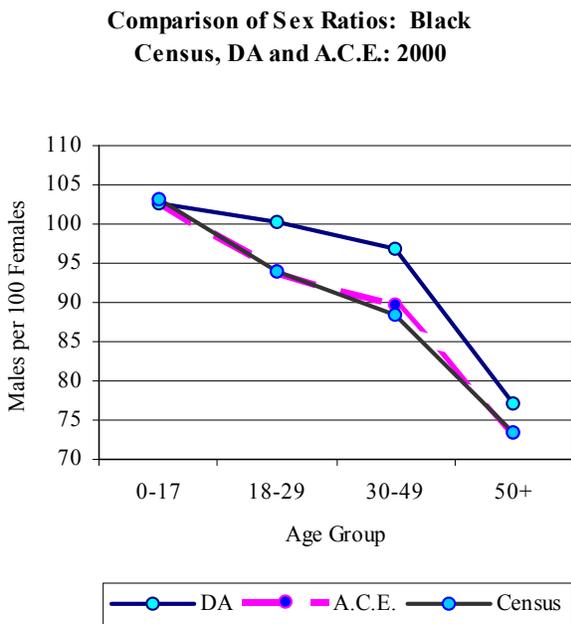
APPENDIX A: Estimates of the Foreign-Born Population by Migrant Status: 2000

Prepared by Kevin E. Deardorff and Lisa M. Blumerman

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INTRODUCTION

This appendix presents a discussion of the components of the foreign-born population and focuses on the findings from the Demographic Analysis-Population Estimates (DAPE) research project. In particular, we assess the assumptions used to estimate the various types of international migrants (legal immigrants, temporary migrants, unauthorized migrants, and emigrants) and the effect of alternative assumptions in estimating the size of the foreign-born population. By reviewing alternative assumptions about the types of international migrants, we assess the completeness of coverage of the foreign-born population in Census 2000, and the reasonableness of the resulting Demographic Analysis (DA) estimates.

BACKGROUND

The foreign-born population is defined by the U.S. Census Bureau as people who are not U.S. citizens at birth.

Defining the Components of the Foreign-Born Population (FB)

The foreign born consist of legal immigrants, temporary migrants, and unauthorized migrants (Deardorff, 2001b). Stated as an equation, the foreign-born population is defined as:

$$FB = [L - (M + E)] + T + R$$

where

    FB = Foreign-born population
    L   = Legal immigrants
    M = Mortality to legal immigrants
    E   = Emigration of legal immigrants
    T   = Temporary (legal) migrants
    R   = Residual foreign born (unauthorized migrants)

For the foreign-born population, we estimated demographic characteristics (age, sex, race, and Hispanic origin) for implied legal status (legal immigrants, temporary migrants, and residual foreign born) by place of birth, defined for DAPE as 40 unique groupings of countries (see Mulder et al., 2001).

Legal Immigrants (L)

The Immigration and Nationality Act defines legal immigration as the process by which a non-citizen of the United States is granted legal permanent residence. A non-citizen with legal permanent residence status may remain in the country, be employed, travel freely, and seek naturalization to become a U.S. citizen. Legal immigrants, as categorized by the Census Bureau, include new arrivals to the United States, people adjusting their migrant status to legal permanent resident (including Special

Agricultural Workers (SAWs) and pre-1982 entrants (LAWs)), asylees, and refugees (Perry et al., 2001).

We estimated the number of legal immigrants using Immigration and Naturalization Service (INS) data. In 2000, the estimate of survived legal immigrants ([L - (M + E)]) was 21,612,023.

Foreign-Born Emigrants (E)

Foreign-born legal emigrants were residents of the United States who departed from the United States to reside abroad. Unauthorized migrants, migrants from Puerto Rico, temporary migrants, and natives (U.S. citizens at birth) are excluded from this population universe. For purposes of the DAPE project, we estimated the number of emigrants from a residual methodology using data on the foreign-born population by period of entry from two consecutive censuses (Mulder et al., 2001). We used the resulting number of emigrants to calculate rates of emigration. Although these emigration rates reflect the behavior of the entire foreign-born population, they were used as a reasonable proxy for the legal immigrant population. By applying these emigration rates to the legal immigrant population annually from 1990 to 2000, we estimated the number of emigrants from the legal population between 1990 and 2000.

Mortality (M)

Survival rates for the legal immigrant population were calculated from life tables of the total population by sex and single year of age (Mulder et al., 2001). Although these survival rates were calculated for the total population, they were used as a reasonable proxy for the legal immigrant population. By applying these survival rates to the legal immigrant population, we estimated the number of deaths that occurred to this population between 1990 and 2000.

Temporary Migrants (T)

The Immigration and Nationality Act defines temporary migrants (also referred to as nonimmigrants) as aliens admitted to the United States for a specified purpose and temporary period, but not for permanent residence. Temporary migrants, as categorized by the Census Bureau and defined for the remainder of this paper, include those who would be considered residents of the United States for purposes of the decennial census, including foreign students and temporary workers, but excluding tourists and business workers (see Cassidy and Pearson, 2001).

We estimated temporary migrants using INS data. In 2000, the estimate of temporary migrants was 1,200,000.

Residual Foreign Born (R)

The residual foreign born, as categorized by the Census Bureau, include the foreign born who were not otherwise accounted for in a legal migration component, whether or not they were counted in the census (Costanzo et al,. 2001). Although the residual foreign born include mostly unauthorized migrants, it also includes some categories of legal (or "quasi-legal") migrants for whom data were not

available. Later in our evaluation section, we have attempted to account for this shortcoming by separating the residual foreign born into known components of the foreign born (e.g., immigrants such as asylee applicants who were in a processing backlog at the INS, most of whom will become legal permanent residents) and the implied unauthorized population (Costanzo et al., 2001; Deardorff, 2001a; Deardorff, 2001b). Therefore, the residual foreign born is actually:

$$R = R_1 + R_2$$

where

R_1 = Known components of the residual foreign born (mostly quasi-legal migrants)
R_2 = Implied unauthorized migrants

We estimate known components of the residual foreign born (R_1) using INS data. In 2000, the estimate of this group was 1,700,000. We estimate unauthorized migrants (R_2) by applying undercount rate assumptions to the part of this population counted in the census.

Researchers have not agreed on how many unauthorized migrants were missed in the census. However, after reviewing research conducted by independent migration experts, and after reviewing the results for hard-to-count populations from the Accuracy and Coverage Evaluation (A.C.E.), we assumed a 15-percent average undercount for the foreign born enumerated in the census *and* categorized as residual foreign born (see Table 1). Applying this average 15-percent undercount to the residual foreign born counted in the census, we estimated the following "true" level of foreign born by migrant status in 2000 (see Table 2).

Table 1: Census Level Estimates of the Foreign-Born Population by Migrant Status in 2000: Baseline

Migrant Status	Number
Foreign Born Population	31,098,945
Survived Legal Immigrants (implied)	21,612,023
Temporary Migrants[1]	781,507
Residual Foreign Born	8,705,419

[1] Estimates of temporary migrants were calculated from the census using previous census methodology.
Components of the foreign born do not add to the total foreign born due to rounding in underlying calculations.

Table 2: "True" Level Estimates of the Foreign-Born Population by Migrant Status in 2000: Baseline

Migrant Status	Number
Foreign Born	32,635,199
Survived Legal Immigrants (implied)	21,612,023
Temporary Migrants[1]	781,507
Residual Foreign Born	10,241,669

[1] For the Baseline estimates, we assumed complete census coverage for temporary migrants. For subsequent scenarios, we assumed a "true" level estimate of temporary migrants of 1,200,000.

The demographic analysis estimates presented in detail in the main section of this report used the levels of temporary migrants and unauthorized migrants (counted within the residual foreign born) shown above. These levels represent the results of detailed analysis and the application of detailed age, sex, race, and Hispanic origin distributions.

DETAILED METHODOLOGY

Previous estimates of the foreign-born population by migrant status used a variety of often unrelated data sets. Using different data sets to estimate types of international migrants is problematic given the residual methodology used previously and in this analysis. To minimize inconsistencies, we used an integrated approach to calculate the migrant status of the foreign born. Additionally, we generated standardized files for the 1990 Census and Census 2000 data which were used for the calculations of the number of each type of international migrant. We also used a standard method to impute values for missing variables and characteristics in these files.

Data Sets Used for Calculations

For temporary migrants, data from the Census 2000 Supplementary Survey were used as a proxy for Census 2000 data that were not yet available. A review and evaluation of these data suggest they are a reasonable approximation for yet unavailable detailed Census 2000 sample data (Malone, 2001; Deardorff and Malone, 2001).

For 1990, we used the census sample edited detail file modified to remove the category of "some other race." Missing data for country of birth were imputed using responses to the country of birth question, independently for each state. For 2000, we used preliminary census sample data, based on intermediate weighting schemes and editing procedures, and modified to match the 1990 racial categories (Malone, 2001). The preliminary Census 2000 sample data were available only for certain variables, including age, sex, race, Hispanic origin, country of birth, citizenship, and year of entry into the United States.

Using these data sets, we estimated the foreign born in 2000 by migrant status (legal immigrants, temporary migrants, and a residual component consisting of quasi-legal and unauthorized migrants) by DA race (Black, NonBlack), sex, and A.C.E. age groups (ages 0-17, 18-29, 30-49, and 50 and older).

In addition, we estimated the number of foreign born by migrant status, sex, A.C.E. age groups, and mutually exclusive race/ethnic categories (non-Hispanic White, non-Hispanic Black, non-Hispanic Asian and Pacific Islander, non-Hispanic American Indian and Alaska Native, and Hispanic).

Review of Previous Methodology Used to Calculate the Foreign-Born Population by Migrant Status

Historically, the Census Bureau employed demographic analysis to evaluate the accuracy of census results. In the course of these evaluations, the Census Bureau made assumptions regarding the level of legal and unauthorized migrants. Based on previous research about census coverage of these populations, the Census Bureau traditionally assumed a higher coverage rate for legal immigrants than for unauthorized migrants (Costanzo et al., 2001). After the 1990 Census, the Census Bureau expanded estimates of international migrants to include temporary migrants to the United States, as previous estimates of temporary migrants were limited to the number of foreign students in the country. A primary reason for estimating temporary migrants was to account for this group independently of the unauthorized population in the decennial census. Other reasons were to develop better demographic characteristics of the foreign-born population (specifically, temporary migrants do not age during the decade because of legal requirements restricting length of stay in the United States), and to evaluate the upcoming results of Census 2000.

A major component of the DAPE project was to validate estimates of the number of international migrants (legal immigrants, temporary migrants, and unauthorized migrants) in 1990. After our validation work, we used the same methodologies to develop estimates of the number of international migrants for 2000 using available data. Independent teams were formed to evaluate work on each of these components of international migration. For detailed descriptions of how the teams revised and improved previous estimates, see Costanzo et al., 2001; Mulder et al., 2001; Cassidy and Pearson, 2001; and Perry et al., 2001.

Evaluation of the Methodology Used to Calculate the Foreign-Born Population by Migrant Status

Although researchers have routinely adjusted census level estimates of unauthorized migrants to account for those missed in the census, they usually do not adjust explicitly for similar undercounts to the legal immigrant and temporary migrant populations (Passel, 2001; Bean et al., 2001).

To assess the robustness of these levels to varying assumptions about the undercount of legal immigrants and temporary migrants, we developed several scenarios. As discussed later, the application of alternative assumptions results in different implied total foreign-born populations by migrant status. Nevertheless, the totals are not different enough to greatly affect the total DA estimates. Thus, while the results based on the 15-percent assumptions discussed above could vary, the variations would not be substantively different.

This evaluation of the methodology used to calculate the components of international migration addressed several questions:

　　　　1) Was the assumption of complete coverage of legal immigrants and temporary migrants in

the census reasonable?

2) Was the assumption of 15-percent undercount for all residual foreign born reasonable?

3) Was the resulting estimate of the residual foreign born a reasonable approximation of unauthorized migrants?

Evaluation Question 1

When assigning the foreign born counted in the census to migration statuses, previous researchers at the Census Bureau assumed complete (100 percent) coverage of legal immigrants and temporary migrants in the decennial census. Because unauthorized migrants were calculated in the residual category (foreign-born population minus the sum of legal immigrants and temporary migrants), the number of foreign born counted in the census who were categorized as unauthorized migrants would be even higher if the assumption of complete coverage of legal immigrants and temporary migrants was dropped.

Researchers studying the foreign born, both inside and outside the Census Bureau, agreed that an assumption of complete coverage for legal immigrants and temporary migrants was unreasonable (Deardorff and Cresce, 2001). A change to this assumption of full coverage in the census would mean fewer foreign born being categorized as legal immigrants and temporary migrants, and more foreign born being categorized as unauthorized migrants during census level calculations.

Evaluation Question 2

Due to time constraints of the DAPE project, we assumed an average 15-percent undercount rate for the residual foreign born, before meeting with external experts on international migration, even though we expected rates to differ for all groups (legal immigrants and temporary migrants, as well as unauthorized migrants) and to vary by demographic characteristics (age, sex, race, and Hispanic origin) and country of birth. Although no consensus emerged on the appropriate levels of undercount to assume, experts we consulted agreed that the previously assumed average undercount of 15 percent was probably too high, especially given the undercount rates of other hard-to-count groups from Census 2000 (e.g., the undercount rate for Hispanic renters was less than 5 percent), (see Hogan and Whitford, 2001). Additionally, a 15-percent undercount represented the midpoint of previously used rates, but evaluation results suggest census coverage improved from the 1990 Census to Census 2000.

Most importantly, researchers were concerned about the possible implications of not correcting the assumptions discussed above. Although an explanation that some legal immigrants and temporary migrants were categorized as residual foreign born was helpful, the media and policy makers could mistakenly interpret our results for the residual foreign born as a "best" guess of the size of the unauthorized migrant population. Furthermore, because we had not included "quasi-legal" immigrants (e.g., refugees who had not adjusted to legal permanent resident status because of processing backlogs at INS) in the legal immigrant category, additional foreign born were included in this residual category. For a more detailed discussion of these populations, see Costanzo et al., 2001.

Based on these discussions, we decided to produce alternative undercount assumptions for the foreign-born population and to evaluate the initial, detailed set of estimates against the alternatives. In addition, we are emphasizing that the residual group (as identified by our initial equation) is not an accurate portrayal of the unauthorized foreign born. Finally, we identified additional information about the foreign-born population to separate the residual foreign born category into two components: known components of the foreign born (or those identified as quasi-legal) and the implied unauthorized population (Costanzo et al., 2001; Deardorff and Cresce, 2001).

RESULTS OF ALTERNATIVE ASSUMPTIONS

Table 1 and Table 2 show estimates of the foreign-born population by migrant status using our baseline estimates that assume a 15-percent undercount of the residual foreign born. For the remainder of this appendix, we calculated the foreign-born population by migrant status using alternative assumptions about census level coverage of these populations. In addition to using different coverage assumptions, we attempt also to separate the residual foreign born into two components: known components (mostly quasi-legal migrants) and the implied unauthorized migrant population.

To address our initial assumption about complete (100 percent) coverage of legal immigrants and temporary migrants in the census, we estimated undercount rates for both groups, then applied those undercount rates to the census level calculations. Although an endless number of possibilities existed for alternative undercount scenarios, we attempted to create a lower and upper bound around our most reasonable assumptions, which will be referred to as the "DAPE Estimate" in this report (Deardorff, 2001a).

Assumptions for the DAPE Estimate of the Foreign-Born Population

Beginning with a preliminary census level foreign-born population of 31,098,945, we assumed a 2-percent undercount rate for legal immigrants, a 35-percent undercount rate for temporary migrants, a 5-percent undercount rate for known components of the residual foreign born, and a 12.5-percent undercount rate for implied unauthorized migrants (see Table 6 and Equation A). [Table 3 through Table 5 show data with the underlying estimates of the foreign-born population by migrant status consistent with the undercount rate assumptions shown in Table 6.]

For this scenario, the undercount rate of legal immigrants was assumed to be about twice as high as for the total household population; the undercount rate of temporary migrants was calculated based on the difference between the number we identified from our estimate (Cassidy and Pearson, 2001) and the number of temporary migrants identified by INS, or 35 percent; the undercount rate of known components of the residual foreign born was assumed to be about 4 times as high as for the total household population (or slightly higher than the rate for Hispanic renters); and the undercount rate of unauthorized migrants was assumed to be approximately 10 times the rate for the total household population, or approximately 3 times the undercount rate for Hispanic renters (see Hogan and Whitford, 2001).

Table 3 shows the resulting foreign-born population by migrant status.

Table 3: "True" Level Estimates of the Foreign-Born Population by Migrant Status in 2000: DAPE Estimate

Migrant Status	Number
Foreign Born	**33,091,988**
Survived Legal Immigrants	**21,612,023**
Temporary Migrants	**1,200,000**
Residual Foreign Born	**10,279,965**
Known Components	**1,789,474**
Unauthorized (Implied)	**8,490,491**

Assumptions for the DAPE Lower-Bound Estimate of the Foreign-Born Population

Beginning with a census level foreign-born population of 31,098,945, for the lower-bound estimate, we assumed a 1-percent undercount rate for legal immigrants, a 7-percent undercount rate for temporary migrants, a 1-percent undercount rate for known components of the residual foreign born, and a 10-percent undercount rate for implied unauthorized migrants, as shown in Table 6 and Equation B.

For this scenario, the undercount rate of legal immigrants was assumed to be about the same as for the total household population; the undercount rate of temporary migrants was assumed to be almost twice as high as for Hispanic renters; the undercount rate of known components of the residual foreign born was assumed to be about the same as for the total household population; and the undercount rate of unauthorized migrants was assumed to be approximately 8 times the rate for the total household population, or a little more than twice the undercount rate for Hispanic renters (see Hogan and Whitford, 2001).

Table 4 shows the resulting foreign-born population by migrant status.

Table 4: "True" Level Estimates of the Foreign-Born Population by Migrant Status in 2000: Lower-Bound DAPE Estimate

Migrant Status	Number
Foreign Born	32,174,511
Survived Legal Immigrants	21,612,023
Temporary Migrants	1,200,000
Residual Foreign Born	9,362,488
Known Components	1,700,000
Unauthorized (Implied)	7,662,488

Assumptions for the DAPE Upper-Bound Estimate of the Foreign-Born Population

Beginning with a census level foreign-born population of 31,098,945, for the upper-bound estimate, we assumed a 2-percent undercount rate for legal immigrants, a 35-percent undercount rate for temporary migrants, a 5-percent undercount rate for known components of the residual foreign born, and a 15-percent undercount rate for implied unauthorized migrants (see Table 6 and Equation C).

For this scenario, the undercount rate of legal immigrants was assumed to be about twice as high as for the total household population; the undercount rate of temporary migrants was calculated based on the difference between the number we identified from our estimate (Cassidy and Pearson, 2001) and the number of temporary migrants identified by INS; the undercount rate of known components of the residual foreign born was assumed to be about 4 times as high as for the total household population (or slightly higher than the rate for Hispanic renters); and the undercount rate of unauthorized migrants was assumed to be approximately 12 times the rate for the total household population, or nearly 4 times the undercount rate for Hispanic renters (see Hogan and Whitford, 2001).

Table 5 shows the resulting foreign-born population by migrant status.

Table 5: "True" Level Estimates of the Foreign-Born Population by Migrant Status in 2000: Upper-Bound DAPE Estimate

Migrant Status	Number
Foreign Born	33,347,473
Survived Legal Immigrants	21,612,023
Temporary Migrants	1,200,000
Residual Foreign Born	10,535,450
Known Components	1,700,000
Unauthorized (Implied)	8,835,450

Implications and Reasonableness

The estimates of the foreign-born population differ because of alternative assumptions about coverage rates by migrant status. The implied total undercount for the foreign-born population ranges from 3.3 percent using the assumptions for the lower bound to 6.7 percent using the assumptions for the upper bound (see Table 6). These ranges are similar to the undercount rates (as measured by the A.C.E.) of approximately 3 percent for Hispanics and approximately 4 percent for Hispanic renters.

Table 6: Census Level Undercoverage Rate Assumptions for the Foreign-Born Population by Migrant Status: 2000

Migrant Status	DAPE Estimate		
	Lower Bound	"DAPE"	Upper Bound
Foreign Born	32,174,511	33,091,988	33,347,473
Survived Legal	1%	2%	2%
Temporary [1]	7%	35%	35%
Residual Foreign Born			
Known Components	1%	5%	5%
Unauthorized (Implied)[2]	10%	12.5%	15%
Average Undercount Rate[3]	3.3%	6.0%	6.7%

[1] The 35-percent undercount assumption for temporary migrants is consistent with the Census Bureau's estimate using 1990 methodology. This methodology does not identify temporary migrants in certain visa categories that did not exist until after 1990.
[2] The undercount assumptions for unauthorized migrants are for "true" level, not census level.
[3] Average undercount rate = ((estimated foreign born - Census foreign born) / estimated foreign born) x 100.
The Census foreign-born population was 31,098,945.

The "true" level for the foreign born would be 3.3 percent higher than census level using the assumptions for the Lower-Bound DAPE Estimate; 6.0 percent higher using assumptions for the DAPE Estimate; and 6.7 percent higher using assumptions for the Upper-Bound DAPE Estimate.

Using these new results for the total foreign-born population to calculate DA estimates results in figures lower than the A.C.E. total population of 284,683,782 (see Table 7). Including the Lower-Bound DAPE Estimate of the foreign born in the calculation of the DA population would result in an estimate of 281,299,186, or more than 3 million people lower than the A.C.E. total population. The DA population would be 282,216,664 using the DAPE Estimate for the foreign born, or more than 2 million people lower than the A.C.E. total population. Similarly, the DA population would be 282,472,149 using the Upper-Bound DAPE Estimate for the foreign born, also more than 2 million lower than the corresponding A.C.E. total population. In summary, despite the use of alternative assumptions in these scenarios, resulting estimates of the foreign-born population do not explain the different total populations calculated by DA and the A.C.E.

Table 7: Effect of Alternative Assumptions for the Foreign-Born Population on Demographic Analysis Estimates

Component	"DAPE" Estimate		
	Lower Bound	"DAPE"	Upper Bound
DA Total Population	281,299,186	282,216,664	282,472,149
Foreign Born			
Number	32,174,511	33,091,988	33,347,473
Percent	11.44	11.73	11.81
Implied Net Undercount of DA Total Population Relative to Census 2000			
Number	-122,720	**794,758**	1,050,243
Percent of DA Total	-0.04	**0.28**	0.37

Notes: The Census 2000 Population is 281,421,906. A minus sign denotes a net overcount.

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EQUATIONS FOR DAPE

<u>Equations for Estimating the Foreign-Born Population by Migrant Status</u>

Equation A: DAPE Estimate of the Foreign-Born Population by Migrant Status[3]

Census Level Foreign Born = [L - (M + E)] + T + R_1 + R_2

"True" Level Foreign Born = AR_L + AR_T + AR_{R1} + Implied Unauthorized

Counted L = 0.98 AR_L
Counted T = 0.65 AR_T
Counted R_1 = 0.95 AR_{R1}

Census Level Foreign Born - (0.98 AR_L) - (0.65 AR_T) - (0.95 AR_{R1}) =
Counted Unauthorized = R_2

To get implied unauthorized:

Apply Undercount to Counted Unauthorized (R_2) = 1/.875 R_2

where:

[L - (M + E)] = Survived legal immigrants (counted)
T = Temporary migrants (counted)
R_1 = Residual foreign born–known components (counted)
R_2 = Residual foreign born–implied unauthorized (counted)
AR_L = Administrative record estimate of implied survived legal immigrants (INS data)
AR_T = Administrative record estimate of temporary migrants (INS data)
AR_R = Administrative record estimate of residual foreign born known components (INS data)

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[3]The census level estimates used to produce results in Table 3 assumed a survived legal immigrant population of 21,188,258 rather than 21,179,783. The "true" level estimates in Table 3 assumed known components of the residual foreign born were 1,789,474 rather than 1,700,000.

Equation B: DAPE Lower-Bound Estimate of the Foreign-Born Population by Migrant Status[4]

Census Level Foreign Born = [L - (M + E)] + T + R_1 + R_2

"True" Level Foreign Born = AR_L + AR_T + AR_{R1} + Implied Unauthorized

> Counted L = 0.99 AR_L
> Counted T = 0.93 AR_T
> Counted R_1 = 0.99 AR_{R1}

Census Level Foreign Born - (0.99 AR_L) - (0.93 AR_T) - (0.99 AR_{R1}) =
> Counted Unauthorized = R_2

To get implied unauthorized:

> Apply Undercount to Counted Unauthorized (R_2) = 1/.90 R_2

where the notation is as defined above.

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[4]The census level estimates used to produce results in Table 4 assumed a survived legal immigrant population of 21,398,043 rather than 21,395,903; a temporary migrant population of 1,121,495 rather than 1,116,000; and known components of the residual foreign born of 1,683,168 rather than 1,683,000.

Equation C: DAPE Upper-Bound Estimate of the Foreign-Born Population by Migrant Status[5]

Census Level Foreign Born = [L - (M + E)] + T + R_1 + R_2

"True" Level Foreign Born = AR_L + AR_T + AR_{R1} + Implied Unauthorized

      Counted L = 0.98 AR_L
      Counted T = 0.65 AR_T
      Counted R_1 = 0.95 AR_{R1}

Census Level Foreign Born - (0.98 AR_L) - (0.65 AR_T) - (0.95 AR_{R1}) =
      Counted Unauthorized = R_2

To get implied unauthorized:

      Apply Undercount to Counted Unauthorized (R_2) = 1/.85 R_2

where the notation is as defined above.

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[5]The census level estimates used to produce results in Table 5 assumed a survived legal immigrant population of 21,188,258 rather than 21,179,783 and known components of the residual foreign born of 1,619,048 rather than 1,615,000.

Appendix Table B1 -- Comparison of the Census, A.C.E., and Demographic Analysis (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 (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E. Amount	Net Undercount A.C.E. Percent	Net Undercount DA REVISED Amount	Net Undercount DA REVISED Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
TOTAL	281,421,906	281,421,906	284,683,783	281,759,858	3,261,877	1.15	337,952	0.12
Male	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
Female	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
BLACK	34,658,190	35,704,124	35,384,874	37,443,256	726,684	2.05	1,739,132	4.64
Male	16,465,185	16,971,124	16,863,646	18,246,388	398,461	2.36	1,275,264	6.99
Female	18,193,005	18,733,000	18,521,228	19,196,868	328,223	1.77	463,868	2.42
NONBLACK	246,763,716	245,717,782	249,298,909	244,316,602	2,535,193	1.02	-1,401,180	-0.57
Male	121,588,378	121,082,439	123,311,683	121,003,754	1,723,305	1.40	-78,685	-0.07
Female	125,175,338	124,635,343	125,987,226	123,312,848	811,888	0.64	-1,322,495	-1.07
TOTAL MALE								
All ages	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
0-17	37,059,196	37,059,196	37,634,604	37,224,858	575,408	1.53	165,662	0.45
18-29	23,672,589	23,672,589	24,517,556	23,741,308	844,967	3.45	68,719	0.29
30-49	42,659,073	42,659,073	43,443,356	43,454,890	784,283	1.81	795,817	1.83
50+	34,662,705	34,662,705	34,579,813	34,829,086	-82,892	-0.24	166,381	0.48
18+	100,994,367	100,994,367	102,540,725	102,025,284	1,546,358	1.51	1,196,579	1.17
TOTAL FEMALE								
All ages	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
0-17	35,234,616	35,234,616	35,786,168	35,552,189	551,552	1.54	317,573	0.89
18-29	22,852,201	22,852,201	23,344,636	22,460,999	492,435	2.11	-391,202	-1.74
30-49	43,092,246	43,092,246	43,506,365	42,791,850	414,119	0.95	-300,396	-0.70
50+	42,189,280	42,189,280	41,871,285	41,704,678	-317,995	-0.76	-484,602	-1.16
18+	108,133,727	108,133,727	108,722,286	106,957,527	588,559	0.54	-858,627	-0.80

Appendix Table B1 -- Comparison of the Census, A.C.E., and Demographic Analysis (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 (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E. Amount	Percent	Net Undercount DA REVISED Amount	Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
BLACK MALE								
All ages	16,465,185	16,971,124	16,863,646	18,246,388	398,461	2.36	1,275,264	6.99
0-17	5,532,176	5,728,700	5,698,648	5,996,105	166,472	2.92	267,405	4.46
18-29	3,079,238	3,192,384	3,201,682	3,443,771	122,444	3.82	251,387	7.30
30-49	4,891,384	5,034,696	5,020,804	5,643,767	129,420	2.58	609,071	10.79
50+	2,962,387	3,015,344	2,942,512	3,162,745	-19,875	-0.68	147,401	4.66
18+	10,933,009	11,242,424	11,164,998	12,250,283	231,989	2.08	1,275,264	10.41
BLACK FEMALE								
All ages	18,193,005	18,733,000	18,521,228	19,196,868	328,223	1.77	463,868	2.42
0-17	5,353,520	5,545,392	5,516,334	5,839,073	162,814	2.95	293,681	5.03
18-29	3,274,167	3,396,445	3,402,256	3,436,502	128,089	3.76	40,057	1.17
30-49	5,529,188	5,686,774	5,599,970	5,824,214	70,782	1.26	137,440	2.36
50+	4,036,130	4,104,389	4,002,668	4,097,079	-33,462	-0.84	-7,310	-0.18
18+	12,839,485	13,187,608	13,004,894	13,357,795	165,409	1.27	463,868	3.47
NONBLACK MALE								
All ages	121,588,378	121,082,439	123,311,683	121,003,754	1,723,305	1.40	-78,685	-0.07
0-17	31,527,020	31,330,496	31,935,956	31,228,753	408,936	1.28	-101,743	-0.33
E18-29	20,593,351	20,480,205	21,315,874	20,297,537	722,523	3.39	-182,668	-0.90
30-49	37,767,689	37,624,377	38,422,552	37,811,123	654,863	1.70	186,746	0.49
50+	31,700,318	31,647,361	31,637,301	31,666,341	-63,017	-0.20	18,980	0.06
18+	90,061,358	89,751,943	91,375,727	89,775,001	1,314,369	1.44	-78,685	-0.09
NONBLACK FEMALE								
All ages	125,175,338	124,635,343	125,987,226	123,312,848	811,888	0.64	-1,322,495	-1.07
0-17	29,881,096	29,689,224	30,269,834	29,713,116	388,738	1.28	23,892	0.08
18-29	19,578,034	19,455,756	19,942,380	19,024,497	364,346	1.83	-431,259	-2.27
30-49	37,563,058	37,405,472	37,906,395	36,967,636	343,337	0.91	-437,836	-1.18
50+	38,153,150	38,084,891	37,868,617	37,607,599	-284,533	-0.75	-477,292	-1.27
18+	95,294,242	94,946,119	95,717,392	93,599,732	423,150	0.44	-1,322,495	-1.41

Appendix Table B -1 Notes:

1) DA Revised–DA estimates with revisions to the components of population change.

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) Totals may differ in last digit due to rounding.

Appendix Table B2-- Comparison of the Census, A.C.E., and Demographic Analysis (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 (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E.		Net Undercount DA REVISED	
					Amount	Percent	Amount	Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
TOTAL	281,421,906	281,421,906	284,683,783	281,759,858	3,261,877	1.15	337,952	0.12
Male	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
Female	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
BLACK	36,419,434	37,104,248	37,192,329	37,443,256	772,895	2.08	339,008	0.91
Male	17,315,333	17,643,072	17,738,787	18,246,388	423,454	2.39	603,316	3.31
Female	19,104,101	19,461,176	19,453,542	19,196,868	349,441	1.80	-264,308	-1.38
NONBLACK	245,002,472	244,317,658	247,491,454	244,316,602	2,488,982	1.01	-1,056	0.00
Male	120,738,230	120,410,491	122,436,542	121,003,754	1,698,312	1.39	593,263	0.49
Female	124,264,242	123,907,167	125,054,912	123,312,848	790,670	0.63	-594,319	-0.48
TOTAL MALE								
All ages	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
0-17	37,059,196	37,059,196	37,634,604	37,224,858	575,408	1.53	165,662	0.45
18-29	23,672,589	23,672,589	24,517,556	23,741,308	844,967	3.45	68,719	0.29
30-49	42,659,073	42,659,073	43,443,356	43,454,890	784,283	1.81	795,817	1.83
50+	34,662,705	34,662,705	34,579,813	34,829,086	-82,892	-0.24	166,381	0.48
18+	100,994,367	100,994,367	102,540,725	102,025,284	1,546,358	1.51	1,030,917	1.01
TOTAL FEMALE								
All ages	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
0-17	35,234,616	35,234,616	35,786,168	35,552,189	551,552	1.54	317,573	0.89
18-29	22,852,201	22,852,201	23,344,636	22,460,999	492,435	2.11	-391,202	-1.74
30-49	43,092,246	43,092,246	43,506,365	42,791,850	414,119	0.95	-300,396	-0.70
50+	42,189,280	42,189,280	41,871,285	41,704,678	-317,995	-0.76	-484,602	-1.16
18+	108,133,727	108,133,727	108,722,286	106,957,527	588,559	0.54	-1,176,200	-1.10

Appendix Table B2-- Comparison of the Census, A.C.E., and Demographic Analysis (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 (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E.		Net Undercount DA REVISED	
					Amount	Percent	Amount	Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
BLACK MALE								
All ages	17,315,333	17,643,072	17,738,787	18,246,388	423,454	2.39	603,316	3.31
0-17	6,012,924	6,136,802	6,192,496	5,996,105	179,572	2.90	-140,697	-2.35
18-29	3,221,614	3,301,702	3,351,304	3,443,771	129,690	3.87	142,069	4.13
30-49	5,047,295	5,139,186	5,181,571	5,643,767	134,276	2.59	504,581	8.94
50+	3,033,500	3,065,382	3,013,416	3,162,745	-20,084	-0.67	97,363	3.08
18+	11,302,409	11,506,270	11,546,291	12,250,283	243,882	2.11	744,013	6.07
BLACK FEMALE								
All ages	19,104,101	19,461,176	19,453,542	19,196,868	349,441	1.80	-264,308	-1.38
0-17	5,832,333	5,952,902	6,008,245	5,839,073	175,912	2.93	-113,829	-1.95
18-29	3,434,591	3,522,107	3,568,727	3,436,502	134,136	3.76	-85,605	-2.49
30-49	5,706,371	5,812,103	5,779,748	5,824,214	73,377	1.27	12,111	0.21
50+	4,130,806	4,174,064	4,096,822	4,097,079	-33,984	-0.83	-76,985	-1.88
18+	13,271,768	13,508,274	13,445,297	13,357,795	173,529	1.29	-150,479	-1.13
NONBLACK MALE								
All ages	120,738,230	120,410,491	122,436,542	121,003,754	1,698,312	1.39	593,263	0.49
0-17	31,046,272	30,922,394	31,442,108	31,228,753	395,836	1.26	306,359	0.98
18-29	20,450,975	20,370,887	21,166,252	20,297,537	715,277	3.38	-73,350	-0.36
30-49	37,611,778	37,519,887	38,261,785	37,811,123	650,007	1.70	291,236	0.77
50+	31,629,205	31,597,323	31,566,397	31,666,341	-62,808	-0.20	69,018	0.22
18+	89,691,958	89,488,097	90,994,434	89,775,001	1,302,476	1.43	286,904	0.32
NONBLACK FEMALE								
All ages	124,264,242	123,907,167	125,054,912	123,312,848	790,670	0.63	-594,319	-0.48
0-17	29,402,283	29,281,714	29,777,923	29,713,116	375,640	1.26	431,402	1.45
18-29	19,417,610	19,330,094	19,775,909	19,024,497	358,299	1.81	-305,597	-1.61
30-49	37,385,875	37,280,143	37,726,617	36,967,636	340,742	0.90	-312,507	-0.85
50+	38,058,474	38,015,216	37,774,463	37,607,599	-284,011	-0.75	-407,617	-1.08
18+	94,861,959	94,625,453	95,276,989	93,599,732	415,030	0.44	-1,025,721	-1.10

Appendix Table B - 2 Notes:

1) DA Revised–DA estimates with revisions to the components of population change.

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) Totals may differ in last digit due to rounding.

Appendix Table B3--Comparison of the Census, A.C.E., and Demographic Analysis (DA) Estimates of Population and Percent Net Undercount: 2000 - Average of Model 1 and 2

(Estimates for race groups reflect the average of "Model 1" and "Model 2" census tabulations) (a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E.		Net Undercount DA REVISED	
					Amount	Percent	Amount	Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
TOTAL	281,421,906	281,421,906	284,683,783	281,759,858	3,261,877	1.15	337,952	0.12
Male	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
Female	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
BLACK	35,538,812	36,404,186	36,288,602	37,443,256	749,790	2.07	1,039,070	2.78
Male	16,890,259	17,307,098	17,301,217	18,246,388	410,958	2.38	939,290	5.15
Female	18,648,553	19,097,088	18,987,385	19,196,868	338,832	1.78	99,780	0.52
NONBLACK	245,883,094	245,017,720	248,395,182	244,316,602	2,512,088	1.01	-701,118	-0.29
Male	121,163,304	120,746,465	122,874,113	121,003,754	1,710,809	1.39	257,289	0.21
Female	124,719,790	124,271,255	125,521,069	123,312,848	801,279	0.64	-958,407	-0.78
TOTAL MALE								
All ages	138,053,563	138,053,563	140,175,329	139,250,142	2,121,766	1.51	1,196,579	0.86
0-17	37,059,196	37,059,196	37,634,604	37,224,858	575,408	1.53	165,662	0.45
18-29	23,672,589	23,672,589	24,517,556	23,741,308	844,967	3.45	68,719	0.29
30-49	42,659,073	42,659,073	43,443,356	43,454,890	784,283	1.81	795,817	1.83
50+	34,662,705	34,662,705	34,579,813	34,829,086	-82,892	-0.24	166,381	0.48
18+	100,994,367	100,994,367	102,540,725	102,025,284	1,546,358	1.51	1,196,579	1.17
TOTAL FEMALE								
All ages	143,368,343	143,368,343	144,508,454	142,509,716	1,140,111	0.79	-858,627	-0.60
0-17	35,234,616	35,234,616	35,786,168	35,552,189	551,552	1.54	317,573	0.89
18-29	22,852,201	22,852,201	23,344,636	22,460,999	492,435	2.11	-391,202	-1.74
30-49	43,092,246	43,092,246	43,506,365	42,791,850	414,119	0.95	-300,396	-0.70
50+	42,189,280	42,189,280	41,871,285	41,704,678	-317,995	-0.76	-484,602	-1.16
18+	108,133,727	108,133,727	108,722,286	106,957,527	588,559	0.54	-858,627	-0.80
BLACK MALE								

Appendix Table B3--Comparison of the Census, A.C.E., and Demographic Analysis (DA) Estimates of Population and Percent Net Undercount: 2000 - Average of Model 1 and 2

(Estimates for race groups reflect the average of "Model 1" and "Model 2" census tabulations) (a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (used for A.C.E.)	Census Counts with race Modified (used for DA)	A.C.E. Estimated Population	DA REVISED Estimated Population	Net Undercount A.C.E. Amount	Net Undercount A.C.E. Percent	Net Undercount DA REVISED Amount	Net Undercount DA REVISED Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=(5)/(3)	(7)=(4)-(2)	(8)=(7)/(4)
All ages	16,890,259	17,307,098	17,301,217	18,246,388	410,958	2.38	939,290	5.15
0-17	5,772,550	5,932,751	5,945,572	5,996,105	173,022	2.91	63,354	1.06
18-29	3,150,426	3,247,043	3,276,493	3,443,771	126,067	3.85	196,728	5.71
30-49	4,969,340	5,086,941	5,101,188	5,643,767	131,848	2.58	556,826	9.87
50+	2,997,944	3,040,363	2,977,964	3,162,745	-19,980	-0.67	122,382	3.87
18+	11,117,709	11,374,347	11,355,645	12,250,283	237,936	2.10	939,290	7.67
BLACK FEMALE								
All ages	18,648,553	19,097,088	18,987,385	19,196,868	338,832	1.78	99,780	0.52
0-17	5,592,927	5,749,147	5,762,290	5,839,073	169,363	2.94	89,926	1.54
18-29	3,354,379	3,459,276	3,485,492	3,436,502	131,113	3.76	-22,774	-0.66
30-49	5,617,780	5,749,439	5,689,859	5,824,214	72,080	1.27	74,776	1.28
50+	4,083,468	4,139,227	4,049,745	4,097,079	-33,723	-0.83	-42,148	-1.03
18+	13,055,627	13,347,941	13,225,096	13,357,795	169,469	1.28	99,780	0.75
NONBLACK MALE								
All ages	121,163,304	120,746,465	122,874,113	121,003,754	1,710,809	1.39	257,289	0.21
0-17	31,286,646	31,126,445	31,689,032	31,228,753	402,386	1.27	102,308	0.33
18-29	20,522,163	20,425,546	21,241,063	20,297,537	718,900	3.38	-128,009	-0.63
30-49	37,689,734	37,572,132	38,342,169	37,811,123	652,435	1.70	238,991	0.63
50+	31,664,762	31,622,342	31,601,849	31,666,341	-62,913	-0.20	43,999	0.14
18+	89,876,658	89,620,020	91,185,081	89,775,001	1,308,423	1.43	257,289	0.29
NONBLACK FEMALE								
All ages	124,719,790	124,271,255	125,521,069	123,312,848	801,279	0.64	-958,407	-0.78
0-17	29,641,690	29,485,469	30,023,879	29,713,116	382,189	1.27	227,647	0.77
18-29	19,497,822	19,392,925	19,859,145	19,024,497	361,323	1.82	-368,428	-1.94
30-49	37,474,467	37,342,808	37,816,506	36,967,636	342,040	0.90	-375,172	-1.01
50+	38,105,812	38,050,054	37,821,540	37,607,599	-284,272	-0.75	-442,455	-1.18
18+	95,078,101	94,785,786	95,497,191	93,599,732	419,090	0.44	-958,407	-1.02

Appendix Table B - 3 Notes:

1) DA Revised–DA estimates with revisions to the components of population change.

2) Census tabulations for race groups represent the average of "Model 1" and "Model 2".

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) Totals may differ in last digit due to rounding.

Appendix Table B4--Comparison of Census, Post Enumeration Survey (PES) and Demographic Analysis (DA) Estimates of Population and Percent Net Undercount: 1990

(a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (used for PES)	Census Counts with race Modified (used for DA)	PES Estimated Population	DA REVISED Estimated Population	Net Undercount PES Amount	Net Undercount PES Percent	Net Undercount DA REVISED Amount	Net Undercount DA REVISED Percent
	(1)	(2)	(3)	(4)	(5)=(3)-(1)	(6)=5/3	(7)=(4)-(2)	(8)=7/4
TOTAL	248,709,873	248,709,873	252,712,820	252,875,565	4,002,947	1.58	4,165,692	1.65
Male	121,239,418	121,239,348	123,623,142	124,202,612	2,383,724	1.93	2,963,264	2.39
Female	127,470,455	127,470,525	129,089,678	128,672,953	1,619,223	1.25	1,202,428	0.93
BLACK	29,986,060	30,483,281	31,377,093	32,265,365	1,391,033	4.43	1,782,084	5.52
Male	14,170,151	14,420,331	14,900,868	15,696,464	730,717	4.90	1,276,133	8.13
Female	15,815,909	16,062,950	16,476,225	16,568,901	660,316	4.01	505,951	3.05
NONBLACK	218,723,813	218,226,592	221,335,727	220,610,201	2,611,914	1.18	2,383,609	1.08
Male	107,069,267	106,819,017	108,722,274	108,506,148	1,653,007	1.52	1,687,131	1.55
Female	111,654,546	111,407,575	112,613,453	112,104,052	958,907	0.85	696,477	0.62
TOTAL MALE								
All ages	121,239,418	121,239,348	123,623,142	124,202,612	2,383,724	1.93	2,963,264	2.39
0-17	32,584,278	32,750,854	33,649,794	33,317,384	1,065,516	3.17	566,530	1.70
18-29	24,312,055	24,436,887	25,105,216	25,014,240	793,161	3.16	577,353	2.31
30-49	36,281,757	36,110,628	36,965,692	37,407,256	683,935	1.85	1,296,628	3.47
50+	28,061,328	27,940,979	27,902,440	28,463,732	-158,888	-0.57	522,753	1.84
18+	88,655,140	88,488,494	89,973,348	90,885,228	1,318,208	1.47	2,396,734	2.64
TOTAL FEMALE								
All ages	127,470,455	127,470,525	129,089,678	128,672,953	1,619,223	1.25	1,202,428	0.93
0-17	31,020,154	31,172,863	32,045,587	31,763,579	1,025,433	3.20	590,716	1.86
18-29	23,738,756	23,833,448	24,424,918	23,985,500	686,162	2.81	152,052	0.63
30-49	37,032,606	36,900,573	37,361,657	37,153,892	329,051	0.88	253,319	0.68
50+	35,678,939	35,563,641	35,257,516	35,769,982	-421,423	-1.20	206,341	0.58
18+	96,450,301	96,297,662	97,044,091	96,909,374	593,790	0.61	611,712	0.63

Appendix Table B4--Comparison of Census, Post Enumeration Survey (PES) and Demographic Analysis (DA) Estimates of Population and Percent Net Undercount: 1990

(a minus sign denotes a net overcount)

Race, Sex, Age	Census Counts as Tabulated (used for PES)	Census Counts with race Modified (used for DA)	PES Estimated Population	DA REVISED Estimated Population	Net Undercount PES		Net Undercount DA REVISED	
					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	15,696,464	730,717	4.90	1,276,133	8.13
0-17	4,849,497	4,975,547	5,215,800	5,251,817	366,303	7.02	276,270	5.26
18-29	3,110,320	3,202,490	3,225,832	3,489,432	115,512	3.58	286,942	8.22
30-49	3,841,762	3,876,914	4,099,633	4,457,467	257,871	6.29	580,553	13.02
50+	2,368,572	2,365,380	2,359,603	2,497,748	-8,969	-0.38	132,368	5.30
18+	9,320,654	9,444,784	9,685,068	10,444,647	364,414	3.76	999,863	9.57
BLACK FEMALE								
All ages	15,815,909	16,062,950	16,476,225	16,568,901	660,316	4.01	505,951	3.05
0-17	4,734,918	4,857,767	5,095,218	5,128,670	360,300	7.07	270,903	5.28
18-29	3,309,077	3,393,150	3,501,319	3,511,916	192,242	5.49	118,766	3.38
30-49	4,458,556	4,495,024	4,606,129	4,629,276	147,573	3.20	134,252	2.90
50+	3,313,358	3,317,009	3,273,559	3,299,039	-39,799	-1.22	-17,970	-0.54
18+	11,080,991	11,205,183	11,381,007	11,440,231	300,016	2.64	235,048	2.05
NONBLACK MALE								
All ages	107,069,267	106,819,017	108,722,274	108,506,148	1,653,007	1.52	1,687,131	1.55
0-17	27,734,781	27,775,307	28,433,994	28,065,567	699,213	2.46	290,260	1.03
18-29	21,201,735	21,234,397	21,879,384	21,524,808	677,649	3.10	290,411	1.35
30-49	32,439,995	32,233,714	32,866,059	32,949,789	426,064	1.30	716,075	2.17
50+	25,692,756	25,575,599	25,542,837	25,965,984	-149,919	-0.59	390,385	1.50
18+	79,334,486	79,043,710	80,288,280	80,440,581	953,794	1.19	1,396,871	1.74
NONBLACK FEMALE								
All ages	111,654,546	111,407,575	112,613,453	112,104,052	958,907	0.85	696,477	0.62
0-17	26,285,236	26,315,096	26,950,369	26,634,909	665,133	2.47	319,813	1.20
18-29	20,429,679	20,440,298	20,923,599	20,473,584	493,920	2.36	33,286	0.16
30-49	32,574,050	32,405,549	32,755,528	32,524,616	181,478	0.55	119,067	0.37
50+	32,365,581	32,246,632	31,983,957	32,470,943	-381,624	-1.19	224,311	0.69
18+	85,369,310	85,092,479	85,663,084	85,469,143	293,774	0.34	376,664	0.44

Appendix Table B - 4 Notes:

1) DA Revised - DA Estimates with revisions to the components of population change

2) PES estimates are based on the "357-Poststrata" Design.

3) Totals may differ in last digit due to rounding.